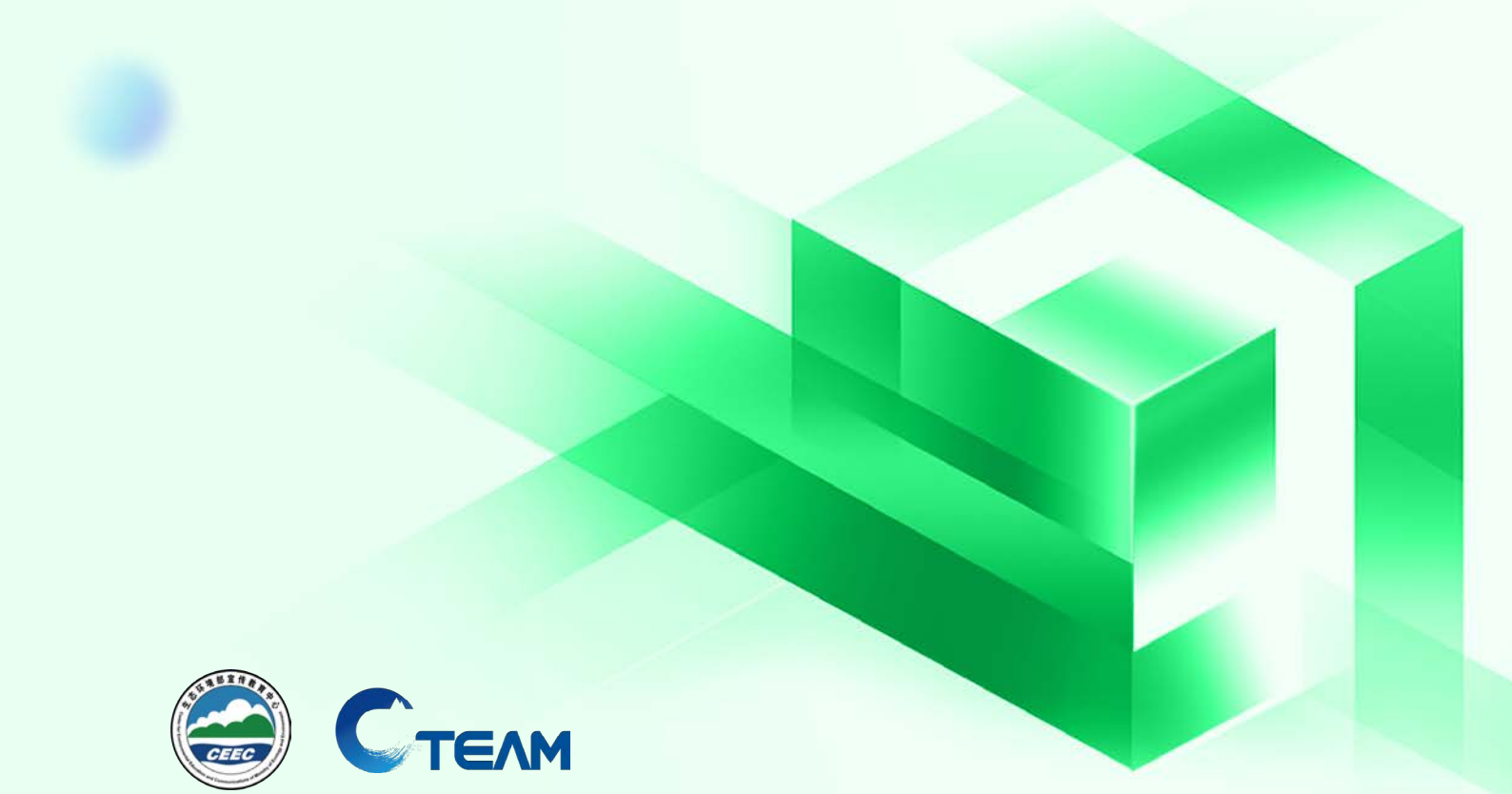
绿色空间
使用者行动
Distinguished Green
Users for Space

2025 BEAUTIFUL CHINA CASE STUDIES OF DISTINGUISHED GREEN USERS FOR SPACE



Editor's Note

In recent years, the "Beautiful China, I Am an Actor" series of activities work plan, jointly released by the Ministry of Ecology and Environment and other departments, has advocated for a simple, moderate, green, and low-carbon lifestyle while mobilizing parks, enterprises, communities, schools, families, and individuals to take action. Green space users are precisely the ones translating policy language into daily practice.

The collected cases involve diverse entities such as schools, enterprises, and parks. Through various approaches including resource utilization, circular economy, and carbon management, they have, to some extent, embarked on a green path characterized by source reduction, process control, and end-of-pipe recycling. Some of these projects have achieved notable ecological, economic, and social benefits.

Admittedly, green space usage models remain exploratory, lacking unified standards and guidelines to direct related work. Some participating organizations have limited internal funding, as well as constrained channels for promotion and network support. The very purpose of launching this project is to identify, recognize, and encourage actively engaged social forces, facilitate exchange and mutual assistance among them, and share experiences and practices. We hope that next year this initiative will bring together more participants and inspire greater grassroots wisdom.

Center for Environmental Education and Communications of the MEE

C Team

November 2025

Project Team of the 2025 Beautiful China Case Studies of Distinguished Green Users for Space

Shidong YAN, Yu LIN, Penghui LI, Xueqin DENG

Ge TIAN，Peidan YANG, Guanli WANG, Yifeng LIU

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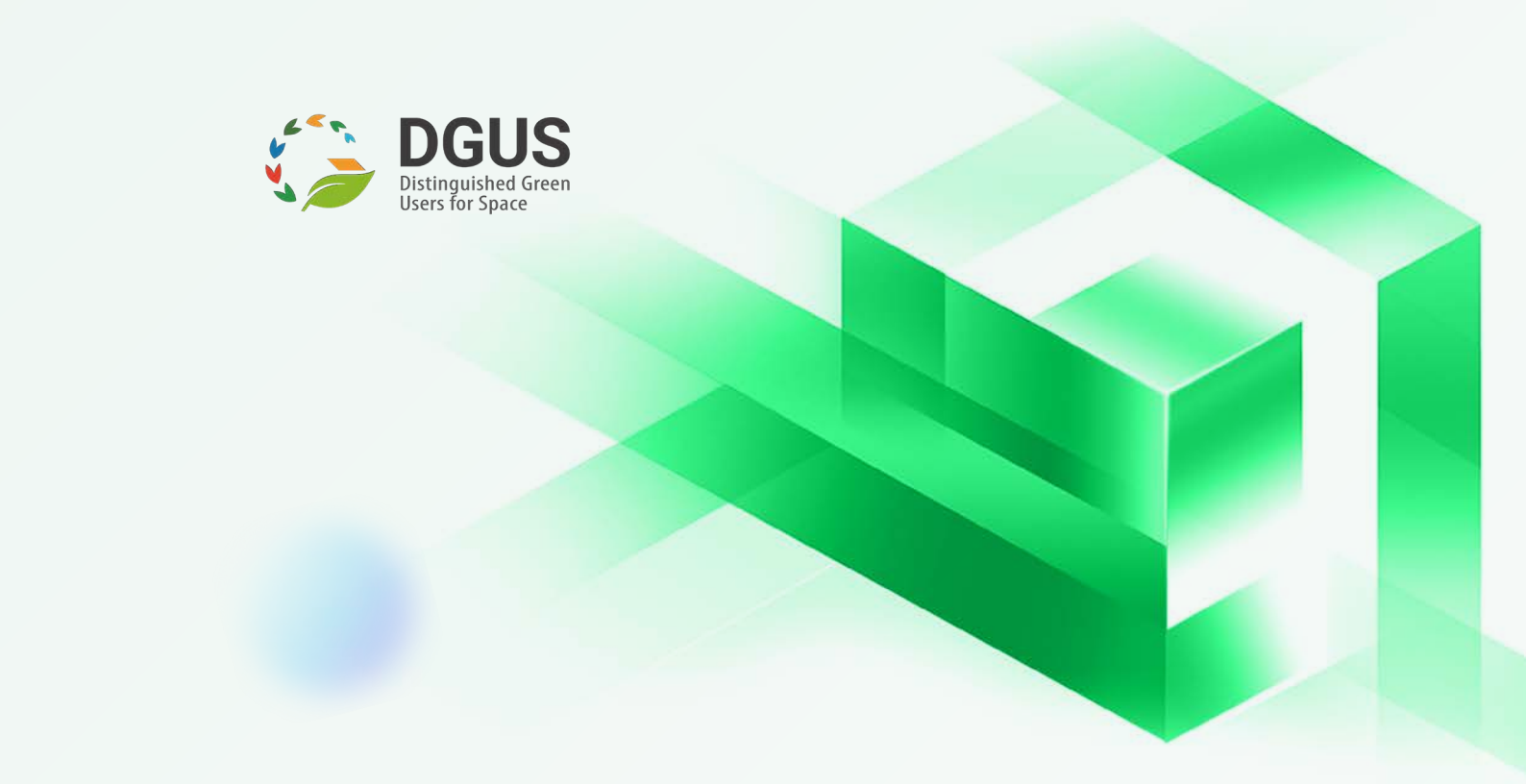


YANGTZE RIVER PHARMACEUTICAL GROUP : FORGING A "WASTE-FREE" EXEMPLARY MODEL IN THE PHARMACEUTICAL INDUSTRY

Project Overview

In order to implement the concept of sustainable development and respond to the national call for "zero-waste cities", in October 2023, Yangtze River Pharmaceutical Group initiated the construction of the first "Zero-Waste Group" in the pharmaceutical industry of Jiangsu Province. Through measures such as source reduction and recycling, the group aimed to enhance the level of solid waste resource utilization and reduce environmental risks. The construction of the "Zero-Waste Group" by Yangtze River Pharmaceutical Group was based on 2023 as the base year. The "Yangtze River Pharmaceutical Group Zero-Waste Group Construction Implementation Plan (2024-2025)" was compiled and submitted to the environmental protection department for record and approval. The implementation period was from January 2024 to December 2025, involving 9 factories within Jiangsu Province. By the end of 2024, the coverage rate of clean production audits for normal production factories of Yangtze River Pharmaceutical Group reached 100%; the reduction and utilization of industrial solid waste was approximately 1,929 tons, generating economic benefits of approximately 11.9 million yuan; the generation intensity of industrial solid waste was reduced to 0.0478 tons per ten thousand yuan.

Company/Organization Profile

Yangtze River Pharmaceutical Group was founded in 1971. It has over ten factories and more than 20,000 employees. Its products include both Chinese and Western medicines, and it has expanded into the field of health care. It covers 15 therapeutic areas and has a total of 565 specifications. Its marketing network covers all provinces in China, and some of its products are exported to 42 countries and regions around the world. It has established 4 national-level innovation platforms and won 3 National Science and Technology Progress Awards. It has successively won the China Quality Award Nomination Award, the EFQM Global Award, and the National Excellent Intelligent Factory title. In line with the Healthy China initiative, it is accelerating the layout of the integrated development of medicine, healthcare, elderly care, food, and tourism, and is moving towards the vision of becoming a leading and world-class pharmaceutical and health care industry group in China.

扬子江药业集团
Yangtze River Pharmaceutical Group

Project Highlights

Based on the current situation of solid waste at each factory, Yangtze River Pharmaceutical Group has actively explored the paths of reducing, recycling and harmless treatment of solid waste, aiming to minimize the environmental impact of the solid waste generated by the company's production and operation activities through the construction of an "Zero-Waste Group". As of the end of August 2025, four of the group's factories have received the local "zero-waste factory" honor.

Project Outcome

1. Reduction of packaging materials

In order to simultaneously meet the requirements of GMP and ESG, Yangtze River Pharmaceutical Group has formulated the "Regulations on the Management of Materials for Pharmaceutical Packaging of Yangtze River Pharmaceutical Group", which clearly defines the full-process control requirements for packaging material quality and acceptance, and systematically promotes the reduction of packaging materials. For example, the factory directly prints the content of the drug instructions on the packaging box to reduce the use of instructions. Taking doxofylline injection as an example, it reduces the annual paper usage by 10.84 tons. The factory reduces the specification of the blister in the packaging of Lanqin Oral Liquid to reduce the use of plastic packaging materials, reducing the annual plastic usage by 4.47 tons.

2. Organic solvent recycling

As a key reaction medium in pharmaceutical production, the single batch consumption of organic solvents is usually several times that of the products. To reduce the solvent usage, Yangtze Jiang Pharmaceutical Group, from the perspective of process optimization, has taken effective measures to minimize the use of organic solvents. For instance, in the specific drug production process of the factory, methods such as distillation and concentration are employed to recover and reuse the chemical solvents. In 2024, 1,477 tons of solvents were recycled and reused, saving costs of 10.5 million yuan.

3. Paperless Office

To simplify the daily management process in laboratories and promote the paperless transformation of office work, in accordance with the unified deployment of Yangtze River Pharmaceutical Group, each factory has adopted the ELN system (Electronic Laboratory Notebook) to achieve digital collection, classification, storage and retrieval of laboratory data, facilitating unified data management. After the ELN system was put into use, each factory saved approximately 560,000 sheets of paper annually. By the end of 2024, Yangtze River Pharmaceutical Group had extended the application of the ELN system to 10 of its factories, achieving paperless operation in laboratories.

4. Solid Waste Industrialization

Yangtze River Pharmaceutical Group has comprehensively reviewed the current situation of solid waste, fully tapped the potential for resource utilization of solid waste, actively established cooperative relationships with solid waste disposal units, and gradually increased the comprehensive utilization rate of solid waste. For example: The group jointly explored the resource utilization path with the activated carbon production unit, converting the previously incinerated waste activated carbon into recycling and utilization. In 2024, 53 tons of waste activated carbon were recycled and utilized; the factory entrusted a qualified unit to conduct a hazardous characteristic identification of the sludge generated by the wastewater station. The identification result was general industrial solid waste. After being registered with the environmental protection department, it cooperated with the disposal unit to utilize the drying technology to turn the sludge into a brick-making raw material. In 2024, 87.1 tons of sludge were comprehensively utilized.

Project Implementation

"The Waste-Free Group" is an expansion and extension of the national initiative for "waste-free cities". In response to the call for building a "waste-free group", and to promote the reduction of solid waste at the source and its resource utilization by Yangtze River Pharmaceutical Group, as well as to strengthen the management of solid waste throughout its lifecycle, in October 2023, Yangtze River Pharmaceutical Group initiated the construction of the first "waste-free group" in the Jiangsu pharmaceutical industry. The group is committed to establishing a "waste-free group" construction system with reduction and resource utilization as the core, supported by information technology, and guaranteed by institutional construction, with the aim of building a distinctive "waste-free group" system of Yangtze River Pharmaceutical. Gradually, a new model of "waste-free Yangtze River" has been established, promoting the green and low-carbon development of the group and leading the new trend of green development in the industry.

I. Construction Scope

The construction of the "waste-free group" involves 9 factories within Jiangsu Province, jointly promoting the construction of the "waste-free group".

II. Construction Goals

1. By the end of 2025, the intensity of industrial solid waste generation will be reduced to 0.048 tons per 10,000 yuan.
2. After 2025, the construction of the "waste-free group" will be continuously advanced, and the intensity of industrial solid waste generation will continue to be reduced.

III. Key Measures Taken

In 2024, Yangtze River Pharmaceutical Group comprehensively reviewed the current situation of solid waste management and identified projects for solid waste reduction, resource utilization, and harmless treatment. In April 2024, the "Yangtze River Pharmaceutical Group Construction Plan for a Waste-Free Group (2024-2025)" (hereinafter referred to as the "Plan") was compiled and passed the provincial expert review on solid waste management, and received the approval document from the environmental protection department in October 2024. The main measures of the Plan are as follows:

1. In terms of solid waste reduction and resource utilization, through measures such as reducing packaging waste, recycling organic solvents, promoting paperless office operations, and Solid Waste Industrial Chain Integration, the intensity of industrial solid waste generated by the group has been continuously reduced, contributing to the achievement of the "zero waste" goal.
2. In terms of solid waste management, the group's requirements for hierarchical and classification management of hazardous waste and laboratory hazardous waste management have been clarified, and these requirements have been integrated into the "Regulations for the Prevention and Control of Solid Waste Pollution Environment" and implemented throughout the group, promoting the refined management of hazardous waste.
3. In terms of information technology construction, with Yangtze River Pharmaceutical Group Co., Ltd. as a pilot, a smart management platform for hazardous waste was built. Through information technology means, the entire process of hazardous waste management will be strengthened.

IV. Construction Achievements

By the end of 2024, the coverage rate of clean production audits for operating factories reached 100%, the reduction and utilization of industrial solid waste was approximately 1,929 tons, generating economic benefits of approximately 11.9 million yuan, and the intensity of industrial solid waste generation was reduced to 0.0478 tons per 10,000 yuan, achieving the overall project goals ahead of schedule.

In the future, Yangtze River Pharmaceutical Group will continue to explore measures for solid waste resource utilization and reduction, strengthen the management of solid waste throughout its lifecycle, promote the development of solid waste disposal towards efficiency, intelligence, and low-carbonization, and contribute to the sustainable development of the group.

Project Impact & Sustainability

The "zero-waste" construction of Yangtze River Pharmaceutical Group is an expansion and extension of the national plan for "zero-waste cities". Its aim is to reduce the generation intensity or total amount of solid waste in the enterprise through measures such as solid waste reduction, resource utilization, and harmless treatment, thereby minimizing the impact on the environment. In 2025, the group innovatively proposed to carry out the construction of "zero-waste workshops" within the factory. It assesses each workshop based on the recovery rate of hazardous waste generation, further implementing and refining the "zero-waste group" construction work. At the same time, the group actively promotes the excellent case experiences of "Zero-Waste Group": on the one hand, it participated in the compilation of T/UNP 724—2025 "Guidelines for Zero-Waste Factory Construction in Pharmaceutical Enterprises", leading the top-level design of "zero-waste factories" in the pharmaceutical industry; on the other hand, it leverages platforms such as "2025 International Forum on Ecological Civilization in Guiyang ESG Cases" and "Outstanding ESG Practices of Chinese Enterprises Internationalization" to share excellent practices and assist the pharmaceutical industry in its "zero-waste" transformation.

Expert Comments

As Jiangsu Province's first pilot 'Zero-Waste Enterprise' in the pharmaceutical industry, Yangtze River Pharmaceutical Group has established a solid waste management system focused on source reduction and resource utilization. Through measures including packaging minimization, solvent recycling, paperless offices, and industrial utilization of solid waste, the company has achieved remarkable data-driven results and passed cleaner production audits at all nine of its facilities. This provides a replicable, standardized model for green and low-carbon transformation in pharmaceutical manufacturing.

GANSU LONGSHEN RONGFA PHARMACEUTICAL CO., LTD.: GREEN LOW-CARBON OPERATION AND RESOURCE RECYCLING PRACTICE IN ITS CHINESE PATENT MEDICINE FACTORY AREA

Project Overview

In March 2022, Longshen Rongfa launched a green low-carbon transformation project in its factory area in Dingyuan Town, Yuzhong County, Lanzhou City, Gansu Province, focusing on the core directions of "space operation optimization" and "resource recycling". The project includes building a 500kW solar photovoltaic system, upgrading sewage and waste gas treatment facilities, constructing a herb residue-organic fertilizer recycling chain, and introducing a fully automatic intelligent dropping pill production line. By December 2024, the project provides 656,000 kWh of green electricity annually, with a water recycling rate of over 90%, 100% herb residue recycling, and 2.33 tons of annual nitrogen oxide emission reduction. It has obtained the "Municipal Green Factory" certification and become a model of green operation for Chinese patent medicine enterprises.

Company/Organization Profile

Gansu Longshen Rongfa Pharmaceutical Co., Ltd. is a provincial state-owned GEM listed company (stock code: 300534), mainly engaged in the R&D, production, and sales of Chinese patent medicines. It possesses 25 products across 5 dosage forms (such as dropping pills and mixtures), 5 of which are national exclusive varieties. As a national high-tech enterprise and municipal green factory, the company has passed ISO9001/14001/45001/50001 four-system certification. It is committed to building provincial platforms, such as the Gansu Provincial Technical Innovation Center for Chinese Medicine Solid Dispersion Preparations, and focuses on green production and ESG governance to promote the sustainable development of the traditional Chinese medicine industry.

Project Highlights

The project prioritizes the use of existing resources, such as building PV on factory roofs (occupying no new land) and utilizing existing production wastewater to create a circulation system. It innovates by establishing a "production-herb residue-planting" ecological chain, achieving synergy between industry and the environment. The company has obtained "Municipal Green Factory" and "National High-Tech Enterprise" certifications, as well as 2.7 million yuan in government technological transformation subsidies.

Project Outcome

1. **Energy & Emission Reduction:** Generates 656,000 kWh of electricity annually from solar PV, replacing traditional energy and achieving an annual carbon reduction of approximately 468 tons. The factory area's comprehensive energy consumption has also decreased by 15%.
2. **Water Resource Utilization:** The water circulation system's utilization rate exceeds 90%, reducing annual fresh water intake by approximately 120,000 tons and achieving water cost savings of about 840,000 yuan.
3. **Solid Waste Reduction:** 100% of herb residue is recycled into organic fertilizer, reducing annual solid waste disposal by 800 tons and generating derivative revenue of approximately 560,000 yuan.
4. **Pollutant Control:** Following the ultra-low nitrogen transformation of boilers, NOx emissions are ⩽ 30mg/Nm^3 (achieving an annual emission reduction of 2.33 tons), and 300m^3 of sewage is treated daily with 100% compliance.
5. **Economic Benefits:** The fully automatic production line reduced the scrap rate by 30%, saving approximately 2 million yuan in material costs annually, and secured 2.7 million yuan in government subsidies for green technological transformation.

Project Implementation

I. Implementation Plan and Process (Mar 2022-Dec 2025)

1. **Energy Transformation Stage (Mar 2025-Dec 2025):** Build a 500kW solar PV system on the existing factory roof (about 8,000 ㎡) with supporting intelligent energy storage equipment; simultaneously replace workshop lighting and air conditioning systems with LED energy-saving lamps and frequency conversion equipment to enable real-time energy consumption monitoring.
2. **Resource Recycling Stage (Jan 2023-Sep 2023):** Transform the original sewage treatment station and add a reclaimed water reuse pipeline network (covering greening and equipment cooling); cooperate with local agricultural cooperatives to establish a herb residue fermentation production line and process herb residues into organic fertilizer for Chinese medicinal materials planting.
3. **Pollution Control and Intelligence Stage (Oct 2023-Dec 2024):** Carry out ultra-low nitrogen transformation of natural gas boilers (install denitrification devices); introduce a fully automatic dropping pill counting and packaging production line, integrate AI identification and rejection system to reduce material waste.

II. Comparison Before and After Implementation

- **Energy consumption:** Before transformation, the factory used about 4.3 million kWh of electricity annually (fully dependent on grid electricity); after transformation, it uses 656,000 kWh of green electricity annually, and comprehensive energy consumption decreased by 15%;
- **Water resources:** Fresh water consumption decreased from 130,000 tons to 10,000 tons annually, and water recycling rate increased from 60% to over 90%;

- **Pollutants:** Nitrogen oxide emissions decreased from 80mg/Nm^3 to below 30mg/Nm^3, and sewage COD concentration decreased from 150mg/L to below 50mg/L.

III. Challenges and Support

- **Overcoming Challenges:** Odor control during herb residue fermentation (introduced biological filter deodorization process).
- **Internal and External Support:** Internally, a "Green Technological Transformation Special Group" was established, investing about 42 million yuan.

Externally, the project obtained 2.7 million yuan from the "Manufacturing High-Quality Development Special Fund" of the Gansu Provincial Department of Industry and Information Technology; received technical guidance from the Lanzhou High-Tech Zone Environmental Protection Department; and cooperated with Gansu Agricultural University to optimize the organic fertilizer formula.

Project Impact & Sustainability

1. **Innovation Value:** Technically, it achieves the integration of "PV + energy storage + load matching" (replicable for high-energy-consuming pharmaceutical enterprises). Institutionally, it integrates party building with ESG governance and establishes a "green KPI assessment" (e.g., linking workshop energy consumption compliance rates to performance).
2. **Industry Promotion:** It provides a full-chain green transformation template (covering energy, resources, and pollution) for Chinese patent medicine enterprises. It has hosted 12 peer companies for site visits and study tours, and its related technologies have been cited in the "Green Production Guide for the Traditional Chinese Medicine Industry."
3. **Sustainability:** The follow-up plan is to expand the PV installed capacity to 1000kW in 2025 and explore the "green electricity direct supply + carbon trading" model. It will also cooperate with local governments to expand the application of its herb residue organic fertilizer to 20,000 mu of Chinese medicinal materials planting bases, continuing to enhance its circular ecology model.

Expert Comments

LongShen RongFa, a traditional Chinese medicine enterprise, has implemented an integrated 'photovoltaic + energy storage + load matching' system to establish a comprehensive green operation chain covering energy, resources, and pollution control. The project has achieved a 15% reduction in annual comprehensive energy consumption and decreased solid waste by 800 tons, with verified data demonstrating significant environmental benefits. Future plans include expanding photovoltaic capacity to 1,000 kW and exploring carbon trading opportunities, showing strong potential for continuous improvement. This case demonstrates exemplary value for low-carbon development in the TCM industry.

MENGNIU:
WATER CIRCULAR ECONOMY ACTIONS AND INNOVATIONS

Project Overview

Mengniu's yogurt Division has established a water circular economy system centered on efficient water resource recycling. Addressing the high water consumption inherent in dairy production, the division leverages digital and intelligent technologies alongside full-chain management optimization to implement a "monitoring-optimization-recycling-coordination" framework.

Specific actions are as follows:

1. Deploying smart metering devices covering 99% of water usage points to enable real-time data collection and visual management of water consumption;
2. Developing a digital CIP cleaning algorithm that reduced ineffective cleaning rates from 38% to 24%, minimizing water waste during cleaning processes;
3. Establishing a three-tier reuse system ("production water – recycled water – reclaimed water"), achieving a 95% reuse rate for cooling water.The maximum daily recycled water usage at a single plant reaches 600 tons.;
4. Promoting cross-departmental collaboration to integrate water data with carbon management and ESG systems, forming a systematic water conservation mechanism.

Ultimately, these initiatives resulted in a 15% reduction in water consumption per ton of product, increased water resource recycling rates to 35%, and earned four factories national "Green Factory" certification. The Tai'an factory achieved AWS (Alliance for Water Stewardship) Gold Level certification, providing replicable best practices for water recycling in the dairy industry.

Company/Organization Profile

Mengniu High-Tech Dairy Products (Beijing) Co., Ltd. was established on February 14, 2014. As a high-tech enterprise under Mengniu Dairy Group, it specializes in the research, development, and production of low-temperature fermented milk and lactic acid bacteria beverages. Located in the Food Industrial Park of Lucheng Town, Tongzhou District, Beijing, the company operates 11 production lines with a daily capacity of 411 tons. Its products are distributed across 17 provinces and municipalities nationwide. Possessing proprietary bacterial strains that have achieved industrial-scale application, the company demonstrates outstanding technological capabilities. Concurrently, it places high priority on environmental protection, having invested over 20 million yuan in wastewater treatment to ensure compliant discharge. With a registered capital of 87.5 million yuan, all capital has been fully paid in.

Project Highlights

Mengniu Dairy has established a water circulation system featuring "graded reuse and digital management," achieving annual water savings of 300,000 tons. The company's factory earned AWS Gold Level certification and participated in setting industry standards. Its water conservation education exhibition hall welcomed 5,000 visitors annually, driving the green transformation of 30 suppliers and creating replicable industry solutions. As China's sole dairy enterprise, it was honored with the 2024 International Quality for Sustainable Development Award.

Project Outcome

1. **Water Conservation and Emission Reduction:** In 2024, the entire division saved 300,000 tons of water (including 120,000 tons of wastewater reuse) and reduced wastewater discharge by 120,000 tons, achieving significant results in water-scarce northern regions.
2. **Cost Optimization:** Annual savings of 9 million RMB in water fees, energy consumption, and maintenance costs. Four factories received "Green Factory" certification, enjoying 2 million RMB in tax benefits.
3. **Ecological Benefits:** Reduced the water body's Chemical Oxygen Demand (COD) load by 50 tons/year, decreased groundwater extraction, and helped low-temperature dairy products obtain "Green Product" certification, leading to a 1.5% increase in market share.
4. **Industry Leadership:** Published a white paper on water conservation management, participated in setting industry standards for water recycling, and educated 5,000 people annually on water conservation through its open exhibition hall.
5. **Supply Chain-Driven Development:** Trained 30 suppliers, driving an annual water saving of 50,000 tons in the upstream supply chain, building a green supply chain, and establishing a "large enterprise-led" model.

