2024 “Act towards a Beautiful China” Business Climate Action Cases

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Editor's Note

In May 2024, the Ministry of Ecology and Environment (MEE) of China, along with eight other departments, jointly issued the *Work Plan on the In-depth Implementation of "Act towards a Beautiful China" Campaigns* (hereinafter referred to as the "*Work Plan*"). Targeting six main groups, including enterprises, the *Work Plan* outlines six series of activities, such as open ecological and environmental protection events of businesses. It sets forth the goal of recommending a batch of exemplary corporate cases in open ecological and environmental protection events by the end of 2025.

Against this backdrop, the Center for Environmental Education and Communications of the MEE of China, along with the C Team, has jointly launched the collection of *2024 "Act towards a Beautiful China" Business Climate Action Cases*, with support from the Vanke Foundation. This activity aims to identify and promote vivid examples of enterprises engaged in education on ecological civilization, and open ecological and environmental protection activities around green, low-carbon transformation.

Over the past six years, the *Business Climate Action Cases* has gathered a total of 95 excellent cases, inspiring and motivating more companies to engage in innovative emission reduction efforts while showcasing Chinese enterprises' pioneering and exemplary actions on the global stage in addressing climate change. This year, 15 outstanding cases—featuring companies excelling in corporate governance and public engagement—have been included. These cases demonstrate enterprises' pioneering experiences in sectoral transformation and efforts to mobilize public engagement in climate action. They offer creative solutions to critical industry transition challenges, providing feasible transformation pathways for industries, with strong influence and scalability.

As a platform showcasing the pathways and achievements of emission reduction projects, the *Cases* cannot encompass the full scope of all companies' efforts and potential in green transformation. However, it highlights the determination, intelligence, and execution of select sectors and enterprises. We hope these cases can inspire and encourage more companies to engage in innovative emission reduction efforts, thus jointly advancing the realization of "dual carbon" goals.

Co-Initiators
C Team
Center for Environmental Education and Communications of the MEE of China

Supporting Organization
Vanke Foundation

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An Innovative Business Model for Idle Items Reuse and Recycle

Zhuanzhuan Spirit

Project Overview

Global warming is one of the major challenges facing humanity. Each year, the world emits approximately 50 billion tons of greenhouse gases, the primary drivers of global warming today. Reusing and recycling used products, guided by the 3R principle (Reduce, Reuse, Recycle), can effectively contribute to reducing carbon emissions and optimizing resource utilization. This practice holds fundamental importance for the circular economy. However, the inherent "non-standard" nature of used products, coupled with the challenges of information opacity and asymmetry, poses substantial barriers to trust, thereby impeding the development of the secondhand market.

Zhuanzhuan has innovated its business model and technological approach by introducing a service-embedded C2B2C business model. This model integrates secondhand recycling, quality inspection, warranty, after-sales, and retail. This integration significantly alleviates the trust issues arising from informational asymmetry between buyers and sellers. Consequently, Zhuanzhuan effectively promotes resource recycling, reuse, and circulation.

We are the first to provide quality inspection services in the secondhand industry. Based on user needs, we build a nationwide network of offline stores and door-to-door services, pioneering a new 'Internet + Recycling' model for the recycling and reuse of used products. We also established a secure B2C e-commerce platform that creates a solid bridge of mutual trust between the consumers and the market, thus encouraging more people to participate in secondhand trading and promoting a sustainable lifestyle.

With 'official inspection' at its core, the Zhuanzhuan APP offers consumers a wide selection of secondhand items across more than 100 categories, ensuring a more reliable and transparent shopping experience. This platform also features standardized after-sales and fulfilment services, which is a pioneering practice in the industry. These efforts have significantly enhanced trust in secondhand commerce, resulting in a cumulative reduction of approximately 4.113 million tons of carbon emissions, and a decrease in energy consumption by 5,625 GWh.

Company/Organization Profile

Zhuanzhuan Group, established in 2015, is a leading enterprise in the field of second-hand idle goods recycling consumption in China and a leading digital platform for circular economy. It owns several second-hand e-commerce brands such as Zhuanzhuan, Zhaoliangji, and Caihuoxia. Since its inception, it has received investments from Tencent, 58, Xiaomi Group, and others, with a valuation exceeding 3 billion US dollars, and has been included in the list of Chinese unicorn enterprises. The platform now has over 400 million registered users, covering more than a hundred categories of second-hand transactions, including mobile phones, books, 3C digital home appliances, and light luxury goods.

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Project Outcome

By the end of 2023, Zhuanzhuan and its users had achieved a cumulative carbon emission reduction of 4.113 million tons by facilitating the circulation of used products. This is equivalent to the carbon emissions produced by a traditional fuel vehicle travelling 580,000 laps around the Equator or, to put it another way, 23.1 billion kilometres. Meanwhile, the platform achieved a total energy reduction of 5,625 GWh, equivalent to the annual energy consumption of 470,000 Chinese households. The platform has also processed transactions for over 28.7 million secondhand books, conserving approximately 240,000 forest trees. This highlights the significant role of reusing products in reducing carbon emissions, combating climate change, and protecting biodiversity. According to the latest results released by CDP, Zhuanzhuan received a 'B' rating on the climate change questionnaire, making it the first company in the secondhand trading sector to participate and achieve this rating. Zhuanzhuan is also the first company in the industry to join SBTi, committing to scientifically validated carbon neutrality goals, verified and approved by the SBTi.

1. Carbon Inclusion:

Zhuanzhuan has actively promoted carbon emission reductions among consumers, driving the green transformation of economic and social development. The initiative, dubbed the 'Guardian of the Future Plan', champions eco-friendly principles by issuing carbon credits and rewards, thereby advocating continuous low-carbon behaviors in their daily lives. To date, the program has reached over 8.7 million people, distributing a total of 120 million credits. Additionally, Zhuanzhuan achieves cross-platform circulation of carbon credits in collaboration with Tencent SSV, facilitating interconnectivity in carbon credit transactions. This not only emphasizes the value of public engagement in carbon reduction but also promotes the sharing of emission reduction strategies among enterprises.

2. Employment:

The initiative prioritizes hiring recent graduates, providing them with stable employment opportunities. In addition to offering a platform for numerous users to buy and sell secondhand items online and earn additional income, the project also plays a vital role in the local employment market. By nurturing technical and managerial talent, the project improves local residents' income and promotes their well-rounded development. For instance, our Qingdao operation generated 1,273 local jobs in 2023 alone. Furthermore, our engineering team, comprising 2,000+ engineers, provides services such as door-to-door inspection and the recycling of items such as mobile phones and tablets in over 240 cities nationwide. A significant portion of this team is composed of fresh graduates and vocational school students.

3. Dissemination of the Green Concept:

Zhuanzhuan was appointed as the official supplier of secondhand recycling services for the 31st FISU World University Summer Games. Aligning with the green concept, it offered free 'official inspection' secondhand mobile phone rental services to athletes worldwide. This initiative serves as a new perspective and reference for the low-carbon operation of future large-scale events. In addition, the successful

practice was also recognized at COP28 as an exemplary implementation of 'China's Carbon Reduction Practices through Circular Economy' and was featured as a green consumption case study in the "*Development of China's Carbon Inclusion and Corporate Practices*" report, released by the Institute of Energy, Environment and Economy, Tsinghua University.

Additionally, the project significantly enhances public awareness of environmental protection and promotes green consumption by adopting green packaging and other green practices. By the end of 2023, the project had fully achieved 100% biodegradable green packaging. The project has also received a total of 74 awards and honors, including "CITES Green Development and Service Demonstration Case" and "ESG Pioneer Green Enterprise," further showcasing its profound social impact.

Project Highlights

Throughout the project's operations, we have consistently prioritized user needs, fostering continuous innovation and optimization of our products and services, thereby earning substantial trust and support from a vast user base. To date, the project has amassed over 400 million registered users, with transaction volumes surpassing RMB 100 million (USD 14 million). In 2023, the annual revenue exceeds RMB 10 billion (USD 1.4 billion).

Project Implementation

1. Infrastructure innovation for circular economy:

(1) Quality Inspection: To address the trust issue in the secondhand market, our project innovates the first secondhand quality inspection service — 'official inspection' in China, setting industrial standards for the secondhand market. We have established three automated and intelligent quality inspection centers in Shenzhen, Chengdu and Qingdao, along with 17 quality inspection stations nationwide. These facilities conduct thorough inspections of commodities and issue detailed quality inspection reports, significantly enhancing the recycling and reuse rates of used products, and fostering the development of new quality productive forces.

(2) Door-to-door service :Door-to-door recycling is a unique network built by our project. With 2000+ engineers nationwide, we now provide on-site inspection and recycling services for smartphones, tablets, and more, across more than 240 cities and towns. This service allows consumers to engage in secondhand commerce without leaving their homes, significantly reducing the costs associated with information exchange.

(3) Stores: Our project has established brick-and-mortar stores to enhance the consumer experience in secondhand commerce and to address the challenges faced by older people and local communities. By the end of 2024, we expect to open over 750 directly operated and franchised stores across approximately 80 cities nationwide. The project takes an omni-channel strategy to integrate online and offline sales, allowing users to order online, and pickup in-store. This approach ensures more secure and reliable transactions for consumers.

2. Technology innovation:

The project has independently developed a leading quality inspection system in China, securing over 90 patents in areas including intelligent scheduling, image vision, intelligent interaction, and VR recognition. Our 'software × hardware integrated' automated inspection processes significantly enhance its efficiency and accuracy. This includes function and battery testing, utilizing proprietary software and automation to accurately evaluate different brands' performance and battery life. For appearance inspection, we use industrial cameras and image algorithm models to automatically capture images and standardize appearance grading.

The project utilizes proprietary data removal software to perform multiple data deletions, ensuring that users' private data is irrecoverable. The software has achieved ADISA's international certification for data security, effectively preventing privacy breaches and data security incidents.

3. Online e-commerce platform:

It supports multi-category secondhand e-commerce through APPs and WeChat mini programs, covering more than 100 categories including mobile phones, electronic products, cameras, and luxury goods, fully catering to the diverse needs of both buyers and sellers for different categories. We are committed to creating standardized services and have pioneered 'official inspection', warranty, and a '7-day refund' after-sales service for secondhand products, thereby offering a reliable and convenient secondhand transaction experience for a wide range of users.

4. The first report on carbon emission reduction in second-hand transactions:

In 2021, the Institute of Energy, Environment and Economy at Tsinghua University and Zhuanzhuan Group jointly released the "2021 China Idle Second-Hand Transaction Carbon Emission Reduction Report". The report is based on the LCA framework, applying the theory and evaluation of product life cycle to the carbon footprint analysis of idle goods, and conducting a quantitative analysis of carbon emissions at various stages of the product. Looking at the specific categories of idle goods transactions, the main goods traded by users include household appliances, 3C electronic products, clothing accessories, home supplies, and books. The procurement of raw materials, production, transportation, and consumer use stages of these goods will all generate carbon emissions.

Taking mobile phones as an example, a new mobile phone will produce an average of 49 kilograms of carbon emissions throughout its life cycle. Through second-hand transactions, it can achieve a carbon emission reduction of 25 kilograms. The carbon emission reduction that can be achieved through second-hand transactions of household appliances is even higher, with an average value of 130 kilograms.

Project Impact & Sustainability

Capitalizing on its acute insights into the secondhand market's pain points, this project has a service-embedded C2B2C recycling and reuse model. This model significantly boosts consumer motivation to recycle, enhances commodity circulation efficiency, and broadens the spectrum for tiered consumption. Since July 2022, the model has been profitably scaled, demonstrating strong potential for replication and growth. At present, the project's network of stores is steadily expanding, with over 600 locations in operation and continuous improvements in performance and operations. The number of stores is expected to exceed 750 by the end of 2024.

The project establishes industry-leading door-to-door recycling capabilities across the country, supplemented by services including door-to-door trade-in and after-sales, collectively termed 'Door-to-door+' services. This year, the project launched a county-level door-to-door recycling expansion plan, aiming to enhance the accessibility of buying and selling used products for county residents. By extending 'Internet + Door-to-door Recycling' services to counties, the project promotes the rapid development of the county business system.

At the same time, the project is continuously enhancing multiple categories through a 'light quality inspection' approach, organically growing to include over 100 categories within a year. This expansion has greatly enriched the diversity of available commodities and increased opportunities for used products to be sold on.

Even in countries with robust credit systems like the United States and Japan, reliance solely on credit mechanisms or intermediaries alone proves inadequate to address industry challenges. There remains a need for intermediary services, such as quality assurance. The presence of trust mechanisms and third-party service providers markedly enhances transactional efficiency and lowers trade barriers, especially in high-value transactions and complex decision-making scenarios. This underscores the considerable value and potential for global expansion of the project's model.

Expert Comments

The recycling and reusing of idle items is a key part of the circular economy industry, which is of great significance for promoting carbon emission reduction and enhancing efficient resource utilization. This project leverages technological innovations, such as platform-based quality inspection service within the secondhand idle item transaction industry, to substantially enhance trust in the transaction of idle items. This, in turn, contributes to reduced energy consumption and lower carbon emissions. The project is expected to repurpose more "idle" items, improving resource utilization efficiency and easing environmental pressures. By encouraging greater public participation in the recycling and reusing of idle items, the project promotes environmental awareness, popularizes a green lifestyle, and facilitates the realization of the dual carbon goals, thus contributing to the vision of building a Beautiful China.

Establishing a Low-Carbon Supplier Evaluation System for Great Wall Motors, Driving the Green Transformation of the Industry Chain

GREAT WALL MOTOR COMPANY LIMITED

Project Overview

As a multinational automobile manufacturer, GWM places a strong emphasis on ESG sustainable development and is committed to enhancing its sustainable operational capabilities. It deeply integrated the concept of sustainable development into its operations and management, and has established a LCA(life cycle analysis) low-carbon operation and management mindset that is technology-driven, value-focused, and spans both the upstream and downstream of the value chain.

As global climate change has become increasingly urgent, the need to reduce carbon emissions and achieve carbon neutrality is presenting pressing challenges for the automotive industry. The industry is gradually transitioning from fuel-powered vehicles to pure electric vehicles, significantly reducing emissions during the usage phase. However, the high energy consumption and emissions associated with the production of automotive materials is posing new challenges to the industry's overall decarburization efforts.

Great Wall Motor contributes to societal emission reduction through its industrial chain by fully integrating sustainability into supply chain management. It guides upstream and downstream suppliers in collaborative carbon reduction efforts, to create a low-carbon, sustainable, and resilient supply chain. The Great Wall Motor evaluation guidance for Low Carbon Emission supplier began to be planned in 2022, and a special management team was set up in 2023 to carry out low-carbon emission supplier evaluation,training and guidance. In 2023, evaluations were completed for 25 suppliers, and the initiative is still continued in 2024, with 54 suppliers planned for evaluation. As of the end of August, 54% of the project has been completed. The implementation of this project has effectively raised supplier awareness of emission reduction and improved low-carbon management expertise within the supply chain.

Company/Organization Profile

Great Wall Motor (GWM) is a globalized intelligent technology company, with business covers automobile and parts design, R&D, production, sales and services, and owns HAVAL WEY, ORA TANK and POER. Great Wall Motor has built a forest ecosystem oriented to energy and intelligence, established the parallel development of hybrid, pure electric and hydrogen energy, carried out the whole industry chain layout in intelligent driving, intelligent cockpit and intelligent chassis, etc., constructed the industry-leading energy system of "photovoltaic +distributed storage +centralized storage", and completed the "solar energy-battery-hydrogen energy" system. It has built an industry-leading energy system of "photovoltaic + distributed energy storage + centralized energy storage" and completed the layout of the whole value chain of "solar energy - battery - hydrogen energy - automotive power".

Project Outcome

1. The first low-carbon supplier evaluation standard in the industry.

We constructed standard of two dimensions from risk assessment and low-carbon emission attributes formed the risk assessment index of carbon management and the Evaluation Index of Low-carbon for Suppliers and established the company's " The Specification of evaluation guidance for Low Carbon Emission supplier ", which is applicable to the whole parts and components industry, such as forging, casting, electroplating, painting, injection molding and machining. After the implementation of the evaluation project, suppliers' comprehensive low-carbon scores has improved by 15%, and a nationwide carbon emission risk map for the supply chain has been created.

2. Promoting the establishment of low-carbon awareness among suppliers.

With on-site evaluations, GWM has promoted carbon management expertise to suppliers, and has conducted a total of 25 training sessions with over 300 participants. The training covered topics such as the policy environment, standard systems, the importance of carbon reduction, an introduction to evaluation standards, and management directions.

3. Effectively Enhancing Suppliers' Low-Carbon Capabilities.

Leveraging GWM's low-carbon technological capabilities, combined with suppliers' specific process scenarios, the company promoted the initiative across suppliers in the industry. This included the sharing of 53 case studies and 63 improvement suggestions, which helped the reduction of carbon emissions throughout the supply chain. Additionally, utilizing its scale and technological advantages, GWM has encouraged suppliers to adopt photovoltaic power generation, further reducing carbon emissions across the supply chain.

Project Highlights

1. Helping to formulate industry evaluation guidelines: On 9 July 2024, the "Evaluation Guidelines for Low-Carbon Suppliers in the Automotive Industry" compiled in cooperation with China Automotive Carbon (Beijing) Digital Technology Centre Co., Ltd. was formally released, serving as an important reference basis for low-carbon supplier evaluation.
2. Supporting Carbon Reduction in Products: The WEY 07 model consistently received the industry's authoritative certifications, including the "Low-Carbon Leader Model No. 1" and the "Low-Carbon Level 1 Label" from the "Automotive Industry Energy Saving and Green Development Evaluation Center" under the China Automotive Technology and Research Center.
3. In 2024, the company was awarded the "ESG New Benchmarking Enterprise Award" by Stock Star.
4. Awarded the Green Development Award for "Excellent Cases of CSR Practices in China's Automobile Industry in 2024" issued by China Association of Automobile Manufacturers (CAAM).

Project Implementation

1. Top-Level Design Programme Planning

In May 2022, Great Wall Motor initiated the project to establish a low-carbon supplier evaluation system to address questions such as the definition of low-carbon suppliers, low-carbon products, and key to manage low-carbon suppliers. To ensure the feasibility and scientific basis of the standard system, the Low-Carbon Supplier Evaluation Standard was developed with extensive reference to relevant domestic and international evaluation and management standards, forming the initial version of the Low-Carbon Supplier Evaluation Standard. To test the applicability of the standard's provisions, a "trial evaluation" was conducted within Great Wall Motor's parts and components companies. Feedback was solicited from the evaluated units, and the standard was refined based on the evaluation results.

To ensure the smooth implementation of the project, Great Wall Motor Co. listed the project of building a low-carbon supplier evaluation system as a key monitoring project at the company in 2023. In adherence to the principles of scientific rationality, fairness, transparency, and authoritative support, a project team was established in May 2023 in collaboration with a professional consulting organization in the industry, CACC (Beijing) Digital Technology Center Co, Ltd.