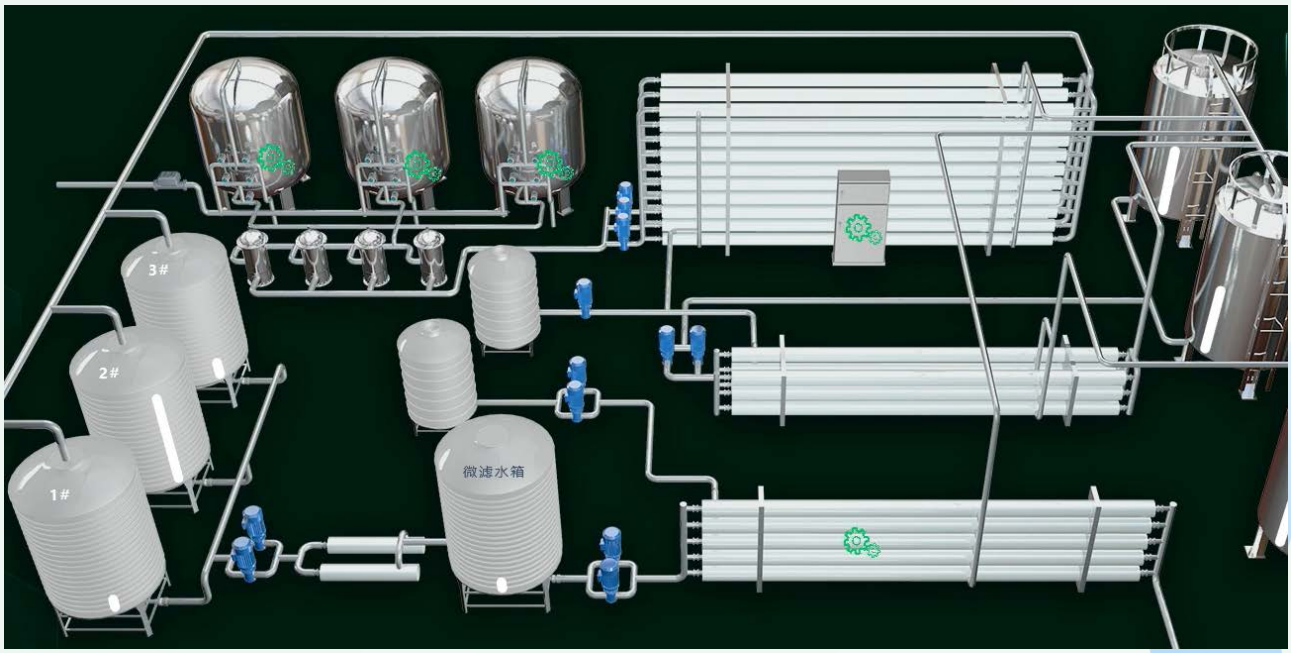
Project Implementation

Mengniu Dairy's Yogurt Division has established a digital water conservation management system through a four-dimensional closed-loop model of "monitoring-optimization-reuse-collaboration," enabling precise control over the entire water resource lifecycle. By deploying a smart metering network covering 99% of water usage points—integrating smart water meters, flow meters, and water quality sensors—the division leverages industrial IoT for sub-second data collection and anomaly alerts. This boosts response efficiency by 95% (from 48 hours to 1 hour) while generating real-time reports analyzing water consumption distribution across processes (e.g., 42% for cleaning, 28% for cooling), providing data-driven insights for water conservation decisions. An innovative water footprint visualization tool dynamically displays the factory's water usage flowchart, precisely labeling water consumption, quality changes, and discharge paths at each stage to form a closed-loop visual management system.

In process optimization, the pioneering application of digital CIP cleaning technology employs intelligent algorithms to monitor product residue in real time and automatically optimize cleaning parameters. This enables dynamic water temperature adjustment (80° C → 60° C) and precise flow control.

Combined with a program verification module to eliminate equipment idling, reducing the ineffective cleaning rate at the Meishan single-unit factory from 37% to 22%. Simultaneously advancing quality-based treatment and reuse technologies, cooling water undergoes sand filtration + activated carbon filtration for reuse in floor washing. The Beijing plant achieves a 95% reuse rate, saving 300 tons of water daily. Washing wastewater treated with membrane filtration technology is reused in condensers, significantly enhancing water resource utilization.

The division innovatively introduced the 3U water conservation strategy (Use Less, Use Again, Use Together), mapped the entire plant's water flow, categorized water usage units by area/category/consumption, systematically identified 23 water-saving



Above: Intelligent Water Treatment System

opportunities, and established a full-process management mechanism covering water extraction, usage, treatment, and reuse. A cross-departmental coordination system was formed, with specialized task forces comprising production, equipment, environmental protection, and quality control. This created a "data-driven - process optimization - standard assurance" linkage mechanism: production departments provide real-time feedback on process requirements; environmental protection departments strictly monitor recycled water quality compliance (meeting the "Urban Wastewater Reuse Standards"); and quality control departments verify key indicators such as microbiological parameters to ensure recycled water safety. Simultaneously, the Water Recycling Management Specifications were developed, incorporating per-ton product water consumption and reclaimed water reuse rates into departmental KPIs. Standardized operating procedures and quantitative evaluation metrics were established.

Following implementation, Mengniu's YogurtDivision achieved intelligent water monitoring, precision process optimization, systematic resource reuse, and standardized collaborative management, establishing a replicable water conservation model. Through dual-engine digitalization and technological innovation, reducing water consumption per unit of product by 15%, setting a benchmark for green transformation in the food industry.

Project Impact & Sustainability

Mengniu's Yogurt Division has established a new paradigm for water resource management in the food industry through its innovative "quality-based reuse + digital management" model. This approach leverages deep process integration as a technical breakthrough, enabling data-driven water control and standardized construction of recycling systems. It has earned AWS Gold Level certification and industry-wide recognition. Post-implementation, the project conserves 300,000 tons of water annually, alleviating regional water supply pressure while creating a replicable "technical-economic-ecological" synergistic solution: internally rolled out to ambient temperature and milk powder divisions; externally driving 50,000 tons/year water savings across upstream/downstream operations like dairy farms, generating 15,000 yuan in economic value.

By establishing a full-chain water circular economy system, the project not only addresses the high water consumption challenge in the food industry but also creates a sustainable development mechanism of "standard output + benefit sharing." It provides a demonstrably viable model for the dairy industry's green transformation, combining both technical feasibility and commercial viability. Future efforts will focus on continuously optimizing the intelligent monitoring system and driving the establishment of industry standards.

By deploying an intelligent water network management system that achieves 99% smart metering coverage at water usage points and applying digital CIP (clean-in-place) algorithms, Mengniu Dairy has significantly reduced ineffective cleaning rates. As a result, water consumption per ton of product has decreased by 15%, and the company has achieved annual water savings of 300,000 tons, supported by solid performance data. These results demonstrate that traditional water-intensive industries can reshape resource value through circular economy models. The project has also engaged 30 suppliers to join water-saving initiatives, forming a synergistic "technology–economy–ecology" solution.

Expert Comments

YOFC HEADQUARTERS BUILDING: SUSTAINABLE OPERATIONAL PRACTICES

Project Overview

As a global leader in optical fiber technology, YOFC integrates sustainable development principles into the entire process of building construction and operational management. Its building, designed by Gensler and awarded LEED Gold certification, incorporates green features such as a "breathing" intelligent curtain wall and a rainwater recycling system. Under the professional operation of the Cushman & Wakefield Vanke Service property team since April 2023, it has achieved a systematic transition from green construction to sustainable daily practices.

In terms of energy conservation, the building’ s electricity consumption in 2024 decreased by 444,100 kWh year-on-year. This was made possible by a scientific energy management system that includes real-time load-based adjustment of air conditioning, on-demand lighting, and "tidal strategy" lighting control in the parking garage, significantly improving energy efficiency.For waste management, the property team promotes a "zero-waste office" initiative through source reduction, accurate classification, recycling alternatives, and employee engagement. In the first month of the pilot, over 67 tons of plastic, paper, food waste, and other recyclables were collected. The team also organizes low-carbon campaigns and produced an in-house video titled "A Day of Zero Waste," using engaging methods to raise environmental awareness among employees.

With technology-driven energy savings and a culture of sustainability, YOFC has established an efficient operational system that integrates safety, green principles, and human-centric synergy, serving as an exemplary benchmark of full-lifecycle low-carbon practice in the industry.

Company/Organization Profile

Established in May 1988, Yangtze Optical Fibre and Cable (YOFC) stands as one of China's earliest manufacturers of optical fibers and cables. The company was initially founded as a tripartite joint venture among the former Ministry of Posts and Telecommunications, the Wuhan Municipal Government, and Philips of the Netherlands.

The company integrates R&D and production of core products including preforms, optical fibers, and optical cables, holding a leading global market share for consecutive years. Its products, known for ultra-low attenuation and superior bend resistance, are industry-leading. YOFC is a core supplier for national strategic projects such as 5G, marine communications, and ultra-high voltage (UHV) transmission, with a dominant share in the high-end market.

YOFC
Smart Link Better Life.

Project Highlights

The project consistently prioritizes the use of existing building spaces and equipment systems, enhancing performance through smart retrofits rather than extensive demolition and reconstruction. In terms of ecological synergy, it innovatively integrates an energy management platform with property operational processes, enabling cross-system low-carbon coordination. The project has been awarded LEED Gold certification and several international accolades. Users widely report a significant improvement in environmental comfort, while the property team highlights the system’ s user-friendliness and strong sustainability, demonstrating outstanding multi-stakeholder synergy.

Project Outcome

Through a combination of technical and managerial measures by the property management team, energy efficiency has significantly improved: total electricity consumption in 2024 decreased by 444,100 kWh compared to 2023, while over 700 tons of waste was sorted and recycled.

Integrated energy-saving technical measures were systematically implemented. The building's triple-layer "breathing" facade optimizes indoor light and heat, reducing HVAC load from the source. The HVAC system's efficiency was enhanced through:

- Dynamic Load Management: Saving 650 kWh per hour by shutting down redundant units when load is below 60%.
- Zoned Controls: Saving approximately 2700 kWh per weekend day by powering down high-use zones after hours.
- Smart Lighting: Office lighting auto-adjusts to maintain 300–400 Lux, while garage "tidal lighting" reduces brightness from 50% to 25% during off-peak hours, ensuring safety without waste.

Operational and cultural initiatives drove sustainable practices. A "Zero-Waste Office" initiative, emphasizing source reduction and sorting, successfully recovered over 67 tons of recyclables in its first month. This was supported by robust low-carbon promotion and staff engagement, with annual participation reaching over 5,000 person-times. Activities included Earth Day events, a self-produced A Day of Zero Waste video, and green commuting challenges, successfully fostering a company-wide culture of sustainability.

Project Implementation

In advancing the 'Zero-Waste Office' initiative, the team faced multiple challenges such as changing habits and system conversion. However, through effective strategies and support from all parties, they successfully overcame these difficulties and achieved remarkable results.

Employees found it difficult to break old habits and showed low compliance in the initial stage: despite the installation of separate waste bins, they still tended to discard all trash into their personal desktop bins, rendering precise waste sorting in pantry areas ineffective. Moreover, policies such as not providing disposable cups caused inconvenience and led to resistance.

After thorough discussions, the project team adopted a combined approach of continuous awareness guidance and economic incentives. On one hand, they repeatedly promoted waste sorting knowledge and the environmental significance of the project through internal emails, promotional posters, kick-off meetings, and other forms of communication. On the other hand, tangible incentives such as "bring-your-own-cup discounts" at the coffee bar were introduced to motivate employees to shift from "passive compliance" to "active participation," gradually fostering new habits.

The success of the project relied on the collaboration and resource investment from multiple parties both inside and outside the company. The leadership at Yangtze Optical Fibre and Cable Joint Stock Limited Company (YOFC) provided special authorization and financial support, which served as the cornerstone of the project by approving the

purchase of sorting bins, the renovation of waste disposal rooms, and subsidies for "Bring Your Own Cup" incentives.

The property management team, serving as the core implementing body, demonstrated full cohesion and collaboration. They were responsible for the daily maintenance of facilities, the redesign and execution of cleaning procedures, secondary sorting of waste (particularly crucial in the initial stages), and preliminary data collection (such as waste weighing). Their work was fundamental to the successful implementation of the project.

All departments participated simultaneously and assisted in promotion. HR, Administration, Finance, and other teams provided substantial support in areas such as promotional campaigns, process transformation, and employee guidance, working together to integrate the new initiatives into the company culture.

Through meticulous planning, sustained communication and education, and well-designed incentive measures, the team overcame challenges related to changing employee habits and restructuring systems. At the same time, they effectively integrated strategic resources from senior management, operational resources from the property management department, as well as supply chain resources from external vendors and processors. This collective effort contributed to the success of the pilot project, with solid data from the first month demonstrating the feasibility and significant potential of the initiative.

Project Impact & Sustainability

To actively respond to the national call for energy conservation and emission reduction, the YOFC industrial building actively explores the application of low-cost, high-flexibility IoT energy-saving technologies in its green operations, effectively enhancing the precision management of electricity-consuming equipment.

We have taken the lead in introducing IoT-based control systems in certain areas, gradually phasing out traditional single-timer devices. This system supports real-time monitoring and adjustment of electricity-consuming devices via mobile terminals, offering not only low investment costs but also significantly enhancing control convenience and response speed, effectively eliminating wasteful energy consumption.

Meanwhile, we have equipped split air conditioners in computer rooms with infrared temperature-sensing switches, enabling automatic on/off operation within set temperature ranges (e.g., turning on at 26° C and off at 24° C). This achieves unmanned intelligent temperature control, significantly reducing unnecessary runtime of air conditioners and lowering additional energy consumption.

These two technologies require small investments, deliver quick results, and are easy to replicate. They not only provide new pathways for low-carbon building operations but also serve as valuable models for energy-saving renovations in small and medium-sized computer rooms and office areas. In the future, we plan to extend the application of IoT-based electricity control and infrared temperature-sensing technologies to more scenarios, and explore further integration with building automation systems to continuously tap into energy-saving potential and support the green transformation of the industry.

Expert Comments

Through IoT-enabled smart retrofitting rather than large-scale reconstruction, the YOFC Headquarters Building achieved a green operation upgrade for a high-end manufacturing facility. By integrating smart curtain walls, dynamic AC load management, and adaptive lighting within a "zero-waste office" initiative, it delivered robust data-driven results. Its innovation lies in using low-cost, high-flexibility IoT technology to replace traditional timers and infrared temperature-sensing switches for unmanned server-room climate control — offering small investment, quick returns, and easy replication.

SINOPEC HAINAN : CARBON-NEUTRAL ENERGY STATION

Project Overview

Time: From January 1, 2022 to present

Location: Sinopec Sales Co., Ltd. Hainan Yongwan Gas & LNG Refueling Station, No. 177 Binhai Avenue, Xiuying District, Haikou City, Hainan Province

Main Project Content: Building a carbon-neutral energy station

Brief Project Achievements: It is Hainan’ s first "PV-Storage-Charging-Discharging" integrated demonstration station and has obtained a carbon neutrality certification certificate. This certificate verifies that the station has actively built itself into a carbon-neutral energy station.

Company/Organization Profile

Sinopec Sales Co., Ltd. Hainan Oil Branch is the only sales enterprise of Sinopec in Hainan. In recent years, the company has closely followed the construction pace of Hainan Free Trade Port, accelerated the development of a green enterprise featuring "clean, efficient, low-carbon and circular". Meanwhile, it has focused on the development direction of "oil, gas, hydrogen, electricity and services", accelerated the construction of charging and swapping stations, photovoltaic power generation and hydrogen refueling stations, and promoted the transformation of single gas stations into comprehensive energy supply stations.

中国石化 SINOPEC

Project Highlights

Centered on the core concept of "activating existing space and innovating energy models", this project utilizes the existing building rooftops and slope protection spaces of Yongwan Station to innovatively create a small-scale "photovoltaic-storage-charging-discharging" energy ecosystem. It achieves ecological synergy of "self-sufficiency with surplus electricity supplied externally", and is also eligible for policy incentives such as VAT rebates for photovoltaic projects and corporate income tax reductions/exemptions, while being included in the local distributed photovoltaic filing support scope. After its commissioning, the project was praised by users as a "one-stop green service for refueling and charging", and described by the project team as a "benchmark for the transformation of traditional gas stations".

Project Outcome

1. It has been built into Hainan's first "PV-Storage-Charging-Discharging" integrated demonstration station.
2. Carbon Reduction and Emission Reduction: Since 2022, the cumulative photovoltaic power generation at this gas station has reached 413,500 kWh. Calculated based on the standard of 1.256 tons of CO_2 emission reduction per 10,000 kWh, it has achieved a total CO_2 emission reduction of approximately 51.93 tons and obtained a carbon neutrality certification certificate.
3. Economic Benefits: It realizes full-year self-consumption of green electricity, with an average monthly cost saving of 15,500 yuan and an annual direct economic benefit of about 186,000 yuan.
4. Public Participation: With the demonstration station as a platform, it has carried out popular science activities, and has mobilized more than 800 people including nearby residents and car owners to participate in green energy promotion activities.
5. Resource Optimization: It has activated idle spaces such as the business room rooftop and slope protection areas, realized the composite utilization of land resources, and reduced resource consumption caused by traditional power generation.

Project Implementation

Plan Design

Relying on the technical framework of Sinopec's "10,000 Stations Bathed in Light" initiative, this project has optimized its design scheme, focused on overcoming core issues such as "coordination between photovoltaic layout and safe operation" and "energy storage capacity matching", and finally realized the demonstration of integrated functions of "photovoltaic, storage, charging and discharging".

Construction Progress

In line with the principle of "self-consumption first, surplus power fed into the grid, and maximum grid connection where possible" and adapting to local conditions, on the basis of ensuring power consumption absorption, it enhanced energy conservation and cost reduction capabilities. At Haikou Yongwan Station, slope protection works were reinforced and renovated to accommodate PV module installation; meanwhile, in response to the frequent typhoons in Hainan, a PV bracket system with a wind resistance rating of Level 12 was designed and selected.

Collaborative Support

The project received special fund support from Sinopec Sales Co., Ltd. Hainan Oil Branch. Power grid enterprises simplified grid connection procedures, and local authorities provided guidance on distributed PV filing, ensuring the smooth completion of the project’ s construction and commissioning.

Comparison Before and After Implementation

Dimension	Before Implementation	After Implementation
Economic Benefit	All electricity used at the station was purchased from the power grid	Cumulative electricity cost savings of RMB 278,600, while feeding electricity back to the grid for revenue
Carbon Emission	Annual carbon emissions were 1,225 tons before 2022	Annual carbon emissions were 341 tons in 2024
Risk Resistance Capacity	Typhoons prone to damaging outdoor facilities	Stable operation with Level 12 wind-resistant PV system
Energy Model	Single reliance on purchased electricity	"Power Generation-Storage-Charging-Discharging" closed loop, with independent and controllable energy supply

Since 2022 to date, Haikou Yongwan Station has achieved a cumulative power generation of 413,500 kWh. Its self-consumed electricity reached 357,200 kWh, resulting in an electricity cost saving of RMB 278,600 (calculated at RMB 0.78 per kWh). The on-grid electricity stood at 56,300 kWh, generating an income of RMB 24,200 (calculated at RMB 0.43 per kWh).

Project Impact & Sustainability

As a shining example of Sinopec's "10,000 Stations Bathed in Sunshine" Initiative in Hainan, the project has innovatively achieved in-depth integration of idle gas station spaces with the "PV-Storage-Charging-Discharging" technology, providing a replicable model for the new energy transformation of traditional oil and gas stations. Its model of "self-consumption first and surplus power fed into the grid" promotes the coordinated development of new energy and the traditional oil and gas industry, and plays an important role in advancing the low-carbon transformation of the transportation energy sector.

Going forward, Sinopec Sales Co., Ltd. Hainan Oil Branch will continue to drive the maximum benefits of photovoltaic power through energy storage projects, make overall plans in advance, and pilot microgrid and integrated "PV-Storage-Charging-Discharging" projects. Meanwhile, it will keep a close eye on the technological developments and price trends of photovoltaic products and energy storage products, and seize opportunities to update equipment and carry out supporting construction of photovoltaic power stations.

Relying on the plan of the "10,000 Stations Bathed in Sunshine" Initiative,Sinopec Sales Co., Ltd. Hainan Oil Branch will use the Yongwan Station as a blueprint to actively promote similar projects in the future. This will contribute to the group's plan to build 10,000 photovoltaic stations by 2027 and facilitate the achievement of the "dual carbon" goals.

Expert Comments

Sinopec Yongwan Gas Station has transformed idle rooftop and slope protection spaces into an integrated micro-energy ecosystem featuring 'photovoltaic, energy storage, charging, and discharging' capabilities. Through intelligent dispatch, it achieves energy self-sufficiency and feeds surplus electricity to the grid, demonstrating high technological integration. The project saves an average of 15,500 yuan monthly, showing significant synergistic economic and environmental benefits. As a flagship of Sinopec's 'Ten Thousand Stations Basking in Sunlight' initiative, its 'existing space revitalization + new energy technology embedding' model provides a replicable and scalable paradigm for low-carbon upgrades of traditional oil and gas stations.

CNPC: Green Sharing Cabins — Building Platforms and Hubs for Communicating Ecological Civilization

Project Overview

Since 2024, China National Petroleum Corporation (CNPC) has established nine Green Sharing Cabins in two phases across its subsidiaries, including Daqing Oilfield, Changqing Oilfield, Kunlun Energy, Tarim Oilfield, Xinjiang Oilfield, and Dagang Oilfield, with a total area of 1,100 square meters. Serving as platforms and hubs for biodiversity conservation education, the cabins receive over 10,000 visitors annually. Relying on these Green Sharing Cabins, 197 volunteer members have been recruited to serve as guides. More than 200 educational and outreach events have been organized, covering employees and local communities, which have significantly enhanced the ecological awareness of both CNPC staff and the general public.

Company/Organization Profile

China National Petroleum Corporation (CNPC) is a key state-owned backbone enterprise and one of the world's leading oil and gas producers. Its business covers oil and gas exploration and development, new energy, refining and marketing, and capital and financial services, forming a comprehensive international energy company that ranks third among the world's top 50 oil companies. In 2025, CNPC ranked fifth on the Fortune Global 500 list. CNPC is committed to green and low-carbon development, promoting the mainstreaming of biodiversity conservation, and has formed a standardized OECMs (Other Effective area-based Conservation Measures) management model. Built on this basis, the Green Sharing Cabins have become an important carrier for delivering ecological benefits to the public and disseminating ecological culture.

中国石油

Project Highlights

All nine Green Sharing Cabins were established within CNPC's affiliated enterprises, located in areas frequented by employees and the public, and were converted from existing buildings. The project innovatively created an integrated model combining "Scientific Research Display" with "Popular Science Education" and "Biodiversity Conservation", achieving the integration of multiple ecological values. The park housing the Green Sharing Cabin at Daqing Oilfield was selected in 2025 as an Outstanding Case of Ecological Civilization Education Practice in Heilongjiang Province. The "Wenfeng Luyuan" Green Sharing Cabin built by Kunlun Energy in Hainan became CNPC's first biodiversity science education demonstration base in Hainan Province.

Project Outcome

1. Strengthened the popularization of Xi Jinping Thought on Ecological Civilization, promoted ecological science education and green interaction, and fostered ecological culture.
2. Showcased CNPC's achievements in promoting ecological civilization and exploring biodiversity conservation, providing a demonstration model for regional coordination in ecological civilization.
3. Provided platforms for environmental education, nature experience, and community engagement, becoming iconic destinations for local eco-cultural tourism.
4. Organized volunteer activities to expand social influence, enhance public understanding of carbon neutrality, and strengthen environmental awareness and ecological responsibility.

Project Implementation

The construction of CNPC's Green Sharing Cabins adheres to a goal-oriented approach, taking as its foundation the deepening of the public dissemination of Xi Jinping Thought on Ecological Civilization, the presentation of achievements in ecological development and biodiversity conservation, the promotion of ecological well-being for the people, and the advancement of ecological culture. Designs are adapted to local conditions. The overall coordination is led by CNPC headquarters, secondary regional companies act as supervisory units, and specific member enterprises of regional companies are responsible for implementation. This structure ensures that the construction aligns with the overall strategy, meets the needs of regional ecological coordination, and achieves standardization and efficiency.

Taking Daqing Oilfield as an example, the supervisory unit is Daqing Oilfield Co., Ltd., and the implementing unit is Daqing Oilfield Ecological Environment Stewardship Company. The Daqing Oilfield Green Sharing Cabin is located within the Ma'an Mountain Ten-Thousand-Mu "Zero-Carbon" Ecological Park, covering an area of nearly 300 square meters. It is composed mainly of "six zones and two halls." The six zones include a micro-ecological simulation display area, a native flora and fauna specimen display area, an oilfield flower and nursery display area, a Guowu Lake–Laohu Mountain protected species display area, an interactive achievement-sharing display area, and an outdoor interactive area. The two halls are the study-tour education hall and the exchange hall for reflection and practice. Through the scientific layout of "six zones and two halls," indoor exhibitions are integrated with outdoor experiences, satisfying the functional demands of the space while also balancing artistry and practicality. The exhibition innovatively introduces fashionable elements such as Benjes heaps, artificial bird nests, and insect hotels, integrating scientific research display, popular science education, specimen interaction, and floral appreciation, allowing visitors to experience, through immersive participation, the harmony and coexistence between ecology and energy.

Other Green Sharing Cabins are also located in areas within CNPC's affiliated enterprises that feature notable ecological construction and favorable community collaboration conditions. Examples include the Green Sharing Cabin at the Yange Lake Petroleum Base of Changqing Oilfield, the Green Sharing Cabin built in the "Sea of Death" by Tarim Oilfield, and the "Wenfeng Luyuan" Green Sharing Cabin of Kunlun Energy in Hainan. Each has its own distinctive features and has become a CNPC biodiversity popular science education demonstration base in its respective region.

During implementation, the enterprise and society worked together to jointly build the project. A project leadership group was established in each project area to take charge of organization, coordination, and management. After completion, specific management and maintenance units were designated to ensure organizational support. Project funds were drawn from the public-welfare initiative "Internet + Nationwide Voluntary Tree-Planting" — CNPC's "Plant a Tree for Carbon Neutrality" campaign, with any remaining costs supplemented by regional companies to ensure smooth implementation. The significance and outcomes of the project were widely publicized through news media and online platforms to enhance public participation and support.

Through these efforts, nine well-equipped and fully functional Green Sharing Cabins have been constructed, providing high-quality environmental services to the public. A high-caliber and dynamic volunteer team has been established to carry out a rich varietyT of environmental activities. The project has enhanced public understanding and awareness of carbon neutrality and biodiversity conservation, and strengthened environmental consciousness and a sense of responsibility among the public.

Project Impact & Sustainability

Project Impact: The project deepens the communication of Xi Jinping Thought on Ecological Civilization, allowing employees and the public to directly experience the concept of "coexistence between ecology and energy." It has become a benchmark for ecological education and public-interest practice. As an innovative practice by a state-owned enterprise advancing China's "dual-carbon" goals and ecological civilization, the Green Sharing Cabins employ immersive and functional zoning displays, forming a distinctive ecological education platform.

Replicability: Firstly, utilizing existing assets for renovation, adopting standardized signage and regulated operations; the model is technically mature, cost-controllable, and easily replicable. Secondly, with nine cabins distributed nationwide, it provides model references for other regions. Lastly, with broad public reach, its low-threshold, high-interaction model effectively engages the public, combining ecological conservation with community well-being.

Sustainability: Firstly, the project is recognized by the International Union for Conservation of Nature (IUCN) and aligns with national policies on ecological civilization and biodiversity strategies. Through public participation, it forms a stable "conservation alliance." Secondly, construction and operation are guaranteed by dedicated organizational and financial support mechanisms. Thirdly, by enriching science education and volunteer programs, the project explores new models of "ecological display" & "experiential learning", providing lasting momentum for the energy industry's green transition and societal participation in carbon neutrality.

This case, using the 'Green Sharing Cabin' as a platform, demonstrates state-owned enterprises' innovative practices and sense of responsibility in ecological civilization development. The project repurposes existing spatial resources through an integrated model combining 'scientific research display, public education, and biodiversity protection', merging ecological value with social benefits to establish strong exemplary significance. During implementation, it emphasizes public participation and volunteer services, enhancing environmental awareness among employees and community residents while promoting the dissemination of carbon neutrality concepts.

Expert Comments

GUOHUA (RUDONG): A BIODIVERSITY-FRIENDLY MODEL FOR PHOTOVOLTAIC DEVELOPMENT IN COASTAL WETLANDS

Project Overview

The project is jointly researched and implemented by Guohua (Rudong) New Energy Co., Ltd. and the Environmental Planning and Design Institute of Nanjing University. Since 2023, along the coast of Rudong County, Nantong City, Jiangsu Province, the project has completed the treatment of 324 hectares of Spartina alterniflora, the construction of a 400 MW (400,000 kW) photovoltaic (PV) station, and wetland ecological restoration.

1. Meticulous Survey and Scientific Site Selection Prioritized heavily invaded Spartina alterniflora marshes with low biodiversity, selecting sites where control is encouraged by national policies.
2. Eco-friendly PV Construction Achieved 100% removal of Spartina alterniflora in conjunction with the PV engineering, restoring the original tidal flat morphology. Implemented "low-tide construction" practices to protect benthic organisms and fish.
3. Integrated "Four-in-One" Marine Space Utilization Optimized the PV array layout by raising panels and increasing spacing. The upper layer supports power generation and high-tide waterbird roosting. The lower layer facilitates the restoration of shellfish farming and waterbird foraging habitats.
4. AI-driven Scientific Operation Suppressed Spartina alterniflora regrowth through PV shading, while enhancing suitable habitats for benthic organisms and waterbirds through ecological restoration measures, such as native vegetation replacement. Deployed smart site systems for unmanned operation, minimizing human disturbance while concurrently monitoring waterbird diversity and Spartina alterniflora invasion.

The project achieves an annual CO_2 reduction of 309,400 tons, provides green electricity for 700,000 households, synergistically controls Spartina alterniflora, and restores coastal wetland habitats for waterbirds and community shellfish farming. This "invasive species control + eco-friendly PV + wetland restoration + smart operation" model achieves a win-win outcome in "carbon reduction and pollution control" and "ecological prosperity for communities".

Company/Organization Profile

Guohua (Rudong) New Energy Co., Ltd. is a subsidiary of the Guohua Investment Jiangsu Branch, under the China Energy Investment Corporation (China Energy). The company is fully committed to developing a distinctive "integrated wind-solar-hydrogen-storage" development model, contributing green energy solutions to support the goal of becoming a world-class leader in clean and low-carbon energy technology.

国家能源集团 CHN ENERGY 国华投资江苏分公司 GHEI JIANGSU COMPANY

Project Highlights

The project's highlight lies in its 'triple-benefit' synergy. By clearing the invasive species (Spartina alterniflora) before PV construction, the project not only eliminated a major ecological threat but also, through innovative PV array design, simultaneously restored ecological value (waterbird habitats) and economic value (shellfish farming). This approach transforms the cost of ecological governance into an asset that supports local livelihoods.

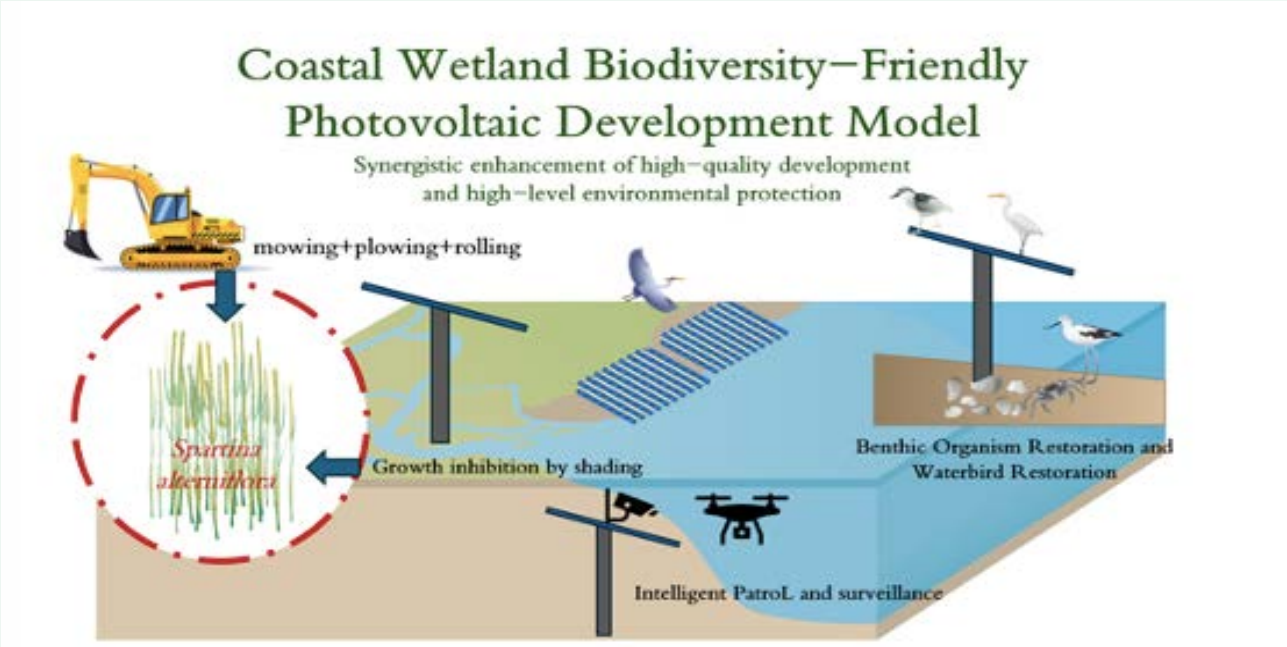
Project Outcome

1. Dual Benefits of Green Power Supply and Carbon Emission Reduction The project has a total installed capacity of 400 MW (400,000 kW), reducing CO_2 emissions by 309,400 tons annually—equivalent to the carbon sequestration capacity of 1.5 West Lake scenic forest areas. It provides green electricity for 700,000 households yearly, significantly advancing the "dual carbon" goals.
2. Integrated Ecological and Efficient Space Utilization The project synergizes the control of the invasive Spartina alterniflora with photovoltaic (PV) construction. By optimizing PV array layouts, the upper space meets both power generation needs and high-tide habitat requirements for wetland birds (e.g., plovers, herons, gulls), while the lower space restores pre-invasion shellfish aquaculture, supporting local livelihoods while also providing foraging grounds for wetland birds.
3. Effective Spartina alterniflora Control Innovating a "PV construction + invasive species control" model, the project treats 324 hectares of coastal Spartina alterniflora invasion. Through "mowing + plowing + rolling + native vegetation replacement" techniques, a control and removal rate of over 95% was achieved, with the recurrence rate kept below 5% via PV panel shading.
4. Coastal Wetland Community Restoration Post-construction, benthic organisms are reintroduced, and native wetland vegetation restores original habitats, increasing benthic biomass to over 3 times the pre-treatment levels. The rise in intertidal species provides abundant food for birds, boosting populations to over 10 times those of Spartina alterniflora-dominated mudflats—achieving comprehensive biodiversity enhancement alongside coastal PV development.
5. A Chinese Template for Invasive Species Management This offers a biodiversity-friendly model for global Spartina alterniflora control and coastal PV synergy, demonstrating how ecological restoration and renewable energy can mutually reinforce.

Project Implementation

I. Project Implementation Overview

The project implementation plan was jointly developed by Guohua (Rudong) New Energy Co., Ltd. and Nanjing University Environmental Planning and Design Institute Group Co., Ltd.， which is located in Rudong County, Nantong City, within coastal wetland areas where invasive Spartina alterniflora had rendered the habitat unusable for waterbirds. With a total installed capacity of 400 MW (400,000 kW), its innovation lies in the integrated approach of "invasive species control + eco-friendly PV construction + wetland restoration + smart operation", establishing a biodiversity-friendly PV model.



This contributes to achieving "dual-carbon" goals, managing invasive species, protecting wetland waterbirds, and boosting community income.

II. Implementation Process

- 2023: Preliminary Preparation (1) Site surveys confirmed superior terrain, geological conditions, and sunlight exposure, but dense Spartina alterniflora growth disrupted ecological balance. Policies like China's Guidance on encouraging social capital participation in ecological protection and restoration supported private-sector involvement in remediation. (2) A research team optimized PV array layout to balance power generation with Spartina alterniflora suppression through spacing and pile height design, while also providing suitable habitats for intertidal species (e.g., barnacles, shellfish, and crabs) and restoring shellfish farming and waterbird foraging grounds. (3) Bird-friendly PV panel components were designed to serve as high-tide roosting sites during spring tides.
- 2024: Ecological Construction (1) After expert consultation, a "PV-based Spartina alterniflora control" plan was developed for simultaneous remediation and PV installation in heavily infested zones. "Low-tide construction" methods minimized impact on benthic organisms and fish. (2) Pre-construction measures included mowing, rotary tillage, and plowing to remove aboveground biomass. Site leveling and soil compaction inactivated residual rhizomes, while PV shading suppressed seed germination. Ecological restoration involved: a. Rehabilitating crab habitats to control regrowth via grazing on young shoots. b. Planting native species (e.g., Suaeda spp.) to competitively inhibit Spartina alterniflora regrowth. c. Installing bird-friendly structures to create high-tide refuges.
- 2025: Post-construction Monitoring & Management After completion in March 2025, ongoing monitoring tracked weed control, environmental quality, and biodiversity recovery. Four AI-powered bird monitoring systems were deployed, enabling "unmanned" operation via smart site management to reduce human disturbance. Simultaneous surveys assessed waterbird diversity and Spartina alterniflora reinvasion.

III. Pre- vs. Post-Implementation Comparison

Post-construction, the project achieves annual CO_2 reductions of 309,400 tons, providing green electricity for 700,000 households while synergistically remediating approximately 324 hectares of Spartina alterniflora-dominated areas. It restored waterbird habitats and community shellfish farming conditions.

Key ecological outcomes: (1) Spartina alterniflora control: No regrowth under PV panels; sporadic recurrence (recurrence rate <5%) at edges and mudflats, with a control efficacy of over 95% based on density metrics. (2) Environmental quality: Soil/sediment and water quality improved post-project, with no significant difference between the PV-treated zones and adjacent "control-only" zones, confirming negligible environmental impact. (3) Biodiversity recovery: Native wetland plants, intertidal species, and bird populations increased significantly. Abundant intertidal prey supported robust waterbird communities.

Project Impact & Sustainability

This project is a key component of China's third batch of "large-scale wind and photovoltaic base projects in desert, Gobi, and wasteland areas", as well as the country's first integrated demonstration project combining photovoltaic-hydrogen-storage energy utilization with coastal ecological restoration. It embodies dual value in implementing national energy strategy and regional ecological protection.

The project innovatively proposes a "synergistic model for photovoltaic construction and Spartina alterniflora control". The related technical approach is currently undergoing application for group standards and patents.

The project serves as a replicable blueprint for existing and planned coastal photovoltaic farms to integrate "PV construction + ecological governance", holding significant importance for achieving sustainable development goals.

Guohua Investment Rudong Company has built a 400 MW photovoltaic power station on mudflats previously invaded by Spartina alterniflora. This project reduces CO_2 emissions by 309,400 tons annually while effectively controlling the invasive species, creating a model that synergizes "clean power generation – ecological management – carbon sink enhancement" and provides a replicable solution for similar regions.

Expert Comments

TIME-CHAINS TECHNOLOGY: AIOT ENERGY MANAGEMENT PLATFORM

Project Overview

In October 2023, Time-chains Technology conducted a comprehensive energy and carbon retrofit of the Vanke Cloud City building. The retrofit focused on deploying IoT hardware, building a software platform, and applying AI algorithms to the building's energy system.

Main Project Content: The project concentrated on the central air-conditioning cooling system. An IoT data acquisition system was deployed, with temperature, pressure, flow, and energy consumption sensors installed on key components and pipeline valves to collect multi-dimensional data in real time and transmit it to a data center. The data was integrated and analyzed to develop an AI control model that dynamically adjusts cooling power and operating modes according to changes in occupancy and ambient temperature. AI algorithms were used to balance cooling supply and demand, adjusting equipment operating parameters for precise matching and sustained high-efficiency operation.

Brief Project Outcomes: After implementation, the project achieved a verified energy-saving rate of 17.13%. The system energy efficiency ratio (EER-sys) increased from ⩽ 3 before the retrofit to 3.6–4.2, significantly surpassing the qualified benchmark of 3.1 required by the Public Building Energy Conservation Testing Standard. Through AIoT-enabled intelligent energy-saving operation, cooling power and operating modes were optimized under varying environmental conditions, improving overall system efficiency while reducing both energy consumption and operation and maintenance costs, achieving both technical optimization and economic benefits.

Company/Organization Profile

Time-chains Technology is a leading provider of zero-carbon digital urban solutions. Guided by the mission of "bringing civilization to ecology and intelligence to all things," the company centers on artificial intelligence, the Internet of Things, and blockchain application technologies. With a closed-loop technical framework integrating software, hardware, and algorithms, Time-chains offers one-stop comprehensive energy and carbon services, including integrated energy services, energy hosting and operations, AIoT intelligent energy-saving control, power demand-side response, intelligent distribution operation and maintenance, and carbon management. The company is committed to driving zero-carbon and digital transformation in cities through technological innovation.

时链科技 Tc Technology

Project Highlights

The project aimed to enhance the digitalization, intelligence, and operational convenience of the refrigeration system while ensuring operational safety and reducing system operation and management costs. Existing system resources were utilized during implementation. The construction period was short and did not affect the normal operation of the system, and the non-intrusive installation process avoided any damage to equipment while maintaining stable system performance.

Project Outcome

1. The project achieved a verified energy-saving rate of 17.13%, effectively reducing energy consumption while maintaining the building's cooling performance.
2. The energy efficiency ratio of the cold source system (EER-sys) increased significantly from no more than 3 before the retrofit to 3.6–4.2, well above the qualified benchmark value of 3.1 specified in the Public Building Energy Conservation Testing Standard.
3. The air-conditioning system now operates under intelligent energy-saving control, improving operational efficiency, enabling faster and more stable cooling response, reducing energy expenses and equipment wear, and lowering operation and maintenance costs — supporting greener and more economical building operations.

Project Implementation

Pain Points Before Implementation

Before the project implementation, the refrigeration system had a low level of digitalization and relied heavily on manual operation. Limited professional operation and maintenance capacity led to energy waste. Pumps were not equipped with frequency converters and lacked intelligent control. Manual data recording was inefficient, the absence of an alarm system posed safety risks, and the chilled-water storage system was not utilized for energy saving.

Solution and Results:

1. Strengthening System Safety and Equipment Management

The original control system was retained and operated in parallel with the new intelligent control system, with a one-click switching function for enhanced redundancy. An alarm mechanism was established to issue voice and app notifications for equipment faults and abnormal parameters. Equipment runtime and efficiency were automatically recorded to support intelligent start-stop control and maintenance suggestions, ensuring safe system operation and extending equipment life.

2. Comprehensive Digital Upgrade

Communication modules, frequency converters, sensors, and controllers were added to chillers, chilled-water pumps, cooling-water pumps, pipeline systems, indoor zones, and valves. This enabled real-time monitoring of equipment operating status, remote parameter adjustment, and associated intelligent control, providing the data and control foundation required for system-wide intelligent operation.

3. Intelligent Operation and Management Optimization

A big-data analysis platform was deployed to support AI-based load prediction, parameter optimization, efficiency optimization, automatic equipment rotation, and equipment protection. A unified management platform was built to support web and mobile access, with an intelligent operation center simplifying control workflows. Automatic meter reading and intelligent visualization functions were implemented. The chilled-water storage system was re-integrated to realize its energy-saving potential, reducing both energy costs and operation and maintenance expenses.

Implementation Path

System Safety and Equipment Management:

1. Deploy the new intelligent control system in parallel with the original system and complete the debugging of the one-click switching function.
2. Install monitoring sensors and configure the alarm system, including voice and app alarm functions.
3. Develop equipment operation data recording and analysis modules to support intelligent start-stop control and maintenance recommendation generation.

Digital Upgrade:

1. Install and commission communication modules for the chiller to enable status monitoring and remote parameter setting.
2. Add frequency converters to chilled-water and cooling-water pumps, and complete monitoring and remote parameter adjustment configuration.
3. Install temperature and pressure sensors on pipelines, temperature and humidity sensors indoors, and controllers on valves to enable status monitoring and corresponding control.

Intelligent Operation and Management Optimization:

1. Build the big-data analysis platform and embed AI algorithms such as load forecasting and parameter optimization, followed by debugging.
2. Develop the unified management platform and intelligent control center to support one-click equipment operation, implement automatic meter reading and intelligent visualization, and integrate chilled-water storage energy-saving strategies into operation.

Project Impact & Sustainability

Technological Innovation

This project adopts a wireless automatic control system built on IoT intelligent terminals and edge intelligent control devices. Through an integrated "software + hardware + algorithm" architecture, it enables monitoring, analysis, and control optimization of air-conditioning and power distribution systems. The solution improves energy efficiency, supports intelligent operation and maintenance, and helps building owners save energy, reduce carbon emissions, lower costs, and enhance operational performance.

Mechanism Innovation

The project adopts an Energy Conservation Benefit Sharing – Contract Energy Management model. All equipment and related expenses during the retrofit are funded by the energy service company, requiring no capital investment from the building owner. After project completion, during the contract period, the owner shares the verified energy-saving benefits with the energy service company according to the agreed duration and sharing ratio.

Impact on the Building Sector

The project enhances building energy performance through innovative energy management, achieving over 15% improvement in operational efficiency after optimization. It promotes intelligent building upgrades and reduces operation and maintenance costs across the building sector.

Expert Comments

This case demonstrates an intelligent retrofit of an existing building's energy system using AIoT technology. By adopting an integrated "software-hardware-algorithm" architecture, it achieved a substantial increase in energy savings without disrupting normal operations, showcasing significant technical effectiveness. Its energy performance contracting model effectively lowers financial barriers for building owners and holds strong commercial potential for broader adoption. The project provides a replicable technical pathway and business model for energy-efficient retrofits in industrial and commercial buildings. It is recommended to further standardize implementation protocols to accelerate its application in similar building types.

CATL:
BUILDING A GREEN SPACE FOR LOW-CARBON INNOVATION

Project Overview

CATL released its "Zero Carbon Strategy" in 2023, setting targets to achieve carbon neutrality in core operations by 2025 and across the entire value chain by 2035. To realize this goal, the company vigorously promotes the green transformation of its energy structure, increases the use of recycled materials, upgrades energy-saving and emission-reduction equipment and facilities, and implements refined management through intelligent and digital platforms to improve resource and production efficiency. Guided by innovation, CATL has advanced process optimization, energy conservation, and emission reduction in an orderly manner, promoting the achievement of carbon neutrality in both operations and the value chain.

Company/Organization Profile

Contemporary Amperex Technology Co., Limited (CATL) is a global leader in new energy innovation and technology, committed to providing first-class solutions and services for worldwide new energy applications. As of May 2025, CATL has served more than 19.81 million vehicles and sold products to 66 countries and regions. In 2024, CATL was listed among Forbes China's "2024 China ESG 50," Forbes' "2024 China Best ESG Practice Employer of the Year," S&P's Sustainable Development Yearbook (China Edition) 2024, and Fortune China's "ESG Influence List 2024."

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Project Highlights

1. The renovation project of organic waste gas treatment facilities for CATL's electrolyte vacuum pumps received a total subsidy of ¥9.6226 million from the Central Ecological Environment Fund in 2024.
2. CATL's carbon peaking and neutrality practices have been reported by major media such as People's Daily Online and China Daily Online, earning wide acclaim from the government and local communities.

Project Outcome

1. **Energy saving:** In 2024, CATL implemented 310 energy-saving optimization projects, saving 255 million kWh of electricity, 7.50 million m^3 of natural gas, and 375,500 tons of steam annually. These savings are equivalent to avoiding about 264,600 tons of CO_2 equivalent (CO_2e) emissions — 14,400 tons CO_2e from Scope 1 and 250,200 tons CO_2e from Scope 2.
2. **Pollution reduction:** From 2024 to August 2025, 17 sets of organic waste gas treatment facilities for electrolyte vacuum pumps were upgraded, increasing treatment efficiency from 90% to over 95%. Five industrial sewage treatment stations were also upgraded, tightening the nickel emission standard from 0.5 mg/L to below 0.05 mg/L.
3. **Consumption reduction:** Recyclable packaging materials replaced disposable ones. In 2024, the reuse frequency of packaging containers increased 1.5 times year-on-year, reducing the use of about 455,000 sets of disposable packaging materials.

Project Implementation

1. Formulation of the "Zero Carbon" Strategy

CATL released the "Zero Carbon Strategy" in 2023, aiming for carbon neutrality in core operations by 2025 and across the value chain by 2035. Based on this strategy and its action plan, the company actively advanced the construction of "zero-carbon" factories to comprehensively realize these goals.

2. Practice of "Zero Carbon" Factory Construction

Resource recycling: CATL continuously promotes resource reduction and recycling to minimize waste generation at the source. Recyclable packaging made of metal and high-density polyethylene is widely used for battery packs and module products. In 2024, about 2.089 million battery packs and 1.819 million modules adopted recyclable packaging. The reuse frequency of packaging tools increased 1.5 times year-on-year, equivalent to reducing 455,000 sets of single-use packaging.

Energy-saving upgrades: CATL implemented 310 energy-saving optimization projects, such as variable-frequency retrofits for chilled-water systems, adsorption dryer improvements in air compressor systems, and air-conditioning system upgrades to include return-air dehumidifiers. These initiatives saved energy equivalent to avoiding 264,600 tons of CO_2 emissions.

Pollution control upgrades: CATL independently developed the RTO+ system, upgrading RCO and RTO facilities to RTO+, which improved VOCs treatment efficiency from 90% to 95%. By the end of 2024, 20 sets of RTO+ systems had been completed, enhancing operational stability and reliability. Industrial sewage stations were upgraded to tighten the nickel emission standard from 0.5 mg/L to below 0.05 mg/L. By October 2025, five stations had been upgraded, reducing environmental risks.

As of October 2025, CATL has built 10 "Zero Carbon" factories based on the PAS 2060:2014 standard.

3. Practice of "Zero Carbon" Supply Chain

CATL includes the carbon footprint of raw materials as a key supplier evaluation indicator, sets zero-carbon power use targets for core raw material suppliers, and provides technical support for distributed photovoltaic projects. In 2024, zero-carbon power usage reached 57% among positive and negative electrode suppliers and 45% among aluminum product suppliers.

4. "Zero Carbon" Awareness and Education

CATL launched the "CATL Zero-Carbon Science Popularization into Campus Project" and organized a Zero-Carbon Science and Technology Knowledge Competition to help young people learn about carbon emissions, understand low-carbon concepts, and practice green lifestyles — achieving the transion from "knowing" to "doing."

Project Impact & Sustainability

1. Influence

Through close collaboration with supply chain partners, CATL explores sustainable carbon reduction solutions and sets clear decarbonization targets, advancing the overall low-carbon transition of the supply chain and guiding the industry toward green and sustainable development.

2. Promotability

CATL’ s low-carbon materials and technological achievements have empowered its value-chain partners. The company has also actively participated in national standard formulation as a main drafting unit for the Methods for Quantifying Carbon Footprint of Greenhouse Gas Products and Requirements for Automotive Power Batteries standard. Its energy-saving technologies, energy management schemes, and green development concepts are valuable references for the manufacturing sector and applicable to other industries as well.

Expert Comments

CATL operates its factory campus as a "city," implementing 310 energy-saving projects, RTO + exhaust gas treatment, circular packaging, and direct photovoltaic power purchase simultaneously. It also integrates raw-material carbon footprints into procurement criteria, demonstrating that heavy-asset battery manufacturing can achieve a full-chain carbon closed loop within existing spaces and providing a replicable template for green spatial restructuring in high-end manufacturing.

QINGDAO YIQIFEN COMMUNITY: A CASE STUDY OF A WASTE CLASSIFICATION AND LOW-CARBON CIRCULAR DEMONSTRATION EDUCATION BASE

Project Overview

The "Chengyang District Waste Classification Low-Carbon Circular Demonstration and Education Base" has been established. In 2023, aligned with waste classification education and the demand for horticultural waste disposal at the Olympic Sculpture Cultural Park (with a total area of 430,000 square meters), the horticultural waste storage area was transformed into three functional zones: a compost courtyard, a leaf composting area, and a zero-waste habitat garden. These zones include 26 compost bins, with a total compost pile capacity exceeding 70 cubic meters and a total area of 1,000 square meters. By empowering the landscaping management team, the sustainable operation of green spaces is ensured, achieving the on-site reduction and resource utilization of 120-150 cubic meters of organic waste annually.

The base plays a demonstrative and educational role. It carries out experiential research and learning activities on environmental education for waste classification and low-carbon circular practices, connecting with over 40 nearby schools and attracting over 4,000 participant-visits for participatory research and learning. Collaborating with competent authorities, it has demonstrated and guided over 40 parks, communities, and schools to embed an organic composting low-carbon circular model into their waste classification systems, reaching over 120,000 people.

Company/Organization Profile

Qingdao YiqiFen Community Environmental Service Center was established in September 2019. It is dedicated to creating a professional organization for green, low-carbon, and sustainable living. The center utilizes community/campus waste sorting, kitchen composting, and low-carbon recycling as key approaches, integrating them into interdisciplinary educational courses on low-carbon, environmental protection, and sustainability. It aims to inspire the intrinsic motivation of young people, engage families, and drive community involvement. By fostering a supportive relationship between home, school, and community, the center strives to promote the development of a low-carbon and sustainable ecological environment and establish a harmonious relationship between humans and nature.

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Project Highlights

Activated the existing space of the open park, transformed the garden waste disposal method, realized on-site ecological composting, and converted "green waste" from a negative asset to a positive asset; promoted the transformation of garden managers into low-carbon promoters; activated public participation through experiential education, forming a model of coordinated ecological, economic and social benefits.

Project Outcome

1. Emission Reduction: From October 2023 to July 2025, a cumulative total of 270 cubic meters of horticultural organic waste was reduced. Through composting, 20.19 tons of CO_2e in carbon emissions were mitigated.
2. Environmental Benefits: 21.6 tons of organic compost products were generated. Of these, 50% were used on-site for soil improvement in the zero-waste habitat garden; the remaining 50% supported community schools in conducting composting activities, generating a demonstration effect.
3. Economic Benefits: The cost of transporting horticultural waste off-site was reduced by approximately 21,600 yuan, and expenditures on purchased fertilizers decreased by 17,300 yuan. The combined total of cost reductions and benefit increases amounted to 39,000 yuan.
4. Public Education and Engagement: A visible and participatory public education and demonstration model for classified low-carbon circular practices was established in open parks. Public-participation environmental education courses were carried out, attracting over 4,000 participant-visits for research and learning.
5. Social Benefits: Over 40 parks, communities, and schools were demonstrated and guided to integrate an organic composting low-carbon circular model into their waste classification systems, reaching over 120,000 people.

Project Implementation

I. Implementation Plan and Process

1. **Spatial Activation:** Transformed Aoyuan (Olympic Sculpture Park) into the "Waste Classification Low-Carbon Circular Demonstration Education Base." By fully utilizing existing space and horticultural waste, 26 standardized compost bins were set up, with a total compost pile capacity exceeding 70m³ and a total area of 1000m². Three functional zones were formed: the Compost Courtyard, the Leaf Composting Area, and the Zero-Waste Habitat Garden.
2. **Composting Promotion:** An "easy-first, then-difficult" strategy was adopted. In the initial stage, easily decomposable materials like fallen leaves and grass clippings were processed, establishing a standardized composting workflow. Subsequently, professional equipment was introduced to solve the challenge of crushing horticultural waste. Community volunteers were mobilized to bring their own kitchen waste, forming a sustainable supply chain. Through two years of continuous operation, a cumulative 270m³ of organic waste was processed on-site, generating 21.6 tons of organic compost.
3. **Operational Support:** The district-level competent authority invited "Chengyang YiqiFen," which has rich composting experience, to provide integrated design, clarify responsibilities, and ensure sustainable operation. Landscaping companies were empowered to include compost management in the park's daily maintenance system. The project collaborated with Qingdao Agricultural University to conduct regular compost quality testing, ensuring quality and safety. A team from the Chinese Academy of Sciences was also invited to monitor carbon emissions and provide data support.
4. **Demonstration and Promotion:** Actively collaborated with over 40 primary and secondary schools to conduct participatory research and learning activities. Successfully drove 40 parks, communities, and schools to replicate the model, covering 120,000 people.