The project implementation process consists of seven sub-projects: supplier selection, formulation of the implementation plan, solidification of evaluation criteria, personnel training, on-site evaluation, personnel certification, and project summary.

2. Create standards Industry first

It's the first enterprise in the automotive industry to establish a low-carbon supplier evaluation standard, which combined the carbon emission management risk, evaluation indexes and comprehensive scores, based on carbon emissions, energy and environmental protection laws and regulations, and industry standards, to form two evaluation dimensions of management risk and low-carbon performance.

To evaluate the risk level of supplier from 4 respects, namely the high-energy-consuming industries, the environmental labelling, the supervisor enterprise of carbon emissions by ecological environment bureau, comprehensive energy consumption. The risk level has been divided into four classes that is low risk level general level, highly risk, serious level.

In the low-carbon performance dimension, each evaluation indicator is assigned a score, and based on the company's graded performance, a total score is calculated by summing the individual indicators. Based on the total score, companies are categorized into five levels, ranging from A to E.

3. Collaboration and Carbon Reduction: A Win-Win Cooperation

Starting in 2022, Great Wall Motor has been conducting a low-carbon supplier evaluation program for three consecutive years. This initiative aims to collaborate with upstream suppliers to enhance low-carbon management capabilities at the source, promote low-carbon principles, and create a green, sustainable, and resilient supply chain.

In 2023, we completed the evaluation of 25 Tier 1 and Tier 2 suppliers, covering industries such as casting, machining, injection moulding, and rubber, with products including wheel hubs, steering systems, cylinder heads, plastic particles, and air conditioning aluminum plates. Throughout the process, each enterprise received low-carbon training and promotion, and 53 low-carbon technologies were shared. Additionally, low-carbon technology support activities were conducted for suppliers, leveraging Great Wall Motor's scale and technological advantages to help suppliers establish photovoltaic power generation systems at low cost, thereby reduce carbon emissions across the supply chain.

This effort has been continued in 2024, with plans to complete low-carbon evaluations for 54 suppliers.

4. Authoritative Organizations Professional Guidance:

The project's implementation has received strong support from the industry authority, CACC Data, which provided professional guidance and objective evaluation across various stages, including supplier identification, standard optimization, and on-site evaluation. Following training and hands-on practice, a total of 92 individuals were awarded the "GWM Carbon Verifier Certificate" by the Automotive Industry Energy Saving and Green Development Evaluation Centre. The Chief Engineer of China Auto Carbon (Beijing) Digital Technology Centre remarked that the project's implementation holds significant importance, representing an innovative model and pioneering a new path for collaborative supply chain carbon reduction.

Project Impact & Sustainability

Supply chain decarburization is a critical factor in the low-carbon transformation of automotive products. As the electrification of vehicles accelerates, the proportion of carbon emissions from the supply chain is expected to rise significantly. By 2040, it is projected that supply chain carbon emissions will account for over 85% of the total life cycle emissions of automobiles.

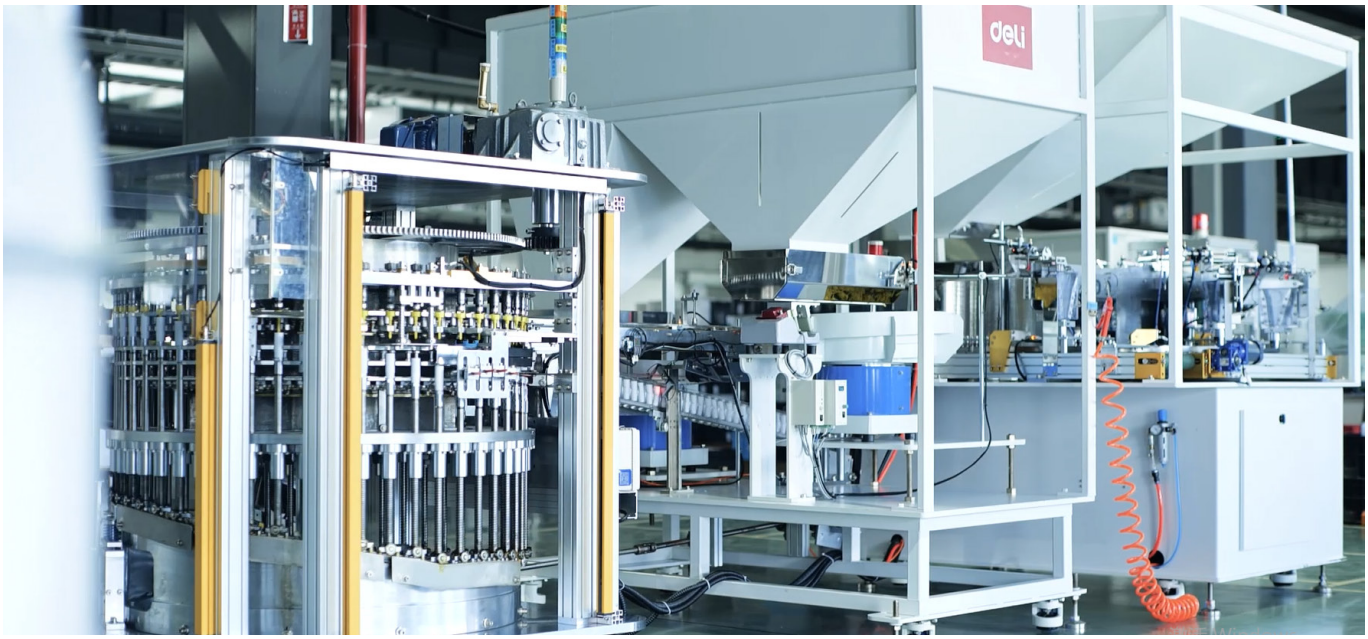
The implementation of this project serves as a reference for addressing challenges in supply chain decarbonisation collaboration, and the lack of management methods and tools. It offers a strong demonstration effect with replicable and feasible potential.

In collaboration with CAC Data and industry partners, we have successfully completed the "Low Carbon Supplier Evaluation Guide for the Automotive Industry," which will be officially released on July 9, 2024. This standard will provide crucial guidance and theoretical support for decarbonizing automotive supply chains. It helps supply chain enterprises set clear carbon reduction goals while offering OEMs a framework to decarbonize their supply chains. To further promote a collaborative effort between automakers and supply chain enterprises in reducing carbon emissions, CAC Data has initiated a Low-Carbon Supplier Audit and Mutual Trust Initiative, aimed at driving carbon reduction across the entire automotive industry value chain.

In the future, Great Wall Motor will continue to implement low-carbon supplier evaluation projects, establishing them as a routine part of its management processes. The company plans to incorporate the evaluation results into key areas such as supplier access, product procurement decisions, and supplier performance evaluations. By continuously promoting low-carbon concepts among suppliers and improving the overall sustainability of the supply chain, Great Wall Motor aims to build a green, sustainable supply chain. The effort will also contribute to the broader green upgrade of the entire automotive industry value chain.

Expert Comments

Great Wall Motors has exhibited outstanding leadership and innovative spirit in driving sustainable development and pursuing carbon neutrality. By crafting a full lifecycle-oriented, low-carbon operational management framework, the company has embedded sustainability deeply within its operations, with supply chain management as a standout focus. The establishment of a low-carbon supplier evaluation standard not only fills a gap in the industry but also offers supply chain enterprises a clear guidance on carbon reduction strategies. This has resulted in the creation of a nationwide carbon emission risk map, effectively raising awareness among suppliers and strengthening their capabilities in low-carbon management. The company's commitment to supply chain decarbonization has not only yielded substantial environmental and social benefits for Great Wall Motors itself but also offers valuable hands-on experience for decarbonization efforts across the automotive and wider manufacturing industries, showing important demonstration effect and replicability. These measures have contributed Chinese wisdom and strength to the green transformation of the global automotive sector.



Empowering a Greener Future: Digital Carbon Accounting and Sustainable Supply Chain Transformation at Deli Group

Deli Group

Project Overview

Green innovation has always been at the heart of Deli Group's journey. In recent years, Deli has thoroughly embraced the strategic importance of China's "dual carbon" goals, significantly advancing its carbon management initiatives. Starting with a single pilot factory, the company has since expanded these efforts to over 10 manufacturing and logistics bases. By transitioning from annual manual inspections to quarterly digital collaborative accounting, Deli has taken crucial steps in precise "calculation". This shift has laid a solid foundation for emissions reduction, fostered supplier engagement, and created a scalable, replicable model for the industry.

Since the project's launch in July 2023, Deli, supported by digital carbon accounting tools and a top-down management framework, has achieved a cumulative reduction of over 5,000 tons CO_2 equivalent, decreased energy consumption by 5.1%, and increased manufacturing efficiency by 20%. Carbon accounting has been successfully completed for more than 10 core factories and logistics bases, with over 50 key carbon emission monitoring points established and over 100 data records collected and analyzed. Thanks to digital tools, carbon accounting efficiency has improved by 50%, while costs have dropped by 30%. Furthermore, over 800 managers and operational staff have received carbon management training, playing an active role in Deli's low-carbon transition. On the supply chain front, three suppliers have already joined the carbon reduction plan, collectively driving the green development of the industry.

Company/Organization Profile

Deli Group is a leading advocate and provider of comprehensive solutions for multi-work and learning scenarios. Since its establishment in 1981, the company has evolved into a global leader in the creative tech-industrial sector, with diverse business segments including office supplies, stationery, tools, furniture, printers, children's educational products, and B2B services.

Project Outcome

1. **Emission Reduction:** From July 2023 to September 2024, Deli Group leveraged a digital carbon accounting system to conduct carbon audits across more than 10 core factories and logistics bases. Over 50 key carbon emission monitoring points were established, and nearly 80 instances of energy inefficiencies and irregularities were identified and addressed. These efforts resulted in a reduction of more than 5,000 tons of carbon emissions compared to the previous year.
2. **Energy and Water Savings:** Utilizing data from the digital platform, Deli Group identified 95 improvement points across its factories. By the end of September 2024, 75 of these areas had been addressed, with an investment of over 2 million RMB, saving approximately 3 million kWh of electricity and 8,000 tons of freshwater.
3. **Scale of Coverage:** To address carbon emissions and energy consumption in its core factories and logistics bases, Deli Group launched targeted energy-saving initiatives. More than 20 subsidiaries and departments have actively participated, covering regions such as Ningbo, Hangzhou, Suzhou, and Vietnam. Over 800 individuals received training, with nearly 10,000 employees engaging in related activities.
4. **Campaign Promotion:** Since July 2023, the cross-departmental project team has published nearly 20 reports on energy optimization and emission mitigations practices through Deli Group's internal ESG sustainability information hub, sharing insights from energy usage data and improvement actions. Additionally, around 10 energy-saving games have been organized in Ningbo, Hangzhou, and Vietnam.

Project Highlights

The shift from annual to quarterly carbon accounting has empowered the timely understanding of carbon emission trends for the cross-departmental project team, enabling swift strategic adjustments and more effective promotion of carbon reduction initiatives.

The availability of more detailed and comprehensive data has allowed factory managers to pinpoint operational inefficiencies and optimize manufacturing processes, thus allowing further enhancement for energy and cost performance.

Additionally, the digital platform has streamlined information sharing and collaboration, enhancing interdepartmental communication. It has also given employees clearer insight into how their roles influence carbon emissions, fostering greater motivation to actively engage in emission reduction efforts.

Project Implementation

1. **Implementation Plan:**

(1) Digital System Selection and Deployment: Introduce a digital carbon accounting system tailored to the needs of Chinese manufacturing enterprises, while

aligning with international carbon accounting standards. The system should support real-time data collection and analysis, encompassing Scope 1, 2, and 3 emissions.

(2) Staff Training and Culture Building: Provide comprehensive company-wide training to enhance employees' understanding of carbon management and digital tools, cultivating a proactive, carbon-conscious culture.

(3) Pilot Operation and Expansion: Begin with a pilot program in selected factories to test the system's functionality and workflows, and gradually expand it to cover all manufacturing, storage, and logistics bases.

(4) Data Standardization and Integration: Develop a unified methodology for preprocessing data, with automated collection for certain data sources to ensure accuracy and efficiency.

(5) Continuous Monitoring and Improvement: Regularly analyze data to identify carbon emission challenges and improvement opportunities, optimizing management strategies on an ongoing basis.

2. Implementation Process:

The project launched in July 2023 with the formation of a cross-departmental project team, including members from IT, equipment, procurement, and administration. Within a month, the ESG department completed the selection and initial deployment of the digital carbon accounting system. A two-month pilot was conducted in two factories, during which system performance and user feedback were gathered.

During the pilot phase, the team focused on resolving technical challenges, such as assigning individual reporting points and addressing gaps in accounting templates. Based on feedback, the system's interface and functionality were continuously optimized by the supplier. Following the successful pilot, the project was extended to all manufacturing, storage, and logistics bases. Concurrently, over 150 employees participated in training sessions to ensure they could effectively use the new system.

3. Before-and-After Comparison:

(1) Efficiency Improvement: The carbon accounting cycle was changed from annual to quarterly or even more frequent intervals, boosting work efficiency by 50%. This enabled faster identification of carbon emission challenges and opportunities for improvement.

(2) Cost Reduction: The automated digital system minimized manual operations, reducing labor input and cutting carbon accounting costs by 30%.

(3) Increased Process Transparency: The digital system provided real-time, visualized carbon emission data, greatly improving process transparency. Management could monitor emissions across departments in real-time.

4. Challenges Overcame:

(1) High Complexity: Traditional manual audits involved fragmented data scattered across various departments, worse still inconsistent formats. The digital system standardized and centralized data management, streamlining the process.

(2) Skepticism: Initially, some employees were hesitant to adopt the new system, fearing it would increase their workload. However, through continuous training and communication, they came to appreciate the convenience and value the digital tools offered.

5. Support Received:

(1) Internal Support: The management recognized the importance of the project and a reasonable amount of budget was given. Key department heads and factory managers joined the cross-departmental project team, offering necessary support to ensure its success.

(2) External Support: Partnering with Carbonstop, the project benefited from cutting-edge digital tools and shared industry best practices, accelerating the transition to digital carbon accounting.

Project Impact & Sustainability

Influence: As highly influential company in China's cultural and creative industries, Deli partners with numerous suppliers. Its actions sets a strong example, prompting more companies in the industry to recognize the importance of carbon management. With relatively low costs, Deli's approach could encourage others to adopt similar methods, advancing the sector as a whole towards low-carbon and sustainable development.

Scalability: The digital carbon emission management system establishes standardized procedures for data collection, monitoring, analysis, and reporting. This significantly lowers both training and operational costs, enabling small-to-medium suppliers to set up their own carbon management systems efficiently and in a shorter time frame.

Sustainability: Deli aims to expand the scope of its carbon accounting from the organizational level down to products (PCF). By accumulating carbon data over time, Deli is able to monitor emissions in real time and use feedback to continuously refine its carbon management strategies, ensuring decision-making remains both consistent and scientifically grounded.

Expert Comments

Deli Group has shown exceptional innovation and unwavering commitment in advancing its green, low-carbon transformation. Leveraging advanced digital tools and a top-down management framework, the company has conducted comprehensive carbon inventory across its core factories and warehousing bases. By establishing critical carbon emission monitoring points, Deli has significantly enhanced the efficiency and accuracy of carbon accounting, achieving outcomes in reducing carbon emissions, conserving energy, and boosting operational efficiency. This approach has fully highlighted the immense potential of digital technology in driving energy conservation and emission reduction.

The Green Route of Gac Honda

GAC Honda Automobile Co., Ltd

Project Overview

In 2023, GAC Honda unveiled its 'Carbon Neutral' strategy at Auto Guangzhou, setting the goal of 'achieving carbon neutrality throughout the entire life cycle of its products by 2045 (with an aim to achieve it by 2040)', and committing itself to becoming a leader in the automotive industry in terms of carbon emission management. At the same time, GAC Honda launched the 'Blue Sky ' programme, taking the lead in mangrove ecological protection projects, becoming the first automotive company to carry out mangrove ecological restoration in accordance with international standards, and the first to realise the development of the whole process of low-carbon, setting a precedent in the industry.

GAC Honda also actively promotes low-carbon production in the automotive manufacturing process, advances the research and development of environmentally friendly technologies, and builds green factories. As Honda's most advanced electric vehicle production line in the world, GAC Honda's new electric vehicle factory, which will go into operation in 2024, will adopt the environmental protection construction concepts of 'Intelligent, Green and Zero Carbon', and will be empowered with intelligent technology through 'Human-based Intelligence', through the in-depth control of the entire process and the large-scale introduction of the industry's most advanced technology. Through in-depth control of the entire process and large-scale introduction of the industry's most advanced technologies, the factory will promote energy conservation and environmental protection to reach the international advanced level of clean production, and set up a new benchmark of 'Zero Carbon - Digital Intelligence' for comprehensive evolution.

Compny/Organization Profile

GAC Honda Automobile Co., Ltd. was established on 1st July 1998, which is an enterprise jointly invested, constructed and operated by Guangzhou Automobile Group Company Limited, Honda Giken Industries Co.

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The headquarter of GAC Honda is located in Huangpu District, Guangzhou City, covering a total area of 2.38 million square metres. The construction project of a new electric vehicle plant based on the concept of 'Harmony, Green and Zero Carbon' is underway, and the new plant is scheduled to commence operation in 2024. In 2023, GAC Honda will reach another milestone on the road to high-quality development by selling more than 640,000 vehicles in a full year and accumulating a cumulative production and sales volume of 10 million units.

Project Outcome

1. Join hands with SEE Foundation to officially launch the mangrove ecological protection project, becoming the first automotive company in the industry to carry out mangrove ecological restoration in accordance with international standards.
2. Build a new electric vehicle factory, adopting digital intelligent vehicle manufacturing method, realizing 100% automatic welding, gluing and painting; realizing environmentally friendly and low-carbon production in the whole process, which not only reduces the emission of heavy metals by 100%, but also adopts industry-advanced high-efficiency monocrystalline silicon solar panels, making full use of the roof of the factory building and the car park area for photovoltaic power generation, with an installed capacity of as high as 24MW, realizing an annual power generation of about 20 million kWh. The total installed capacity will be up to 24MW, achieving an annual power generation capacity of about 20 million kWh, which will reduce carbon dioxide emissions by 16,100 tonnes per year.
3. Establish a green and low-carbon supply chain management system. 2023, GAC Honda set a CO_2 reduction target of 1% (compared to 2022), and through the Slim Office system, collected carbon emission data from 344 key Tier 1 and Tier 2 suppliers, with a 100% recovery rate, and the average CO_2 reduction was 1.2%.
4. Adhere to green production practices and reduce the environmental impact of the production process by innovating environmental protection technologies, managing carbon footprints, and adopting energy-saving and emission reduction methods; through the introduction of high-efficiency energy utilisation technologies and intelligent manufacturing systems, the Company has improved production efficiency while achieving a reduction in energy consumption. in 2023, the Company will promote a total of 252 energy-saving and emission reduction projects, achieving a reduction of 27,000 tonnes of CO_2/year.

Project Highlights

1. GAC Honda was recognised by the Ministry of Ecology and Environment as the only enterprise selected as a National Environmental Health Management Pilot Enterprise.
2. GAC Honda's all-new Accord e:PHEV won the 'B-Class Plug-in Hybrid Sedan - Champion' of the 2023 China's Automotive Low Carbon Pacesetter Models issued by the Automotive Industry Energy Saving and Green Development Evaluation Centre.

Project Implementation

1. Practice Environmental Protection and Public Welfare

GAC Honda combines public welfare projects with its carbon neutral strategy and the 'Blue Sky Plan', and continues to create branded and specialised environmental public welfare projects, such as mangrove ecological restoration and the protection of the water source of the Liuxi River, to promote the ecological construction of a green and beautiful Guangdong.

Together with the SEE Foundation, we launched the Mangrove Ecological Protection Project, the first phase of which will last for five years (2023-2027), and will carry out mangrove ecological protection actions in Wenchang, Hainan and Zhanjiang, Guangdong, with a plan to protect mangrove forests of no less than 1,800 acres. The project is the first of its kind to realise the full process of blue carbon development, and GAC Honda has become the first automobile company in the industry to carry out mangrove ecological restoration in accordance with international standards. GAC Honda hopes to explore the protection and restoration of mangrove ecosystems in cooperation with all parties, create a replicable model for social public welfare forces to participate in the ecological protection of mangrove forests, and help China's '3060' goal of carbon peaking and carbon neutrality with positive exploratory practices.

Since 2016, GAC Honda has joined hands with the Green Shoots Foundation to carry out the 'GAC Honda - Little Drops of Care' Liuxi River Water Source Protection Action, and has successfully built the first provincial-level rural ecological environment education base in Guangzhou - the Liuxi River Water Source Ecological Environment Education Base. GAC Honda held a number of eco-environmental public welfare camps at the base, and released the public welfare video 'Beauty in Liuxi - Injecting Living Water into Eco-Protection', which substantially enhanced the social influence of the environmental public welfare programme.

2. Implementation of Green Operation

GAC Honda implements the concept of green development, actively builds a green production system that is highly efficient, low-carbon and recyclable, continuously reduces energy consumption, resource consumption and pollution emissions per unit of product, upgrades green manufacturing processes, promotes resource recycling, and promotes the company's green and low-carbon transformation with a sustainable development mindset.

Based on its own responsibilities and specialities, it explores the optimal use of energy in the production system of 800 coating units to reduce the company's energy consumption and carbon emissions. Through the process of flexible beat setting can maximise equipment utilisation, carry out energy-saving review of the whole process, minimise energy consumption; improve energy measuring instruments, build equipment-level energy management system and other basic work to complete the establishment of energy grading management system. At present, the energy hierarchical management system has been established and operated effectively every month, cutting carbon emissions by 714 tonnes, with a single carbon emission of 122.12 kg/unit.

Establishing a brand-new walking bead-type fast colour change paint supply system and launching small-colour flexible processing technology, we have achieved a reduction of about 19.24 tonnes/year in the amount of paint used and in the process of pipeline cleaning, and a reduction of 1.64 tonnes/times in the amount of solvent used for pipeline cleaning, which in total reduces VOCs emissions by about 3.2 tonnes/year.

3. Carrying out green propaganda and education

In 2023, the company and the Guangzhou Ecological Environment Bureau, Huangpu District Branch, Zengcheng Branch jointly carried out the 6th Five-Year Plan environmental protection activities and the 'Green Enterprise, I am an actor' industrial tour. Science popularisation activities.

- Jointly with Huangpu Branch of Guangzhou Ecological Environment Bureau, the Company carried out four 'Green Industry, I am an Actor' science popularisation tours;
- Carried out environmental protection activities on the theme of 'Building a modernisation of harmonious coexistence between human beings and nature' in conjunction with the Zengcheng Sub-bureau of the Guangzhou Municipal Bureau of Ecology and Environment;
- Jointly organised with the Yunpu Street Management Committee to build a green demonstration boutique community based on Rongyue Garden.

Project Impact & Sustainability

With the concept of 'making the sky more blue for children', GAC Honda is deeply committed to environmental protection, promoting the construction of a green and beautiful Guangdong through environmental public welfare projects such as mangrove ecological restoration and the protection of the water source of the Liuxi River, and being the first automobile company in the industry to restore mangrove forests in accordance with international standards to help achieve the '3060' goal. 3060' goal. GAC Honda's green operations, such as building a green production system and energy-saving technologies, effectively reduce energy consumption and carbon emissions, demonstrating corporate responsibility.

GAC Honda's model of environmental protection and public welfare can be replicated. Through in-depth research, GAC Honda has established a two-dimensional matrix of 'importance to GAC Honda's development' and 'importance to stakeholders', identifying substantive social responsibility issues and providing directions for the company to better carry out its social responsibility work, as well as providing guidance for other companies. This provides a direction for the company to better carry out its social responsibility work, and also provides experience for other companies.

GAC Honda focuses on the long-term nature of its ESG strategy, and green management concepts have always been a cornerstone of its development, such as energy grading management and paint innovations, which have the potential for cross-industry promotion and help green and low-carbon transformation. GAC Honda has been applying green management concepts and low-carbon thinking throughout the entire life cycle of its automotive products, and has continued to empower its products with technological innovations in the new era of smart power to promote the sustainable development of the companies and the society.

Expert Comments

GAC Honda Automobile Co., Ltd has announced and implemented a "carbon neutrality" strategy, setting a goal to "achieve carbon neutrality throughout the entire product lifecycle by 2045". This involves establishing a green, low-carbon supply chain management system, innovating in environmental technologies, managing carbon footprints, and pursuing eco-friendly, low-carbon production throughout the automotive manufacturing process. Key measures include 100% automated welding, gluing, and painting, utilizing photovoltaic power generation, and conducting mangrove ecological restoration projects. While enhancing production efficiency, these efforts achieve a 100% reduction in heavy metal emissions and decreased energy consumption. Recognized at the national level, Guangqi Honda has been selected as a pilot unit for national environmental health management, underscoring its significant value in energy conservation and emission reduction, with strong potential for demonstration and wider application.

Promote the Application of Intelligent Operation Platform for Biogas Power Generation By Anchoring the Target of "Double Carbon"

State Grid Suining County Electric Power Supply Company

Project Overview

This project starts on January 1, 2022, and the project completion unit is Suining County Power Supply Branch of State Grid Jiangsu Electric Power Co., Ltd, and the project location is Suining County, Xuzhou City, Jiangsu Province, Brief description of the main content of the project: distributed biogas power station centralized monitoring and scheduling operation system is a new form of development of the energy industry and a new mode of energy industry that is a kind of deep fusion of the Internet and energy production, transmission, consumption and energy market, with the main features of equipment intelligence, information symmetry, system flatness and efficient management. It has the main features of intelligent equipment, symmetric information, flat system, efficient management, etc. It is of great significance to increase the proportion of non-fossil energy, enhance the comprehensive efficiency of energy, and build a reasonable energy market mechanism.Project content: study the process and mechanism of biogas power generation and establish a model of biogas power generation output; establish a power and electricity prediction model for biogas power generation based on intelligent algorithms; establish a model of optimal power and electricity dispatch for regional biogas power generation, taking into account the environmental, economic and ecological development in the long term and the safety and economic objectives of grid operation in the short term; and study the coordinated operation technology of cluster biogas power generation for large-scale grid connection. Key technologies of the project: to make up for the gap in the prediction model of biogas power generation, and to provide an important technical means of market prediction for demand-side management of electricity; to establish a scheduling model for the operation characteristics of biogas power generation, to improve the economy of biogas power generation, and to reduce the cost of power generation and loss; to form the grid-connected power generation system with the complementary of "wind, light, and gas" energy sources, to improve the reliability of power supply, and to alleviate the shortage of energy. It will form a grid-connected system of "wind-gas" and "wind-solar-gas", improve the reliability of power supply, alleviate the problem of energy shortage, and bring economic and environmental benefits to the biogas power generation.

Company/Organization Profile

State Grid Suining Power Co., Ltd, the team has 2 senior engineers, 2 senior technicians and 3 masters.

国家电网 STATE GRID
国网睢宁县供电公司 STATE GRID SUINING COUNTY ELECTRIC POWER SUPPLY COMPANY

The team members are familiar with many aspects of grid business such as power transmission, transformation and distribution, and are able to skillfully master professional knowledge in many fields such as intelligent control. State Grid Suining County Power Supply Company is a state-owned mega power supply enterprise, subordinate to Jiangsu Electric Power Company, and is responsible for power supply in 16 townships and national-level airport development zones in Suining as well as the economic development zone in Suining County. The project research and development team of Suining County Power Supply Company has rich experience in power supply production and operation and equipment management, and has undertaken and successfully completed key scientific and technological projects at provincial and municipal levels for many times.

Project Outcome

1. Improve regional environmental pollution, alleviate the shortage of traditional energy in the region, and improve the quality of life of residents. Biogas as a clean green energy for power generation is conducive to increasing the scale of local clean energy development and utilization, improve the degree of electricity substitution, reduce the proportion of local oil and coal utilization, alleviate the shortage of traditional energy in the region, and thus reduce the pollutants emitted in the process of energy development and utilization, in accordance with the pollutant emission coefficient of coal power generation of 0. 1 ton / 10,000 kilowatt-hours, biogas power generation of 100,000 kilowatt-hours, then the reduction of pollutant emission is 1 ton, which will improve regional environmental pollution and improve the quality of life of residents.
2. Provide scientific model support for grid connection of biogas power generation to realize the balance of regional electric power. The biogas power prediction model can reasonably and accurately predict the power output and power of local biogas power plants, and provide scientific and effective prediction means for the subsequent planning, construction, utilization and promotion of power grids.
3. It brings economic benefits to the biogas industry, reduces the investment and operation costs of biogas power plants, and improves the return on investment. Taking Linzhuang Biogas Power Plant in Qing'an Township, Suining as an example, the biogas power plant can generate profits of 613,200 yuan per year. The biogas is used to generate electricity, and the biogas residue and liquid are sold at market price or supplied to the surrounding farmland and orchards for fertilization, which not only saves energy but also provides high-quality organic fertilizer.

Project Highlights

Bringing economic benefits to the biogas industry, reducing the investment and operation costs of biogas power stations and improving the return on investment. It realizes the optimized design of the output of each distributed power source within the grid, thus achieving the purpose of grid peak voltage regulation, reducing network loss, and coordinated utilization of comprehensive energy sources, and bringing higher economic benefits to the investment.

Project Implementation

Suining County has built 33 biogas stations with a total volume of 49,000 cubic meters of biogas anaerobic fermentation devices and rich biogas resources. The pilot project can effectively implement the strategy of power demand side management and energy saving and consumption reduction, etc., solve the problem of biogas consumption, alleviate the tension of electricity consumption in rural areas, provide scientific models and strategies for the planning, construction and operation of the local biogas power generation industry, and provide decision-making tools for investors. The successful pilot project in Suining County has a demonstration effect on the construction of biogas power generation projects in other biogas resource-rich areas, and can provide new solution ideas for biogas power generation and grid connection in rural areas in the future.

Project Impact & Sustainability

1. Bridging the gap in forecasting models for biogas power generation and providing an important market forecasting technology for demand side management of electric power Means. At present, there are mature studies on power prediction models for wind power and other new energy generation at home and abroad, but there is still a gap in power prediction models for biogas power generation. Based on the historical data of biogas power stations in a certain area, the project establishes power and electricity models of biogas power generation and uses intelligent algorithms to establish a new power prediction model that meets the operating characteristics of biogas power generation, which provides theoretical support and decision-making means for the planning, design and operation management of the local grid-connected power system of biogas power generation and for the development trend of the macro-economy.
2. Establishing a dispatching model for the operation characteristics of biogas power generation, improving the economy of biogas power generation, and reducing the cost and loss of power generation. At present, there are mature studies on power dispatching models based on carbon trading and load forecasting errors at home and abroad, but the establishment of a dispatching model for biogas power generation is still immature. Based on today's energy development trends and policies, the project analyzes the grid's biogas power generation scheduling demand, load demand, and the operating characteristics of each energy source (e.g., wind, light, gas, etc.) with reference to existing carbon trading models and dispatch models, and establishes an optimal dispatch model of biogas power generation to optimize the output of distributed power devices, taking into account the cost of carbon emission control, raw material and transportation costs, and the benefits brought by the biogas power generation and the biogas residue used as fertilizers. Optimize the output of each distributed power supply equipment, so as to minimize the operation cost or total fuel consumption of the biogas power station and achieve the best economic benefits.
3. Forming a grid-connected power generation system with the complementary energy sources of "wind, light and gas", improving the reliability of power supply, alleviating the problem of energy shortage, and bringing economic and environmental benefits to biogas power generation. With the rapid development of China's economy and people's living standards, the existing power supply capacity has been unable to meet the growth rate of rural electricity load, it is predicted that by 2050, the total electricity consumption in rural areas will reach 30,761,000,000,000 kWh. However, for rural areas, due to the dispersion of households and the natural conditions of the urban areas, which is a little worse, resulting in the extension of the grid for the supply of electricity at greater cost. Therefore, the use of multiple energy sources to supply electricity can fully absorb clean energy in rural areas, improve the power supply capacity of rural power grids, and ensure the smooth and safe operation of rural power grids. The large-scale grid-connection of multi-energy complementary makes up for the shortcomings of each energy source's power generation, overcomes the shortcomings of the independent system that cannot supply power continuously, improves the stability and security of the system, and alleviates the tense situation of electricity consumption in the future.

Comments

State Grid Suining County Electric Power Supply Company has aligned with the "dual carbon" goals by establishing an operational model for biogas power generation, among other technological innovations. This initiative includes 33 biogas stations with a total anaerobic digestion capacity of 49,000 cubic meters, creating a multi-energy power grid system featuring complementary "wind-photovoltaics-biogas". This integration enhances power supply reliability and alleviates energy shortages. Through a centralized monitoring and scheduling system for distributed biogas power stations, the project facilitates the deep integration of the internet with energy production, transmission, consumption, and the energy market, creating new models and formats for the development of the energy industry. As a result, biogas power generation thus delivers both economic and environmental benefits.

Integrating “Green” into “Gold”: Building a Regional Market-based Universal Carbon Inclusiveness Trading and Service System

State Grid Suzhou Power Supply Company

Project Overview

In order to help achieve the goal of carbon peak and carbon neutrality, and promote the sustainable development of regional market-oriented carbon trading, State Grid Suzhou Power Supply Company benchmarks the United Nations Sustainable Development Goals (SDG7. Affordable & Clean Energy and SDG12. Responsible Consumption and Production), based on the industrial attributes of Suzhou, the world’s largest industrial city, and against the backdrop of accelerating the construction of distributed photovoltaics and strong demand for carbon reduction from domestic multinational corporations, taking Suzhou Industrial Park as a pilot and using distributed photovoltaics as the entry point, has established a market-oriented Carbon Inclusiveness trading system to quantify, verify, and monetize extensive and small-scale carbon reduction behaviors in the region. Promote the establishment of a one-stop carbon neutral and inclusive service center, connecting the four key service links of carbon verification, carbon reduction, carbon trading, and carbon neutrality certification, and providing one-stop low-carbon services for market participants throughout the entire process. The carbon inclusive trading system has issued more than 235,000 tons of carbon emission reduction, and achieved more than 34,000 tons of carbon emission reduction transactions. According to current scale statistics, it is expected to attract more than 300 megawatts of photovoltaic participation from Suzhou during the 14th Five-Year Plan period, with an annual power generation of over 300 million kilowatt hours. It can achieve a trading benefit of 14 million yuan and a financing benefit of 11.42 million yuan per year. It is expected that by the end of the 14th Five Year Plan, Suzhou Industrial Park can achieve a carbon reduction of over 240000 tons per year. Effectively stimulate regional carbon reduction vitality and assist in the green, low-carbon, and high-quality development of the region.

Company/Organization Profile

国家电网 STATE GRID

国网苏州供电公司 STATE GRID SUZHOU POWER SUPPLY COMPANY

The State Grid Suzhou Power Supply Company is a mega-sized power supply company under the State Grid Jiangsu Electric Power Co., Ltd. It covers the entire area of Suzhou, serving 6.936 million business and household customers. It owns 556 substations and 1,578 transmission lines of 35 kV and above, covering 13,900 km. In 2018, the company was honored as a “Pioneer Enterprise for Achieving Sustainable Development Goals in China.” In September 2021, the company was invited to participate in the United Nations Global Compact Young SDG Innovators Summit. In June 2022, Tong Chong, an employee of the company, was selected as a “Global Pioneer for the United Nations Sustainable Development Goals for 2022.

Project Outcome

Economic value: Attract more small-scale carbon assets from enterprises to participate in market transactions, achieving “carbon appreciation” of clean energy. At present, over 213000 tons of carbon reduction emissions have been issued, and over 21000 tons of carbon reduction emissions have been traded. During the 14th Five-Year Plan period, Suzhou is expected to attract more than 300 megawatts of photovoltaic participation, with an annual power generation of over 300 million kilowatt hours. It can achieve an annual transaction benefit of 14 million yuan and financing benefit of 11.42 million yuan.

Social value: Serve the government to grasp comprehensive and accurate carbon management information, control the development trend of regional carbon reduction, support the full chain supervision of the Carbon Inclusiveness market, and scientifically formulate carbon reduction policies and strategies. Service stakeholders such as investment enterprises and carbon reduction demand enterprises to obtain the required carbon reduction products, carbon trading services, carbon market intelligence information, and experience in Carbon Inclusiveness development models. It was featured by CCTV News and Economic News of China Central Television.

Environmental value: This platform has attracted more than 230 companies to settle in, and has been linked to over 700 photovoltaic projects in Suzhou. According to the annual average utilization hours of 1000 hours, the power generation capacity of Suzhou Industrial Park can achieve a carbon reduction of 240000 tons per year by the end of the 14th Five Year Plan, and with the continuous participation of market entities, it will promote the formation of a larger scale carbon reduction effect.

Project Highlights

Suzhou’s Carbon Inclusiveness Trading System has been incorporated into the “Suzhou City’s Plan for Achieving Carbon Peaking” and the “National Carbon Peaking Pilot (Suzhou Industrial Park) Implementation Plan”. The project has been selected as a “2021 Best Practice for Achieving Sustainable Development Goals” by the UN Global Compact Network China, awarded the Champion Award of the “Golden Key - China’s Actions towards SDGs”, successfully included in the “Compilation of Cases on Strengthening Ecological Environmental Protection and Promoting High-quality Development in Free Trade Pilot Zones” by the Ministry of Ecology and Environment, and selected as one of the 50 typical cases of digital and green collaborative transformation and development in Jiangsu Province.