II. Comparison Before and After Implementation

1. **Role Positioning Transformation:** The District Waste Classification Office transformed its role into a leader for the integration of waste classification and low-carbon recycling. "Chengyang YiqiFen" was invited to operate the base, driving the role transformation of over 40 space managers in parks, communities, and schools.
2. **Waste Treatment Model Upgrade:** Shifted from the original high-cost off-site transport and disposal model to an on-site recycling system. This reduced transportation and end-disposal costs, saving a cumulative 39,000 yuan while simultaneously lowering carbon emissions.
3. **Driving Public Participation:** Attracted over 4,000 participant-visits to composting and low-carbon circular research and learning activities.

III. Challenges and Support

1. **Overcoming Public Concerns:** Faced with concerns that "horticultural waste is flammable," 60% humidity control combined with compost temperature and humidity monitoring was used to ensure safe operations. Misconceptions that "composting must be odorous" were effectively dispelled by opening the compost space and organizing hands-on activities. The compost recycling model increased public trust in waste classification.
2. **Operational Support:** Received continuous commissioned operation and policy guidance support from the competent authority's park demonstration base. The project was awarded a grant from the United Nations Development Programme (UNDP) Global Environment Facility (GEF) Small Grants Programme (SGP) for a collaborative innovation project on low-carbon schools and parks.
3. **Communication and Awards:** Received 5 news reports from CCTV and dozens of reports from provincial and municipal media; hosted numerous visits from government officials and experts. In 2025, the organization's director was named a "Qingdao Top Talent," and the "Green Pioneer" project won the National Volunteer Service Competition Silver Award.

Project Impact & Sustainability

1. Model Innovation: With "activation of existing space + on-site recycling" as the core, a replicable low-carbon park operation plan has been formed, which does not require large-scale new construction and reduces the promotion threshold;
2. Technical Support: Carbon reduction and compost quality have been verified by authoritative institutions, and the technical system is mature, which can be directly applied to other parks and communities;
3. Mechanism Guarantee: Established a mechanism of "empowering management teams + incentivizing public participation", and integrated composting into the daily process of the park to ensure long-term operation;
4. Follow-up Plan: Continue to expand the coverage of research and study activities, promote the replication of this low-carbon recycling model in more regions, and strengthen the influence of resource utilization of "green waste".

Expert Comments

The Qingdao YiqiFen Project has revitalized underutilized spaces into demonstration and education bases for waste sorting and low-carbon circular systems, achieving a creative transformation of green spaces from single-function landscapes to integrated value centers that combine "ecological processing + environmental education + community co-governance." Its model of "government guidance, social operation, school participation, and community collaboration" has been successfully replicated in over 40 parks and schools, reaching more than 120,000 people and demonstrating strong scalability. The experiential learning activities convert environmental concepts into public action, embodying the sustainable operational wisdom of "enhancing management through practical application."

HAOTIAN CARBON-NEUTRAL PARK: A FULL-LIFE-CYCLE CARBON-NEUTRAL PARK

Project Overview

Haotian Carbon-Neutral Park is located in Gongchen Sub-district, Fangshan District, covering a total area of about 6.4 hectares with 5 hectares of green space. It officially opened to the public in April 2022.

The park site was originally a 50,000-cubic-meter construction waste dump. It was redeveloped based on five core low-carbon design concepts: zero-waste construction, zero-waste operation, renewable energy utilization, PEDF (photovoltaics, energy storage, direct current, and flexibility) application, and near-zero fresh water consumption. This project, the nation's first full-life-cycle carbon-neutral park, was jointly initiated by the Gongchen Sub-district, the Beijing Eco-Island Environmental Big Data Research Institute, and EDF.

Company/Organization Profile

In 2020, Gongchen Subdistrict took the lead in launching a special carbon reduction initiative. In May 2021, it released the "Gongchen Subdistrict Carbon Reduction Action Plan," which outlined key carbon-reduction tasks across nine sectors, including buildings and transportation. As the first carbon-neutral application scenario for this plan, the park was developed in collaboration with the Beijing Eco-Island Environmental Big Data Research Institute and EDF.

Project Highlights

Based on a 25-year operational period, the park’ s low-carbon construction plan has achieved a cumulative carbon emission reduction of 934 tons, while carbon offsets from PV systems amount to 1,823 tons and carbon sequestration has increased by 1,237 tons. The project is expected to achieve full life-cycle carbon neutrality within 10 years and will have a surplus carbon offset of 2,139 tons.

The park has currently received 5 domestic and international awards. For example, it received the 2024 Green Design International Award (Nomination) and the 2023 Beijing New Era Practice Outstanding Innovation Case. It was also promoted as an excellent case at the COP28 Conference and the CCICED 2024 Annual General Meeting.

Project Outcome

1. **Comprehensive Application of Over Ten Green and Low-Carbon Technologies:** On-site disposal of 50,000 cubic meters of construction waste reduced carbon emissions by about 134 tons compared to off-site transport. The low-carbon public toilets reduced daily water consumption from 6 m^3 to 0.3 m^3, cutting carbon emissions by approximately 0.4 tons per year.
2. **Demonstration of Cutting-Edge PEDF Technology:** The PV panels are expected to generate 112,000 kWh annually; approximately 82,000 kWh is used on-site, and 30,000 kWh of surplus is fed into the grid (equivalent to ~24 tons of carbon offsets). From trial operation in 2022 to July 31, 2025, a total of 180,700 kVA of surplus electricity was connected to the grid.
3. **Balanced Development of Ecological Functions:** The 50,000-square-meter green area, with over 2,800 native seedlings, is expected to generate 1,236 tons of carbon sequestration over 25 years (an average of ~50 tons per year). The park is also equipped with 5 intelligent two-category waste bins and 1 children-specific waste bin.
4. **Systematic Construction of Public Education:** The park features nearly 100 educational exhibition boards, an online VR hall, and a public display screen showing carbon neutrality progress. In 2025 alone, 60 volunteers were trained and 40 public activities were held, such as "Insect Hotel," "Adopt a Tree," and "Biodiversity in Urban Parks."

Project Implementation

In preliminary planning at the end of 2020, Gongchen Subdistrict and its expert team developed the "Gongchen Subdistrict Carbon Reduction Action Plan." This was followed by the construction philosophy adopting the five low-carbon design concepts (zero waste, renewable energy, PEDF, and near-zero new water).

Specific measures included on-site "waste-to-mountain" construction, installation of the 98 kW photovoltaic system, enhanced rainwater and reclaimed water utilization, and maximized internal resource recycling (e.g., using deadwood for signposts). For technology selection, the "Carbon Neutrality Technology Challenge" was held to select and integrate technologies like PV panels, EV charging stations, and rainwater collection tanks. In operational management, the "Gantanhao" (Dare to Carbon) Volunteer Service Team was established to promote the park's design, implement biodiversity measures, and support maintenance.

The before-and-after comparison is stark: the site was originally a construction waste pile. After transformation, it achieves near-zero carbon emissions during operation and functions as both an environmental education base and a biodiversity conservation site.

Project Impact & Sustainability

The project's technologies—such as solar PV, PEDF, bidirectional charging, rainwater harvesting, and recycled building materials—are organically integrated into the park scenario. This realizes internal resource circulation, reduces operating costs, and ensures sustainable operation. These technologies have strong universality and replicability, providing a valuable reference for other regions.

As a key output, the group standard Guidelines for Developing Carbon-Neutral Parks—formulated based on the Haotian Park model—was officially released in August 2023. It provides guidance for similar projects and helps promote the construction of carbon-neutral parks across China.

Expert Comments

Haotian Carbon-Neutral Park has creatively transformed a construction spoil site into a full-lifecycle carbon-neutral demonstration space, embodying the revolutionary concept of "turning waste into treasure" in green space development. The project integrates over ten cutting-edge technologies, including photovoltaics with storage and flexible power distribution (PEDF), recycled building materials, and rainwater recycling, establishing a closed-loop system that achieves "zero waste and negative carbon emissions." Over its 25-year operational period, the park is projected to achieve 1,237 tons of carbon sequestration, demonstrating outstanding systemic carbon reduction capabilities. Its most significant contribution lies in developing the group standard Carbon Neutral Park Implementation Guide, which provides a replicable model for the industry. It is recommended to establish a dynamic carbon monitoring and disclosure platform next, while deepening the exploration of carbon-inclusive mechanisms to continuously lead the low-carbon transformation of urban parks.

CHENGDU GAOTOU: PRACTICE OF THE "BUCKET-FOR-BUCKET" MODEL FOR HOUSEHOLD KITCHEN WASTE

Project Overview

As a national-level standardized pilot for waste classification, the Xinchuan Area of Gaoxin District, Chengdu focuses on the core goal of "source reduction and accurate classification" of household kitchen waste, and innovatively explores a governance model of "whole-society participation and market-oriented operation", effectively addressing the pain points in traditional waste classification work, namely "difficulty in residents' participation, difficulty in improving quality and efficiency, and difficulty in sustaining the model". In 2023, the Xinchuan Area officially implemented the "Double 20-Day Work Method", launched the "bucket-for-bucket" recycling model in 9 pilot residential communities, and built a closed-loop system of "residents - property management - professional companies - intelligent terminals". As of August 2025, the pilot program has covered 7,799 households, with a total of 692.72 tons of kitchen waste recycled and a waste purity rate of 98%.

Company/Organization Profile

Gaotou Urban Resources integrates businesses such as municipal administration, city appearance management, environmental sanitation, landscaping, and water affairs within urban public spaces into an "integrated property project" for overall operation. Utilizing a digital platform, it integrates resources and achieves online closed-loop disposal of offline urban problems.

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CITY UP

Project Highlights

First, it relies on the existing domestic waste temporary storage points in residential areas as bucket exchange locations, and integrates the property's existing transportation capacity to undertake bucket transfer. There is no need to build large-scale new infrastructure, thus reducing the implementation cost.

Second, it constructs an ecological coordination system featuring "Party building leadership + professional services + intelligent support + property/enterprise collaboration + resident participation." This realizes the full-chain connection of "classification-transportation-disposal-management," breaks the barriers of fragmentation in traditional governance, and presents a "win-win-win" ecosystem where "residents are willing to participate, enterprises are willing to invest, and the government is willing to promote."

Third, the Xinchuan Area has been listed as a "national-level standardization pilot area for waste classification." The "bucket-for-bucket" model is supported by funds from Chengdu Hi-Tech Industrial Development Zone, with streets and communities taking the lead in coordinating resources to ensure implementation. Through a "community-by-community screening + key building breakthrough" strategy, the street-level bucket issuance rate in 9 pilot communities increased from 35% in the first month to 57.99%. Through a "publicity + supervision" campaign, community-level resident awareness of waste classification reached 95%. The kitchen waste sorting rate in the 9 communities increased from less than 1% before promotion to 5%, and the sorting rate for bucket-using households reached 15%.

Project Outcome

In terms of environmental benefits: A total of 692.72 tons of kitchen waste has been recycled, thereby reducing the amount of waste entering the incineration stage by the same volume. The purity of kitchen waste reaches 98%, laying the foundation for subsequent resource utilization and reducing the difficulty of mixed waste treatment.

In terms of social benefits: The awareness rate of the "bucket-for-bucket" model among residents has reached 95%, covering 9 communities, over 7,000 households, and 12,000 residents. The daily number of small green buckets for household kitchen waste recycling reaches more than 500, and the daily collection and transport volume of household kitchen waste reaches 1.05 tons. The project has recruited more than 100 resident volunteers, driving the formation of a green living atmosphere in the community. Its relevant experience has been listed as a "reference case for waste sorting promotion" by Chengdu Hi-Tech Industrial Development Zone, and has received funding support from the Chengdu Hi-Tech Industrial Development Zone.

In terms of economic benefits: Adopting a "market-oriented operation" model, links such as transportation, cleaning, and pre-treatment are entrusted to professional entities, reducing costs by 30% compared with the traditional model fully subsidized by the government. Buckets are recycled (the service life of a single bucket is extended to more than 1 year), reducing the costs of plastic bucket procurement and replacement.

Project Implementation

1. Project Implementation Process

Top-Level Design: Formulating the "Double 20-Day" Master Plan

The operational philosophy of "innovation-driven, local adaptation, and precise classification" was established, and the "Double 20-Day Work Method" was adopted as the pilot operation's master plan. The first 20 days are the atmosphere-building period ("5 days of centralized publicity + 15 days of on-site guidance"); the latter 20 days are the quality and efficiency improvement period, focusing on classification accuracy, bucket recycling efficiency, and data traceability capabilities, using intelligent terminals to monitor classification in real-time and continuously optimize supervision strategies.

Team Support: Establishing a "five-in-one" team of "professional services + intelligent support + community + property management + professional company".

Atmosphere Creation: Breaking Through Residents' Cognitive Barriers in Stages

Five days were used to carry out centralized publicity, comprehensively promoting the "bucket-for-bucket" operation process, which quickly raised residents' awareness rate of the model to 95%. Subsequently, a professional classification supervisor was assigned to each domestic waste disposal point in the community to conduct 15 days of on-site guidance. Through continuous on-site guidance, buckets were eventually distributed to over 4,500 households in the pilot communities, with the bucket distribution coverage rate stabilizing at 57.99%.

Model Innovation: Implementing the "Bucket-for-Bucket" Closed-Loop System

A "four-level cycle" closed-loop system for "bucket-for-bucket" involving the "resident end - property end - professional end - intelligent end" was innovatively built.

- Resident end: Pilot households go to the community's temporary storage point at the specified time every day to exchange buckets filled with kitchen waste for clean ones.
- Property end: A professional company is responsible for recycling the dirty buckets replaced by residents. After completing weighing and traceability registration, the dirty buckets are uniformly cleaned and disinfected to ensure the recycling of buckets and data traceability.
- Professional end: A professional environmental protection company transports the recovered pure kitchen waste to "small-scale venous homes" for pre-processing, laying the foundation for subsequent resource utilization and improving resource efficiency.
- Intelligent end: The terminal system provides real-time data on each household's kitchen waste separation rate, purity, and other data.

2. Comparison Before and After Implementation

Challenges before implementation: Low residents' willingness to participate (cumbersome process of the traditional model), classification purity of less than 40%, high cost of manual supervision, and difficulty in data traceability.

Improvements after implementation: The "bucket-for-bucket" model's operation received support from Chengdu High-Tech Zone, including pilot funds and technical guidance. Community residents and property management actively cooperated, solving the "difficulty in multi-party coordination." Residents' participation rate was effectively improved (bucket distribution rate of 57.99%), the kitchen waste classification rate reached over 15%, purity reached 98%, and intelligent terminals achieved precise management.

Project Impact & Sustainability

1. Project Influence, Promotability, and Sustainability

Strong adaptability of the "Double 20-Day Work Method": The first 20 days focus on "cognition-participation," and the latter 20 days focus on "quality-efficiency-habit," requiring no large-scale infrastructure renovation.

Lower participation threshold with the "bucket-for-bucket" model: By replacing "bag-breaking disposal" with "bucket exchange," the participation rate is more than 3 times higher than the traditional model.

Sustainable "government-enterprise-community" cooperation mechanism: The government is responsible for top-level design and supervision; market entities (property management, professional companies) undertake operational services; and the community and residents actively participate.

Data-driven precise management: Intelligent terminals track the separation rate and purity in real-time, enabling "one-on-one" guidance for households with poor classification, which is 50% more efficient than "one-size-fits-all" publicity.

2. Future Plans

Promote on-site disposal of kitchen waste buckets: In the future, the construction of advanced skid-mounted "kitchen waste stations" will be planned, which is expected to increase disposal efficiency by more than 30% while simultaneously reducing energy consumption in the waste transport link.

Expand intelligent disposal categories: Based on the existing intelligent terminal system, build an intelligent waste classification system covering all categories, promote intelligent disposal for other waste and full-category traceability for recyclables/hazardous waste, and improve the overall intelligence level of waste classification.

Expand the model to the whole region: Attempt to explore transforming the successful experience of the Xinchuan Area into common practice in the High-Tech Zone, creating a "Model for High-Tech Zone Garbage Classification."

Expert Comments

The bucket-for-bucket model effectively addresses kitchen waste sorting challenges in communities. By integrating the "Dual 20-Day Work Method" with smart terminals, it establishes a four-party collaborative governance framework involving residents, property management, enterprises, and government. The project transforms kitchen waste recycling into a quantifiable, traceable closed-loop management system, achieving 98% purity that demonstrates remarkable quality efficiency and 30% cost reduction that highlights market-oriented operational advantages. Its data-driven precision guidance mechanism offers a replicable digital approach for green governance in mega-communities. Future recommendations include enhancing waste traceability analysis within containers and exploring spatial integration with resource recovery facilities such as community composting sites and biogas plants.

WUHAN BEIHU COMMUNITY COMMUNITY: BUILDING A GREEN AND LOW-CARBON CULTURAL NEIGHBORHOOD

Project Overview

Since 2023, Huanbao Community in Beihu Subdistrict, Jianghan District, Wuhan, leveraging its participation in the C40’ s Green and Thriving Neighbourhoods programme pilot, has deeply implemented the national "Dual Carbon" strategy. Building on its unique location and abundant local resources, the community has approached the promotion of green and low-carbon development across all sectors and areas as a systematic endeavor. This included creating the Wuhan Opera Hub cultural street as a green space, establishing shared workshops, and developing a zero-carbon circular supermarket. It actively explored near-zero carbon solutions for bustling central urban districts, achieving significant results.

In 2024, the Beihu Subdistrict Green and Thriving Neighbourhoods programme was recognized as a "National Green and Low-Carbon Typical Case" for 2023 by the Ministry of Ecology and Environment (MEE). In 2025, Huanbao Community was selected as a national advanced typical case for public participation in community environmental protection under the "Beautiful China, I am an Actor" initiative, and its community volunteer service team received the Hubei Provincial "Walk with the Motherland, Dedicate to the People" Pioneer Award for Volunteer Public Welfare (Ecological and Environmental Category). It has received over 100 media reports.

Company/Organization Profile

Beihu Community is located in the central part of Jianghan District—a national comprehensive reform demonstration zone for the service industry—at the core of Wuhan's Financial Street. It covers a total area of 0.24 square kilometers, covering 22 residential communities and 11 co-construction partner institutions, including the Wuhan Municipal Ecology and Environment Bureau and Beihu Primary School. The total population is 8,234.

The area primarily consists of existing buildings, with a mix of commercial streets and residential compounds. It hosts the Wuhan Opera Hub cultural street, an area rich in cultural heritage and vibrant community life. The community has established five low-carbon circular economy bases, including a Shared Workshop and a Zero-Carbon Circular Supermarket, Green Cultural & Creative Market, Community Broadcast Studio, Life Decluttering Center, launched the "Beautiful Beihu - Whole-Population Low-Carbon Action" campaign, encouraged participation in green and low-carbon actions among residents of all ages, and promoted resource recycling.

Project Highlights

Prioritizing the use of existing resources, the community developed the Wuhan Opera Hub cultural street, building the "Shared Workshop," "Zero-Carbon Circular Supermarket," and more. Using party building to drive mechanism innovation, it established a "1+9+N" volunteer service system.

Green and Thriving Neighbourhoods programme of Beihu Subdistrict, centered on Huanbao Community, was selected as a 2023 Green and Low-Carbon Typical Case by the MEE. The project's achievements were showcased at the 28th Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change (UNFCCC), the Copenhagen UIA World Congress of Architects, and the C40 Green and Thriving Neighbourhoods programme 2024 China Regional City Exchange Meeting.

Project Outcome

I. Established a home for Wuhan ecological environment volunteers, incubated two environmental social organizations, formed a green and low-carbon volunteer service team of over 150 people, and nurtured more than 20 "Little Planners" and "Blooming Teens" focused on green and low-carbon initiatives.

II. Installed 18 smart waste recycling bins, processed an average of 7 tons of kitchen waste annually through composting, and recycled over 100 tons of bulky waste and construction waste.

III. Created more than 30 green and low-carbon community spaces, including shared gardens, green stations, and shared tool sheds; added 3 kilometers of leisure greenways and non-motorized vehicle lanes; improved 9 shared bicycle parking areas; and installed 30 new energy vehicle charging piles.

Project Implementation

I. Building a Diversified Co-Governance System to Strengthen the Foundation of Low-Carbon Governance

The community party committee took the lead, collaborating with various forces within the Wuhan Opera Hub street area, including enterprises, Beihu Primary School, and Wuhan Laisi Social Work Center. A "1+9+N" green and low-carbon volunteer network of over 150 people was formed, and two environmental social organizations were incubated, applying for an average of over CNY 100,000 in public welfare funds annually. Utilizing platforms like the C40 Cities Climate Leadership Group and China Quality Certification Centre (CQC), a carbon source survey of the street area was completed, setting low-carbon work goals for 3-10 years. A "Green and Thriving Community Management Post" was established, continuously improving low-carbon governance capabilities.

II. Promoting Spatial Renewal Projects to Create Low-Carbon Living Scenarios

Over 10 application scenarios were developed within the Wuhan Opera Hub street area, including rooftop photovoltaics (PV), exercise-powered fitness equipment, PV-integrated smart benches, and PV storage outdoor lighting. Vacant lots were transformed into pocket parks, featuring science education equipment like "light-pressure windmills," 3D pavement art areas, and creatively painted cartoon bollards. Over 90 residential parking spaces were replanned. Eighteen smart waste recycling bins were installed, processing an average of 7 tons of kitchen waste annually through composting and recycling over 100 tons of bulky waste and construction waste. Along Beihu Road, opera character walls, Han Opera bronze statues, and photo spots like "Xiaoshan Xiaoshui" (environmental mascots) promoting green living were created, forming a "Street Environmental Protection Opera Museum." Iron railings were replaced with long corridors, and flowering shrubs were planted, creating a green living space where "greenery meets the eye outside every window, and parks await at every door."

III. Deepening All-Ages Education Initiatives to Activate Low-Carbon Participation

Activities such as "Little Community Planners" and "Blooming Teens" were organized, nurturing over 20 children to participate in green space design. Parent-child charity markets and "Flower Planter" volunteer activities were held to cultivate children's environmental awareness. Residents of all ages were mobilized to become "Carbon Reduction Champions," engaging in "green-filling planting" and "replacing old with green" in over 10 spots around their homes, on balconies, and roofs. Household competitions like the "Beautiful Balcony Contest" and water and electricity saving evaluations were conducted. The low-carbon lifestyle platform "Wutan Jianghu" was promoted, covering 30 carbon inclusive application scenarios. Five low-carbon circular economy bases, including the "Shared Workshop" and "Zero-Carbon Circular Supermarket," were established, and a Community Green Prosperity Fund was set up to support community green development.

IV. Building a Culture-Tourism Empowerment Brand to Inherit Low-Carbon Cultural Genes

Integrating traditional culture with ecological protection, a Han Opera version of "Making China More Beautiful" was launched. Using the Wuhan Opera Hub cultural street as a platform, diverse green cultural performances were held, creating a "People's Grand Stage" with "monthly festivals and weekly shows." Thematic campaigns for World Environment Day (June 5th), National Energy Efficiency Promotion Week, National Low-Carbon Day, and National Ecology Day were consistently organized. Three editions of the "Carbon Quest Jianghu - Beihu" social media challenge and the Wuhan stop of the national "PepsiCo Zero Waste" public education project were held.

Project Impact & Sustainability

Scientifically formulated three-year, five-year, and ten-year work goals and tasks for green and low-carbon development were established, along with a "1+9+N" volunteer service system. A dedicated "Green and Thriving Community Management Post" was created, filled by members of the community's two committees (Party and Residents). Innovatively, five low-carbon circular economy bases, including the "Shared Workshop" and "Zero-Carbon Circular Supermarket," were constructed, and the personal low-carbon lifestyle platform "Wutan Jianghu" was promoted. A guidance mechanism with rewards and penalties for waste sorting and a supervision mechanism with two-way management were established to precisely advance waste sorting, reduction, and resource recycling. The Wuhan Opera Hub cultural street was developed, creating a green cultural space.

These mechanistic innovations provide effective experience and solutions for implementing near-zero carbon work in bustling central urban districts, helping to inject green momentum into primary-level governance. Subsequent efforts will deeply explore the low-carbon potential of the Wuhan Opera Hub green space and continuously promote the construction of a near-zero carbon community.

Expert Comments

The Wuhan Beihu Environmental Community Project has pioneered a near-zero carbon transition pathway featuring "cultural leadership, spatial restructuring, and community-wide participation" in a high-density built-up area. Through a "1+9+N" volunteer service mechanism and a multi-stakeholder co-governance system led by Party building, it has transformed a 0.24-square-kilometer neighborhood into more than 30 low-carbon living demonstration sites, achieving a remarkable transformation from an "aging community" to a "green and vibrant neighborhood." This project provides a practical "Wuhan Solution" for green urban renewal in central city areas. It is recommended to enhance dynamic carbon emission monitoring and carbon-inclusive mechanisms in follow-up work to further improve scientific rigor and impact.

THE LYUBA RESIDENTIAL COMMUNITY: SHANGHAI HABITAT MUSEUM

Project Overview

In June 2023, in accordance with Xi Jinping's thought on ecological civilization, Changning District decided to build a "Habitat Museum" that integrates the essence of all habitat gardens in the district. Through the proposal of the whole-process people's democracy and expert evaluation, Xinjing Town, which has superior natural endowments, finally decided to build the first national habitat-themed "Shanghai Habitat Museum" around the Leyi Habitat Garden, which has won the "100+ Global Typical Cases of Biological Diversity" of the United Nations. The address is 4th Floor, No. 24, Lane 239, Xiehe Road, with an exhibition area of 600 square meters.

This project was approved by the Changning District Party Committee and the District Government, invested by the Xinjing Town Party Committee and the Town Government, and attracted well-known enterprises interested in the ESG cause to participate together. Professional units such as the Municipal and District Ecological and Environmental Bureau and the Shanghai Natural History Museum provided guidance. The Shanghai Habitat Museum was officially opened on May 22, 2024, and is divided into the Preface Hall, the Outer Exhibition Hall, the Inner Exhibition Hall, the Natural Bookstore, and the Habitat Lecture Hall.

In 2024, the Habitat Museum received more than 3,000 domestic and foreign guests. It also invited ecological and animal and plant experts to carry out 50 natural education courses such as "Habitat Classroom" and "Forest Academy" throughout the year in the Habitat Lecture Hall of the museum. The construction and activity results have been reported on CCTV eight times and by the mainstream domestic media, playing an excellent role in publicizing biodiversity and protecting the environment.

Company/Organization Profile

Shanghai Lyuba Residential Community is located in Xinjing Town, Changning District, adjacent to Hongqiao International Airport. It comprises 2,331 households across three types of housing: commercial housing, relocation housing, and public rental housing, with a population of 6,500 residents. The green coverage rate reaches over 38%, and two of Shanghai's most beautiful rivers, Zhoujiabang and Nanyupu, connect the three natural communities under its jurisdiction.

Project Highlights

Lyuba Community leverages its existing ecological advantages: the Leyi Living Habitat Garden, which has been completed and recognized as one of the "100+ Global Typical Cases of Biodiversity" by the United Nations; and the community's rivers, which, after a decade of management, have been named Shanghai's Most Beautiful Rivers and Best Managed Rivers. Based on these strengths, the community has established the Shanghai Living Habitat Museum, which is rooted in the community, radiates to surrounding areas, serves citizens, and provides popular science education to schools. Additionally, the community utilizes an ecological public welfare volunteer team to operate the Lyuba Biodiversity Experience Center formed by these elements, making it an ecological treasure within the community.

Project Outcome

1. Throughout 2024, the Habitat Museum officially received 165 batches of over 3,000 guests from 24 provinces, municipalities, and autonomous regions across China, Hong Kong and Taiwan regions, as well as representatives from the United Nations Development Programme, the United Nations Children's Fund, and the World Health Organization.
2. The museum invited experts in ecology, flora, and fauna to hold 50 sessions of nature education activities, including "Habitat Classroom" and "Forest Academy", in its Habitat Lecture Hall throughout the year.
3. The museum has been featured on China Central Television (CCTV) eight times and covered by major domestic media outlets.
4. It has turned into a "suburban park" right at the doorstep of local residents, enabling nearby citizens to experience popular science, learn about ecology, and get close to nature without traveling far.