Project Implementation

1. Resource Aggregation to Leverage the Overall Benefits of Distributed Carbon Assets

Currently, there is a surge in "decentralized carbon assets" such as distributed photovoltaic systems. According to statistics, by the end of 2023, the installed capacity of distributed photovoltaic systems in Suzhou Industrial Park has reached 270 MW, that of Suzhou City has reached 3,814 MW, and that of Jiangsu Province has reached 27,722.4 MW. This model promotes the aggregation and packaging of distributed carbon assets to form carbon inclusiveness products for market trading or collateral financing. By activating regional distributed carbon assets through market mechanisms, it optimizes the allocation of carbon resources throughout society, stimulates market entities' enthusiasm for carbon reduction, promotes green industrial upgrading, and supports low-carbon development.

2. Mechanism Leadership: Collaborating to Establish a Carbon Inclusiveness Market Mechanism

The Suzhou Industrial Park Carbon Inclusiveness System has joined distributed photovoltaic investors, government agencies, banks, carbon-reduction-demand enterprises, the Shanghai Environment and Energy Exchange, and other stakeholders to innovatively establish a complete market-based voluntary emission reduction trading system.

Collaborating with local government authorities, the system has worked together with the government to establish a carbon inclusiveness market management mechanism, assisting in clarifying the basic content of the carbon inclusiveness market, such as commercial operation rules, operation entities, standardized processes, service standards, and promoting the government to issue policy documents such as carbon inclusiveness verification methodologies and market implementation measures to clarify the market operation mechanism.

In cooperation with the Shanghai Environment and Energy Exchange and under government guidance, the system has jointly drafted rules such as the "Overall Implementation Plan for Carbon Inclusiveness," the "Management Measures for Carbon Inclusiveness," the "Development and Application Guide for Carbon Inclusiveness Methodologies," and the "Construction Guide for Carbon Inclusiveness Projects," establishing a regional carbon inclusiveness market operation mechanism.

Continuing with the translation, requiring accuracy and professionalism **collaborating with banks,** the system conducts innovative research on carbon inclusiveness financial products, establishing regulations for product credit standards, operational procedures, and risk management. Additionally, federated learning technology is applied to customer credit inquiries to achieve efficient credit checking.

Partnering with authoritative domestic and international institutions, the system has introduced certification bodies such as CQC (China Quality Certification Center), CTI (Centre Testing International), SGS (Societe Generale de Surveillance S.A.), and BSI (British Standards Institution). These collaborations focus on carbon neutrality certifications based on carbon inclusiveness reductions. Successfully, certification services have been provided to some Suzhou enterprises and exhibition events.

3. Digital Empowerment: Attracting Multi-Stakeholder Efficient Participation in the Carbon Inclusiveness Market

By rediscovering the value of electric power big data, we integrate the "electricity market" with the "carbon market" and collaborate with the government to actively build a "Carbon Inclusiveness Intelligent Service Platform". This platform serves as a full-link digital platform that enables digital verification, over-the-counter trading, online cancellation, verification assistance, and carbon neutrality services entirely online. A service mini-program is launched to allow carbon-related transactions to be conducted anytime, anywhere. An online auction function is introduced to enable online bidding and contracting of high-quality carbon assets such as carbon offsets. Public data service functions, including photovoltaic subsidies and electricity certification, are provided to enhance platform traffic.

4. Ecological Operation: Ensuring the Healthy Development of the Carbon Inclusiveness Market

Establishing Jiangsu's First One-Stop Service Center. In collaboration with Chinese conglomerates, Singapore's MVGX Technology, and the Suzhou Industrial Park Resource Conservation and Energy Management Association, under the guidance of government administrators, we have established a one-stop carbon neutrality and inclusiveness service center. This center connects the four key service chains of carbon verification, carbon reduction, carbon trading, and carbon neutrality certification, providing market participants with comprehensive one-stop green and low-carbon services throughout the entire process.

Promoting the Co-construction and Sharing of the Carbon Inclusiveness System for Cross-Regional Cooperation and Service Promotion. We are advancing the development of methodologies. Based on distributed photovoltaic carbon inclusiveness reduction products, the service center has newly released methodologies for three additional reduction projects: EV charging stations, lighting energy efficiency, and wetland carbon sequestration. We are also promoting the development of cross-regional reduction assets. In partnership with the Natural Resources and Planning Bureau of Hailing District, Taizhou City, we have developed wetland carbon sequestration resources and issued over 2,500 tons of wetland carbon sequestration credits. Furthermore, we are promoting cross-regional carbon inclusiveness transactions. We have achieved cross-provincial carbon inclusiveness reduction transactions with Chuzhou, Anhui; Chengdu, Sichuan; and Jiaxing, Zhejiang, with a total of 1,795 tons of reduction credits traded.

Project Impact & Sustainability

The one-stop inclusive carbon neutrality Inclusiveness service system is the first regional market-based voluntary emission reduction trading mechanism established nationwide on November 16, 2022, led by Suzhou Power Supply Company. Its operational model has been reported by CCTV News, People's Daily Online, and other media outlets. The entire system has continuously improved the operational management model for inclusive carbon services, regularly organized Suzhou Low-Carbon Green Development Salons, opened inclusive carbon service windows in business halls to serve local enterprises in their low-carbon transitions, and assisted enterprises in obtaining over 20 carbon neutrality certificates. It has continuously enriched inclusive and applicable scenarios and types of emission reductions, having published four methodologies for emission reduction projects and implemented the first national inclusive carbon trading for electric vehicle charging, with two more methodologies under development. Efforts have been made to actively promote cross-regional cooperation for inclusive carbon services, with strategic cooperation agreements signed with Chuzhou, Taizhou, Jiaxing, and other cities to replicate and promote the Suzhou experience. Through collaboration with international authoritative institutions and the signing of cooperation agreements with domestic and foreign certification bodies such as SGS and BSI, the system has achieved carbon neutrality certification for inclusive carbon reduction products that meet both domestic and international standards, fulfilling the export needs of enterprises and forming an international influence. It strives to become a high-quality inclusive carbon service system with Suzhou characteristics and international influence.

Expert Comments

State Grid Suzhou Power Supply Company has developed a market-based carbon inclusion trading system, leveraging distributed photovoltaics as a starting point. This system integrates four essential service links—carbon verification, carbon emission reduction, carbon trading, and carbon neutrality certification—allowing for the quantification, verification, and value realization of widespread, small-scale carbon reduction activities in the region. By providing comprehensive, one-stop green and low-carbon services throughout the entire process, the system attracts diverse stakeholders to efficiently engage in the carbon inclusion market. It also promotes cross-regional cooperation in carbon inclusion, achieving substantial environmental benefits, economic gains, and social value. This operational model has been reported by CCTV's News Broadcast, Economic Information Broadcast, and People.cn, among other media outlets.

The Construction and Operations of Green and Low-Carbon Industrial Park of Haier Group

Haier

Project Overview

Since 2021, Haier Group has been continuously carrying out energy and carbon emission management in the Haier Sino-German Industrial Park in Qingdao through digitalization and low carbon technologies, relying on its subsidiary COSMOPlat Smart Energy. Through the digital platform for data collection, storage, processing and analysis, it provides a complete set of energy and carbon management and control solutions, realizes the comprehensive management of energy use and carbon emissions in the park, and then makes the construction of green and low-carbon industrial park a reality. The control system of the air compressor station was designed, the constant pressure air supply of the air compressor station was realized, the waste heat recovery of the air compressor was recovered, and the frequency conversion transformation of the motor of the water pump room was carried out, which improved the overall efficiency of energy consumption for Haier Sino-German Park, and established a first-class energy efficiency air compressor station, reducing the cost by about 1.2 million RMB per year. The construction of rooftop distributed photovoltaic power generation system has been completed on the roof of 130,000 square meters of parkland, with a total installed capacity of 13.5 megawatts, and an annual power generation capacity of more than 15 million kWh. Combined with artificial intelligence, big data, cloud computing, 5G network and other technologies, it helps the "four flows in one" of energy flow, data flow, information flow and carbon traceability flow, and improves and optimizes the energy balance through centralized and intuitive dynamic monitoring and digital management of the whole link of energy and power production, transmission and distribution in the park, so as to achieve a comprehensive energy utilization efficiency of more than 80% and an annual carbon dioxide emission reduction of about 32,000 tons.

Company/Organization Profile

Founded in 1984, Haier Group is a leading global provider of better life and digital transformation solutions, with 10 R&D centers, 71 research institutes, 35 industrial parks, 143 manufacturing centers and a sales network of 230,000 nodes around the world.

The group has six listed companies, and our subsidiary Haier Smart Home is named among the Fortune's Global 500 and World's Most Admired Companies. We have several global premium brands, including Haier, Casarte, Leader, GE Appliances, Fisher & Paykel, AQUA and Candy, and have the world's first smart home Scenario Brand, SAN YI NIAO. We have built the world-leading industrial Internet platform COSMOPlat and the comprehensive health industry ecosystem Incaier.

Project Outcome

On the basis of carbon emission quantification, analysis, management and report generation, the energy and carbon asset management system also realizes the online certification of the carbon footprint of the organization and products, and obtains the verification certificate online, which shortens the verification cycle and saves the user's time and cost. The platform monitors and systematically manages carbon emission reduction data, quotas, carbon assets, etc., providing users with a transparent, visualized and controllable energy management experience.

The smart control system of the air compressor station was designed, the waste heat recovery of the air compressor, the frequency conversion transformation of the motor of the pump room, and a series of measures to reduce the energy consumption of a single unit, so as to improve the overall efficiency of energy consumption for the park, and establish a first-class energy efficiency air compressor station, reducing the energy cost by about 1.2 million RMB/year.

Change the original energy supply model, vigorously reduce fossil energy, and use clean energy to replace, with a clean energy utilization rate of 41%. The construction of rooftop distributed photovoltaic power generation system has been completed on the roof of 130,000 square meters of parkland, with a total installed capacity of 13.5 megawatts, and an annual power generation capacity of more than 15 million kWh.

The gas trigeneration system designed for the park realizes the cascade utilization of energy in the form of combined cooling, heating and electricity. The comprehensive energy utilization efficiency of this system can reach more than 80%, compared with the traditional energy supply system, it can achieve energy saving and emission reduction of 20% to 40%, and reduce carbon dioxide emissions by 32,600 tons, which is equivalent to afforestation of 13,300 mu per year.

Project Highlights

Major Awards

1. Clean Energy Ministerial - Global Energy Management Award
2. China Electricity Council Science and Technology Achievement Appraisal: Key Technologies and Applications for Low-Carbon and Efficient Operation of Regional Integrated Energy Systems - Internationally Leading
3. Zero Carbon Park Standard Pilot by the Energy Investment Committee of the China Investment Association
4. China Industrial Economics Association - Pioneering Enterprise for Carbon Peak in Chinese Industry

Project Implementation

COSMOPlat Smart Energy has applied smart energy practices to Haier Sino-German Park to build a green and low-carbon industrial park, which is expected to achieve carbon emission reduction and reduce energy consumption, and effectively solve the regulatory pain points caused by the lack of digitalization in energy management.

Through intelligent O&M and fault warning, the efficiency of equipment O&M is improved and the safety of energy consumption is ensured. The energy consumption is reduced through energy efficiency evaluation and optimization. Through digital carbon management methods including the formulation of dual-carbon planning, the deployment of carbon asset management platform, carbon inventory verification, product carbon footprint tracking, carbon reduction path planning and dual-carbon achievement certification, the park can realize the clear, managed and controlled carbon assets. At present, on the basis of carbon emission quantification, analysis, management and report generation, the platform also realizes the online certification of the carbon footprint of the organization and products, and obtains the verification certificate online, which greatly shortens the verification cycle and saves the user's time and cost. The platform also carries out real-time monitoring and systematic management of carbon emission reduction data, quotas, carbon assets, etc., providing users with a transparent, visual and controllable energy management experience, improving management level and operational efficiency, and creating economic and environmental benefits. After the transformation and upgrading, the energy meter data can be automatically obtained in real time, and the multi-level energy management and control of the group, factory, production line and equipment can be realized, as well as all-round and multi-dimensional statistical analysis of energy consumption.

In terms of energy saving and efficiency improvement in production, Haier COSMOPlat Smart Energy designed a smart control system for the air compressor station for Haier Smart Park, unified the configuration of the gas supply pipeline network of several plants in the park, started the corresponding equipment according to the production intensity requirements, and equipped it with high-precision detection modules and measuring instruments to realize the constant pressure gas supply of the air compressor station., reducing the energy cost by about 1.2 million RMB/year.

In terms of clean energy substitution, by changing the original energy supply model, vigorously reducing fossil energy, using clean energy substitution, the clean energy use rate reached 41%. The construction of rooftop distributed photovoltaic power generation system has been completed on the roof of 130,000 square meters of parkland, with a total installed capacity of 13.5 megawatts, and an annual power generation capacity of more than 15 million kWh.

In terms of comprehensive energy utilization, the gas trigeneration system designed for the park uses natural gas as fuel, and this system produces electricity, steam, air conditioning cold source, domestic hot water and other products through the combination of lithium bromide units, electric refrigeration units and gas boilers, and realizes the cascade utilization of energy in the form of combined cooling, heating and power. In addition, Haier Industrial Park has also built projects such as VOC online monitoring, magnetic levitation refrigerators, energy efficiency improvement of injection molding machines, and optical storage and charging carports.

As a comprehensive energy service model project built by Haier COSMOPlat Smart Energy, the smart energy platform built in Haier Sino-German Industrial Park can carry out centralized and intuitive dynamic monitoring and digital management of the whole process of production, transportation, distribution and use of energy, such as electricity, water, gas, heat, compressed air, sewage treatment, fountains, photovoltaics, lighting, elevators, etc., to control and dispatch the energy system of the park and improve the overall efficiency.

Project Impact & Sustainability

1. Project Influence: Leading the transformation of the industry to modernization: The construction and management project of Haier Sino-German Industrial Park uses digital, green and intelligent technologies to transform and upgrade traditional industries, and through real-time monitoring, intelligent analysis and optimized control, the project provides a scientific energy and carbon management strategy for the industrial park, improves energy efficiency and equipment operation stability, reduces the risk of failure, and ensures safe productionThe integration and application of these technologies not only improves the energy management efficiency of the park, but also significantly reduces energy consumption and carbon emissions.

   Contribute to the national dual carbon goal: Through the use of clean energy such as photovoltaic power generation and the improvement of comprehensive energy utilization efficiency, the annual carbon dioxide emission reduction is about 32,000 tons.

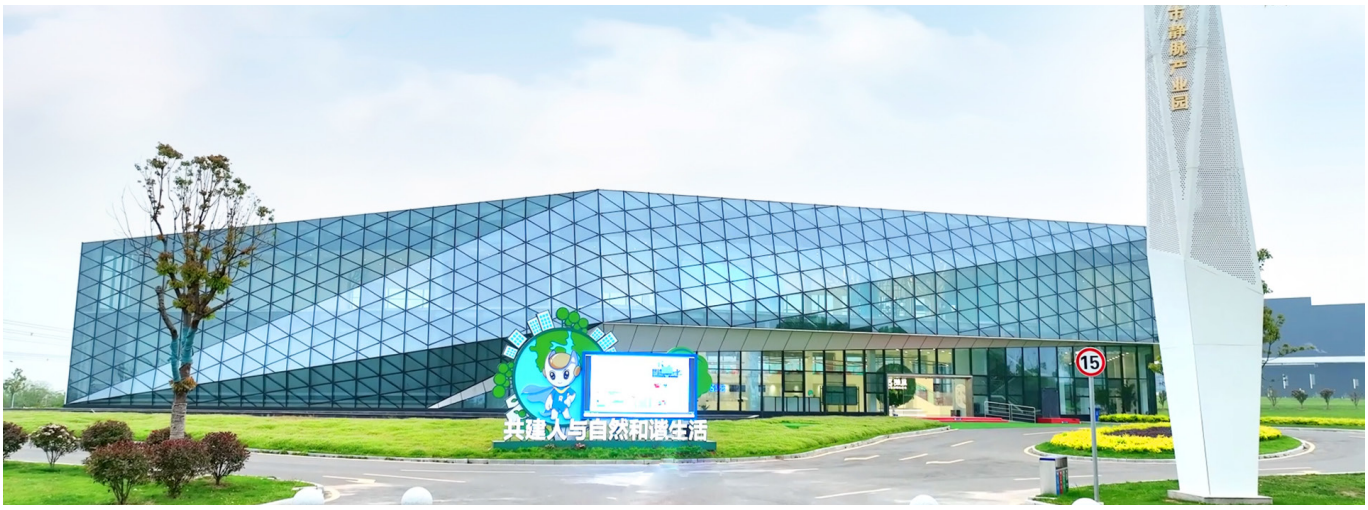
2. Scalability: Kaos Energy Technology Co., Ltd.'s online digital platform + offline green scene business model, serving Haier Group internally, empowering more than 700 users externally, with a cumulative energy saving and cost reduction of 200 million yuan, and participating in the formulation of relevant group standards for national zero-carbon factories and zero-carbon parks as a participating unit. Haier Sino-German Industrial Park has achieved a comprehensive energy utilization efficiency of more than 80% through Kaos's full-process energy solution. The park's smart energy management and green development concepts are not only worthy of reference and learning from the manufacturing industry, but also have applicability in other industries.

3. Sustainability: Smart energy management: Relying on the Kaos smart energy platform, Haier Sino-German Park combines artificial intelligence, big data, cloud computing, 5G network and other technologies to help the "four flows in one" of energy flow, data flow, information flow and carbon traceability flow, and improves and optimizes the energy balance through centralized and intuitive dynamic monitoring and digital management of the whole process of energy and power production, transmission and distribution in the park.

   Supply chain collaboration and continuous improvement and innovation: Haier Sino-German Industrial Park is committed to using itself as a model to cooperate with upstream and downstream suppliers for green transformation. In the future, we will continue to improve our energy and carbon management model, continue to apply carbon reduction technologies and develop low-carbon products, meet market demand, and establish corporate responsibility.

Expert Comments

Leveraging the capabilities of its subsidiary, COSMOPlat Energy Technology Co., Ltd., Haier Group has provided a comprehensive energy and carbon management solution through a digital platform that facilitates data collection, storage, processing, and analysis. This solution enables holistic management of energy use and carbon emissions across industrial parks. One notable feature of the case is the cloud-based control system for air compressor stations, which includes waste heat recovery and frequency conversion upgrades for water pump motors, yielding an annual cost reduction of approximately CNY1.2 million. Additionally, rooftop distributed photovoltaics have been installed, reducing fossil fuel use and generating over 15 million kWh of electricity per year. Integrating advanced technologies such as AI, big data, cloud computing, and 5G network, this solution achieves the "integration of four flows"—energy flow, data flow, information flow, and carbon tracking flow. Through centralized, visualized dynamic monitoring and digital management of energy production, transmission, distribution, and utilization, it enhances and optimizes energy balance, and boosts comprehensive energy utilization efficiency to over 80%. The project also results in annual carbon dioxide reductions of approximately 32,000 tons, equivalent to afforesting 13,300 mu (or 886.67 hectares) per year. With its scientific foundation, practicality, and scalability, this solution stands as a benchmark in corporate energy conservation and carbon reduction.



Grandblue Pioneers a "Wall-less" Solid Waste Treatment Model, Setting the Standard for "Waste-free Xiaogan"

Grandblue Environment Co., Ltd.

Project Overview

Grandblue (Xiaogan) Solid Waste Treatment Co., Ltd. has developed an innovative and "wall-less" approach to solid waste management through its Xiaogan Eco Industrial Park. Designed as a multi-functional hub, the park integrates elements such as architecture, ecology, landscape, science education, and social engagement, transforming it into an eco-friendly educational, industrial, and tourist destination. Since 2021, the park has welcomed over 10,000 visitors annually. The park is committed to raising public awareness and fostering active community participation in environmental governance. This proactive engagement helps to overcome the NIMBY (Not In My Backyard) effect and supports the development of a beautiful, sustainable China.

At the heart of the park is the "Waste-free Cities" exhibition hall, spanning over 4,000 square meters, the largest of its kind in central China. Equipped with cutting-edge, interactive displays, the space brings environmental science and low-carbon living concepts to life, blending education with entertainment for visitors of all ages. The park's vibrant, open design—free of traditional boundaries—has even become a popular backdrop for wedding photos, symbolizing the "harmonious coexistence of humanity and nature."

The Xiaogan Eco Industrial Park utilizes a collaborative treatment model for various solid waste streams, optimizing both environmental and economic outcomes. This holistic approach not only serves the entire city of Xiaogan but also plays a critical role in building a "waste-free city," delivering significant ecological, social, and economic benefits to the region.

Company/Organization Profile

Grandblue Environment Co., Ltd. (stock code: 600323) is a publicly listed company and a leader in China's environmental services industry, offering a comprehensive portfolio that includes solid waste treatment, energy, water supply, and drainage solutions. Recognized as one of the Top 10 Environmental Enterprises in China (ranked 5th in 2023), Grandblue has also maintained its status as one of the Top 10 Most Influential Enterprises in solid waste treatment for 10 consecutive years. As of the end of 2023, Grandblue's operations span 35 prefecture-level cities across 16 provinces and autonomous regions across China.

The company has established a robust end-to-end industry chain, featuring front-end "Great Municipal" management services, mid-end intensive "Great Diversion" + "Disaggregated Classification" processing, and back-end comprehensive collaborative processing and resource utilization of multi-source solid waste. This integrated approach strengthens Grandblue's ability to support the development of "Waste-free Cities," continuously enhancing its comprehensive environmental governance capabilities.

Project Outcomes

1. The project embraces the development concept of "lucid waters and lush mountains are invaluable assets," and aligns with the objective of building "Waste-free Cities." It has established the largest environmental protection and science education exhibition hall in central China, repurposed from the site of the former Xiaogan City landfill. Spanning over 4,000 square meters, the "Waste-free Cities" exhibition hall features a range of interactive, tech-driven devices that make learning about low-carbon living and environmental protection engaging and fun.
2. The park's facilities feature a de-industrialized design seamlessly integrated with the surrounding environment, elevating the site into a prominent urban landmark. This aesthetic transformation has shifted public perception from a "NIMBY" issue to a valued "neighborhood asset." Since its opening in 2021, the park has attracted over 10,000 visitors annually, establishing itself as a significant destination for urban environmental services in central China.
3. The project leverages a variety of multimedia channels and online resources to expand its environmental and science educational efforts, including short videos focused on science and a virtual reality (VR) tour of the exhibition hall. These innovative approaches ensure a wider outreach and faster dissemination of environmental knowledge, encouraging public understanding, recognition, and participation in ecological governance.
4. The park's high-standard operations have significantly contributed to the advancement of "Waste-free Cities," garnering attention from mainstream media outlets such as Xuexi Qiangguo, Hubei Daily, and Xiaogan TV Station.

Project Highlights

- National AAA-level Domestic Waste Incineration Plant
- Hubei Provincial Science Popularization Education Base
- Xiaogan Science Popularization Education Base
- In 2023, Grandblue was awarded the title of High-quality Low-carbon and Socialized Services Power Plant by the National Leader Office in its quality grading and "leader" ranking evaluation.
- Recipient of the "Polaris Cup" - Excellent Power Plant Open to the Public in the Waste Incineration Power Generation Industry (2022)
- Outstanding Institution for Work Safety and Fire Safety (2023)
- Outstanding Institution for Ecological and Environmental Protection (2023)

Project Implementation

The Xiaogan Eco Industrial Park (hereinafter referred to as the "industrial park") is a landmark project focusing on environmental protection, science education, and improving public welfare. Planned and supported by the Xiaogan Municipal Party Committee and Municipal Government, the industrial park, is a critical component of Xiaogan's journey toward becoming a "waste-free city." It has successfully overcome the challenges of the "NIMBY effect" by adopting a unique, open-concept approach to solid waste treatment.

1. "Wall-less" Design: A New Model for Environmental Engagement

The industrial park features a groundbreaking "wall-less" design, with de-industrialized facilities that seamlessly blend into the surrounding environment. Rather than physical barriers, the park's solid waste treatment infrastructure is incorporated into a public, interactive platform for environmental education. The industrial park was formerly a domestic waste landfill, and the public was concerned about its potential impact on their health and the environment. To address this, the former domestic waste landfill was transformed into an eco-friendly, multi-purpose park that integrates leisure, entertainment, and science education. The park has even become a popular spot for wedding photography and a weekend destination for local residents, demonstrating its success in transforming perceptions of waste treatment.

2. Promoting Environmental Education and Awareness

The industrial park is home to the largest environmental protection and science education exhibition hall in central China covering an area of 4,310 m2. Built on a former landfill site, the exhibition hall creatively integrates Xiaogan's local culture, history, geography, climate, and environment. Equipped with engaging, interactive displays, the hall vividly demonstrates the harmless process of waste treatment and resource utilization, offering visitors an entertaining educational experience on low-carbon living and environmental stewardship. Since its inception, the exhibition hall has welcomed over 10,000 visitors annually, including primary and secondary school students, as part of its mission to raise public awareness about environmental issues. By encouraging citizens to adopt green and low-carbon lifestyles, the park is playing a key role in shaping a culture of energy conservation and carbon reduction in Xiaogan. In alignment with China's national goals for "Waste-free Cities Construction," the park has further upgraded its exhibition hall to center on this important theme.

3. High-quality Construction and Operation—A Model for Xiaogan

The Xiaogan Eco Industrial Park encompasses a range of projects, including domestic waste treatment, municipal sludge treatment, sewage treatment, food and kitchen waste treatment, human waste treatment, comprehensive slag utilization, fly ash management, and leachate treatment. Through innovative collaborative disposal and recycling efforts, and energy efficient processes, the park has transitioned from a traditional "single landfill" approach to a modern "clean incineration" model. This not only enables resource recovery and waste reduction, but also ensures environmentally safe treatment while generating green energy. The park's operations are aligned with China's ambitious "carbon peaking and carbon neutrality" goals, contributing to a greener, circular economy.

In terms of operations and management, the industrial park upholds rigorous standards, having achieved ISO 9001 (International Quality Management), ISO 14001 (Environmental Management), ISO 45001 (Occupational Health and Safety), and SA8000 (Social Responsibility) certifications. In recognition of its high-quality operations, Grandblue (Xiaogan) Solid Waste Treatment Co., Ltd. was awarded the prestigious "National AAA-Level Domestic Waste Incineration Power Plant" rating in November 2023.

Project Impact & Sustainability

The industrial park was built on the innovative "wall-less" concept, designed to explore various forms of science education, strengthen external cooperation and exchanges, and emphasize the unique features of science popularization education bases. By expanding the reach and impact of science education, the park promotes high-quality, diverse learning opportunities for the public. Visitors are welcome to explore the park's garden-like environment and experience its high-standard operations and management. This initiative successfully challenges the common misconception that solid waste treatment facilities, such as incineration power plants, are dirty and disorganized.

All Grandblue's environmental governance facilities across China feature environmental protection and science popularization exhibition halls or corridors. These play a crucial role in raising public environmental awareness, promoting environmental knowledge, encouraging public participation, advancing the environmental protection industry, and fostering a harmonious relationship between environmental facilities and communities.

The industrial park includes various projects, such as domestic waste treatment, municipal sludge treatment, sewage treatment, food and kitchen waste treatment, human waste treatment, comprehensive slag utilization, fly ash landfill management, and leachate treatment. These efforts facilitate the centralized treatment and recycling of various types of garbage and waste, supporting Hubei Province in systematically planning and promoting the construction of "Waste-free Cities." This industrial park model created by Grandblue, which integrates the treatment of multiple solid waste streams, has been adapted and replicated in Jinjiang, Kaiping, Hui'an, and other locations, contributing to the development of local "Waste-free Cities."

Expert Comments

The key initiative to open environmental protection facilities to the public, led by the Ministry of Ecology and Environment, has significantly enhanced public understanding of such facilities, strengthened corporate responsibility within the environmental sector, enhanced trust among stakeholders, and mitigated outstanding "not-in-my-backyard" (NIMBY) conflicts. As an exemplary representative among 487 publicly accessible waste treatment facilities, Grandblue (Xiaogan) has broken the traditional operation model of environmental management facilities by integrating ecological concepts, landscape design, educational outreach, and social engagement. Additionally, it employs multimedia tools such as short videos and online VR experiences to promote environmental education, guiding the public to experience and understand ecological and environmental governance. This innovative case is worth learning.

Ant Group's High-quality and Low-carbon Development Practice Based on Green Computing Technology

ANT GROUP

Project Overview

Based on the concept and principles of sustainable development, combined with the ESG framework, Ant Group released a roadmap for carbon neutrality in 2021, committing to achieve net-zero emissions (Scope I, II and III) by 2030 as a proactive respondence to the national dual-carbon goals.

In the process of practicing sustainable development, Ant Group insists on playing a triple role: 1) a practitioner of green development of the enterprise, committing to and implement carbon neutrality goals; 2) a provider of green and low-carbon products and services, guiding the public to participate in the sustainable lifestyle and the ecological protection and restoration as a circulation; 3) an explorer of green technology, promoting the green transformation of industries.

Ant Group insists on green computing technology innovation and practice, as a significant part of exploration of green technology, and conducts a series of core technology research and development around low-carbon computing supplier selection capability, global resource scheduling capability, workload optimization capability, and sustainable observation and profiling capability, applying them to Ant Group server cluster.

Green Computing technology started to be applied to the "Double Eleven" scenario at scale in 2021, and continued to be iterated from 2021 to 2024, and has now realized large-scale application in the daily routine and during the peak period of Double Eleven in Ant Group. It has effectively solved industry problems such as rational allocation of large-scale cluster resources, minute-level effective scheduling, intelligent traffic prediction, etc., which has significantly improved resource utilization, and potential to play an exemplary role in energy saving and emission reduction for data centers in various industries.

Ant Group has reduced carbon emissions from upstream data centers in the supply chain by a total of 72,026.70 tons of carbon dioxide equivalent in 2023, through green computing technology, which reduces the proportion of carbon emissions by as much as 26% when compared to the baseline usage scenario of the same server size with the use of green computing technology.

Company/Organization Profile

Ant Group traces its roots back to Alipay, which was established in 2004 to create trust between online sellers and buyers. Over the years, Ant Group has grown to become one of the world's leading open Internet platforms.

蚂蚁集团 ANT GROUP

Through technological innovation, we support our partners in providing inclusive, convenient digital life and digital financial services to consumers and SMEs. In addition, we have been introducing new technologies and products to support the digital transformation of industries and facilitate collaboration. Working together with global partners, we enable merchants and consumers to make and receive payments and remit around the world.

More details in official website: https://www.antgroup.com/en

Project Outcome

1. Industrial Benefits:

The current concept of "green computing" in the industry usually refers to the hardware, focusing on power production and computing power supply. However, the implementation of green computing in Ant Group, as the typical practice of 'green computing in the computing power application' will promote an end-to-end green computing industry awareness and development.

2. Economic Benefits

(1) Internal application: direct economic benefits

Taking Alipay as an example, the upgrading capability of the whole infrastructure middleware has been shortened from a yearly cycle to a two-week cycle, and the unattended upgrading of hundreds of thousands of business services throughout the whole station can be achieved in 15 days in terms of operation and maintenance efficiency, which significantly improves the efficiency of research and development as well as operation and maintenance, reduces the consumption of thousands of people, and saves billions of dollars in costs for the company every year.

(2) Potential promotion: indirect economic benefits

Looking ahead, if green computing is promoted to the financial industry, it can reduce costs and increase efficiency by improving the utilization rate of computility, saving 4.5 billion yuan in electricity costs in the financial industry each year, reducing 160,000 tons of carbon, saving 100,000 servers purchased each year, and generating 7 billion yuan in economic benefits. Green Computing is also potential to be promoted to Internet industry and so on.

3. Social Benefits

(1) Boosting corporate ESG goals and national dual-carbon strategy

In 2023, Ant Group reduces carbon emissions from upstream data centers in the supply chain by a total of 72,026.70 tons of carbon dioxide equivalent through green computing technology. Green Computing helps achieve corporate ESG goals, as well as national carbon strategy.

(2) Build an open and win-win technology cooperation ecology through open source

Ant Group has now committed to open 7 low-carbon patents externally, and gradually open-source the core software involved in the green computing technology system to the industry, lowering the practical threshold of green computing applications in the industry.

Project Highlights

Project awards:

- Ant Group's Green Computing has reached the international leading level as a sustainable and low-carbon technology, as evaluated by the National Energy Conservation Center.
- Recognized as 'Typical Case of Dual Transformation and Coordination of Digital

Technology Enterprises in 2022' organized by the Office of the Central Cyberspace Affairs Commission

- Selected in the list of 'Typical Case of Digitalization and Greenization Synergistic Transformation and Development in Yangtze River Delta in 2023' jointly organized by the Internet Information Office of the Party Committees of the three provinces and one city in the Yangtze River Delta (Shanghai)
- Recognized as '36 Carbon Zero Carbon Pioneer Cases in 2023', etc.

Project Implementation

Ant Group, as a typical representative of Internet enterprises, ranks in the top ten worldwide in terms of server size. Beginning from 2018, the number of servers within Ant Group has shown a dramatic growth. At that time, the level of server utilization in the industry was very low, and a large amount of energy was consumed in maintaining servers instead of providing efficient computing power, and in 2017, the entire server utilization rate of Ant Group was only about 8%, and a large number of servers were in an idle state. Therefore, Ant Group launched the "Cloud to Future" project, in which one of the key objectives was to reasonably allocate computing resources through the upgrade of technical architecture, thus improving the overall operational efficiency of Ant Group's data centers for the green and stable development.

Ant Group establishes a green computing system, in which we premise on green data centers, and independently develop a full set of high-quality software stacks, including the upgrading of the system architecture of the computing platform, the updating of the business software, as well as the synergistic design of the business application and the platform system to improve the utilization of computility. This set of "green computing" technology system focusing on resource efficiency is centered on low-carbon computing supplier selection capability, global resource scheduling capability, workload optimization capability, and sustainable observation and profiling capability, applying them to Ant Group server cluster, and has been widely used in Ant Group's business scenarios.

Ant Group's Green Computing technology system contains hardware, operating system, efficient scheduling system, multi-dimensional intelligent data analysis and other technical systems, and the key technical paths are as follows:

1. Unify heterogeneous server arithmetic through pooling and other technical means, provide unified computing power services in a standardized way, isolate the complexity of heterogeneous computing power, and improve stability;
2. Enhance system performance through elastic computing power unified scheduling, performance optimization, etc.; reduce device dependency through containerization;
3. Efficient and fast resource elasticity scaling by practicing platform engineering and configuration codification, improving operation and maintenance efficiency and business peak activity support capability;
4. Make workloads easier to be elastically scaled and scheduled through Serverless;
5. Workload optimization: Combined with Ant Group's own business requirements, it focuses on optimizing storage workloads, AI intelligent computing workloads, and online workloads;
6. Continuous detection of workload resource consumption and resource optimization through green observation and optimization systems.

The project has realized the large-scale application of green computing technology in daily routine and during the peak period of Double 11 in Ant Group, and has stably supported all core business systems of MYBank and Alipay, ensuring the stable operation of the relevant systems for more than four years. It has effectively solved industry challenges such as rational allocation of large-scale cluster resources, minute-level effective scheduling, intelligent traffic prediction, etc., which has significantly improved resource utilization, and potential to play an exemplary role in energy saving and emission reduction for data centers in various industries.

Ant Group has reduced carbon emissions from upstream data centers in the supply chain by a total of 72,026.70 tons of carbon dioxide equivalent in 2023, through green computing technology, which reduces the proportion of carbon emissions by as much as 26% when compared to the baseline usage scenario of the same server size with the use of green computing technology.

Project Impact & Sustainability

1. Innovation points:

(1) Significant improvement of computility utilization with the unified scheduling ability, including in offline and online mixed colocation technology, time-sharing scheduling technology, AI intelligent capacity technology, and Serverless serverless;

(2) Quickly locate resource bottlenecks and root cause analysis through Continuous Profiling; and take the lead in the industry to independently develop the GreenOps platform, which focuses on the data center part of the carbon emission Scope III, providing users with one-stop carbon emission observation, analysis, and optimization capabilities. Currently, it has been piloted and landed on many internal businesses, significantly improving green observability.

2. The green computing technology has potential to be generalized, including:

- Industry commonality of business scenarios: Green computing technology can be applied to many enterprises, including Internet, finance and other industries in demand of improving cloud resource utilization and reducing carbon emissions in a refined way.
- Hardware commonality: The hardware in the green computing system is completely based on common and domestic hardware, and can be exported on a large scale as an option or through domestic server vendors.
- Technology/product standardization: The core software and key technologies in the green computing system will be gradually standardized through open source and commercialization.

3. Follow-up plan:

For the future, Ant Group actively participates in the construction of industry standards and evaluation systems, and cooperates with industry, academia and research institutes to build a green computing ecosystem; on the other hand, Ant Group actively opens up the practice of green computing, and exports it externally through open source, commercialization and other forms.

Expert Comments

By unveiling its roadmap to achieve net-zero emissions by 2030, Ant Group has demonstrated its firm commitment to green, low-carbon development as an industry leader. Its innovations in green computing technology have not only effectively addressed industry challenges such as large-scale cluster resource allocation and intelligent flow forecasting, but also have significantly improved resource utilization rate, setting a benchmark for energy conservation and emission reduction in data centers. In particular, the large-scale application of green computing during high-traffic events like "Double 11" shopping spree has validated the practical feasibility and efficiency of green computing technology. By open-sourcing its green computing technology, Ant Group has created an open, win-win technology collaboration ecosystem, lowering the entry barrier for green computing applications across the industry, and contributing meaningfully to the sustainable development of the broader society.

Qingdao Green Sail Construction Waste Resource Utilization "Zero Carbon" Industrial Park

Qingdao Green Sail Recycled Building Materials Co., Ltd.

Project Overview

The Qingdao Green Sail Construction Waste Resource Utilization "Zero Carbon" Industrial Park is located at No. 36C Binhai Road, Licang District, Qingdao City, covering an area of 158 acres. It was completed in May 2021. By utilizing independently developed complete sets of equipment and technology, 22 production lines for various types of recycled building materials will be constructed. The annual processing capacity of urban construction waste is 5 million tons, and the annual production capacity of recycled aggregate concrete, fly ash bricks, permeable bricks, aerated concrete, recycled organic planting soil and other recycled products is about 2.6 million cubic meters.