Project Implementation

To further enhance community governance capacity and ecological experience functions, under the guidance of professional authorities and experts from the Shanghai Municipal and Changning District Bureaus of Ecology and Environment, as well as Shanghai Natural History Museum, Shanghai Zoo, Shanghai Botanical Garden, etc., Xinjing Town has established China's first habitat-themed "Shanghai Living Habitat Museum".

Covering an area of 600 square meters, this venue integrates habitat, museum, community and education functions, and is one of Shanghai's three major biodiversity experience centers for ecological research, nature popular science and benefit-sharing among the public. It houses over 1,200 specimens of various animals and plants, as well as nearly 100 species of live exhibits.

Composed of a preface hall, external exhibition hall, internal exhibition hall, habitat classroom and nature study room, the museum is divided into sections for insects, fish, birds, mammals, reptiles, amphibians and plants. With Shanghai's native animals, plants and their habitats as the main exhibition objects, it adopts the integrated technology of sound, light and electricity to bring an immersive experience to visitors.

After a year of extensively collecting opinions through whole-process people's democracy and involving experts in the design, the museum was officially opened to the public on May 22, 2024 (International Day for Biological Diversity). As a key part of the Lyuba Biodiversity Experience Center, it joins hands with the Leyi Living Habitat Garden to provide high-quality experience and practice venues for Shanghai's native flora and fauna and nature education.

The exhibition hall not only meets the needs of daily popular science and communication, but also serves as an important venue for ecological education during holidays. It interacts with the Leyi Living Habitat Garden to provide nature experience and education services for students of all age groups from kindergartens to universities. Meanwhile, with the support of community residents and surrounding institutions, it carries out popular science education and nature education, making it an excellent all-round platform for understanding and participating in biodiversity conservation.

The Shanghai Living Habitat Museum adopts a model featuring government project approval, corporate sponsorship, public participation, and community-based operation, innovatively realizing the public welfare-oriented construction and operation & maintenance of the museum. It serves as a research and study base as well as a popular science venue for ecological and nature education for nearby educational institutions ranging from kindergartens to universities, including East China Normal University, Xinjing Middle School, Lüyuan Primary School, and the Foundation Kindergarten. From these institutions, ecological volunteers are selected to participate in the daily operation of the museum, undertaking tasks such as on-site interpretation, venue maintenance, and ecological tank maintenance.

In terms of subsequent fundraising for operation and maintenance, the museum has adopted a variety of approaches with positive results, including support from scientific research projects of the Shanghai Municipal Bureau of Ecology and Environment (Shanghai Biodiversity Experience Center System Construction), assistance from social organizations (Jiuduansha Public Welfare Foundation), and naming sponsorships from brand enterprises (Shanghai Rural Commercial Bank). For volunteer team management, the museum adopts a participation mechanism involving both the community (residents) and society (schools). Through professional training and voluntary services, it has built a dedicated group of individuals who understand ecology, explain ecology, and practice ecology, thus fostering a micro-environment for biodiversity protection.

Project Impact & Sustainability

The establishment and operation of the Shanghai Living Habitat Museum is a crucial step for Shanghai Municipality and Changning District in building an ecological city. It not only provides the public with a new window to understand and appreciate Shanghai's native biodiversity, but also allows residents living in the metropolis to immerse themselves in a "nature classroom" right at their doorsteps, experiencing the perfect integration of nature and humanity, making it a classic case of harmonious coexistence between humans and nature in a modern megacity.

The project has successively won: COP15 United Nations "100+ Global Typical Cases of Biodiversity"; National Age-Friendly Demonstration Community; "Top 10 Advanced Models of Community Environmental Protection Public Participation" by the Ministry of Ecology and Environment of China under the "Beautiful China, I am an Actor" campaign; Shanghai Green Community and other honors.

Expert Comments

This project represents a model for urban community biodiversity conservation. It fully leverages existing ecological resources such as the Leyi Habitat Garden to achieve an energy-level elevation from a "garden" to a "museum." Using the habitat museum as a platform, it skillfully integrates ecological conservation, community governance, and public education, establishing a multi-party collaborative governance model involving government, enterprises, and communities. Through 50 environmental education courses and reception of over 3,000 visitors, the project has significantly enhanced public ecological awareness. The "community-embedded ecological experience" model demonstrates valuable potential for replication in high-density urban areas.

BOEN PROPERTY: ENERGY-EFFICIENT RETROFIT FOR UNDERGROUND GARAGE LIGHTING IN RESIDENTIAL COMMUNITY

Project Overview

Date: March to July 2025

Location: 36 managed projects of Boen Property across Fujian, Jiangsu, and Guangdong provinces.

Main Content: Boen Property comprehensively replaced high-energy-consuming lights in underground parking lots with microwave sensor-connected lamps across 36 projects in Fujian, Guangdong, and Jiangsu provinces. While ensuring compliance with lighting quality standards, over 16,500 lamps with a power rating of ⩾ 18W were reduced to 2.45W.

Summary of Project Results: After implementation, the project achieved an average energy savings rate of 85.23%, contributing to low-carbon emission reduction. Annual electricity cost savings amounted to approximately ¥1.3286 million. Additionally, while significantly reducing energy consumption, the project improved lighting quality by 28.7%.

Company/Organization Profile

Fujian Boen Property Group Co., Ltd. (referred to as "Boen Property") was established in 2005.

With 20 years of dedicated experience in residential property services, Boen Property has pioneered innovative service models such as the "All-Round Butler" approach and the "Benefit+" service system. Leveraging technologies such as the Internet of Things (IoT), big data, and artificial intelligence (AI), the company provides comprehensive, multi-scenario, and professional services tailored to clients' diverse needs.

It is committed to building smart communities, enhancing the quality and value of community space operations, and delivering desirable community governance solutions.

Project Highlights

1. Higher Energy Efficiency

Featuring dual modes of "dimming + motion sensing" via microwave radar technology, the retrofitted lighting system provides on-demand illumination, achieving an energy savings rate of up to 85.23%.

2. Easy Replication

The entire process—from installation to monitoring to maintenance—has been standardized, making the implementation experience easily transferable to other projects.

3. High Cost-Effectiveness

The newly installed lights come with a 5-year manufacturer’ s warranty, reducing long-term maintenance costs. The high energy savings allow for a quick return on investment, delivering multiplied long-term benefits.

Project Outcome

1. **Energy Savings: Before renovation:** Average illuminance 58.9 lux, average energy consumption 276.03 kWh/day;After renovation: Average illuminance 75.8 lux, average energy consumption 40.77 kWh/day;
2. **Cost Reduction and Efficiency Improvement:** Annual electricity cost savings amounted to approximately ¥1.3286 million. After the renovation, the illuminance increased by 16.9 lux compared to pre-renovation levels, with an energy savings rate of 85.23%.
3. **Model Promotion:** By establishing a standardized model, 36 projects were mobilized, and the renovation of over 16,500 lighting fixtures was cumulatively completed.

Project Implementation

I. Pain Point Insights In property management projects operating under the "single-fee system," underground garage lighting has been fully integrated into the operational costs of property management companies. Through in-depth research and analysis, the following core pain points have been identified regarding underground garage lighting:

- Excessive energy consumption and high electricity costs. The original underground garages predominantly used 18-watt high-power T8 fluorescent tubes. Due to the basic requirement for 24-hour uninterrupted lighting, electricity expenses constituted a significant burden on operational costs.
- Frequent equipment maintenance and high repair costs. Traditional fluorescent tubes have a high failure rate. This not only incurs ongoing expenses for the replacement of fixtures, tubes, and accessories but also entails substantial labor costs for inspection and maintenance. The dedicated maintenance funds and manpower invested monthly have become a heavy recurring expenditure.

II. Feasibility Testing and Small-Scale Verification To ensure the feasibility and effectiveness of the renovation solution, the project team decided to conduct small-scale tests to obtain reliable first-hand data.

- Technology Selection and Test Plan Formulation: "0-16W adjustable power microwave networked sensor light tubes" were selected as the replacement solution. During the testing phase, the renovation area was carefully planned, personnel allocation and responsibilities were clarified, and a compact timeline was established to ensure efficient and orderly testing.

- Test Execution and Data Monitoring: In the designated area, the existing 18W T8 tubes were replaced with the new microwave networked sensor tubes. To accurately evaluate energy-saving effects, independent electricity meters were installed at the front end of the modified circuits. A one-month continuous monitoring period was conducted, with monthly records established to calculate input-output efficiency. During monitoring, actual energy consumption data post-renovation was meticulously recorded and rigorously compared with historical energy consumption data from the same period before the renovation. The results demonstrated a short investment return period and significant economic benefits for this renovation project.

III. Large-Scale Implementation Based on Test Results The success of the small-scale test laid a solid foundation for comprehensive promotion. The project team subsequently initiated large-scale renovation efforts. Based on the product specifications and technical parameters determined during testing, the procurement of microwave networked sensor tubes was completed, and collective renovation of eligible old fixtures was carried out. To ensure project quality and efficiency, a standardized renovation workflow was established:

- Step 1: Removal and Recycling of Old Lights. Organized professional personnel to systematically remove and recycle the original T8 tubes and brackets.
- Step 2: Installation and Commissioning of New Fixtures. Installed new microwave sensor fixtures and completed tube assembly. Conducted precise adjustments based on the actual garage layout to maximize energy savings while ensuring safety.
- Step 3: Network Testing and Effect Acceptance. Completed group communication testing of the fixtures to ensure system stability. Acceptance criteria strictly adhered to two key points: Overall electricity savings rate must exceed 80%. Ground illuminance must meet or exceed the national standard of 65 Lux and safe driving requirements.

IV. Establishment of a Long-Term Maintenance and Operational Support System

- Data-Driven Operations and Dynamic Cost Accounting: Monthly statistics and analysis of energy consumption data for the underground garage lighting system are conducted, with dynamic accounting of actual cost benefits post-renovation.
- Implementation of Warranty and After-Sales Service System: The newly procured microwave networked tubes come with a manufacturer-provided five-year free warranty. The project team follows up on fault reports and repairs of tubes and accessories, ensuring ongoing support and peace of mind.

Project Impact & Sustainability

First, this project is primarily suitable for the following three typical scenarios:

- The first category includes property management projects that strictly implement the "single-fee system." Under this model, the cost of public energy consumption is directly borne by the property management company, making the goal of cost reduction and efficiency improvement through energy-saving renovations particularly significant.
- The second category includes projects where the lighting energy costs for all underground garage areas are clearly covered by the property management party. These areas typically require 24-hour uninterrupted lighting, and traditional high-power fixtures consume substantial energy.
- The third category includes projects where the power of the existing fixtures is ⩾ 16W and the original manufacturer's warranty period is <3 years.

Second, the project has established a mature and replicable standardized implementation system:

From precise installation and commissioning in the initial phase, to data monitoring and verification in the mid-term, and standardized operation and maintenance in the later phases, a comprehensive closed-loop management process has been formed. This ensures the controllability and sustainability of the renovation outcomes and provides strong support for rapid replication and promotion across different projects.

The project, centered on "making optimal use of existing resources," retrofitted the underground garage lighting system, achieving the dual objectives of energy conservation and enhanced lighting quality. By implementing a "dimming + motion sensing" smart control mode, it achieved an energy saving rate of up to 85.23%. The retrofit of over 16,500 fixtures across 36 projects established a mature scalable model. This approach successfully integrated environmental and economic benefits, saving approximately ¥1.32 million in annual electricity costs while increasing illuminance by 28.7%. A 5-year warranty mechanism ensures project sustainability. This project fully demonstrates the initiative of space operators in low-carbon transformation, and its experience provides valuable reference for the property management industry.

Expert Comments

HANGZHOU CANGQIAN SUBDISTRICT: DISTRICT-LEVEL OVERALL PLANNING AND OPERATION EMPOWERS WHOLE-REGION GREEN SPACE PRACTICE

Project Overview

In May 2024, Zhejiang Province released the list of the first batch of 25 subdistricts for comprehensive Future Community pilot construction. Taking the comprehensive Future Community construction in Cangqian Subdistrict, Yuhang District, Hangzhou as an opportunity, and aiming to build a "Youth Development-Oriented International Quality Community," the Cangqian Subdistrict Office has established a three-tier service facility system of "Subdistrict–Community–Residential Quarter" and implemented comprehensive green space practices.

Cangqian Subdistrict is located at the intersection of Hangzhou's "One Corridor" (Chengxi Science and Innovation Grand Corridor) and "One Axis" (Ancient-to-Modern Millennium Development Axis), serving as the center of Hangzhou's important new urban center. The subdistrict covers a total area of 46 square kilometers.

The Cangqian Subdistrict Office implements "stock renewal and intelligent operations" at the spatial optimization level, achieving closed-loop green intelligent space operations through "operations–platform–personnel." It practices "all-age sharing for complete happiness," with community activities averaging 4 events per week and reaching 800 events annually. Through measures including organizing diverse types of activities, low-carbon utilization of activity venues, and promoting green concepts and low-carbon behaviors, it realizes green space user practices that combine multiple operational models of "activity–community–talent."

Company/Organization Profile

Cangqian, originally named Lingyuan, has a long history and rich cultural heritage. Cangqian Subdistrict covers an administrative area of 46 square kilometers, comprising 6 administrative villages and 11 communities, with an actual population of 260,000. The jurisdiction includes tens of thousands of enterprises, including 15 listed companies.

In 2024, Cangqian Subdistrict was selected in Zhejiang Province's first batch of 25 pilot subdistricts for comprehensive Future Community construction. It was also recognized as a provincial casual labor market and a provincial smart business district, both being the only ones in Yuhang District, Hangzhou.

CANG QIAN

仓前街道

Project Highlights

The project implements PV system construction based on the operation-first planning concept and promotes energy conservation and emission reduction through digital operations via a digital-intelligence platform. Meanwhile, ecologically friendly spaces are built by combining methods such as permeable pavement and ecological grass swales. Community existing spaces are prioritized for transformation into multifunctional venues such as table tennis halls and traditional Chinese medicine clinics. Group green spaces and compound-used commercial spaces are utilized to conduct distinctive activities like lawn yoga and pet clubs. The project has won multiple provincial awards including the High-Standard Domestic Waste Classification Demonstration Community of Zhejiang Province, been selected as a "Good Community, Good Neighborhood" case study, and received widespread acclaim from residents, merchants, and government authorities.

Project Outcome

1. Enhancing Energy-Efficient Space Operations:

The fitness equipment and streetlights installed in the Xianlingang Multicolored Sports Park utilize photovoltaic (PV) power generation. Combined with operational needs, the park adopts permeable pavement, ecological grass swales, and rain gardens.

2. Activating Existing or Idle Spaces:

A total of 3 district-level neighborhood centers covering 21,000 square meters, 12 community-level neighborhood centers covering 11,000 square meters, and three types of residential quarter-level "micro-space" renovations covering 16,000 square meters have been revitalized and constructed. Existing space was transformed into a table tennis hall, which covers 770 square meters. By offering some facilities for free use by residents and charging fees for other facilities, and using the digital-intelligence operations system as the core approach, low-carbon service forms such as venue reservations, point redemption, and course registration are adopted, generating annual community revenue of 240,000 yuan.

3. Encouraging Broad Resident Participation:

A variety of activities were carried out, including creative craft sessions, children's environmental practices, waste sorting reward events, and resource recycling with charity drives such as "Trade Hazardous Items for Kindness, Old Clothes for Warmth." These activities, averaging 4 events per week with 20 attendees each, reached residents in the service area and encouraged a green, low-carbon lifestyle.

4. Achieving Favorable Social Benefits:

A reward and punishment mechanism has been established to guide residents in domestic waste classification, using green packaging, and trading idle items. Significant achievements have been made primarily in resource utilization of perishable waste and recyclables. The classification quality has remained above 90% in monthly undercover inspections and assessments conducted by the city, district, and subdistrict. The recyclable utilization rate of domestic waste reaches 50%.

Project Implementation

Cangqian Subdistrict is located in the new urban center, where land resources available for constructing service facilities and green spaces are limited and underutilized. From the project's inception in 2024, it was based on the actual situation of Cangqian Subdistrict, with careful planning and construction of a three-tier service facility system of "Subdistrict–Community–Residential Quarter."

In terms of green scenario construction, renewable energy systems featuring PV power generation were built in parks, ecologically friendly spaces were constructed using forms such as permeable pavement, ecological grass swales, and rain gardens, and activities

like yoga and book clubs were conducted in combination with the aforementioned green spaces.

After project implementation, the three-tier service facility system was basically completed, with complete supporting facilities within the community and more convenient resident life. The comprehensive green space has taken initial shape, and the community environment has been significantly improved.

The Yuhang District Government introduced relevant policies to provide guarantees for project construction, offered subsidies for community sustainable operations, and invested government funds in space construction and renovation, laying a solid foundation for the project. Professional operation service providers provided comprehensive support in property resources, personnel allocation, and other aspects.

Project Impact & Sustainability

1. A New Digital Low-Carbon Operations Model.

Using the digital-intelligence platform as the core tool, this model connects venue reservations, volunteer services, activity registrations, and village-community services through a points system, with "AI-driven platform operation services" as the core direction. It promotes the implementation of smart community platforms to meet the needs of vertical living scenarios such as green and low-carbon livable and workable environments, community elderly care, education, and canteens.

2. A Time-Sharing Compound Utilization Operations Mechanism for Existing Spaces in Urban Central Areas.

This mechanism integrates spatial resources within the operational area, utilizes clothing stores, flower shops, and others, and combines them with club activities such as pet exchanges and coffee tasting to create a new low-carbon paradigm for community life through linkage among communities, merchants, and clubs.

3. By integrating pocket parks, community group green spaces, and waterfront ecological spaces, this links ecology, activities, and residents to form a compound-scenario green living operations model.

4. Spreading Green Concepts and Promoting Low-Carbon Behaviors Through Activity and Community Operations.

The Cangqian Subdistrict Comprehensive Future Community Construction Project has achieved phased results, providing reference experiences and models for future community construction throughout the province.

This project exemplifies green and low-carbon development at the urban neighborhood level: (1) It establishes a three-tier service system covering street, community, and residential levels, revitalizing 21,000 m^2 of existing space; (2) it integrates green technologies including photovoltaic power generation and rain gardens to create eco-friendly public spaces; (3) supported by a digital platform, it organizes 800 activities annually to guide residents toward green lifestyles; and (4) through a "government guidance + professional operation" mechanism, it generates 240,000 yuan in annual community revenue, establishing a sustainable operational model. The project provides a replicable practical pathway for green urban renewal in high-density areas.

Expert Comments

SHENYANG CHANG'AN COMMUNITY: INDUSTRIAL HERITAGE TRANSFORMATION BRINGS NEW LIFE

Project Overview

In 2022, the Chang'an Community in Chang'an Sub-district, Dadong District, Shenyang City, Liaoning Province, initiated a project to transform an industrial abandoned site within the community into a multi-functional community service complex. The industrial heritage in question was a group of abandoned boiler rooms and their inner courtyards, with a construction area of approximately 1,800 square meters and a land area of about 3,400 square meters. The building had been left unused for years and had become a dilapidated structure, while the inner courtyard was overgrown with weeds and filled with garbage.

To enhance the community's service functions and make full use of the abandoned boiler site, it was renovated and upgraded into a multi-functional community service complex.

After the renovation, the total construction area is about 3,000 square meters. The main building serves as the Party and Mass Service Center and a multi-functional community area, containing over ten functions, including an administrative service hall. The ancillary buildings were renovated into a community senior citizens' canteen, providing free meals for those over 90 years old. The original boiler chimney was illuminated and transformed into a landmark building, becoming a gathering place for community residents' cultural and recreational activities.

After completion, this area solved the common problems of lacking elderly care, education, and medical services in community facilities, and added facilities such as childcare, health clinics, and community senior services, addressing the urgent needs of community residents.

On January 23, 2025, on the eve of the Spring Festival, General Secretary Xi Jinping visited the Chang'an Community (the location of this case) to learn about the optimization of convenient and beneficial services for the people and the improvement of residents' quality of life.

Company/Organization Profile

Chang'an Sub-district (or Chang'an Street), subordinate to Dadong District, Shenyang City, Liaoning Province, covers an administrative area of 5.8 square kilometers. Established in 1999, it was named after the adjacent, century-old Chang'an Road, symbolizing long-term peace and stability. Within the area, there are facilities such as schools, cultural centers, community libraries, health service centers, elderly care stations, etc.

新基发展
Nova Base

Project Highlights

Transform the abandoned industrial boiler rooms and inner courtyards within the community for many years into a multi-functional service complex for the community. After the renovation, the multi-functional area of the community includes a city reading room, a medical service station, a community comprehensive service station, etc. It also has an indoor fitness area, a cultural and entertainment activity room, a multi-functional meeting room, etc. The lighting renovation of the original boiler chimney has transformed it into a landmark building. This area has addressed the common deficiencies in community facilities such as elderly care, education, and medical services, meeting the urgent needs of community residents.

Project Outcome

1. The smart platform enhances the capacity of elderly care services. Fully considering the issue of community aging, a new intelligent security perception system has been added to community services, achieving all-round monitoring throughout the community. A smart elderly care information platform has been introduced into the community service complex to provide universal emergency rescue services, care services for elderly people living alone, and daily life services. The elderly can call the service platform by phone or mobile video to put forward demands such as meal delivery, bathing, haircuts, errand running and accompanying medical treatment, and the service center will provide services at their door. Since its launch in 2024, the platform has served a total of 1,200 elderly people, with a service satisfaction rate of over 95%.
2. Advocate green production and lifestyle in society. We have fully leveraged the role of the renovated multi-functional service complex, established 21 various resident associations, and organized community residents to carry out green and low-carbon activities such as "garbage Classification" and "Clean Plate Campaign" every week. As of now, the collection and transportation rate of domestic garbage in the community has reached 100%, the coverage rate of garbage classification has also reached 100%, and the collection and transportation rate of recyclable materials has reached 35%.
3. Leadership affirmation of the community's renovation achievements. On January 23, 2025, on the eve of the Spring Festival, General Secretary Xi Jinping visited the Chang'an Community and toured the community service complex. The General Secretary pointed out that urban renewal should be adapted to local conditions and integrated with community development, with all efforts focused on facilitating, benefiting and ensuring the safety of the people. Special attention should be paid to better caring for and protecting the elderly and children.

Project Implementation

During the renovation process of the community service complex, the construction administrative department and the sub-district and community were fully involved. In the initial on-site investigation, they went deep into each household and conducted a questionnaire survey on a per-household basis. The participation rate of residents was over 95%.

Through the leadership of the Party building and grid-based management, opinions of residents are widely solicited to design the renovation plan for the community service complex, ensuring that the renovation serves the interests of the majority of residents. The people's designers and residents participated throughout the process, offering their opinions. The community held a joint meeting on Party building once every quarter to provide feedback on the adoption of opinions. During the process of renovating old buildings, more than 30 residents' symposiums were held, and over 1,500 opinions and suggestions from the residents were collected.

Project Impact & Sustainability

On January 23, 2025, on the eve of the Spring Festival, General Secretary Xi Jinping visited the Chang'an Community to learn about the optimization of convenient and beneficial services for the people and the improvement of residents' quality of life. Upon learning that all aspects of service and support were in place, the General Secretary expressed his approval.

The General Secretary pointed out, "Community work is a matter for every household. The position of community work serves as a bridge between the upper and lower levels, but it requires a downward perspective. The 'thousand lines above' are also for the people. Ultimately, they should be implemented on the people, especially taking good care of the elderly and children. The best compliment is when your neighbors give you a thumbs-up."

[The project was interviewed by CCTV News Broadcast, as well as several authoritative media outlets from Liaoning Province and Shenyang City.]

Expert Comments

This project transformed a cluster of abandoned boiler rooms into a community service complex, exemplifying the concept of "green space" and achieving a transition from an industrial rust belt to an attractive residential zone. Key highlights include: adopting stock renewal instead of large-scale demolition, which preserves urban memory while creating convenient spaces with over a dozen functions including elderly care, healthcare, and cultural activities—with the creative landmark transformation of the original boiler chimney; establishing an innovative collaborative mechanism that embodies co-construction, co-governance, and shared benefits; and integrating a smart elderly care platform with green lifestyle initiatives, having served 1,200 senior residents and achieved 100% waste sorting coverage, thereby harmonizing environmental and social benefits.

XIAOCAOPO VILLAGE, RIZHAO CITY: A PRACTICE OF RURAL ECOLOGICAL REVITALIZATION

Project Overview

Xiaocaopo Village in Donggang District, Rizhao City, places great importance on rural ecological revitalization. It has successively carried out a series of initiatives, including universal household road access, rainwater–sewage separation, "Beautiful Courtyard" campaigns, waste sorting, smoke-free village construction, and a "photovoltaic + electric heating" clean energy system.

The village's ecological environment has been significantly improved, and residents' sense of happiness has markedly increased.

Its perishable waste reuse technology was selected as a national-level model case, while its sewage treatment and wastewater reuse systems received an Outstanding Promotion Case Award from Shandong Province. The village has earned multiple honors, including Provincial Civilized Village, Provincial Beautiful Village Demonstration Site, Provincial Sanitary Village, and Municipal Advanced Primary-Level Party Organization.

Company/Organization Profile

Nestled in Taoluo Town—a region known for its fertile lands and abundant fishing resources in Rizhao City—Xiaocaopo Village is home to 108 households and 302 residents. The village enjoys a prime location with convenient transportation and is surrounded by scenic attractions such as Liujiawan Beach-Combing Park and Tiantai Mountain.

In recent years, Xiaocaopo has developed a series of signature green initiatives, including separated rainwater and sewage systems, a smoke-free community, waste sorting, and photovoltaic power generation. These efforts have earned the village multiple honors, including Provincial Civilized Village, Provincial Beautiful Village Demonstration Site, Provincial Sanitary Village, and Municipal Advanced Primary-Level Party Organization.

Project Highlights

By upgrading infrastructure and focusing on domestic sewage treatment and waste classification, Xiaocaopo Village has achieved sustainable pollution reduction and carbon mitigation. It continues to explore eco-friendly development models—cultivating specialty industries under the "One Village, One Product" initiative and promoting rural ecotourism. These actions have created synergy between environmental improvement and industrial revitalization. In 2023, the village was recognized as a Shandong Provincial Typical Case for Urban and Rural Waste Classification.

Project Outcome

1. Open Drains and Concealed Pipes: Separating Rainwater from Sewage

Xiaocaopo Village pioneered a separate drainage system—the first of its kind in the city. The project followed a unified process from design and procurement to construction and inspection, while upgrading drinking water access and greening neighborhood streets.

Each home now features open channels for rainwater collection, while underground pipes carry wastewater from kitchens, toilets, and bathrooms. Sewage passes through a three-chamber sedimentation process, is treated into reusable water, and then flows into a constructed wetland. This clear separation of rainwater and sewage made Xiaocaopo a provincial model and earned it a municipal innovation award.

2. AO + Stabilization Pond + Reservoir: Ecological Treatment of Domestic Sewage

In 2023, the village invested RMB 45,000 to build a localized system that recycles domestic sewage while combining irrigation and fertilization. This "resource-based circular farm" model treats, reuses, and enriches water resources. Following the national eco-farm standard of "no pollution beyond boundaries", it enables natural nitrogen–phosphorus cycling. The system treats 40 tons of sewage per day, achieving nearly 100% treatment efficiency—showing that clean water and green growth go hand in hand.

3. "Five + Two" Waste Sorting Model

Xiaocaopo introduced an innovative "5 + 2" waste management approach. Waste is divided into five categories—hazardous, recyclable, compostable, landfill, and other—and managed through two collection systems: scheduled door-to-door pickup and designated drop-off points. This pilot project has inspired full participation in waste reduction and resource recovery.

4. Organic Waste Utilization: Turning Waste into Wealth

A composting station processes food scraps and other perishable waste into about 20 tons of organic fertilizer annually. Using sealed fermentation and composting, the process is entirely green and safe. Villagers can freely use the resulting fertilizer for fruit and vegetable cultivation—realizing a "waste-to-value" cycle. The project was recognized as a National Model for Rural Organic Waste Recycling.