The full component recycling technology system for construction waste has been proposed for the first time in China, based on the principle of "zero waste utilization", to achieve 100% recycling of construction waste. Through carbon reduction technologies such as energy cascade utilization, photovoltaic power generation, biomass boilers, etc., a zero carbon energy solution that integrates energy consumption, production capacity, and functionality has been formed, and a zero carbon industrial park with "five zero cycle systems" integrating "zero waste, zero wastewater, zero exhaust gas, zero waste heat, and zero energy consumption" has been built. The park can reduce CO_2 emissions by 1.5 million tons annually, save 4.7 million tons of natural sand and gravel aggregates, save 300 acres of landfill land, and reduce pollution of 1600 acres of land and groundwater sources.

Company/Organization Profile

Qingdao Green Sail Recycling Building Materials Co., Ltd. was established in April 2009 and is located in Licang District, Qingdao City. The company is committed to the research and practice of comprehensive utilization of construction waste resources. Currently, it has 19 invention patents and 33 utility model patents, and its product production technology and processes have reached an international level.

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The company has been successively rated as a "specialized, refined, unique and new" enterprise in Shandong Province and Qingdao City, a high-tech enterprise in Qingdao City, and a member unit of the "12th Five Year Plan" National Science and Technology Support Program. It has also participated in the formulation of multiple national level norms and industry technical standards, playing a leading and demonstrative role in the comprehensive utilization of urban construction waste sources.

Project Outcome

The project uses waste as raw materials, with no raw material costs, while reducing the harm of discharging waste building materials into the natural world, and lowering the cost of garbage disposal and environmental governance. Effectively solving the large amount of construction waste brought about by social development, ensuring 100% resource utilization of construction waste, greatly alleviating the growing demand pressure for new building materials in the local area.

The park can process 5 million tons of urban construction waste annually, reduce CO_2 emissions by 1.5 million tons, save 4.7 million tons of natural sand and gravel aggregates, save 300 acres of landfill land, and reduce pollution of 1600 acres of land and groundwater sources.

The service life of photovoltaic power generation is set at 25 years, which can save a total cost of 7.846 million yuan; Biomass boilers can save 401000 yuan in raw material costs per year; The recycling of wastewater can save 4 million tons of water annually, while the rainwater recovery system can save 10000 tons of water annually, resulting in cost savings of approximately 16.04 million yuan per year.

The park has turned construction waste into treasure through comprehensive utilization, proposed a systematic integrated technology system for the resource utilization, low-carbon disposal, and regeneration of construction waste, and formed a "zero carbon" park solution that integrates energy consumption, production capacity, and function. The production process has achieved "zero" emissions, fully reflecting the circular economy concept of "taking from building materials and using for building materials". It can serve as a demonstration window for large-scale replication and promotion of resource comprehensive utilization.

Project Highlights

In 2021, the project was awarded the honorary title of "Zero Carbon China" Excellent Case and Technical Solution by the China Investment Association. In 2022, the project was selected as a demonstration project for benefiting the people through science and technology in Qingdao and received support from the city's science and technology special funds. In 2023, the project was awarded the honorary title of "Shandong Province Resource Comprehensive Utilization Base" by the Shandong Circular Economy Association. In 2024, the project was selected for the Small Grants Program of the United Nations Development Programme's Global Environment Facility and received research project grant support from the foundation.

Project Implementation

With the full component recycling technology of construction waste as the core, we have created a zero carbon industrial park that integrates zero waste, zero wastewater, zero exhaust gas, zero waste heat, and zero energy consumption, known as the "Five Zero Cycle Systems". Through refined disposal and precise utilization, building solid waste is turned into treasure. The waste separation technology has reached the international leading level, with a separation rate of 98%. This not only achieves full disposal and recycling of waste, but also ensures the quality of building materials from raw materials. On the basis of optimizing and improving basic processes, the object of resource utilization has been expanded from construction waste itself to the entire production process, with key technologies including photovoltaic power generation, multi temperature cracking and recycling, seawater desalination, multi-stage utilization of steam, rainwater collection, cascade utilization of water resources, pure electric transport vehicles, etc., forming a zero carbon energy solution that integrates energy consumption, production capacity, and functionality.

1. Zero waste

The recycling process of the project is based on the principle of refined disposal and utilization. Different levels of aggregates are used to produce building materials with different quality requirements, achieving a closed-loop production process where "upper end waste" is the "lower source material". At the same time, targeted utilization of dust generated during the production process was carried out, adopting a "collection, reduction, collection, and use" design system to achieve 100% recycling and utilization of the entire process and material.

2. Zero wastewater

Realize the intensive utilization of water resources through two approaches: open source and throttling. The wastewater generated during the production process is treated on-site and recycled. Domestic wastewater is treated and reused for production, while organic waste is used to produce organic fertilizers or planting soil. Design a rainwater recovery system that can be used for production after treatment, achieving a 100% rainwater recovery rate.

3. Zero exhaust gas

Cascade utilization of waste steam and heat generated during the production process to achieve orderly circulation of steam and water. The discharged primary steam is used for magnetic levitation power generation, the secondary steam is used for concrete prefabricated oxygen chambers and seawater desalination systems, and the tertiary steam is converted into high-pressure steam through a steam generator for the production of boards and fly ash autoclaved bricks.

4. Zero waste heat

The biomass boiler is designed with a flue gas waste heat recovery system, which adds a seawater circulation system inside the chimney, uses waste heat to preheat seawater, and cools the flue gas to 40 degrees, achieving colorless, heat free, and odorless flue gas emissions, avoiding the heat island effect caused by overheated flue gas emissions, and achieving a waste heat recovery rate of 90%.

5. Zero energy consumption

We have developed a zero carbon energy system by utilizing a series of low-carbon technologies such as photovoltaic integrated systems and biomass boilers. The integrated design of building photovoltaics has a total installed capacity of 6MW, and the total power generation can meet the electricity demand for production and lighting. At the same time, all concrete mixing trucks and loaders on site are electric vehicles, which use the green electricity from photovoltaics in the factory area for charging and serve as mobile energy storage devices for the photovoltaic system, achieving a zero carbon closed loop from production to transportation.

The park can process 5 million tons of urban construction waste annually, reduce CO_2 emissions by 1.5 million tons, save 4.7 million tons of natural sand and gravel aggregates, save 300 acres of landfill land, reduce pollution of 1600 acres of land and groundwater sources, and achieve significant environmental benefits. The park has turned waste into treasure through comprehensive utilization of waste, achieving "zero" emissions in the production process, fully reflecting the circular economy concept of "taking from building materials and using for building materials", and can serve as a demonstration window for large-scale replication and promotion of resource comprehensive utilization and circular economy.

Project Impact & Sustainability

The full component recycling technology system for construction waste has been proposed for the first time in China, and all production processes used are independently developed. Currently, it has more than 50 patents, among which the waste separation technology has reached the international leading level, with a separation rate of 98%. The entire process of disposing and regenerating construction waste involves zero waste, zero wastewater, zero exhaust gas, and zero waste heat emissions, forming a systematic integrated technology system for the resource utilization, low-carbon disposal, and regeneration of construction waste.

The company participated in the preparation of two national standards, "Recycled Fine Aggregates for Concrete and Mortar" and "Recycled Coarse Aggregates for Concrete", as well as the industry standards "Technical Regulations for the Application of Recycled Aggregates" and the group standard "Evaluation Specification for Zero Carbon Factories", playing a demonstrative role in the research of comprehensive utilization methods and approaches for building solid waste resources. The project has completed the second phase planning and approval. The next step will be to use technologies such as distributed photovoltaic power generation, wind power generation, and maglev power generation to develop production and promote the further upgrading of the construction waste treatment industry.

Expert Comments

The Qingdao Green Sail Zero-Carbon Industrial Park for Comprehensive Utilization of Building Waste exemplifies a holistic zero-carbon energy solution through carbon reduction technologies, such as tiered energy utilization, photovoltaic power generation, and biomass boilers. This solution integrates energy use, production capacity, and functionality into a "five-zero circular system", encompassing "zero waste, zero wastewater, zero waste gas, zero waste heat, and zero energy consumption". Within the park, building waste is transformed into valuable resources, achieving zero emissions of waste, wastewater, waste gas, and waste heat across all stages of building waste disposal and regeneration, and resulting in a systematic, integrated technology framework for the low-carbon disposal, recycling, and regeneration of building waste. This case fully embodies the principles of the circular economy and serves as a replicable, scalable model with significant potential for broader application and promotion.

Qingdao Olympic Sailing Center Zero-Carbon Community

Qingdao Energy Thermal Power Group No. 3 Heating Co., LTD

Project Overview

The Qingdao Olympic Sailing Center is located in the core area of Qingdao's coastal area. Since successfully hosting the sailing competition of the Beijing Olympic Games in 2008, it has been serving as the "international reception room" for various large-scale events both domestically and internationally in Qingdao. In the early stages of construction, its planning and design reached world-class standards, but over the past decade, with changes and upgrades in energy demand, there is an urgent need to further increase energy conservation and carbon reduction efforts, and explore green and low-carbon development paths in depth. In 2021, the first "zero carbon community" project in Qingdao started construction at the Qingdao Olympic Sailing Center. The project covers an area of 45 hectares and has a building area of 227100 square meters, including the buildings inside the Olympic Sailing Center and surrounding supporting buildings. Based on the investigation and analysis of community energy consumption and carbon emissions, the project accurately grasped the energy demand and rationally utilized technologies such as sea source heat pumps, solar photovoltaic and thermal energy, wind power generation, smart grid, and industrial waste heat to reduce the building's heating and cooling energy consumption, improve the system equipment efficiency, and build a new energy system with multi-energy complementation and multi-energy supply in the region, fully utilizing renewable energy and intelligent management to gradually achieve a reduction in direct carbon emissions of 200,000 square meters of community energy consumption to zero. Through the construction of the zero-carbon community, 3,030,000 kWh of electricity was saved annually, 22,000 GJ of heat was saved, 5,500 Nm3 of gas was saved, 8,663 tons of carbon emissions were reduced, equivalent to planting 1.733 million trees, and annual energy costs were saved by 3.75 million yuan, with significant comprehensive benefits.

Company/Organization Profile

Qingdao Energy Thermal Power Group No. 3 Heating Co., LTD is a subsidiary of Qingdao Energy Thermal Power Group Co., Ltd. and was established in 1984. It is the first enterprise in Qingdao to provide central heating services to the public, and was one of the first to obtain the urban heating concessionary operating rights in Shandong Province and Qingdao City. Its total heating capacity is 580MW, and it serves nearly 101,900 residential and public building users. The company has been awarded various titles, including the National AAA-Credit Enterprise, China's Enterprise Model of Honest Operation and Management, and the Civilized Unit of Shandong Province. It successfully completed all the guarantee tasks during the 2008 Olympic Sailing Events, the APEC Meeting, and the Shanghai Cooperation Organization Qingdao Summit, etc.

Project Outcome

After the completion of the zero carbon community at the Olympic Sailing Center, it will save 3.03 million kWh of electricity, 22000 GJ of heat, 5500Nm3 of gas, and 8663 tons of carbon emissions annually. This is equivalent to planting 1.733 million trees and saving 3.75 million yuan in energy costs annually, with significant comprehensive benefits.

At the same time, leveraging the tourism resources of the Olympic Sailing Center, the Qingdao Energy Science and Technology Museum has created a zero carbon exhibition hall, established the Qingdao Energy Conservation and Renewable Energy Technology Exhibition Center, as well as the Higher Education Student Practice Base and the Science Popularization Education Base for Primary and Secondary School Students. Since its opening in June 2022, a total of 128 visits, research, and study activities have been carried out, affecting more than 7000 people and becoming a propaganda platform for promoting zero carbon knowledge and concepts to the public.

Project Highlights

In 2021, the project was awarded the honorary title of "Zero Carbon China" Excellent Case and Technical Solution by the China Investment Association, selected as a demonstration sub project of public building energy efficiency improvement technology by the China Building Energy Conservation Association (low-carbon technology category), and received green loan funds from the Asian Development Bank and grants from the United Nations Development Programme and the American Energy Foundation.

In 2022, the Qingdao International Convention Center (Olympic Sailing Cultural Center) was awarded the "three-star green building label" evaluation, and the project was selected as a demonstration project for science and technology benefiting the people in Qingdao, receiving support from the city's science and technology special funds.

Project Implementation

1. Technological breakthroughs to form a zero carbon path for existing communities.

   To build a zero carbon community at the Olympic Sailing Center, based on

research and analysis of community energy consumption and carbon emissions, accurately grasp energy demand, make reasonable use of technologies such as seawater source heat pumps, solar photovoltaic photothermal, wind power generation, photovoltaic direct flexible storage, industrial waste heat, etc., improve system equipment energy efficiency, construct a new energy system with multiple complementary and interconnected energies in the region, fully utilize renewable energy and intelligent management, and promote the zero carbon humanistic concept through zero carbon exhibition halls, cultural activities, educational bases, etc., gradually reducing the direct carbon emission intensity of 200000 square meters of community energy consumption to zero.

2. Seawater source heat pump, tailored to local conditions, with optimized cost and technology.

   By fully utilizing the seawater source heat pump system, the original units of the Olympic Sailing Center Museum and Media Center will be renovated and replaced. Two high-efficiency screw seawater source heat pump units will be used, with a summer COP of 6.2 and a winter COP of 3.6. After the renovation, 61000 kW · h of electricity can be saved annually and 76 tons of carbon can be reduced annually;

3. Light storage is direct and flexible, and zero carbon community power "production, consumption, and storage" are coordinated.

   Reasonably utilizing solar energy, establishing a "photovoltaic storage direct flexible" system for photovoltaic power generation, energy storage and storage, DC microgrid power supply, and flexible access and sale of electricity from external power grids, realizing the "production consumption storage" synergy of zero carbon community electricity, with a cumulative annual power generation of 730000 kWh and an annual carbon reduction of 636 tons;

4. Smart control, creating an energy efficient operation self-control platform.

   Build a smart energy management and control platform to achieve efficient operation of the energy system, clean and low-carbon energy multi energy complementarity, real-time big data analysis and visualization display. Combining BIM technology, build a network version of the human-machine interaction display system to provide a complete image foundation for smart operation and maintenance, demonstration, promotion, science popularization and other needs;

5. Zero carbon exhibition hall, promoting the concept of zero carbon deeply in people's hearts.

   Construct a zero carbon exhibition hall at Qingdao Energy Science and Technology Museum, establish a student practical science popularization education base, with zero carbon as the main line, to provide detailed introductions to zero carbon applications and practices in communities, buildings, energy, data, technology, and other aspects, increase zero carbon interactive space, popularize "zero carbon" knowledge to the public, and promote the concept of "zero carbon".

6. Innovate and demonstrate, take multiple measures to create a zero carbon technology system.

   A zero carbon community construction technology system has been formed, which demonstrates the application of key technologies such as ultra-low energy insulation systems, photovoltaic storage systems, seawater source heat pumps, and big data intelligent management platforms. An evaluation index system for zero carbon community construction and operation has been established, and guidance for zero carbon community construction has been formed. The application mechanism and promotion suggestions for key technologies have been proposed.

Project Impact & Sustainability

The Zero Carbon Community of Olympic Sailing Center promotes the promotion and application of technologies such as light storage, direct and flexible, seawater source heat pump, energy Internet, and intelligent energy control system through the application of new technologies such as building energy conservation, renewable energy, efficient systems, artificial intelligence, innovation of management mechanisms, and centralized demonstration of data analysis tools and methods.

By fully utilizing community space resources, maximizing the development and utilization of renewable energy, introducing financial mechanisms such as carbon reduction insurance and green credit, and upgrading traditional production factors such as talent, land, capital, labor, raw materials, and energy, a technically reliable, economically feasible, and data traceable zero carbon solution can be formed.

By using energy Internet, BIM, smart energy control system, big data analysis and visualization and other technical means, we will build a new type of people friendly community that is "clean, zero carbon, smart and humanistic". We will also build a zero carbon exhibition hall of Qingdao Energy Science and Technology Museum in the Olympic Sailing Museum, establish a base for students to practice popular science education, and popularize zero carbon knowledge and concepts.

Expert Comments

As Qingdao's "International Reception Hall", the Qingdao Olympic Sailing Center Zero-Carbon Community leverages technologies such as the energy internet, Building Information Modeling (BIM), and smart energy control systems to rationally use seawater-source heat pumps, solar photovoltaics and photo-thermal, wind power, PEDF (photovoltaic, energy storage, direct current and flexibility) and industrial waste heat. This approach establishes a new energy system featuring multi-energy complementation and co-supply within the region. Additionally, by introducing financial mechanisms like carbon reduction insurance and green credit, the community upgrades traditional production factors—including talent, land, capital, labor, raw materials, and energy, generating remarkable comprehensive outcomes in energy saving, carbon reduction, livability, and educational outreach. It offers a model for technological, mechanism, and operational innovation in green, low-carbon communities in the context of dual carbon strategy.

Onewo Shanghai Gold Liu Xiang Yuan: A Model of Smart Low-Carbon Residential Community Transformation by Property Management

Onewo Inc.

Project Overview

As the property management provider for the Gold Liu Xiang Yuan community in Jiading District, Shanghai, Onewo is pioneering a new standard in low-carbon living through advanced low-carbon transformation technology and an innovative operations model.

A central feature of this project is its achievement in reducing the community's per capita carbon emission intensity by 10% within three years, even though the community was originally constructed without low-carbon, energy-saving facilities. Vanke Service, the residential property management arm of Onewo, has achieved this outcome through a comprehensive retrofitting of low-carbon facilities and sustained community-focused low-carbon education. Initiatives implemented in the community include the installation of distributed photovoltaic power generation systems, the Magic Stone microgrid systems, community energy storage facilities, elevator energy recovery devices, electric vehicle charging stations, and solar street lighting. Other sustainable measures, such as organic waste treatment, low-carbon cultural activities, recyclable goods flea markets, and used clothing recycling programs, not only enhance the efficiency of property management operations but also provide residents with access to clean energy and recycling opportunities, significantly raising environmental awareness and participation among community members.

Onewo's property services extend beyond traditional residential management offerings like cleaning, security, and maintenance, showcasing a strong commitment and capability to lead sustainable development in the property sector. While low-carbon construction is more commonly applied in industrial parks or commercial buildings, Onewo's application of low-carbon principles in retrofitting an established residential community sets a distinctive example.

Onewo aspires for this project to serve as a model that encourages more residential communities to undertake green transformations, fostering a shift towards green and sustainable lifestyles and a collaborative move toward a more environmentally friendly future.

Company/Organization Profile

The property services segment of Vanke, which has been operating since 1990 was Onewo's precursor. We consistently uphold the original aim of our services, and we have become China's leading space management provider.