5. Photovoltaic Power for a Greener Life

As a pilot village in Rizhao's "Photovoltaic + Electric Heating" clean heating program, Xiaocaopo established a New Energy Cooperative to install solar panels free of charge on rooftops, public buildings, and parking areas. This eliminates coal-based heating risks and provides low-cost, zero-carbon warmth. The village was selected as a Provincial "Ten–Hundred–Thousand" Rural Revitalization Demonstration Village.

Project Implementation

1. Infrastructure Upgrades: Investing in a Sustainable Foundation

Xiaocaopo Village has invested RMB 2.55 million in infrastructure modernization, including a renewed drinking water system and 5,161.9 m^2 of paved streets, along with 2,000 new trees—ending the long-standing problem of "dust in dry weather, mud in rain."

The village renovated 99 household toilets, built a RMB 100,000 waste sorting system (halving landfill waste), and constructed a RMB 100,000 village library and RMB 500,000 greening and lighting projects. A 55 kW photovoltaic station (RMB 550,000) at the village committee created a self-consumption + grid-connected revenue model, refreshing the village' s landscape and economy.

2. Eco-Friendly Wastewater Treatment: A Closed-Loop System

Applying the "Four Unifications" (design, procurement, construction, inspection) and "Three Mobilizations" (public participation, Party leadership, whole-village involvement), Xiaocaopo built a 40-ton/day wastewater treatment system using anaerobic tanks, stabilization ponds, and constructed wetlands. Voluntary labor saved RMB 120,000. Monthly water testing ensures treatment quality. In 2023, an upgraded reuse system enabled 11,000 tons/year of reclaimed water for irrigating 170 mu (≈ 11 ha) of farmland—achieving water savings and ecological balance.

3. Waste Sorting and Organic Recycling

Through joint funding by the village collective, enterprises, and government, a composting station converts kitchen waste and straw into fertilizer for farmland. This program became a National Model for Rural Organic Waste Recycling, setting a benchmark for "Beautiful Village" construction.

4. Green Growth through Dual Cooperatives

Two cooperatives drive ecological revitalization: the Guoying Agricultural Cooperative, combining yellow peach cultivation with solar projects (adding RMB 100,000 to annual income), and the New Energy Cooperative, installing 5,300+ solar panels and carbon-fiber infrared heaters in 101 households. These efforts yield RMB 400,000 in annual benefits and achieve environmental, safety, and economic co-benefits—forming a replicable and sustainable model for green rural revitalization.

Project Impact & Sustainability

From smart rain–sewage separation to circular waste sorting, from solar-powered clean heating to the golden harvests of its yellow peach orchards, Xiaocaopo Village has become a national frontrunner in wastewater recycling, waste reduction, and renewable integration. Its comprehensive ecological practices advance green, circular agriculture and rural industries, creating a replicable, participatory, and sustainable model of low-carbon living—benefiting both people and nature.

Expert Comments

The project has achieved coordinated governance of three core systems—water, waste, and energy—through integrated measures including: a "separate stormwater and sewage system" (with open channels for stormwater and underground pipes for sewage), AO process-based ecological wastewater treatment, and a "5+2" waste classification model. Driven by a "dual-cooperative mechanism" and tripartite financing from village collectives, enterprises, and the government, it ensures sustainable operation while generating annual revenues of RMB 400,000. The "photovoltaic + electric heating" combination creates a self-reinforcing energy model that enhances renewable energy utilization. This project offers a replicable and scalable green transformation template for rural revitalization nationwide.

SHENZHEN CHUANGZHIYUN CENTER: AI-DRIVEN SMART LOW-CARBON SPACE

Project Overview

Under the policy guidance of Shenzhen Municipality and Futian District, the Chuangzhiyun Center in Meiting Community, Meilin Sub-district, has successfully created a demonstration low-carbon smart operation space by virtue of its innovative design concepts, advanced technological applications, and mature operational models.

1. Smart Building Development: The project implements a green, low-consumption, and efficient operational model, customizing a "1+2+4+1" smart building solution: 1 Lingshi Edge Center, 2 Capability Platforms, 4 Smart Scenarios, and 1 Integrated Smart Operation. This not only enhances management precision and spatial experience but also provides data and decision support for energy saving and consumption reduction.
2. Energy Management: The project utilizes energy-saving technologies such as high-efficiency chiller units, sub-item energy metering, and scheduling algorithms. It is connected to the "Lingshi" microgrid platform, building a complete "Generation-Grid-Load-Storage-Charging" microgrid system, which reduces energy consumption per unit of building area by 15%–20% year-on-year. The project also optimizes its energy structure through measures like rooftop photovoltaics, mobile energy storage, V2G charging piles, and green electricity procurement.
3. Green Space Development: Idle land was activated to build Meilin Yunrong Park. The sponge city concept was introduced, alleviating the heat island effect. The original large banyan tree was preserved, 32 new trees were added, and butterfly-attracting and orchid plants were introduced to enhance biodiversity and carbon sequestration capacity.
4. Carbon Reduction Initiatives: The project carries out a series of "Park + Community" linked leaf-composting activities.

Company/Organization Profile

Chuangzhiyun Center is a new-type industry cluster developed through the collaboration of the Futian District Government and four listed companies. Located in Meiting Community, Meilin Sub-district, the project is grounded in smart intelligence, agile R&D, and lean operation. It focuses on industrial innovation and technological upgrading, aiming to build an industrial ecosystem integrating "R&D + technology transformation + precision services." Adhering to the philosophy of "Global Green Business Trends, Headquarters Eco-Garden Offices," the project merges efficient industrial development with a green, ecological office environment. It strives to establish a new benchmark for headquarters office spaces that harmoniously blends business atmosphere with natural ecology.

创智云中心
INNOVATION CLOUD CENTER

Project Highlights

The Chuangzhiyun Center is now home to 45 companies, including 6 listed firms, with over 3,000 office staff. Its public spaces and newly built park also benefit more than 5,000 nearby residents. Empowered by the advanced AI capabilities of the Lingshi platform, the project has achieved a shift from "manual, reactive management" to "AI-driven, data-informed management":

1. AI-Vision Enabled: Manual equipment inspections and quality checks have been replaced by AIoT systems that automate monitoring, significantly improving operational efficiency.
2. Automated Energy Saving: Through an integrated energy management system enabling minute-level data granularity, HVAC and lighting costs have been reduced by 15%.
3. Creating an Integrated Green Space Layout: Transforming fragmented spaces into an integrated hub, the project links parks, the campus, and the community via a running track and connecting axes. This "green commons" has been selected by the Shenzhen Ecological Environment Bureau as a showcase project in its Beautiful Parks program.
4. Awards & Recognition: 36Kr Future City Award; Shanghai Climate Week Climate Beacon Community Award; "Carbon Neutral Demonstration Park" by China Green Exchange; "Gold Standard Cup" Smart Park Excellence Award.

Project Outcome

Based on the IoT and AI capabilities of the Lingshi equipment, the project integrates energy, video, and data flows, achieving optimal energy efficiency through global dynamic optimization and regulation.

1. Digital energy consumption monitoring automates meter reading, data consolidation, and report generation, equivalent to reducing CO_2 emissions by 10.3 tons annually.
2. Intelligent control of HVAC and lighting systems cuts energy waste, equivalent to reducing annual CO_2 emissions by 102.7 tons.
3. The "Lingshi + Microgrid" system uses load forecasting, PV generation prediction, and consumption control to boost the project’s overall return rate by 10%. It saves around 110,000 kWh of electricity per year, equivalent to reducing CO_2 emissions by 56.4 tons.
4. The IOC auto-alarm function now covers 11 AI scenarios with approximately 96% algorithm coverage.
5. Carbon reduction initiatives include community leaf-composting activities and diversified vegetation, significantly enhancing the community park's carbon sequestration capacity.

Project Implementation

Facing challenges from diverse energy equipment and scattered subsystems, the project leveraged Lingshi's robust IoT integration to unify all energy and video devices. This enabled the establishment of a complete "source-grid-load-storage" microgrid and drove operational transformation through scenario-based algorithms.

1. **Digital Energy Monitoring:** Through energy line inventory and the addition of collection sensors, full coverage of smart meters for building power distribution rooms, floor-level zoning smart meters, and water meters was achieved. 557 energy points have been integrated. This enables unmanned meter reading and fine-grained energy management by floor and zone, improving efficiency by 5–8 person-days per task.
2. **Intelligent HVAC & Lighting Control:** Based on Lingshi's device IoT access capabilities, system integration for 550 air-conditioning and lighting control panels was completed. Smart energy-saving strategies such as remote control, scheduled control, and automatic sensing control achieve energy savings of over 10% for lighting and air-conditioning, saving approximately 200,000 RMB in electricity costs annually.
3. **Lingshi + Microgrid Optimization:** As the smart core of the entire microgrid, Lingshi uses the microgrid platform's AI algorithms to forecast PV generation and energy consumption for the next 24 hours. It achieves overall optimization of the project-level microgrid's "source-grid-load-storage-charging" system, including load forecasting, PV generation forecasting, maximum PV consumption control, and demand control, saving around 110,000 kWh of electricity per year.
4. **IOC Auto-Alert System:** By embedding AI algorithms in cameras in key areas and linking them with the IOC alert and work order platform, a machine-led, human-assisted security management model is enabled. The annual algorithm accuracy rate reaches 90%, the timely event discovery rate has increased by 60%, and quality complaints have decreased by 20%.
5. **Development of Green Space:** After nearly a year, Futian District's first community park built via a public-private partnership with social investment, and the first innovative exploration project involving a property company in municipal park construction, was created and has been replicated and promoted.

Project Impact & Sustainability

The Chuangzhiyun Center, as an integrated project combining smart offices, technological infrastructures, and low-carbon spaces, demonstrates comprehensive value. In operational efficiency and safety, its intelligent systems have improved operational efficiency by 50% while reducing management risks by 20%. Through its smart energy management, the project has achieved a 15% reduction in energy consumption, supporting its low-carbon transition. The smart office environment has enhanced staff satisfaction, leading to a 10% increase in customer service satisfaction. The intelligent environment enhances corporate branding while reducing overall operational costs by 8%. As a regional driver, the project provides data support for smart city development and attracts talent to stimulate local economic growth. Its innovative "1+2+4+1" framework establishes a replicable, data-driven business model. Finally, the integrated "Park + Campus + Community" spatial approach offers a new paradigm for "people-industry-city" integration, showcasing comprehensive demonstrative value and broad applicability.

Expert Comments

The Shenzhen Chuangzhiyun Center project serves as a benchmark case for AI-driven low-carbon transformation in buildings. It has established a trinity system of "Smart Brain + Microgrid + Green Space," achieving a shift from traditional operations to data-driven management. Through the Ling Shi platform, the project integrates energy points and has built a complete "generation-grid-load-storage-charging" microgrid. AI algorithms enable the transition from "human-based prevention" to "technology-based prevention." The created "park + campus + community" green reception model provides a new paradigm of ecological synergy for high-density urban areas.

VANKE PROPERTY "SOLAR CLOCK": TAKING COMMUNITIES AS THE PIVOT TO BUILD URBAN LOW-CARBON MICRO-ECOSYSTEMS

Project Overview

Timeline: Problem identification began in early 2023; nationwide promotion was launched after the pilot. It was packaged as a standardized product in August 2024 and is currently implemented in over 2500 projects.

Location: Residential projects under the management of Vanke Property.

Core Content: To address safety hazards and energy waste caused by inaccurate on/off timing of public lighting, the "Solar Clock" low-carbon service was developed. Leveraging authoritative astronomical data sources and building an intelligent algorithm that integrates local latitude and seasonal changes, it automatically generates lighting on/off schedules aligned with sunrise and sunset patterns. These schedules are pushed to frontline staff via a WeChat Work bot, replacing manual experience with "natural rhythms"—with zero additional hardware investment. Meanwhile, nationwide research, technological R&D, pilot verification, and optimized promotion are advanced in parallel, forming a full-process implementation closed loop.

Achievements: During the pilot phase, each project saved an average of 30 minutes of lighting electricity daily. After nationwide promotion, public lighting electricity consumption decreased by 10.62%, with an 86.15% user satisfaction rate. In August 2024, the service was launched as a standardized module on the "Cloud Maintenance" mini-program, covering thousands of residential projects. It effectively balances service quality with energy conservation and carbon reduction, providing a replicable model for low-carbon transformation in grassroots scenarios.

Company/Organization Profile

Established in 1990, Vanke Property is a leader in China's property management industry. Vanke Property offers full-lifecycle services centered on preserving and increasing the value of property owners' real estate assets.

vanke service 万科物业

Project Highlights

Adhering to the principle of "utilizing existing resources," this project requires zero hardware investment. It leverages WeCom messaging and authoritative astronomical data to drive energy conservation through natural rhythms via algorithmic optimization. The solution establishes a cross-regional, replicable, and scalable digital carbon reduction model, reflecting innovative practices in ecological synergy—by deeply integrating information technology, natural laws, and property management to achieve a win-win outcome in energy savings, efficiency gains, and user experience. The project was awarded the 2024 Shanghai Climate Week "Climate Lighthouse Navigator Award."

At the user level, the "Sun Clock" service, designed for maintenance supervisors across residential communities, has undergone effectiveness evaluation, achieving a user satisfaction rate of 86.15%. Among the users, 33.06% found the lighting switch-on/off time accurate and reasonable, 30.65% appreciated its timely reminders for adjusting lighting strategies, 20.16% reported a significant improvement in daily work efficiency, and another 16.13% praised its user-friendly operation and positive experience.

Project Outcome

Energy Savings: Public lighting electricity consumption decreased by 10.62%. The larger the public area of the community, the more significant the energy-saving potential and the more considerable the economic benefits from electricity savings. Taking the "Shenzhen Golden Field" project as an example, with a total managed property area of approximately 160,000 square meters, the average monthly electricity consumption was reduced by 554 kWh after using the Solar Clock service, effectively reducing property management costs.

Emission Reduction: Based on the power carbon emission conversion standard (approx. 0.785 kg of CO_2 per kWh), taking a project with 300 light fixtures in its public area as an example, an annual carbon emission reduction of about 2.1 metric tons can be achieved.

Project Implementation

I. Implementation Plan and Key Process

1. Problem Identification, Cause Analysis and Requirement Confirmation (Early 2023)

- Triggering Incident: Due to delayed lighting, an elderly resident at HuiDuYuan exposed to serious risk of a fall injury. The incident reveals a dual imbalance in safety and energy consumption on manually controlled lighting system.
- Core Objective: To establish a dynamic lighting strategy without extra hardware investment and strong universality for 4000+ projects nationwide and address switch-time inaccuracies caused by variations in latitude, season, and terrain.

2. Four-Phase Scientific Closed-Loop Processes

(1) Nationwide Survey & Technical R&D (March 2023)

- National-Wide Survey - Three Baseline Data Validation:
- Existing lighting control methods
- Willingness of being Pilot project
- Availability of electricity consumption data
- Core Technology Development:
- Data Source: Accessed public astronomical data
- Algorithm Model: Incorporated seasonal variation factors, to automatically adjust and dynamically generate recommended on/off times.
- Command Delivery: Utilized a WeCom (Enterprise WeChat) bot to push operational recommendations (text & graphics), achieving a 10-second "receive-execute" cycle.

(2) Rapid Iteration Pilot (April 2023)

- Initial testing launched in 6 cities (spanning high/medium/low latitudes) & validating:
- Data Accuracy (⩽ 5 min error vs. actual dawn/dusk times)
- Ease of Operation
- Preliminary Energy Savings (26-34 minutes reduction in average daily lighting duration)

(3) Scaling Validation & Optimization (August 2023)

- Iterative Problem-Solving: Refined the timing algorithm logic based on user feedback.
- Expanded Coverage: Increased pilot cities to 57 and included communities with special terrain (e.g., mountainous, coastal).
- Value Quantification: Achieved consistent energy savings (reduction of avg. 30 min/day) and an 86.15% user satisfaction rate.

(4) Productized & National-Wide Rollout (August 2024)

- Packaged as a standard module and launched as a subscription service within the "Cloud Maintenance" (云维保) mini-program.
- Provided operational guidelines and serviced communities national-wide on-demand.

Project Impact & Sustainability

The project demonstrates significant impact across economic, social, and industry spheres. Economically, its national implementation led to a 10.62% drop in public lighting energy use, saving approximately 2,700 kWh per community annually and reducing carbon emissions by 2.1 metric tons. Socially, it eliminated critical lighting-related safety hazards, such as fall risks for the elderly, and its industry impact was recognized with the 2024 Shanghai Climate Week's "Climate Lighthouse Navigator Award." Furthermore, the project possesses high scalability and replicability. Its low-cost adaptation model, which integrates existing communication platform APIs (e.g., WeCom) and free data from the National Astronomical Observatories, allows it to be applied across various sectors. This cross-sector potential includes municipal lighting, agricultural supplemental lighting, transportation warning systems, commercial lighting, and even grid dispatch through integration with the State Grid's demand response system. For sustainability, the project features open APIs compatible with future IoT devices, such as linking with smart meters for coordinated control or utilizing weather data to replace soil moisture sensors.

II. Pre- vs. Post-Implementation Comparison

Dimension	Pre-Implementation Sore Points	Post-Implementation Outcomes
Safety & Quality	Late lighting on/early lighting off, posing safety risks for residents' travel	Lighting hours 100% match natural day-night rhythms, eliminating safety risks
Energy Consumption	Uncontrolled lighting duration, causing waste of electrical resources	Public lighting electricity consumption decreased by 10.62%, with significant low-carbon benefits
Management Efficiency	Reliance on manual recording and observation, prone to errors and low efficiency	WeChat Work automatically pushes instructions, improving management efficiency by over 80%
Cost Investment	Traditional lighting renovation requires high hardware costs	Zero additional hardware investment, lowering the threshold for green transformation of projects
Ecological Value	Lack of standardized carbon reduction paths, scattered green practices	Awarded the "Climate Lighthouse Navigator Award" at the 2024 Shanghai Climate Week, setting an industry green benchmark

III. Challenges & Support

1. Challenges

- Technical Challenges: Balancing precision with universality; balancing energy savings with service quality.
- Implementation Challenges: Resistance due to ingrained habits and risk of operational gaps, skepticism about the dynamic strategy and failure to follow instructions.

2. Support

- External Data & Ecosystem Partnerships: Access to astronomical data and the WeCom group bot API for push notifications.
- Internal Collaboration: Feedback and suggestions from general staffs; co-development with pilot city communities.

Expert Comments

The "Solar Clock" project achieves intelligent upgrades in public lighting management through algorithmic integration of astronomical data and natural rhythms with zero hardware investment. By combining astronomy, algorithms, and property management, it establishes a new energy-saving model driven by "data + natural rhythms." The project demonstrates significant practical value with an electricity saving rate exceeding 10%. Notably, the project offers high replicability—relying on communication platforms, it can be standardized as a product, providing replicable low-carbon solutions for urban micro-renewal in municipal, agricultural, and commercial sectors.

SHENYANG LAOHUCHONG ZERO-CARBON CIRCULAR ECONOMY INDUSTRIAL PARK: BUILDING AN EXEMPLARY CIRCULAR ECONOMY

Project Overview

The project was officially launched in 2024 and is located in the Laohuchong Circular Economy Industrial Park in Shenyang City. Its core mission is to promote the circular economy and implement the concept of low-carbon and environmental protection. The park has established a full-chain system covering collection, transportation, treatment and resource utilization by systematically integrating and collaboratively processing various solid wastes such as household garbage, kitchen waste and leachate, achieving efficient material circulation and energy cascade utilization. The project adopts advanced international technologies such as incineration power generation, anaerobic fermentation and deep leachate treatment, ensuring harmless treatment while significantly enhancing resource regeneration efficiency and energy output. Currently, the park processes a total of 1.4 million tons of solid waste annually, generates over 400 million kilowatt-hours of electricity annually, and has a stable reclaimed water reuse rate of 80%. It can reduce about 400,000 tons of carbon dioxide emissions annually. This project not only significantly improves the local environmental quality but also provides a replicable and scalable practical model for the green and low-carbon transformation of the solid waste treatment industry in Northeast China and even the whole country, becoming an important benchmark for regional green and high-quality development.

Company/Organization Profile

Shenyang Laohuchong Zero-Carbon Circular Economy Industrial Park, under the Shenyang Xinji Development Co., Ltd., is a demonstration park that actively responds to the national "dual carbon" strategy and promotes green and low-carbon development. The park covers an area of approximately 1,500 mu and is committed to building a circular economy system centered on solid waste treatment, integrating resource recovery, energy regeneration, and carbon sink management. Several environmental protection projects, such as waste incineration power generation, food waste treatment, leachate treatment, and biogas power generation, have been completed. The park processes over one million tons of various solid wastes annually, achieving green electricity supply and resource recycling. Aiming at the construction of a "waste-free city", the park strives to build a "zero-carbon circular economy industrial base" leading in Northeast China and ranking among the top in the country through industrial collaboration, energy cascade utilization, and intelligent management.

Project Highlights

This project gives full priority to the utilization of existing solid waste resources in the park, building a three-level recycling system of "large, medium and small" to achieve energy efficiency improvement and carbon emission reduction. It has been awarded the title of "2025 Green and Low-Carbon Typical Case" by the National Ministry of Ecology and Environment, being the only park selected in Northeast China and enjoying policy preferences and financial support. Government leaders have conducted multiple research visits and highly recognized it, encouraging it to become a benchmark for the regional environmental protection industry. Users have provided feedback that the resource synergy benefits are significant, and it has replicable and scalable value.

Project Outcome

1. Processes 1.4 million tons of waste annually, generating 400 million kWh of electricity;
2. Reuse rate of reclaimed water reaches 80%, significantly saving water resources;
3. Reduces CO_2 emissions by 400,000 tons per year, equivalent to saving 160,000 tons of standard coal;
4. Recognized as "National AAA Tourist Attraction" and "Waste Classification Education Base";
5. Hosts 2,500 visitors annually, enhancing public environmental awareness.

Project Implementation

The implementation of the Zero-Carbon Park Project in Shenyang Laohuchong Circular Economy Industrial Park is guided by the national "dual carbon" strategy, focusing on six major directions: energy efficiency benchmarking, clean production, zero-carbon energy, green facilities, resource recycling, and digitalized management. The project is systematically advancing the zero-carbon transformation of the park. The implementation is divided into three phases: short-term (2025-2030), medium-term (2031-2035), and long-term (2035-2050). It focuses on the layout of industries such as solid waste resource utilization, new energy green power, hydrogen energy, waste heat utilization, and carbon capture and storage (CCUS), and builds a zero-carbon ecological industrial system characterized by "solid waste as the foundation, green power as the starting point, hydrogen energy as the hub, and services as the link".

Implementation Plan and Process:

The project integrates existing facilities such as waste incineration, kitchen waste treatment, and biogas power generation, and gradually expands demonstration projects such as integrated wind-solar-storage, green power hydrogen production, waste heat coupling with papermaking, greenhouse agriculture, and carbon capture and utilization (CCUS). During the implementation process, a three-level circular system of "large, medium, and small" is established to achieve closed-loop management of energy flow, material flow, and carbon flow. For example, the waste heat from incineration is used to supply heating and papermaking for the surrounding areas, biogas and photovoltaic green power are directly supplied to park enterprises, garden waste is used to produce LNG, and dry ice is used to capture CO_2, etc., to comprehensively enhance resource efficiency and carbon sink capacity.

Comparison Before and After Implementation and Challenges Overcome:

Before implementation, the park mainly focused on traditional solid waste treatment, with an energy structure dependent on fossil fuels and high carbon emission intensity. After implementation, a multi-energy complementary and industrial coupling zero-

carbon system is formed. It is expected that carbon emissions will be controlled at 200,000 tons of CO_2 by 2030 and carbon neutrality will be achieved by 2050. The project has overcome several challenges: first, the demand for land expansion (an additional 5,000 mu), which was solved through comprehensive land consolidation, reclamation of abandoned mining land, and adjustment of basic farmland and urban development boundaries; second, grid transformation and microgrid construction, with support from the State Grid to adjust high-voltage corridors; third, technology integration and financial pressure, relying on government policy preferences, green credit, zero-carbon industry funds, and international financial support to ensure the phased implementation of the project.

Internal and External Support:

Internally, it relies on the leading role of Xinji Development and existing infrastructure advantages to form a cluster effect. Externally, it has received high-level coordination from the Shenyang Municipal Government and collaborative promotion from various departments, and has been included in the territorial space planning. It has also obtained the endorsement of demonstration projects from the Ministry of Industry and Information Technology and the Ministry of Ecology and Environment, enhancing brand influence and investment attraction. The Sujiatun District Government has provided preferential policies in land acquisition and procedure handling to accelerate project implementation.

Project Impact & Sustainability

This zero-carbon industrial park planning project has significant influence, scalability and sustainability. Guided by the "dual carbon" goals, the project achieves energy structure optimization and resource recycling through technological innovations such as direct supply of green electricity, waste heat coupling, CCUS carbon capture, and hydrogen energy production. It has strong technological demonstration and mechanism innovation capabilities. The park builds a "large, medium and small" three-cycle system, promoting the deep integration of solid waste treatment, new energy, and carbon sink industries, which plays an important role in promoting the development of a circular economy and zero-carbon industrial parks in Northeast China and even the whole country. The project is planned to be implemented in three phases, covering 51 key projects with a total investment of over 20 billion yuan. In the future, it will continue to expand green electricity capacity, extend the industrial chain, and implement intelligent management to ensure the economic viability and environmental benefits of long-term operation, and has good replicability and sustainable development capabilities.

The Shenyang Laohuchong Zero-Carbon Circular Economy Industrial Park demonstrates how traditional solid waste treatment facilities can be transformed into engines driving regional green development. Guided by circular economy principles, it has established a full-chain system covering collection, transportation, treatment, and resource utilization, achieving a deep transition from "waste terminal" to "resource hub." More notably, the project integrates environmental facilities with public science education and industrial tourism, hosting around 2,500 visitors annually and serving as an immersive classroom for promoting sustainability awareness. It proves that even in traditional heavy industrial bases, systematic planning and industrial synergy can create a sustainable development pathway balancing environmental, economic, and social benefits.

Expert Comments

WUXI SINO-SWEDISH LOW-CARBON ECO-CITY

Project Overview

Located in the core area of the Wuxi Economic Development District, the Wuxi Sino-Swedish Low-Carbon Eco-City covers an area of 2.4 square kilometers. Under the direct leadership of the Management Committee of the Wuxi Economic Development Zone, the Construction Bureau oversees the overall planning and implementation of various projects within the Eco-City.

We actively explore pathways toward green and sustainable development. Guided by the "Seven Major Actions" — Green Energy, Green Mobility, Green Buildings, Green Municipal Facilities, Green Blocks, Green Industries, and Green Culture — we aim to complete the overall construction of the Wuxi Sino-Swedish Low-Carbon Eco-City by the end of 2025. The project integrates the strategic goals of "carbon peaking" and "carbon neutrality" into all aspects and sectors of economic and social development, striving to create a first-class, internationally influential modern low-carbon eco-city.

Representative projects that have been completed or are under construction within the Eco-City include: the Wuxi International Conference Center, Wuxi K11 Select Shopping & Art Center, Qingyan Road Zero-Carbon Primary School, Qingshu Road Zero-Carbon Kindergarten, Low-Carbon Technology Innovation Promotion Center, TOD Comprehensive Development Project along the central axis, Wuxi Olympic Sports Center, and supporting residential communities of the Eco-City.

Company/Organization Profile

Located in the core area of the Wuxi Economic Development District, the Wuxi Sino-Swedish Low-Carbon Eco-City covers an area of 2.4 square kilometers. The project was launched following the signing of a cooperation agreement between the Wuxi Municipal Government and the Government of Sweden. Under the direct leadership of the Management Committee of the Wuxi Economic Development Zone, the Construction Bureau oversees the overall planning and development of the Eco-City. At the same time, a management structure tailored to local development has been established to coordinate construction, investment attraction, and regional governance in an integrated manner.

Project Highlights

1. Wuxi Sino-Swedish Low-Carbon Eco-City

Recognized as one of Jiangsu Province’s First Green Building and Energy Efficiency Demonstration Zones, a Sino-Swedish Cooperation Demonstration Project, a National Low-Carbon Ecological Demonstration Zone, and a National Low-Carbon City (Town) Pilot Area.

2. "Dual-Carbon" Management Platform

Honored as one of the Top 100 Digital City Scenarios in the 2024 Digital China Innovation Contest – Digital City Track.

3. Qingyan Road Primary School

Certified as a National Near-Zero Energy Building and awarded RMB 1 million in municipal funding for green building development.