We have always maintained rapid and consistent growth by relying on the benefits of the leading brand and service quality. A diverse and organized cluster of independent brands, including Vanke Service, Cushman & Wakefield Vanke Service, City Up, Vanrui IntelliTech, Onewo Inhome, and Xiangying Enterprise Service, has emerged as a result of the growth of strategy and business.

As of December 31, 2023, there were 3,810 residential property service projects, 2,241 commercial property service projects, and 98 smart city service projects under management nationwide.

In September 2022, Onewo Space Technology Service Co., Ltd. (abbreviated as Onewo) was listed on the Main Board of The Stock Exchange of Hong Kong Limited, with the stock code 2602.HK.

Project Outcome

1. "Photovoltaic-Energy Storage-the Magic Stone Smart Microgrid" Residential Community: The property management facilities in Gold Liu Xiang Yuan are outfitted with distributed photovoltaic systems, generating 45,000 KWH of green electricity annually and resulting in an estimated carbon reduction of 31,657.5 kg CO_2 eq. Additionally, the community optimizes the interaction between municipal electricity supply, distributed photovoltaics, energy storage, and building energy needs through the implementation of energy storage systems and the Magic Stone smart microgrid algorithms, achieving efficient and sustainable use of green energy.
2. "Zero Carbon Property Service Office": The property service center in Gold Liu Xiang Yuan operates entirely on photovoltaic-generated clean energy, achieving 100% green electricity for all property office operations. Furthermore, photovoltaic electricity within the district accounts for over 10% of the total public electricity consumption of the community. By procuring additional green energy, the green electricity usage rate for public management operations in the community reaches 100%.
3. 10% Reduction in Per Capita Carbon Emission Intensity within Three Years: Beyond establishing the "photovoltaic-energy storage-the Magic Stone smart microgrid" residential community, the community has implemented further

infrastructure upgrades and cultural initiatives. These include installing elevator energy recovery devices, organic waste treatment systems, electric vehicle charging stations, and solar-powered street lighting, along with hosting low-carbon cultural activities, organizing recyclable goods markets, and implementing used clothing recycling programs. As a result, per capita carbon emissions have decreased from 1.695 tons of CO_2/person in 2021 to 1.518 tons of CO_2/person in 2023—over 10% lower than the city average and the community's baseline level.

4. Advancing Green Community Concepts: Through extensive advocacy for green, low-carbon, and energy-saving practices, more than 4,000 residents have been engaged in the community. Over 2,000 residents use green energy for transportation, with 74% of residents using electric bicycles and 27% using electric cars, substantially increasing green mobility in the community.
5. Publicity and Recognition: In October 2024, Gold Liu Xiang Yuan will participate in the low-carbon community construction evaluation organized by the Shanghai Municipal Ecology and Environment Bureau for the 2022 cycle. The community is also scheduled to be featured in a special report titled "Model Property Companies" in the Shanghai Evening News in November, highlighting its dedication to environmental sustainability and commitment to fostering green living practices among residents.

Project Highlights

Gold Liu Xiang Yuan has received unanimous recognition from the community, local government, and residents for its nearly two years of work in developing green energy, sustainable development technology innovation, and building a low-carbon community.

1. In 2017, it was awarded the "Green Community" plaque by the Jiading District Environmental Protection Bureau of Shanghai.
2. In 2020, it received the "Water-saving Community" certificate from the Shanghai Municipal Spiritual Civilization Construction Committee Office and the Shanghai Municipal Water Affairs Bureau.
3. From 2022 to 2024, it participated in the low-carbon community demonstration project organized by the Shanghai Municipal Ecology and Environment Bureau

Project Implementation

As a leading property management company in China, Onewo is committed to pioneering low-carbon energy conservation in the real estate sector, with a particular focus on residential communities. In 2021, the Gold Liu Xiang Yuan project in Shanghai was designated a "low-carbon demonstration community" by the Shanghai Municipal Ecology and Environment Bureau, and under the guidance of the Community Management Office in Juyuan New District, Jiading District, Shanghai City, launched a series of low-carbon transformation projects:

1. Microgrid System

Leveraging advanced technology, Onewo established a microgrid, named Magic Stone, to integrate and optimize the community's primary energy sources and consumption. This small, controllable, and integrated power distribution system enables self-monitoring, protection, and regulation. By networking photovoltaic power, energy storage, and property office loads with strategic algorithms, the microgrid achieves cost-effective, low-carbon operations. This innovative model not only addresses high design and construction costs in low-carbon retrofits but also ensures ongoing, effective management, avoiding operational challenges commonly seen in traditional low-carbon communities.

2. Green Energy

The project's property office operates on 100% green electricity. Photovoltaic installations across 300 square meters of suitable rooftops, including office and waste management buildings, provide a total capacity of 80 MWp, generating up to 36,000 MWh annually. Energy storage systems maximize photovoltaic energy use, enhancing overall efficiency and sustainability.

3. Solar Street Lighting

In partnership with the community and homeowners' committees, Onewo installed 50 solar-powered street lights, accounting for 22.22% of all street lights in the community. Solar lighting improves safety, reduces crime rates, and enhances quality of life by extending outdoor activity time and fostering community engagement. In emergencies, such as power outages, solar lights serve as backup sources. Additionally, solar street lighting educates residents on renewable energy and promotes the transition to sustainable energy.

4. Elevator Energy Recovery System

Two high-use elevators in the community were equipped with energy feedback devices, reducing energy consumption by 26.7%, with an average savings of 30%. Each elevator generates approximately 6-8 kWh daily, totaling 2,190-3,000 kWh annually, thereby improving energy efficiency and lowering operating costs.

5. Wet Waste Treatment

In collaboration with the homeowners' committee, Onewo installed two wet waste processors to reduce, neutralize, and recycle waste. The processors, located in waste rooms on opposite sides of the community, grind and ferment 10 kg of waste daily, using 20 g of compost bacteria to produce eco-friendly fertilizer for 10 square meters of green space. This promotes recycling, enhances public awareness of waste management, and encourages community engagement in environmental initiatives.

6. Electric Bicycle Charging Stations

To promote green commuting, Onewo, with government support, installed six electric bicycle charging stations across two community locations. This infrastructure supports the adoption of low-carbon transportation, encouraging residents to choose electric bicycles over fuel-based vehicles.

7. Public Advocacy

Community-wide advocacy efforts support low-carbon living through over 10 monthly events, including workshops, exhibitions, and online forums that promote knowledge of low-carbon practices. The community's public account broadcasts these initiatives, with over 100 families participating in government-supported "Green Family" events organized with the Women's Federation. These activities foster a culture of sustainability and environmental responsibility among residents.

Project Impact & Sustainability

Currently, many existing residential communities in China lack energy-saving facilities and equipment from the early planning stages, making future low-carbon retrofitting a key challenge for asset holders and property managers. Shanghai's Gold Liu Xiang Yuan project, as an innovative pilot led by Onewo in "low-carbon transformation of residential communities," serves as a model for other communities managed by Vanke Service and for tens of thousands of residential communities nationwide.

For example, the property service center and photovoltaic storage investors maintain sustainable operations through energy performance contracting (EPC). Technologically, the project has pioneered Magic Stone microgrid systems that integrate power management, energy storage, load balancing, control systems, and networked management. This approach has enabled the widespread adoption of cost-effective, high-impact energy-saving solutions, such as solar street lighting and elevator energy regeneration devices. Additionally, low-carbon concepts and science-based knowledge on community transformation have been integrated into community life through accessible initiatives, like "flea markets" and "green low-carbon community cultural activities," fostering a strong community consensus on sustainability.

The development of low-carbon communities not only supports environmental sustainability but also brings notable social and economic benefits, with high potential for promotion and sustainability. With increased global focus on climate change and expanded response measures, low-carbon community development is poised to become a central trend in future community growth.

Expert Comments

At the current stage of economic and social development in China, rapid growth in societal electricity consumption necessitates energy-saving measures to reduce energy consumption and lower greenhouse gas emissions. This project, through a series of low-carbon, energy-saving facility upgrades and new constructions, has achieved a 10% reduction in per capita carbon emissions intensity within the community over three years. Additionally, by encouraging residents to participate in resource recycling, the project has significantly raised environmental awareness and community engagement. The valuable hands-on experiences gained from this project are expected to be transferable to other communities, promoting green renovations, encouraging residents to adopt low-carbon lifestyles, and ultimately enhancing the quality of the living environment.

Xiaomi AIoT+Green Digital Product Value Chain System

Xiaomi

Project Overview

With the mission of enabling everyone in the world to enjoy a better life brought by technology, we feel it is our responsibility to help solve this challenge with our products and technologies. In order to achieve the goal of helping users improve their "low-carbon happiness", we focus on improving product utility and ensuring the affordability of products while working hard to reduce the environmental footprint of products and services, ultimately making affordable clean technology available to everyone. This concept is rooted in the entire life cycle of Xiaomi's various products and services. The case is based on Xiaomi's Ecological Strategy 2.0. Xiaomi will integrate its smart manufacturing, supply chain management system, product industrial design, user feedback, and interactive design, and through the "Xiaomi AIoT+Digital Native Green Product Value Chain" system, achieve extreme production efficiency and extreme product efficiency that runs through users-engineering-suppliers, and reduce the carbon footprint of electronic products throughout their life cycle.

Company/Organization Profile

Xiaomi Corporation (hereinafter referred to as "Xiaomi") was formally established in April 2010 and listed on the Main Board of the Hong Kong Stock Exchange on July 9, 2018. Xiaomi is a consumer electronics and smart manufacturing company with smartphones, smart hardware and artificial intelligence Internet of Things (AIoT) platforms as its core businesses. Xiaomi's mission is to always insist on making good products that are "touching and reasonably priced" so that everyone in the world can enjoy the wonderful life brought by technology. In October 2023, the Group officially announced the new group strategy of "Full Ecosystem for People, Cars and Homes". According to the latest Fortune Global 500 list released globally in August 2024, Xiaomi Group ranks 397th in the Fortune Global 500.

From 2021 to 2023, Xiaomi Group's revenue was RMB 328.3 billion, RMB 280 billion, and RMB 271 billion, respectively. In the second quarter of 2024, Xiaomi's scale growth accelerated, with total revenue of RMB 88.9 billion, a year-on-year increase of 32.0%. We continue to deepen the "Full Ecosystem for People, Cars and Homes" strategy, and the smartphone × AIoT business has grown strongly. Among them, smartphone revenue was RMB 46.5 billion, with global shipments of 42.2 million units, a year-on-year increase of 28.1%. Smartphone shipments have ranked among the top three in the world for 16 consecutive quarters; IoT and consumer products revenue was RMB 26.8 billion, a year-on-year increase of 20.3%; Internet service revenue was RMB 8.3 billion, a year-on-year increase of 11.0%. In June 2024, the number of global monthly active users reached 676 million, a year-on-year increase of 11.5%.

Project Outcome

Xiaomi leverages its technological innovation and integration and coordination capabilities to give full play to the advantages of chain-leading enterprises. Based on the Ecological Strategy 2.0, it has built the "Xiaomi AIoT+Digital Native Green Product Value Chain" system to reduce the carbon footprint of electronic products throughout their life cycle. By building a digital native IoT platform, with technological innovation and integration and coordination capabilities, it provides systematic solutions and key technology demonstrations for the consumer electronics industry. The platform has quickly become the world's largest consumer-grade IoT platform and has been leading to date, connecting more than 600 million devices worldwide. Based on data, it realizes domestic and international dual circulation by supplementing and strengthening the chain, providing systematic solutions and key technology demonstrations for the quality improvement and carbon reduction of smart manufacturing in China's consumer electronics industry. It has realized the operation system of smart factories and flexible production, improved the efficiency of manufacturing, and reduced the carbon footprint of the value chain.

Based on Xiaomi's AIoT application system, Xiaomi displays energy consumption to users through the Mijia APP and provides energy-saving suggestions. At the same time, the AIoT system gives full play to the ability of information interaction, provides upstream companies with user portraits of energy-saving products in new scenarios, and provides downstream users with multi-scenario smart interconnection and automated energy-saving technologies, and continuously improves the low-carbon performance of products. Through large-scale production and global shipments of the ultimate "basic model", a series of "touching and reasonably priced" good products have been created in the process of low-carbon iteration and upgrading, such as power strips, power banks, and Xiaomi wristbands, which quickly occupied the market share and overturned the original low-price and low-quality, high-price and high-energy consumption product experience. As Xiaomi products become the mainstream choice in the market, they have set a model for low-carbon products for the entire industry.

Project Highlights

1. Xiaomi's "AIoT platform empowers smart home ecosystem" was selected as a demonstration case for the 2023 China International Fair for Trade in Services.
2. Xiaomi's "air conditioning energy-saving control technology based on IoT technology for customized comfortable operation" broke through the key technology of air conditioning intelligence and won the "international leading" technology appraisal in 2023.
3. "Xiaomi's research and application of key technologies for energy-saving and healthy household air conditioners based on Internet thinking" won the 19th (2023) China Household Appliances Innovation Achievement Award.

4. "Xiaomi AIoT+Digital Symbiosis Green Products and Value Chain" 2023 Paulson Sustainable Development Green Innovation Category Top Ten Nominations.
5. Xiaomi's whole-house smart home system won the Level 5 certification of Telecommunication Technology Laboratory in 2022.
6. The hardware devices in the Xiaomi AIoT platform are deeply integrated with the Mijia application. Based on Xiao Ai's multi-modal voice interaction and intent understanding capabilities, relying on the basic IoT method that supports multiple communication protocols, it independently develops communication modules that can adapt to all categories of smart homes, and has won
7. global authoritative certifications. The industry test has been ranked first in the industry in core indicators for three consecutive years.

In 2022, the project "Key Technologies and Applications of Heterogeneous Interconnection and Converged Interaction for Whole-House Intelligence" won the Second Prize of Beijing Science and Technology Progress Award.

Project Implementation

Xiaomi insists on technology-based development and has established 10 R&D centers, more than 200 laboratories and more than 16,000 engineers around the world. The annual R&D investment in 2023 will reach about 20 billion yuan. Based on Xiaomi's long-term investment in artificial intelligence, the Internet of Things, and big data, Xiaomi has built an artificial intelligence Internet of Things platform for smart homes to help small and medium-sized enterprises in the field of smart homes achieve user-oriented intelligent management of products. As of June 30, 2024, the number of monthly active users of Xiaomi AIoT platform will reach 676 million worldwide, and the number of connections and interactions will maintain a rapid growth trend. It is internationally leading in connection capabilities, interoperability, and ecological capabilities, and its interaction capabilities have reached the world's first-class level.

Xiaomi AIoT mobile terminal smart software includes Mijia APP and Xiaoai, etc., which provide users with one-stop access to Mijia products and other brands of home appliances, and have smart energy scenarios such as whole-house intelligence, which not only provides users with a convenient and comfortable smart environment, but also shows users energy usage and provides energy-saving suggestions. In terms of IoT-based device-level energy-saving patents and user environment customization control based on mobile phone interaction, it has obtained a number of world-leading energy-saving patents, which automatically improve the comprehensive energy efficiency of users while providing comfortable use of home appliances.

Xiaomi has fully utilized the advantages of chain-leading enterprises with its technological innovation and integration and coordination capabilities. Based on the ecological strategy 2.0, it has built a "Xiaomi AIoT+digital native green product value chain" system to reduce the carbon footprint of electronic products throughout their life cycle. By building a digital native IoT platform, it provides systematic solutions and key technology demonstrations for the consumer electronics industry with technological innovation and integration and coordination capabilities. The platform has quickly become the world's largest consumer-grade IoT platform and has been leading to date, connecting more than 600 million devices worldwide. Based on data, it realizes domestic and international dual circulation by supplementing and strengthening the chain, providing systematic solutions and key technology demonstrations for the quality improvement and carbon reduction of intelligent manufacturing in China's consumer electronics industry. It has realized the operation system and flexible production of smart factories, improved the efficiency of manufacturing, and reduced the carbon footprint of the value chain.

Based on Xiaomi's AIoT application system, Xiaomi displays energy consumption to users and provides energy-saving suggestions through the Mijia APP. At the same time, the AIoT system gives full play to the ability of information interaction, provides upstream enterprises with user portraits of energy-saving products in new scenarios, provides downstream users with multi-scenario smart interconnection and automated energy-saving technology, and continuously improves the low-carbon performance of products. Through large-scale production and global shipments with the ultimate experience of "basic models", a series of "touching people's hearts and reasonable prices" good products have been created in the process of low-carbon iteration and upgrading, such as power strips, power banks, Xiaomi bracelets and other products that quickly occupy the market share and subvert the original low-price and low-quality, high-price and high-energy consumption product experience. As Xiaomi products become the mainstream choice in the market, they have set a model for low-carbon products for the entire industry.

From basic technology to application technology, from hardware to software, from content to services, from user ecology to business ecology, Xiaomi AIoT's ecology is becoming more and more perfect. Xiaomi provides a complete and open artificial intelligence open platform, which mainly serves consumer smart hardware (for home use) such as smart home devices, smart home appliances, smart wearable devices, and smart travel devices and their developers, so that smart hardware can be controlled by Xiaoai and Mijia APP, and realize the interconnection between smart hardware, providing users with excellent smart hardware interaction experience. Xiaomi mobile phones and Mijia APP have become system-level entrances to almost all life scenarios of users. As of June 30, 2024, the number of users with five or more devices connected to the AIoT platform reached 16.1 million, a year-on-year increase of 24.2%. Xiaomi AIoT smart terminals continue to expand the influence of Mijia and low-carbon energy conservation, creating a low-carbon and happy life for consumers.

Project Impact & Sustainability

As the chain owner of electronics consumption, Xiaomi's supply chain has thousands of raw material suppliers and hundreds of foundry resources. At the same time, it has developed into more than 300 Xiaomi ecological chain companies and 4,000+ corporate developers, achieving 2,200 smart home categories. The large-scale industrialization of more than one type of smart hardware products has affected more than 40% of domestic supply chain companies and has a demonstration and driving role in the consumer electronics and smart home industries. Xiaomi integrates minimalist concepts into green industrial design and provides unified minimalist industrial design specifications to more than 100 ecological chain companies. Through the AIoT developer platform, Xiaomi provides free technical support to the supply chain, significantly reducing manufacturing materials and production costs. Based on the open one-stop access capability, it provides feedback on the energy consumption characteristics of different equipment to ecological chain enterprises, promoting upstream enterprises to adopt energy-saving technologies and extending the service life of products. "Basic" products with minimalist concepts as the core continue to reduce the carbon footprint of products through innovative iterations, and achieve the ultimate quality of products.

Xiaomi has solved the problems of lack of standards, low efficiency, lack of systems and disconnection in the smart terminal industry chain, and established 7 national and industry standards in 3 key links to improve operational efficiency. Promote the digital transformation of upstream and downstream enterprises with different empowerment models: the supply chain adopts a free platform access strategy to meet the delivery requirements of 500 suppliers. Smart manufacturing adopts a limited-time free + paid value-added strategy to meet the common demands of 12 foundries for cost reduction and efficiency improvement. The new retail link meets the common profit demands of 5,000 partners through free empowerment.