4. Qingshu Road Kindergarten

Recognized as a Provincial Ultra-Low/Near-Zero Energy Building Demonstration Project and received RMB 2.8 million in special funding support.

5. Low-Carbon Technology Innovation Promotion Center

Awarded the Three-Star Green Building Certificate and Operational Carbon Neutrality Certificate.

Project Outcome

1. Renewable Energy Integration

Implement solar energy, building-integrated photovoltaics (BIPV), and shallow geothermal energy systems to increase renewable energy penetration. Ensure that 100% of new buildings utilize renewable energy sources.

2. Smart Energy and Industrial Demonstrations

Pilot user-side energy storage, reclaimed-water-source heat pumps, and intelligent microgrid management in industrial park construction to maximize distributed energy use and achieve diversified energy supply.

3. Low-Carbon Transportation

Promote energy-efficient and low-carbon transportation modes. Establish an advanced and efficient charging and battery-swapping network to enable large-scale adoption of new energy vehicles and ensure green power supply for charging facilities.

4. Waste Classification and Resource Utilization

Establish a comprehensive waste sorting, collection, and transportation system. Achieve 100% classified waste collection and a resource reuse rate exceeding 75%.

Project Implementation

Since its establishment, the Wuxi Economic Development Zone has conducted multiple rounds of research, drawing on the experience of international advanced eco-cities such as Hammarby Sjöstad. It commissioned the Shenzhen Institute of Building Research to prepare the Comprehensive Plan for Low-Carbon and Ecological Construction of Wuxi Sino-Swedish Low-Carbon Eco-City. It also engaged Sweco International, the original design consultant for Hammarby Sjöstad, to conduct relevant consultancy studies.

This led to the formulation and issuance of the Wuxi Sino-Swedish Low-Carbon Eco-City Construction Plan (2022-2025) and the Implementation Opinions on Accelerating the Construction of a Zone-wide "Dual Carbon" Demonstration Area Led by the Sino-Swedish Low-Carbon Eco-City. A pre-assessment by professional institutions indicates that the project preliminarily meets the national Three-Star Standard for Green Ecological Urban Districts (the highest level).

To advance the construction of the zone-wide "Dual Carbon" demonstration area with a high starting point, quality, and standards, the Wuxi Economic Development Zone takes the 2.4-square-kilometer Sino-Swedish Low-Carbon Eco-City as its pilot. Centering on 20 regulatory indicators and 17 guiding indicators, it guides the implementation of ten specific engineering projects through seven major actions. The aim by the end of the "14th Five-Year Plan" period is to build the Sino-Swedish Low-Carbon Eco-City into a model new urban area characterized by green and low-carbon living concepts and the development of low-carbon technologies, achieving continuous regional carbon emission reduction and rapid development of green industries through low-carbon technological innovation.

Currently, the Sino-Swedish Eco-City has not been fully developed, with various projects progressing according to the planned schedule. Compared to conventional urban areas, the Sino-Swedish Eco-City has achieved notable results in four aspects: construction performance (application of green building materials, comprehensive building energy efficiency, road density, urban greening coverage), carbon reduction effectiveness, energy utilization efficiency, and public service and governance outcomes.

Project Impact & Sustainability

Accelerating the Internationalization of "Dual Carbon" Projects

(1) Completed the development of the Chinese and English versions of the Public "Dual Carbon" Management Platform. Centered around a pioneering low-carbon eco-city development indicator system, the platform focuses on the management and showcasing of eco-technology applications and low-carbon lifestyles, effectively presenting the achievements of the Sino-Swedish Low-Carbon Eco-City to domestic and international experts and scholars.

(2) Actively promoted the platform through participation in various national and provincial-level competitions, generating momentum and providing foundational support for establishing the entire Economic Development Zone as a "Dual Carbon" demonstration area. It was awarded the "Top 100 Digital City Scenarios" in the Digital City Track of the 2024 Digital China Innovation Competition.

Advancing the Eco-City's International Alignment

In May 2024, the "Sustainable Development Expert Consultation Meeting for the Sino-Swedish Low-Carbon Eco-City" was convened. The meeting gathered experts and scholars, including academicians from China, Sweden, and Germany. Through high-level dialogue, it facilitated the exchange of wisdom and experience, jointly exploring and promoting multilateral cooperation for the sustainable development of the Sino-Swedish Low-Carbon Eco-City.

Expert Comments

Wuxi Sino-Swedish Low-Carbon Eco-City demonstrates both ambition and a structured pathway for advancing low-carbon development at an urban scale. As a demonstration project jointly developed by China and Sweden, its core value lies in embedding low-carbon concepts from the initial planning stage and building a multi-dimensional, coordinated green urban framework. With a comprehensive and forward-looking top-level design that draws on international experiences such as Hammarby Sjöstad in Sweden, it has developed an indicator system with both regulatory and guiding functions, continuously optimized by professional institutions. The project illustrates that low-carbon transformation is not merely an aggregation of isolated technologies, but a profound transformation encompassing planning concepts, technological applications, governance models, and lifestyles.

SHANGHAI FREE TRADE ZONE: INTEGRATED PRACTICE OF GREEN WAREHOUSING AND PURE ELECTRIC SHUTTLE BUSES IN THE PARK

Project Overview

As the earliest bonded area established in China, the Bonded Area of the China (Shanghai) Pilot Free Trade Zone(hereinafter referred to as "the Bonded Area") has built on more than three decades of logistics development. Adhering to the principle of "maximizing existing resources and deploying emerging technologies," the Area has systematically advanced the construction of green spaces. By September 2025, its total installed photovoltaic capacity had reached 76.8 MW,with an estimated annual reduction of 15,000 tons of CO_2 emissions.

In warehousing, the Pudong Airport subzone launched the nation's first round-the-clock, fully intelligent semiconductor global distribution center—the Kintetsu Semiconductor Global Distribution Center; the Waigaoqiao subzone completed the Jaguar Land Rover Asia-Pacific Distribution Center, certified with LEED Gold; and Infineon's "digital + low-carbon" smart warehouse is steadily progressing, gradually shaping a green distribution cluster serving global supply chains.

In terms of commuting, the area operates 5 free bus lines with a total of 26 pure electric new energy buses, covering an annual operating mileage of about 870,000 kilometers. Furthermore, Shanghai's first "Green Power upon Delivery" V2G (Vehicle-to-Grid) charging and discharging station was built on Fyute North Road, exploring a new model of interaction between new energy vehicles and the power grid.

Through policy innovation and coordinated management, the Bonded Area has initially established an integrated "energy–warehousing–mobility" green logistics system, providing solid support for multinational enterprises' climate commitments and the implementation of the Global Operation Program (GOP), while also generating replicable and scalable experience for the green transition of comprehensive bonded zones nationwide.

Project Highlights

The Bonded Area has pioneered several "firsts" at both the national and municipal levels: the nation's first round-the-clock, fully intelligent semiconductor distribution center (the Kintetsu Semiconductor Global Distribution Center), Shanghai's first "green power upon connection" V2G charging and discharging station (the Fute North Road charging and discharging station), and the operation of free pure electric bus lines within the area. By utilizing existing rooftop resources for photovoltaic deployment and integrating smart warehousing with clean transportation, the Area has established a green logistics paradigm covering the full chain from "energy-storage-mobility", earning strong recognition from multinational enterprises.

Company/Organization Profile

The Bonded Area Administration of the Management Committee of China (Shanghai) Pilot Free Trade Zone is a functional department under the Management Committee of the China (Shanghai) Pilot Free Trade Zone, responsible for administrative management, policy execution, and service support within the Bonded Area. The bonded areas under the Administration's jurisdiction include multiple sub-zones such as the Waigaoqiao Bonded Zone, the Waigaoqiao Port Comprehensive Bonded Zone, and the Pudong Airport Comprehensive Bonded Zone.

The Administration is committed to supporting the green, low-carbon, and intelligent development of the Bonded Area. Through policy guidance and service support, it promotes the implementation of projects such as photovoltaics, green warehousing, and clean transport, creating a demonstration effect of coordinated development between space and industry.

中国（上海）自由贸易试验区保税区域
Shanghai Free Trade Zone

Project Outcome

1. Renewable Energy Substitution:. The 18.26 MW distributed PV project of Shanghai Longyuan in Waigaoqiao Port Comprehensive Bonded Zone has been fully grid-connected. The project adopts a combined model of "full grid feed-in + self-consumption with surplus power fed into the grid" which is expected to generate about 19.16 million kWh of electricity annually.
2. Smart Warehousing: The Kintetsu Semiconductor Global Distribution Center has achieved 100% unmanned operations across its working areas. Compared to traditional warehouses, it has increased cargo handling efficiency by nearly five times and improved space utilization by approximately four times.
3. Green Mobility: Operation of 6 free pure electric bus lines, realizing low-carbon commuting for park employees.
4. Technological Innovation: The Fute North Road V2G charging and discharging station, as Shanghai's first "green" V2G station, explores vehicle-grid interaction and direct green power supply.
5. Social Benefits: Enhanced the green branding of multinational enterprises, assisting Infineon, Jaguar Land Rover, etc., in fulfilling climate commitments and strengthening the area's attractiveness.

Project Implementation

The Bonded Area of the China (Shanghai) Pilot Free Trade Zone has gradually established a low-carbon pathway centered on energy substitution, warehouse upgrading, and cleaner transport in its green space development.

Energy: The Bonded Area has made full use of rooftop resources to promote PV deployment. As of September 2025, the total installed PV capacity has reached 76.8 MW. Following the commissioning of the Shanghai Longyuan 18.26 MW project, the share of clean power in the Waigaoqiao Port area has now surpassed 50%, significantly boosting the greening of corporate energy use.

Warehousing: The Bonded Area has leveraged industries such as integrated circuits, healthcare, premium consumption, and aviation logistics, the Bonded Area has formed a cluster of green distribution centers serving global supply chains. The Kintetsu Semiconductor Global Distribution Center employs an automated high-density storage and retrieval system integrated with AGVs and collaborative robots, achieving 100% unmanned operations. Since its operation began in 2023, the Jaguar Land Rover Asia-

Pacific Parts Distribution Center has cumulatively used over 1,500,000 kWh of green electricity, earning it the "2024 Pudong New Area Sino-Foreign Enterprise Sustainable Development (ESG) Leading Model Award".In 2025, Infineon’ s China Distribution Center commenced construction, equipped with automated warehousing and intelligent management systems to comprehensively advance "digital + low-carbon" smart logistics.

Transport: The Bonded Area has actively expanded clean transport infrastructure. The system currently operates six free bus routesutilizing 26 new energy vehicles, with 168 stopsin service. It runs 397 daily trips, covering an annual mileage of approximately 870,000 kilometers. Leveraging the peripheral "three rail lines and five stations" rail transit system, it has essentially established a supporting bus network characterized by "independent operation, free shuttle services, and seamless transfer".

Governance: The Bonded Area leverages the synergy among government, customs, development entities, and enterprises. Management authorities incorporate key projects into a holistic coordination system, ensuring timely allocation of various resource guarantees. We strengthen coordination with customs to establish round-the-clock clearance channels, providing efficient end-to-end customs services. Development entities accelerate the construction of factory buildings and supporting facilities. Enterprises, aligning with their own climate goals, set more stringent green standards. Through this multi-party collaboration, PV and smart warehouse projects are advancing rapidly, green travel modes are continuously improved, and dovetailing with the decarbonization strategiesof multinational corporations, significantly enhancing the region's appeal as a business destination.

Project Impact & Sustainability

The Bonded Area's green space construction has formed a systemic synergy in three areas: energy, warehousing, and transport. These initiatives have jointly built an integrated green space of "clean electricity - green warehousing - green transport," which not only enhances the park's operational efficiency and attractiveness to enterprises but also provides a replicable path for the green transformation of comprehensive bonded zones in the Yangtze River Delta and across the country. Looking ahead, the Bonded Area will further promote the integration of "source-grid-load-storage" and pilot direct green power supply, continuously expanding the demonstration effect of green logistics and green mobility.

Based on the Bonded Area Administration of the Management Committee of China (Shanghai) Pilot Free Trade Zone—one of the earliest bonded areas established in China—the Shanghai Pilot Free Trade Zone has optimized spatial utilization and energy structure through systematic transformations in energy, warehousing, and transportation. This experience can serve as a reference for the green transition and low-carbon development of similar regions nationwide. It is recommended to further refine the green and low-carbon development plan, strengthen coordination of low-carbon pathways across various sectors, and expand the application and demonstration of innovative technologies such as AI and blockchain for carbon footprint tracing.

Expert Comments

NANSHAN CLOUD TECHNOLOGY BUILDING: BASED ON THE "SPACE RENOVATION - EMPLOYEE ACTION - CUSTOMER EXTENSION" THREE-LEVEL IMPLEMENTATION MODEL

Project Overview

Nanshan Cloud Technology Building is a landmark super high-rise office tower located in the Liuxiandong Headquarters Base of Shenzhen's Nanshan District, with a total gross floor area of approximately 183,000 square meters and a building height of 234.54 meters. From October 2024 to June 2025, the project carried out a Zero Waste Office Pilot Initiative in accordance with the "Zero Waste Implementation and Evaluation Guide", advancing efforts across three key dimensions: spatial renovation, employee engagement, and client outreach.

On the spatial front, energy-saving upgrades and waste sorting facilities were implemented; for employees, a recycling and behavioral management system was established; and toward clients, awareness campaigns and collaborative activities were conducted. Significant zero-waste outcomes were achieved: monthly carbon emissions were reduced by 21 tons, landfill waste decreased by 2.4 tons, and the resource recycling rate reached 65%. The initiative also delivered enhanced energy and resource efficiency—resulting in monthly electricity cost savings of RMB 120,200 and the recovery of 2.4 tons of recyclables per month.

Company/Organization Profile

Nanshan Cloud Technology Building is situated in the core area of Liuxiandong Headquarters Base, Xili Street, Nanshan District, Shenzhen. It is a Class A office building project developed by Shenzhen Dashahe Construction Investment Co., Ltd., and a modern landmark that integrates technology, innovation, and smart office facilities.

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Project Highlights

It gives priority to using existing resources (such as transforming waste plastic bottles into water-saving equipment, making shared stationery stations from waste materials), and innovates the "three-step action method" and income feedback mechanism. There are no clear awards and policy preferences. Employees feedback that "environmental protection has become a habit", and customers evaluate that "activities are interesting and meaningful".

Project Outcome

1. Environmental benefits: 21 tons of carbon reduction, 2.4 tons reduction in waste landfill, resource recycling rate increased to 65%;

2. Energy-saving benefits: monthly average electricity cost savings of 120,200 yuan (energy saving rate 31.35%), 15% reduction in office supplies procurement cost;

3. Resource income: 2.4 tons of recyclables recovered monthly, with an average monthly income of 2,400 yuan and annual office cost savings of 4,800 yuan;

4. Participation coverage: directly affecting over 1,000 employees and more than 50 customers in the building, with a zero-waste activity participation rate of over 80%;

5. Efficiency improvement: the time for cleaning staff to sort waste reduced from 4 hours/day to 2 hours/day, and the equipment maintenance response speed increased to "minute-level".

Project Implementation

1. Implementation Plan and Process

1. **Space Renovation (Oct-Nov 2024):** The engineering team implemented water thermal storage energy saving (using "peak shifting and valley filling"), water tank water saving with plastic bottles (zero cost), and installed smart switches (1,200 yuan); set up classified waste bins + posters on each floor, configured compost bins, included recycling in the cleaning staff's responsibilities, and established a "recycling-income-improvement" closed loop.
2. **Employee Actions (Dec 2024-Feb 2025):** Set up recycling stations for recyclables/ hazardous waste, shared stationery stations, and waste circulation stations; solidified the actions of "cleaning staff's classified recycling + weekly cleaning by the security department", pushed zero-waste knowledge in the employee group, and carried out "scavenger" activities.
3. **Customer Extension (Mar-Jun 2025):** Promoted online (customer group/ building screen), held festival activities on Women's Day (garbage classification for succulents) and Dragon Boat Festival (waste for colored ropes); linked with Earth Hour and Zero-Waste Day (5 bottles for environmental protection bags), and released customer practice briefs.

2. Comparison Before and After Implementation

1. **Energy consumption:** The air conditioning system implemented "peak shifting and valley filling," using cold storage during the off-peak night hours and releasing the cold during peak daytime hours, resulting in a monthly electricity cost decrease from about 383,000 yuan to 262,800 yuan, and equipment response changed from "hour-level" to "minute-level";
2. **Waste disposal:** The time for cleaning staff to sort waste was halved, and recyclables changed from "mixed disposal" to "targeted recycling";
3. **Participation:** Employees' environmental behaviors changed from "passive" to "active", and customers changed from "awareness" to "participation".

3. Challenges and Support

1. **Challenges:** Low participation willingness of employees and customers in the early stage, limited renovation funds;
2. **Support:** Internally, collaboration was secured from the engineering, cleaning, and security departments; externally, guidance was provided by the Vanke Foundation.

Project Impact & Sustainability

Innovation Points: Technically, it has realized energy conservation through "smart switches + radar sensing"; mechanism-wise, it has pioneered the "Three-Step Action Method" (Space - Employees - Customers) and a revenue feedback closed loop, and refined 3 quantifiable formulas:

- **Space Renovation Formula (Facility Renovation and Energy Management):** Energy Consumption Monitoring × Equipment Upgrading + Facility Configuration × Visual Guidance
- **Employee Action Formula (Behavior Incentive and Awareness Enhancement):** Recycling Facility Construction × Resource Sharing Measures × Knowledge Promotion × Practical Activities = Full Staff Participation Closed Loop
- **Customer Promotion Formula (Promotion Interaction and Participation Promotion):** Multi-Channel Promotion × Themed Activity Design × Incentive Mechanism = External Influence Expansion

Promotability: It is applicable to densely populated places such as office buildings and industrial parks. The initial investment is only 1,400 yuan (cost recovery in 6 months), relying on the existing team (cleaning/engineering/customer service) without the need for additional recruitment. The plan can be replicated in the steps of "Renovation - Action - Extension".

Expert Comments

The green operation practices of Shenzhen Nanshan Cloud Technology Building provide an inspiring example for systematically advancing zero-waste initiatives in high-rise commercial buildings. The project has established a complete closed-loop system that spans from hardware optimization to behavioral guidance, and from internal management to external collaboration, demonstrating clear implementation logic and remarkable comprehensive benefits. These practices embody the pragmatic concept of "making optimal use of existing conditions," achieving tangible results in emission reduction, energy conservation, and resource recycling while improving operational efficiency and realizing an environmental–economic win-win. The most valuable aspect of this case lies in its model characterized by "light investment, strong synergy, and high replicability."

INTERNATIONAL MEDIA PORT: CREATING A SMART LOW-CARBON DEMONSTRATION ZONE

Project Overview

International Media Port is situated in the core area of Xuhui Binjiang—the West Bund Media Port. Anchored by the China Media Group Shanghai Station as its industrial leader, it has attracted a cluster of leading media institutions, forming a robust and synergistic industrial ecosystem. Through integrated underground space development and interconnected second-story platforms, the project achieves intensive utilization of land resources. Since 2024, powered by the "Ling Shi" intelligent system, it has established a highly efficient and composite smart low-carbon demonstration zone.

1. **Planning-First Approach:** Through comprehensive underground space development and the connection of elevated pedestrian platforms, a walkable, short-distance, and low-energy consumption environment was created from the outset, laying the physical foundation for low-carbon operations.
2. **Smart & Precise Management:** The "Ling Shi" intelligent core employs AI vision algorithms to drive smart operations and maintenance, while integrating AIoT for intelligent energy conservation. Together, these enable precise control and efficient management of multi-functional spaces.
3. **Behavioral Empowerment:** An online mini-program enables smart access control, transforming the activities of employees and visitors into trackable contributions to low-carbon goals.

Company/Organization Profile

International Media Port (Shanghai) Cultural Development Co., Ltd. is a wholly owned subsidiary established in Shanghai by China International Television Corporation. It serves as the implementing entity for projects under the CMG Yangtze River Delta Regional Headquarters and Shanghai Station.

国际传媒港
INTERNATIONAL MEDIA PORT

Project Highlights

Through deep integration and re-innovation of land, architectural, and industrial resources, the International Media Port project has transformed from a single-function area into a vibrant, multi-functional community. By synergistically planning the industrial ecosystem, regional environment, and smart operations, it has successfully established a modern urban district that is sustainable environmentally, economically, and socially.

Project Outcome

Public Awareness/Environmental Initiative Participation: Through campaigns such as World Environment Day, cumulative participation exceeded 1,000 individuals. During these activities, participants collectively planted wild apricot trees via "Ant Forest".

Integrated Garbage Transfer: Leveraging the interconnected spatial layout, individual waste rooms and dedicated sanitation roles across various plots were eliminated. By enabling staff multiplexing and resource sharing, redundant energy consumption and resource input were reduced, advancing low-carbon management practices. A cumulative total of nearly 100,000 barrels were centrally transferred over 2023-24.

Project Implementation

Since 2024, the Shanghai International Media Port project has officially launched the implementation of its intelligent operation system.

I. Implementation Plan & Key Processes

The project implementation follows the phased path of "Laying the Foundation First, Achieving Breakthroughs through Pilots, and Promoting Comprehensively," advancing steadily step by step:

Infrastructure Development & System Integration Phase (2024): The project involved large-scale hardware installation and server deployment, establishing the computational foundation for subsequent system operation.

Pilot Application & Algorithm Optimization Phase (Starting 2025): Through continuous data accumulation and model iteration, the team rapidly stabilized the AI algorithms, achieving the leap from "seeing" to "understanding."

Process Re-engineering & Efficiency Enhancement Phase

- Digital Personnel Management: By designing and optimizing patrol routes and accurately calculating standard working hours, the variance between task execution time and the standard time was successfully controlled within 10%. This achieved highly efficient and quantifiable management of field operations.
- High-Efficiency Fire Response: By deploying remote intelligent monitoring equipment, an automatic alarm and multi-level notification linkage mechanism was established. The response process was drastically reduced from 4 minutes to just 34 seconds, achieving a revolutionary improvement in emergency response speed.
- Precise Energy Consumption Management: Intelligent upgrades and comprehensive monitoring of water and electricity meters were completed, establishing an online energy consumption monitoring platform. This enables real-time insight and data analysis of energy usage, providing a scientific basis for formulating precise energy-saving strategies and identifying waste/leakage. This is a core component for achieving the project's green and low-carbon operational goals.

C-End Service & Ecosystem Building Phase (August 2025): The project launched a mini-program platform, reducing the need for physical materials and in-person trips and contributing to low-carbon operations.

II. Performance Comparison Before vs. After Implementation

Dimension	Before Implementation	After Implementation	Core Improvement
Issue Detection & Handling	Relied on manual patrols, passive response, slow process.	AI vision auto-identification, automatic work order generation, fire alarm response reduced from 4 mins to 34 secs.	Dramatic increase in efficiency & proactivity, shifting from "human-based" to "technology-based" prevention.
Field Personnel Management	Extensive management	Electronic badges + Bluetooth beacons enable real-time tracking, optimized routes, <10% variance in task time.	Significant improvement in management precision & personnel efficiency
Energy & Facility Management	Relied on manual meter reading	Remote real-time monitoring of utilities, data visualization	Enhanced management visibility & scientific decision-making
User Experience & Engagement	Offline paper passes, low participation.	Mini-program + Facial Recognition Gates; 95% of employees completed identity authentication, 65% registered facial data, activity sign-up participation rate surged to over 85%.	Established direct digital touchpoints with C-end users
Operational Model	Isolated systems, reliance on experience-based decisions	Built an intelligent operational "Digital Brain" integrating security, personnel, energy, fire safety, and user services.	Achieved data-driven, internally & externally coordinated, intelligent, and integrated operations.

Project Impact & Sustainability

The case of International Media Port demonstrates the feasibility of empowering composite spatial operations with intelligent systems, offering a replicable benchmark model for the development and management of urban districts.

- In terms of influence, the intelligent operations ensure the stable functioning of high-end media services, reinforcing its image as a technological benchmark in the industry.
- In terms of innovation, it elevates property management from a backstage support role to a core engine driving the sustainable development of the campus, representing a profound mechanism innovation.
- In terms of sustainability, by reducing costs, improving efficiency, and enhancing user experience, it provides a solid foundation for the project's economic, environmental, and operational sustainability.
- In terms of replicability, this proven smart operation system has itself become one of the project's most valuable scalable and transferable core assets.

Expert Comments

The International Media Port project deeply integrates smart technologies with green operations, achieving efficient and intensive land use through integrated underground space development and platform interconnection—reflecting a pragmatic planning philosophy. The "Ling Shi" system, powered by AIoT and algorithmic control, has reshaped property management with remarkable cost reduction and efficiency gains. By converting individual behaviors into measurable low-carbon contributions via an online mini-program, the project has established a complete "technology–management–behavior" chain, providing a replicable digital decarbonization model for high-end business parks. It is recommended to further quantify environmental performance indicators, strengthen ecological synergies, and continuously disseminate smart low-carbon operation standards.

DAQUAN EXPERIMENTAL SCHOOL: XIANGYANGYUAN LABOR PRACTICE BASE

Project Overview

The Xiangyangyuan Labor Practice Base of Daquan Experimental School in Guannan County commenced construction in 2022. Situated at the core of the school's biology curriculum base, the project established dedicated zones for native plant cultivation, ecological observation, and organic farming. It is equipped with ecological facilities such as rainwater irrigation systems and organic fertilizer treatment units, together forming an integrated green space that combines teaching, practical training, and science popularization.

Operating under a three-tier management model of "school-led, teacher-managed, and student-participated," the base supports regular teaching activities—including plant-growth observation and organic-planting practice—while also hosting public events such as open days and environmental lectures. A student ecological monitoring team collects and analyzes environmental data, contributing to native plant conservation and resource recycling.

Since its establishment, the base has achieved a vegetation coverage exceeding 90%, rainwater utilization above 30%, and a notable annual reduction in waste emissions.

More than 90% of participating students now possess a direct, experiential understanding of plant-growth processes, inspiring many surrounding families to adopt greener practices.

The initiative has been featured repeatedly in county-level media and now serves as a replicable model for campus green-space development.

Project Hightlights

Centering on "ecological synergy and experiential education," the project prioritizes the reuse of existing on-campus resources such as organic waste and rainwater.

It pioneers the model of "*student-led monitoring + resource recycling + curriculum integration*," achieving synergy among planting, water conservation, and biology education.

The initiative won the First Prize for County-Level Campus Environmental Protection Practice, received four media features, and hosted three inter-school exchange visits.

Teachers and students note that they "learn environmental protection by doing," while community residents praise the project for cultivating family green habits.

Even without policy incentives, the initiative has evolved into a regional exemplar of sustainable campus management.

Company/Organization Profile

Located adjacent to the Wulongkou Ecological Wetland and the 4A-level Erlang Shen Ruins Theme Park, Daquan Experimental School covers an area of 64.5 mu. The school currently has 112 faculty members, 27 teaching classes, and 1,326 students.

In recent years, the school has promoted its "1+1 Independent Circular Ecological Classroom" model and actively advanced curriculum reform. It has received honors such as the Excellent Achievement Award for Classroom Reform in Jiangsu Province, the Characteristic School for Junior High School Teaching Team Construction in Lianyungang, and the Advanced Collective for Teaching and Research in Lianyungang.

The school has built a distinctive quality education system, with particularly remarkable achievements in ecological education. Relying on its junior high school biology curriculum base, it has established the Xiangyangyuan Labor Practice Base, which has become a green education brand integrating teaching, practice, and science popularization.

Project Outcome

1. Reduction of Waste and Pollutants

Relying on kitchen waste from the school cafeteria and organic waste from teachers and students, the base converts them into natural fertilizer through composting technology, reducing annual waste disposal by about 8 tons. It fully implements organic planting practices—from seed selection to harvest with zero chemical pesticide use—and reduces fertilizer consumption by more than 60% compared with traditional planting.

2. Science Popularization and Participation

On average, 28 activities are held each year, including World Environment Day Practice, Parent-Child Organic Planting Classes, and Ecological Monitoring Study Tours.

Annual student participation reaches about 1,200 person-times, covering 85% of junior-high students, and more than 400 residents and study groups from nearby communities and sister schools take part.

Through the "Little Hands Hold Big Hands" campaign, more than 150 families have developed habits of waste sorting, water saving, and green protection, with the accuracy of family environmental behavior improving by 35% compared with before participation.