By quickly opening up the data chain from the platform application end to the production end based on the Xiaomi AIoT system, a complete closed loop between "user-product-manufacturing and supply chain" is achieved. Data is treated as an independent element and a complete data operation line is designed. Xiaomi uses native data to build a smart factory operation system, which processes, analyzes and provides feedback in real time to the data collected during the production process, and continuously promotes intelligence and production efficiency improvements. Ecological chain companies can obtain user energy feedback and energy-saving effects in different smart scenarios obtained from clients in a timely manner, and integrate them into energy efficiency optimization and smart scenario development in product iterations.

Expert Comments

Building on its Ecosystem Strategy 2.0, Xiaomi has integrated its strengths in intelligent manufacturing, supply chain management system, product industrial design, user feedback, and interaction design. Through its "Xiaomi AIoT + Digital Native Green Product Value Chain" system, Xiaomi maximizes production and product efficiency across the user-engineer-supplier chain, reducing the carbon footprints throughout the lifecycle of electronic products. This case has received multiple authoritative certifications and awards, allowing Xiaomi, an industry leader, to set a benchmark in low-carbon product development. It also provides a systematic solution and critical technological demonstration for the consumer electronics sector, with exemplary leading role in the consumer electronics and smart home industries.

Industry Pioneer —— Integrated Project of Deep Flue Gas Treatment and Waste Heat Heating for Citizens

Asia Symbol (Shandong) Pulp And Paper Co., Ltd.

Project Overview

The integrated project of deep flue gas treatment and waste heat heating for the community is an effective practice of Asia Symbol (Shandong) Pulp And Paper Company, in response to the national "dual carbon" goal and practicing the concept of sustainable development. The project was initiated and constructed in February 2021 and completed in 2023. The company has introduced professional technical expertise to recycle waste heat from the flue gas and wastewater generated during the pulp production process in areas such as the alkali recovery boiler and lime kiln of the factory. Part of the recovered heat is used for heating community residents, and the other part is reused in the company's production system, which can effectively replace and reduce the use of fossil fuels. The total investment of this project is RMB 327 million yuan, which can reduce carbon emissions by 382,500 tons per year and also lower the emission concentrations of nitrogen oxides, sulfur dioxide, and dust in flue gas.

During the 2022-2023 heating season, the total heating output was about 1.4 million GJ, achieving good environmental, social, and economic effects and receiving widespread recognition from all sectors of society. This project is the first and largest integrated energy-saving, environmental protection, and waste heat utilization project in China's paper industry, playing a leading and exemplary role in energy conservation and emission reduction for the national and even global paper industry.

Company/Organization Profile

亚太森博(山东)浆纸有限公司

The company is a world leading vertically integrated enterprise of pulp, paper and fiber, the largest commodity wood pulp production enterprise in China, and the largest foreign-funded enterprise in Shandong Province, leading the upgrading of the pulp and paper industry, technological progress, and green development.

The company is a unit responsible for the formulation and revision of national standards for pulp and paper products and industry standards. It has passed the ISO9001 quality, ISO14001 environmental protection, ISO45001 occupational health and safety, and ISO50001 energy management certification systems.

The company has invested a total of RMB 7 billion yuan in environmental protection, and its main clean production indicators have reached the industry's first-class level. The company fully utilizes the biomass waste generated during the pulp and paper production process to provide energy, which can reduce over 3 million tons of carbon emissions annually.

Project Outcome

1. This project can save 1470,00 tons of kgce annually, reduce carbon emissions by 382500 tons, and also lower the emission concentrations of nitrogen oxides, sulfur dioxide, and dust in flue gas.
2. The project has alleviated the pressure on local heating companies in terms of environmental protection, coal consumption, and emissions, and has found new environmentally friendly heat sources; The project also solves the problem of cooling the surplus low-temperature waste heat in the factory, and the government bridges and integrates resources to obtain policy support. Its operability is achieved through market-oriented mechanism funding support.
3. This project is the first integrated waste heat utilization project in the papermaking industry, playing a leading and exemplary role in energy conservation and emission reduction for the national and even global papermaking industry.
4. The Development and Reform Commission of Rizhao City, Shandong Province, regards this project as a typical example of energy conservation and carbon reduction, and promotes it in other enterprises in Rizhao. Currently, steel companies have begun to explore the use of waste heat for community heating.

Project Highlights

1. This project has been included in the "Three Year Action Plan for Deepening the Conversion of New and Old Driving Forces and Promoting Green, Low Carbon, and High Quality Development in Rizhao City (2023-2025)" and is being promoted as a key project.

2. In 2023, the project was awarded as an excellent case of "520 Social Responsibility Day".
3. The project has been reported on various media platforms such as Dazhong Net, People's Daily Online, and China Paper. It received widespread praise from the government and community residents.

Project Implementation

1. Project Background

The smoke and wastewater generated in the pulp and paper production process contain a large amount of low-temperature waste heat, but due to technical and cost reasons, it can't be recycled, which is a problem of energy waste faced by the entire paper industry.

With the proposal and promotion of the national "dual carbon" target, various regions across the country are exploring the path of green, low-carbon, and sustainable development. With the increase of urban population, heating enterprises in Rizhao Economic and Technological Development Zone are facing increasing pressure in terms of environmental protection, coal consumption, and carbon emissions. They are also actively exploring the use of green and low-carbon energy and heat sources.

2. Solution

In the face of numerous technologies for waste heat recovery and the characteristics of the pulp and paper industry, the technical team of Asia Symbol (Shandong) Pulp And Paper Company has conducted feasibility technical research and demonstration with multiple domestic and foreign companies and research institutions, and introduced the technical strength of professional companies. The main equipment adopts the patented technology of "vacuum phase change heat exchange" (Harbin Institute of Technology Jintao low-temperature phase change flash evaporation technology, which utilizes the characteristic that the boiling point of water decreases with the decrease of environmental pressure, creates a negative pressure environment through a vacuum pump, and causes industrial wastewater above 26 to flash evaporation, producing negative pressure steam that carries the latent heat of vaporization and is transported to the condenser for condensation and heat release into the low-temperature medium). The flue gas and high-temperature wastewater generated in the alkali recovery boiler, lime kiln, power boiler, incinerator and pulp production process of the factory, are used for waste heat recovery and utilization, Part of the recovered heat is used in cooperation with local heating companies for community residents' heating, while the other part is reused in the company's production system, which can effectively replace and reduce the use of fossil fuels.

This project involves the construction of 8 buildings and more than 107 sets of main equipment, including direct heat engines, spray towers, spray water pumps, intermediate water pumps, heating water pumps, return water pumps, motors, plate heat exchangers, flue gas re-heaters, condensate tanks, as well as supporting facilities and heating pipelines in the factory area.

The technical path of the flue gas treatment process implemented in this project is "indirect slurry low-temperature vacuum phase change flash evaporation condensation + flue gas reheating" and "flue gas spray condensation + reheating". The main process flow is to use indirect condensation of flue gas, namely slurry flash evaporation cooling, to achieve the purpose of flue gas condensation and dehydration. In the vacuum phase change heat exchange device, the slurry undergoes heat exchange through flash evaporation, transferring heat to the cold source - the internal cold source and heating water. The cooled slurry returns to the original process system to continue spraying the flue gas, thereby achieving the goal of reducing the temperature and moisture content of the discharged flue gas.

3. Key breakthrough

(1) This project combines the characteristics of the pulp and paper industry in terms of technology, and after technical exchanges with multiple domestic waste heat recovery equipment manufacturers, it has been used for the first time in the pulp and paper industry.

(2) As the project leader, the technical team continuously explores and innovates during the project implementation process, improving the original direct heating integrated waste heat recovery equipment developed by Harbin Institute of Technology to meet the needs of flue gas waste heat recovery from different furnace types.

(3) This project has received strong support from the Rizhao Municipal Government, Rizhao Ecological Environment Bureau, Rizhao Economic Development Zone, and others. The government has acted as a bridge to convert the waste heat energy from factories into livelihood resources, achieving energy recycling and regional carbon reduction.

Project Impact & Sustainability

1. This project is an innovative project in the world's pulp and paper industry that combines flue gas waste heat reuse with civilian use. It has obvious characteristics of technological innovation and mechanism innovation, and has received widespread praise from local governments, ecological environment departments, and communities. It also has good environmental, social, and economic significance.
2. This project has promotable and replicable value, and Rizhao City has already started organizing promotion.

Expert Comments

The Deep Flue Gas Treatment and Integrated Waste Heat Utilization Project recovers waste heat from flue gas in the alkali recovery boilers and lime kilns, as well as from wastewater generated during the pulping process. This recovered heat is partly used to provide heating for community residents and partly recycled back into the company's production system, effectively reducing fossil fuel consumption and, consequently, carbon emissions. It also lowers the emission concentrations of nitrogen oxide and sulfur dioxide in flue gas, and dust. This case sets a benchmark and demonstration effect for energy conservation and emission reduction in the paper-making industry nationally and globally, generating notable environmental, social, and economic benefits. It has been widely covered by media outlets including dzwww.com, people.cn, thepaper.cn, and paper.com.cn.

China National Petroleum Corporation (CNPC) Has Innovatively Launched the “I Plant a Tree for Carbon Neutrality” Public Welfare Campaign, Mobilizing Societal Efforts to Contribute to the Construction of a Beautiful China.

CNPC

Project Overview

China National Petroleum Corporation (CNPC) has fully leveraged its role as a central state-owned enterprise in setting an example for ecological civilization and the construction of a Beautiful China. Since 2022, CNPC has innovatively launched the “I Plant a Tree for Carbon Neutrality” public welfare campaign. Through the national voluntary tree planting network platform, it raises funds from petroleum employees, partners, and the general public. During the 14th Five-Year Plan period, CNPC plans to establish carbon sink forests or carbon-neutral forests on its own production base lands through new plantings, regeneration, and care efforts. The initiative also involves biodiversity protection, tree planting at oil and gas production sites such as well stations, and research on carbon sink-related topics in forestry and grasslands, contributing to the realization of the national “dual carbon” goals and the construction of a Beautiful China.

The operating model of this initiative has been rapidly replicated and promoted across the country, receiving widespread attention and high praise from relevant national ministries, domestic and international mainstream media, various social sectors, and industry peers. To date, over 1.553 million people have participated, raising more than 46.97 million yuan in total. CNPC has already established 4,050 acres of forest land and plans to plant a total of 15,000 acres. Once completed, the project is expected to contribute approximately 200,000 tons of carbon sinks over 20 years and create over 40,000 jobs for society.

Company/Organization Profile

China National Petroleum Corporation (CNPC) is a key state-owned enterprise and one of the world’s major producers and suppliers of oil and gas. CNPC is an integrated international energy company, engaged in domestic and international oil and gas exploration and development, as well as businesses in new energy, refining and chemical production, new materials, support and services, capital, and finance. CNPC firmly upholds the concept that "clear waters and green mountains are as valuable as gold and silver mountains,” and is committed to promoting green and low-carbon development. The company is accelerating the construction of a green and clean energy system, developing and promoting green and low-carbon technologies and processes, and making resource conservation and environmental friendliness a mainstream way of production and life. Through its green and low-carbon transition, CNPC aims to achieve joint development with society and harmonious coexistence between humanity and nature.

Project Outcome

1. Economic Benefits: To date, the total funds raised have exceeded 46.97 million yuan, with over 1.553 million participants, making it the largest fundraising project on the national voluntary tree-planting network platform. In 2022 and 2023, the amount of funds raised and the number of participants accounted for over 40% of the total funds and participants raised through social networks by the China Green Foundation. The initiative has boosted employment in related fields such as design, planting, maintenance, and engineering, providing approximately 40,000 jobs.
2. Social Benefits: The campaign’s theme resonates with the spirit of the times, and its goals align with current trends, keeping it at the top of the national voluntary tree-planting network’s list of popular projects for an extended period. Its strong public outreach and brand image have been recognized by relevant government ministries, the public, and mainstream media. Over 40,000 related news reports have been published, with repeated coverage and reprints on major media platforms such as People's Daily Online and Xinhua Net. CNPC pioneered a new model of central state-owned enterprise participation in the “Internet + Voluntary Tree Planting” initiative in China, with its practices and themes widely replicated, inspiring many similar projects to go online.
3. Ecological Benefits: Currently, 4,050 acres of forest have been established, with a plan to plant a total of 15,000 acres. Once completed, the project is expected to contribute approximately 200,000 tons of carbon sinks over 20 years, along with providing comprehensive ecological benefits such as biodiversity protection, soil and water conservation, and slope stabilization, contributing to the construction of a Beautiful China. The initiative was featured at the China Pavilion side event during the 27th and 28th Conferences of the Parties (COP27, COP28) to the United Nations Framework Convention on Climate Change, drawing widespread attention and praise from domestic and international peers.

Project Highlights

1. It pioneered a new model for central state-owned enterprises in China to participate in the “Internet + Voluntary Tree Planting” initiative, leading similar activities in terms of participants, funds raised, and social influence, and has become a benchmark demonstration project.
2. Its strong public outreach and brand image have been recognized by the general public and mainstream media, encouraging more public participation.
3. The campaign’s outcomes are remarkable, delivering significant economic, ecological, and social benefits.

4. The demonstration effect is excellent, with its model, practices, and themes widely replicated and promoted.

Project Implementation

1. Innovatively Establishing a Strategic Partnership with the China Green Foundation

   CNPC signed a cooperation agreement with the China Green Foundation, establishing a long-term, stable, and efficient mutual cooperation and exchange mechanism. The focus of this partnership is on national land greening, ecological protection and restoration, and biodiversity conservation. By leveraging the resource advantages of both parties, they promote the project and its concepts. After the signing of the cooperation agreement, the "CNPC Green Carbon Neutrality Action" project was launched. The first specific project under the agreement, the "I Plant a Tree for Carbon Neutrality" public welfare campaign, was launched in March 2022, creating a model project for collaboration between a central state-owned enterprise and the China Green Foundation to support the "dual carbon" goals.

2. Actively Planning the "I Plant a Tree for Carbon Neutrality" Public Welfare Campaign

   Every year, CNPC headquarters issues a notice to organize and advocate for the campaign, with the company's Youth League Committee encouraging active participation. Large-scale voluntary tree planting activities are organized, and the media matrix, including newspapers, websites, social media, and videos, quickly follows up to create a strong promotional atmosphere, embedding the "dual carbon" and green planting concepts in the public mind. To date, the campaign has raised more than 46.97 million yuan, with over 1.553 million participants. In 2022 and 2023, the funds raised and the number of participants accounted for over 40% of the total raised by the China Green Foundation's social network fundraising efforts, making the campaign a benchmark and model for corporate participation in the "Internet + National Voluntary Tree Planting" initiative.

3. Comprehensive Layout for Carbon Sink Forests and Carbon Neutral Forests

   CNPC has developed a greening plan for the 14th Five-Year Plan period, combining voluntary tree planting with public green welfare activities, developing both existing and new forest land, and integrating large-scale afforestation of available land with small-scale greening efforts at oil and gas production sites. The company also promotes afforestation in partnership with local communities. These efforts have led to the comprehensive layout of carbon sink and carbon-neutral forests. Relevant projects started at representative production bases at the end of 2022, with 4,050 acres of carbon sink and carbon-neutral forests already established.

4. Actively Supporting the "World Economic Forum Trillion Trees Initiative"

   CNPC, fulfilling its responsibility as a central state-owned enterprise, was one of the first domestic companies to respond to and implement the "World Economic Forum Trillion Trees Initiative." Using funds raised through the "I Plant a Tree for Carbon Neutrality" campaign, the company launched the "Ten Thousand Well Sites Afforestation Action" to carry out afforestation at well sites. This initiative promotes ecological protection, soil and water conservation, slope stabilization, and greening efforts, creating a "Ten Thousand Well Sites, Millions of Participants" social demonstration effect.

5. Exploring and Researching Self-Contributing Biodiversity Conservation

   CNPC actively promotes synergies between climate change response and biodiversity conservation, enhancing in-situ biodiversity conservation levels in alignment with its business operations. The company has established self-contributing biodiversity conservation areas, pushing biodiversity conservation to the forefront of its corporate agenda. In collaboration with top universities, CNPC conducts continuous surveys of flora and fauna at select company sites, analyzes key threats, and formulates conservation plans and policies. Ten Other Effective Area-based Conservation Measures (OECMs) have been officially designated, making CNPC the first domestic enterprise to implement OECMs. Additionally, at the headquarters level, the company has initiated comprehensive biodiversity monitoring and developed a scientific monitoring plan, constructing an intelligent monitoring network.

Project Impact & Sustainability

In the new context, oil and gas companies can promote the sustainable development of the fossil fuel industry by engaging in carbon sink projects. Increasing forestry carbon sinks can help reduce the global carbon footprint to some extent. Under the carbon neutrality framework, forestry carbon sinks may become a new path for the sustainable development of oil companies. Going forward, CNPC will continue to deeply implement Xi Jinping's thought on ecological civilization, stay committed to the goals of carbon peaking and carbon neutrality, and closely align with CNPC's green and low-carbon ecological development strategy. The company will continue to enhance publicity and leadership efforts, contributing to the construction of a Beautiful China Petroleum and strengthening the green foundation for becoming a world-class, comprehensive international energy company with lasting success. By fully leveraging its role as a central state-owned enterprise, CNPC will inspire broader efforts in national land greening and make greater contributions to global environmental and climate governance, advancing the goal of building a modern civilization where humanity and nature coexist harmoniously.

Expert Comments

China National Petroleum Corporation (CNPC) has exemplified its role as a leading central enterprise by launching the innovative "Plant a Tree for Carbon Neutrality" public welfare event. Hosted on a nationwide tree-planting network platform, the event raises funds from CNPC employees, partners, and the general public to establish carbon sink or carbon-neutral forests and to plant trees at well sites, covering 4,050 mu (or 270 hectares) on CNPC-owned land. To date, the event has attracted over 1.553 million participants and raised more than CNY46.97 million. By engaging the public in this endeavor, the event has significantly raised public awareness and participation in the dual carbon goals, serving as a successful case of innovative modes and mechanisms for public engagement in China's national dual carbon strategy.

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Disclaimer:

The contents included in the Cases are provided by the case declarants, organized by the co-initiators C Team and the Center for Environmental Education and Communications of the MEE of China, and commented by relevant industry experts. The co-initiators and experts are not responsible for the accuracy of the information and data provided herein.

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CCCA
CHINA CORPORATE CLIMATE ACTION
中国企业气候行动

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China Corporate Climate Action (CCCA) is a non-profit cooperative network initiated voluntarily by industry associations, business enterprises and social organizations and launched at the Global Climate Action Summit in September 2018. CCCA is committed to driving the carbon emission reduction, green transformation and green innovation of the whole industry chain and industrial clusters through the leadership of industry organizations, promoting industrial and commercial enterprises to integrate climate change mitigation into their corporate development strategies and corporate social responsibility and to become corporate models in addressing climate change, proactively publicizing sustainable business modes and climate solutions, and leading the directions of markets, industries and policies.

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