3. Ecological Environment Improvement

The base cultivates more than 20 species of plants, including native poplars, willows, roses, and medicinal plants such as mint and dandelion, achieving a vegetation coverage rate above 90%. Soil organic-matter content increases by 0.2% annually. A miniature ecosystem has gradually formed, with 3 bird species (sparrows, turtledoves) and 5 beneficial insect species (ladybugs, bees) observed, showing a significant improvement in biodiversity.

4. Social Benefits and Demonstration Effect

The school has developed the school-based course Exploration of Campus Green Spaces, which has become a compulsory practical course with 20 class hours each year.

Its student-led monitoring model has been recognized, and three neighboring schools have come to exchange and learn from the experience, providing a practical reference for regional green-space development.

The school has successively received honors such as Jiangsu Provincial Biology Curriculum Base, Advanced Unit for Ecological Science Popularization Education in Jiangsu Province, and Advanced Collective for Teaching and Research in Jiangsu Province.

Project Implementation

I. Implementation Plan and Process

Preparation began in January 2022 and proceeded through three stages:

Phase 1 (Jan–Mar 2022): Planning and Design

Utilizing idle campus land along the former playground, the team collaborated with experts from the County Bureau of Ecology and Environment and the Agricultural Technology Extension Center.

A design emphasizing native plants and clear functional zoning—including planting, observation, and composting zones—was finalized without occupying new land.

Phase 2 (Apr–Jun 2022): Facility Construction

Teachers and students jointly leveled the site, built a 50 m^3 rainwater tank, installed drip-irrigation networks, repurposed wooden crates into planters, and installed organic-composting equipment and interpretive eco-signs, minimizing construction costs.

Phase 3 (Jul 2022–Present): Operation and Optimization

A principal-led, teacher-managed, student-participated mechanism was established.

Two biology practice sessions per week link coursework with on-site activities; facilities are maintained monthly, and experts provide technical guidance each semester for continuous refinement.

II. Comparison Before and After Implementation

Before the project, the site was a bare, compacted lot overgrown with weeds, occasionally used for garbage dumping and devoid of ecological value.

After implementation, vegetation coverage rose from <10% to >90%, forming a multilayered tree–shrub–herb structure.

Added rainwater-recycling and composting systems transformed the area into a multifunctional green classroom.

Students' ecological awareness shifted from textbook theory to experiential learning, and participation in environmental activities grew from 40% to 90%.

III. Challenges and Support Mechanisms

Two major challenges emerged—limited horticultural experience and constrained funding.

To address these, agricultural experts delivered four training sessions, and student technical teams were created for peer learning.

Funding combined school public funds (60%) and County Education Bureau grants (40%), ensuring financial stability.

Institutionally, the Academic Affairs Office integrated the curriculum, while the General Affairs Office oversaw maintenance.

Externally, the County Bureau of Ecology and Environment supplied educational materials; the County Committee for the Care of the Next Generation designated the site as an Off-Campus Labor Education Base; and community partners supported outreach events—together forming a robust internal-external coordination system.

Project Impact & Sustainability

The project embodies both technological and institutional innovation.

Technologically, it deploys low-cost, easy-to-replicate systems—rainwater harvesting, recycled irrigation, and kitchen-waste composting—requiring no complex machinery. Institutionally, it pioneered a three-level governance model (school-led, teacher-managed, student-monitored) that builds a shared stewardship framework among teachers and students.

The initiative has advanced ecological education from theory to practice. Its school-based curriculum has been adopted as a regional teaching and research case, inspiring three neighboring schools to pursue similar programs. School-community collaboration has enhanced local environmental awareness, and the project has been recognized by the County Ecology and Environment Bureau as a "Campus Environmental Protection Practice Demonstration Site."

Its replicability is strong: by utilizing idle campus space and maintaining low capital and operational costs, the model can be easily adopted by rural schools. The accompanying Green Space Management Manual and Practical Activity Guide provide ready-to-use templates requiring minimal investment.

Sustainability is well assured. Future plans include upgrading to an intelligent irrigation system, deepening cooperation with the County Agricultural Technology Station to introduce native plant cultivation techniques, and launching a "Green Mentor" training program to develop in-house leaders in ecological education—ensuring the project's long-term vitality and lasting educational impact.

Expert Comments

Guannan County Daquan Experimental School ingeniously transformed idle land on the playground periphery to establish a "waste-to-fertilizer-to-planting" closed-loop system. This initiative integrates sustainable waste management concepts into biology courses and ecological monitoring. Through its innovative "student-led monitoring + curriculum integration" approach, the program embeds ecological literacy development in hands-on activities, generating a ripple effect of "campus practice + community engagement." With low operational costs and high participation rates, the project offers a replicable, sustainable paradigm for green space management in rural schools.

DONGHU CAMPUS OF WUHAN WULUOLU MIDDLE SCHOOL: BUILDING A HIGH-QUALITY LOW-CARBON MODEL CAMPUS

Project Overview

Time: May – August 2025

Location: Donghu Campus of Wuhan Wuluolu Middle School

Main Content:

As one of the implementation sites for Wuchang District's ecological environment damage compensation alternative restoration project, Donghu Campus of Wuhan Wuluolu Middle School cooperated deeply with Wuhan Dual Carbon Industry Development Service Co., Ltd. to innovatively promote the "1+10" near-zero-carbon campus construction model.

This model centers on one energy consumption monitoring platform, enabling real-time monitoring and dynamic optimization of campus energy use and carbon emissions. It advances green transformation across ten low-carbon scenarios, covering low-carbon travel, buildings, daily living, green energy, and education.

The project is expected to save about 1,400 tons of water annually, generate approximately 140,000 kWh of photovoltaic electricity, reduce 120.9 tons of CO_2 emissions, and recycle 3.5 tons of resources each year. The school has become the region's first near-zero-carbon campus model, offering a replicable pathway for low-carbon transformation across primary and secondary schools citywide.

Company/Organization Profile

Donghu Campus of Wuhan Wuluolu Middle School is a public junior high school established by the Wuchang District Bureau of Education in August 2020. Located in the heart of Wuchang beside Shahu Lake, the campus covers about 25,616.68 square meters and enrolls 806 students.

Project Hightlights

For the first time, ecological environment damage compensation funds were applied to low-carbon campus transformation.

Using the "1+10" model, the project established a multi-dimensional near-zero-carbon system integrating architecture, environment, energy, operations, and education.

A campus carbon-inclusive mechanism systematically records teachers' and students' low-carbon behaviors and awards carbon credits, encouraging sustainable, healthy lifestyles.

Project Outcome

1. Intelligent Management:

Established a unified platform for monitoring energy consumption and carbon emissions, enabling digital management of systems such as photovoltaic panels and charging stations, and dynamically regulating the "energy conservation and carbon reduction account".

2. Green Energy Utilization:

- Built a 138.6 kWp rooftop distributed photovoltaic station generating about 140,000 kWh annually, reducing 120.9 t CO_2, equivalent to planting over 6,000 trees per year.
- Installed solar-powered street lamps that charge by day and light the campus at night, achieving "zero-carbon" energy use.
- Set up a rainwater collection system to recover over 240 tons of rainwater annually for greening, equivalent in carbon reduction to planting 500 trees per year.

3. Low-Carbon and Energy-Saving Renovations:

- Replaced 136 faucets with high-efficiency aerators, saving about 1,400 tons of water annually.
- Installed direct drinking water systems for safe, energy-efficient access.
- Built an intelligent recycling station to ensure accurate sorting and traceability, with paid incentives generating carbon credits. It recycles 3.5 tons of resources annually, reducing emissions by 5 tons.
- Added charging stations to support green mobility.
- Installed window insulation film to reduce summer cooling loads and improve winter heating efficiency.

4. Low-Carbon Education:

- Developed the school-based curriculum Campus Farming & Scholarship Practitioner, integrating agricultural practice with environmental education to nurture "environmental ambassadors".
- Built an eco-agriculture and water-purification demonstration area, featuring a rice–fish symbiosis wetland and the Qinggeng Garden, equipped with smart irrigation and soil monitoring. Agricultural waste and aquatic plants are composted, realizing a "planting–recycling–reuse" cycle and promoting carbon sequestration through the synergy of plants, water, and soil.

Project Implementation

The near-zero-carbon campus construction at Donghu Campus follows the "1+10" integrated model, centered on the energy monitoring platform and coordinated implementation of ten low-carbon scenarios covering energy, resources, architecture, and education.

I. Implementation Plan and Process

Jointly led by the Wuchang District Bureau of Education and Wuhan Dual Carbon Industry Development Service Co., Ltd., the project engaged professional firms to provide technical support and integrated solutions.

The process combined technology with management:

- Conducted a campus energy audit and carbon baseline assessment.
- Built a smart energy management platform for real-time monitoring.
- Completed renovations during summer vacation to avoid disrupting teaching, advancing the "ten low-carbon scenarios" in coordinated batches.

Key actions included:

- Green energy: installing rooftop PV panels, solar lamps, and rainwater collection systems.
- Low-carbon retrofits: applying window films, replacing faucets, and adding smart water dispensers and recycling bins.
- Low-carbon education: developing the Gengdu Campus Constructor curriculum and establishing an eco-agriculture demonstration zone to embed sustainability into teaching practice.

II. Challenges Faced

- Building constraints: roof leakage and unstable parapet structures complicated PV installation and renovation safety.
- Scheduling conflicts: work concentrated in holidays required tight coordination to avoid disrupting classes.
- Financial pressure: high upfront investment, long payback period, and limited fiscal support created sustainability challenges.

III. Response Measures and Support

- Organized training, lectures, and study visits (e.g., to the China Carbon Registration Building) to build staff and student capacity in low-carbon management.
- Held public lectures and technical workshops to enhance awareness and participation across the school.
- Introduced ecological compensation funds to fill financing gaps and support long-term sustainability.

Through systematic upgrades and continuous management, the project achieved tangible energy and emission reductions and established an integrated "management–technology–education" model for low-carbon campus operations—providing a replicable and scalable pathway for similar institutions.

Project Impact & Sustainability

Adopting the "1+10" near-zero-carbon campus model, Donghu Campus integrates an energy monitoring system with ten low-carbon scenarios, achieving demonstrable results in campus decarbonization.

By leveraging intelligent management and technologies such as photovoltaics, rainwater harvesting, and smart waste sorting, it achieves refined control over energy and carbon footprints, underscoring technology’s pivotal role in the low-carbon transition.

The innovative use of ecological compensation funds offers a practical example for other schools. Its design is replicable and promotable, blending low-carbon education, interdisciplinary learning, and community engagement—enhancing both environmental impact and long-term sustainability.

Expert Comments

This case utilizes ecological environmental damage compensation funds for its low-carbon campus transformation. Through a '1+10' model with clear technical pathways and solid data support, the project systematically integrates smart energy monitoring and low-carbon scenarios. It achieves refined carbon management through facilities including photovoltaic systems, rainwater harvesting, and intelligent waste sorting. Meanwhile, the school deeply incorporates low-carbon concepts into its school-based curriculum and labor education practices, establishing a sustainable tripartite operational model encompassing 'management-technology-education'. This mechanism provides an excellent demonstration for green space utilization in primary and secondary schools.

ZHONGSHAN DIYIN SCHOOL: CONSTRUCTION PRACTICE OF THE PLANT SCIENCE EXPLORATION GARDEN

Project Overview

Zhongshan Diyin School has established a deep partnership with Shenzhen Xianhu Botanical Garden, leveraging its collection of over 20,000 plant species to create South China's first integrated campus habitat garden—a 2,300-square-meter complex featuring ten themed botanical exploration gardens. The project innovatively adopts a dual-mentor model integrating "research institutions + basic education," introducing rare scientific specimens like spinulose tree fern and cycas revoluta. It features specialized zones such as Orchid Garden and Fern Forest, achieving a 5% increase in vegetation coverage.

As an International Eco-School, our school plans to establish a "Four-Dimensional Integrated" teaching system which:

1. Develops school-based curricula equipped with the interactive "Plant Wisdom Exploration Cards" system;
2. Implements a class adoption system where students engage in innovative practices like "transparent water storage devices";
3. Sets up interactive learning stations with "one plant, one QR code" for comprehensive science coverage; and
4. Collaborates with Xianhu Botanical Garden on unique activities like "plant fossil rubbing."

Among them, the "earthworm tower installation" vividly demonstrates ecological cycles, with plans to establish a "Junior Botanist" tour guide system comprising 30 student volunteers. The project embodies the philosophy of "making every plant a starting point for science." By integrating plant cultivation with observation, it has achieved significant increase of ecological literacy in 90% of students. Its "landscape as classroom" design approach provides a dynamic model of "research-empowered education" for campus ecological development in the Guangdong-Hong Kong-Macao Greater Bay Area.

Project Outcome

1. The vegetation coverage rate has increased by 5%.
2. The first campus-integrated habitat garden in South China has been built, covering 5 types of ecosystems.
3. School-based ecological courses have been developed, benefiting over 5,000 teachers and students across the campus.

Project Highlights

Innovation: Give priority to transforming existing planting beds (100% utilization of original facilities) and pioneer the "Xianhu Research Plus Campus Scenario" dual-mentor system.

Ecological Synergy: Realize a micro-ecological closed loop through moss carbon sequestration, pollination networks of nectar plants, and other measures.

Evaluation: Experts from Xianhu have praised it as a "model of industry-university-research-application integration"; students have commented that they "have touched the wisdom of life beyond textbooks".

Company/Organization Profile

Zhongshan Diyin School, founded in 2020, is a non-profit private school offering an integrated twelve-year education. Covering an area of 417 mu, the school currently serves over 10,000 teachers and students. The school is committed to nurturing well-rounded talent and places strong emphasis on ecological education. In 2025, it became one of the first schools in the city to receive the "International Eco-Schools Green Flag" certification. Furthermore, its "Eco-Environmental Education Case" was selected as an exemplary model in Guangdong Province, marking significant accomplishments in building a green campus.

Project Implementation

1. Resource Integration Phase (November 2024 - April 2025)

Shenzhen Xianhu Botanical Garden provided over 200 species of characteristic plants and technical schemes, while the school renovated 10 existing groups of specialized planting beds.

Challenges to overcome:

to resolve issues related to waterproofing layer construction in the plant area and create the specific living environments required by the plants.

2. Zoning Construction Phase (June 2025 - November 2025)

Planting areas were divided based on the ecological characteristics and growth habits of plants, simulating natural habitats, including aquatic plants, xerophytic (desert-dwelling) plants, climbing vines, shade-loving ferns and mosses, an orchid garden, a nectar garden, and a pine-fruit garden. Integrated with the characteristics of local Lingnan medicinal herbs: such as a Chinese herbal medicine garden and a herb garden.

Innovations:

- Transparent water storage devices intuitively demonstrate the water storage capacity of cactus roots.
- Insect hotels provide breeding, overwintering, and habitat sites for beneficial insects, enhancing the stability of the local ecosystem.
- Earthworm towers utilize natural biological processes, perfectly combining three functions: waste management, fertilization, and soil improvement, serving as highly intuitive biological devices.

3. Education Integration Phase (September 2025 - Ongoing)

Developed interactive teaching tools such as "Plant Wisdom Exploration Cards" and jointly organized practical activities (e.g., "Plant Fossil Inheritance Rubbing") with Xianhu Botanical Garden.

Project Impact & Sustainability

1. Technological and Mechanism Innovation

The initiative pioneered a "dual-mentor system" (Xianhu experts in collaboration with on-campus teachers) as a coordinated education mechanism. It developed a replicable ecological curriculum system, supported by intelligent tools of science popularization such as the Plant Wisdom Exploration Card and the One Plant, One QR Code mechanism. Together, these elements established a standardized teaching process based on the sequence of "observation–interaction–practice–co-creation."

2. Demonstration Value for the Sector

As a flagship project of international eco-schools, it has introduced an integrated habitat garden design (encompassing five ecosystem types) and a class-based management model. These practices provide a quantifiable reference paradigm for campus ecological development in the Guangdong–Hong Kong–Macao Greater Bay Area, achieving a 5% increase in vegetation coverage, the first of its kind in Zhongshan City.

3. Sustainable Development Plan

Over the next three years, the initiative will advance the "Threefold Development Strategy":

1. Digitization of the curriculum system, including the development of a plant observation platform;
2. Integration of shared resources, through the joint establishment and sharing of a germplasm resource bank with Shenzhen Xianhu Botanical Garden;
3. Socialization of practice, by organizing "campus ecology workshops" in collaboration with local schools, with an expected outreach to more than five schools.

Expert Comments

The dual-mentor model at Diyin Public School in Zhongshan has established the first integrated habitat garden in campus space in South China, activating the dual ecological and educational value of existing space. By 100% utilizing the original planting beds, the project provides teachers and students with a tangible ecological civilization classroom, demonstrating the educational depth of 'landscape as classroom'.

YINZHOU NO.2 EXPERIMENTAL MIDDLE SCHOOL: THE CHAPTER OF FOOD WASTE IN THE CONSTRUCTION OF ZERO - WASTE SCHOOLS

Project Overview

1. Curriculum Integration: Offered compulsory STEAM courses and carried out community composting practices.
2. Resource Recycling: Collected pre- and post-meal kitchen waste and garden waste on campus, converted them into organic fertilizer through composting, and established a "waste-resource" closed-loop system.
3. Team Collaboration: Led by the principal and managed by the General Affairs Office, it involved personnel from logistics, gardening, kitchen, and property management, forming a cross-departmental collaboration mechanism.
4. Professional Empowerment: Teacher Gu Lingyun joined the "Community Kitchen Waste Composting Platform Composter" program in 2024 and obtained the Composter Certificate and a scholarship in 2025, promoting the professionalization of teaching.

Company/Organization Profile

Yinzhou No.2 Experimental Middle School, located at No. 591 Xiaying South Road, Yinzhou District, Ningbo City, Zhejiang Province, China, is a public junior high school. In December 2024, the school was selected for the list of modernized junior high schools in Zhejiang Province. The school upholds the characteristics of Lanqing School, with "Qing Chu Yu Lan" (Blue comes from indigo but is bluer) as its motto, and aims to cultivate "outstanding social citizens with scientific spirit, humanistic literacy, independent personality, and healthy lives".

Project Highlights

1. Multi-Stakeholder Collaboration: Under the principal's leadership, we established cross-departmental collaboration involving the General Affairs Office, Logistics, Kitchen/Catering Services, and Property Management.
2. Resource Circulation: We transformed pre- and post-consumer kitchen waste and garden trimmings into valuable resources, achieving **100% resource recovery rate** for organic waste on campus.
3. Curriculum Integration: We combined classroom instruction with hands-on composting activities, enhancing students' theoretical knowledge and practical skills simultaneously.
4. Experience Dissemination:We scaled our successful "Zero-Waste Campus" model, promoting it to district, municipal, and rural communities to advance ecological civilization.

Project Outcome

1. On-campus Impact

Implemented a "mandatory school-based STEAM curriculum" for all 425 Grade 7 students (2 class hours/week). Students initiated a "Zero-Waste Campus" proposal. Addressing waste reduction and precise classification needs, they launched community composting practices. 100% of pre- and post-meal kitchen waste, alongside daily garden waste (~50 kg), is composted on-site, processing 100 kg of food waste daily. Student involvement in composting and the introduction of portion-weighing technology achieved source reduction and precise waste sorting.

2. Academic Recognition

The school-developed composting course case study, "Kitchen Waste Management for a Zero-Waste Campus," was rated the highest-tier (3-star) case by the Zhejiang Provincial Institute of Education Research and selected for the National Exemplary Case Repository by the National Research Center for Curriculum and Textbook Development, Chinese Academy of Educational Sciences. This established an "Education + Technology" dual-driver model.

3. Regional Influence

Recognized as a "Ningbo Municipal Model School for Waste Classification." Project methodologies have been successfully replicated across communities in Xiaying Sub-district, Yinzhou District, contributing significantly to local carbon reduction goals.

4. Societal Impact

Gained national recognition within the industry as a model for waste classification education. The project facilitates knowledge exchange through a community composting platform, engaging practitioners nationwide.

Project Implementation

I. Project Background & Objectives

Timeline: curriculum launched in 2018; deep-dive implementation 2023-2025

Location: our campus

Core targets

1. Convert 100 % of cafeteria & landscaping waste into compost on site.
2. Build a "Zero-Waste Demonstration School" and extend the model to the neighborhood.
3. Create a replicable "education-practice-community linkage" template.

II. Implementation Plan & Process

Stage 1 – Tackling three bottlenecks (2023-2024)

1. **Funding gap:** Donations from caring individuals
2. **Staff shortage:** Head of general affairs leads, student volunteers recruited, rotating shifts during long break
3. **Limited spare time:** Centralized theory lessons + distributed practice, credits awarded

Stage 2 – Key technology roll-out & enablement

1. **Technical support:** Nanjing University Lishui Institute supplies composting technology and product testing; Jianling Village, Fenghua, shares rural composting experience to refine compost bins.
2. **Process optimization:** Drain cafeteria waste to cut salt content; Shred landscaping branches and mix with food scraps.

Stage 3 – Cross-district scaling (from 2025)

1. Co-build a Community Compost Education Station with Xiaying Sub-district; train residents.
2. Nanjing University Lishui Institute provides data-monitoring support.

III. Before-vs-After Analysis

1. **Daily food-waste handling:** 0 kg >> 150 kg (all composted)
2. **Curriculum value:** STEAM courses lacked hands-on carriers >> School-based compost course created; 100 % student participation; awards in district & city contests
3. **Community linkage:** No external partners >> Xiaying Sub-district now running community composting

Project Impact & Sustainability

I. Project Impact

Using a STEAM curriculum as its vehicle, the initiative delivers multiple dividends through the creation of a "Zero-Waste Campus":

1. Environmental – 100 % of cafeteria and landscaping waste is converted into resources on site, eliminating the need for landfill or incineration.
2. Educational – More than 1 000 students have developed a sense of ecological responsibility; the "centralized lessons + rotating hands-on duty" model has been added to the district' s STEAM best-practice library.
3. Social – Teacher Gu Lingyun presented at a national composting symposium and earned professional certification; project know-how is now being shared with Xiaying-sub-district neighborhoods through the Vanke Foundation platform.

II. Replicability

The project offers three advantages for rapid uptake:

1. Low-cost & easy to run: it relies on existing campus space and cafeteria waste; no expensive equipment is required.
2. Cross-scenario ready: proven "school + community" dual template already exists.
3. Policy-aligned: it answers the national "Zero-Waste Cities" and rural-revitalization strategies, enjoys technical support from the Nanjing University Lishui Institute, and supplies standardized procedures that can be copied quickly.

III. Sustainability

1. Institutional safeguard: a permanent management system led by the principal, executed by the general-affairs office, and coordinated across departments.
2. Resource loop: compost products feed campus landscaping and nearby farmland, forming a circular chain of "waste → fertilizer → produce".
3. Capacity building: on-campus teachers earn "compost-master" certification; student clubs operate the project autonomously to ensure continuity.

Next step: Expand university–enterprise cooperation, explore marketization of organic fertilizer, and secure a win-win in both ecological and economic returns.

Expert Comments

This case focuses on the valorization of food waste, achieving 100% closed-loop treatment of campus organic waste through composting technology. It converts 300 jin of food waste into organic fertilizer daily, delivering significant environmental benefits. By integrating labor education into mandatory STEAM curricula with deep student engagement, the project also demonstrates outstanding educational value. Certified professional faculty and the designed 'waste-fertilizer-agricultural products' recycling chain ensure the project's sustainable operation, providing a cost-effective and easily replicable model for campus green space utilization in the context of 'Zero-Waste Cities'.

STATE GRID XUZHOU: TRANSFORMING COAL MINING SUBSIDENCE AREAS INTO A NATIONAL WETLAND PARK

Project Overview

In order to solve the core issues of ecological restoration and green transformation in resource-depleted cities, the State Grid Xuzhou Electric Power Company has partnered with governments, universities, and townships to address four key areas: restoring arable land to cultivate 'smart ecological fields'; restructuring water networks to create a 'circular ecological chain'; re-greening to attract birds and form a 'harmonious ecological circle'; and integrating scenery with electricity to develop an 'ecological and cultural tourism chapter.' This initiative deeply engages in the comprehensive ecological management of coal mining subsidence areas, systematically addressing multiple challenges such as arable land destruction, water pollution, biodiversity decline, and hindered economic development. Successful efforts have transformed the subsidence area into a national wetland park, attracting over a million visitors annually. This demonstrates a synchronized enhancement of ecological, economic, and social benefits, providing a replicable practical model for the transformation of resource-based cities.

Company/Organization Profile

State Grid Xuzhou Power Supply Company is an important hub for the national grid's "West-East Power Transmission" and the East China grid's "North Power Supply to the South." The company has maintained the title of National Civilized Unit for five consecutive terms. The company's work in serving the transformation and development of the resource-depleted city of Xuzhou and the creation of new era civilization practice centers has received wide recognition.

国家电网
STATE GRID
国网徐州供电公司
STATE GRID XUZHOU POWER SUPPLY COMPANY

Project Highlight

During General Secretary Xi's inspection of Pan'an Lake, he fully affirmed the transformation results of Jiawang, praising that "Jiawang has truly become prosperous." Local residents expressed, "The environment has improved, and our lives have also gotten better. We are working right at our doorstep, and our income has increased."

Project Outcome

First, more than 4,000 mu of farmland has been restored, increasing soil organic matter by 37%. The city has revitalized 55,000 mu of collapsed land.

Second, 7,000 mu of open water surface and 4,000 mu of wetland landscapes have been created, with an annual water storage of 15 million cubic meters. Water quality has improved from inferior class V to class III.

Third, a total of 16,000 trees have been planted, with both forest and grass coverage rates and soil erosion control rates reaching 98%. We have established 19 wetland islands and a million square meters of flower gardens, attracting over 200 species of birds, more than 40 species of fish, and over 30 species of wildlife, achieving diverse coexistence.

Fourth, Pan'an Lake has been successfully developed into a national 4A-level scenic area, a national wetland park, and one of the first wetland tourism demonstration bases in the country. In 2024, the scenic spot attracted over a million visitors, boosting employment in the fragrance sachet industry by 3,000 jobs. The scenic spot's electric boat shore power has been charged over 10,000 times a year, replacing more than 50 tons of fuel oil, reducing costs for merchants by over 400,000 yuan annually.

Project Implementation

Xuzhou is a city that flourished due to coal, once relying on over 90% of Jiangsu Province's coal reserves to support its economic development. However, a century of mining has left this city burdened with heavy ecological debts: the city has formed a coal mining subsidence area of 423,300 mu, with the Pan'an Lake area being the most severe, where the subsidence area reaches 30,000 mu, with an average depth of 4 meters, and the deepest point exceeding 20 meters, becoming the 'largest ecological scar of Xuzhou' that everyone laments.

Behind this 'scar' were even more difficulties and challenges:

- First, the once fertile farmland had turned into ponds, leading to a reduction in arable land area, loss of soil fertility, and damage to infrastructure, which posed a threat to food security.
- Second, the collapsed areas were accumulating polluted water, with wastewater infiltrating and water quality dropping to the worst level, Category V, raising red flags for water safety.
- Third, vegetation was destroyed, habitats were fragmented, species of flora and fauna sharply declined, and the ecology continued to deteriorate.
- Fourth, the coal industry was shrinking, resulting in labor loss, increased employment pressure, difficulty in utilizing collapsed land directly, and challenges in establishing emerging green industries, making economic transformation and development very difficult.

In the face of difficulties, we united the government, universities, townships, and other forces to promote ecological restoration and green transformation from four aspects.

1. Restore the arable land to cultivate "smart ecological fields."

We started by leveling the land and applying the "stripping-recovery" technique to protect the topsoil. After recovery, we added organic fertilizers to improve the soil and rebuild a healthy plowing layer.

Then, we constructed supporting infrastructure such as ditches, roads, canals, bridges, and sluices to enhance the irrigation and drainage capacity of the farmland. Relying on smart greenhouses and big data in electricity, we developed smart agriculture to establish high-standard farmland that ensures harvests in both drought and flooding. Finally, we planned for the rotation of drought-resistant and salt-tolerant crops, as well as agrotourism and rural cultural tourism, allowing the farmland to produce both food and scenery.

2. Reshape the water network to weave a "circular ecological chain."

The first step was to implement targeted measures: dredging in deep water areas to create ecological lakes; clearing and reshaping shallow areas, planting water-purifying plants, and converting them into artificial wetlands; and stabilizing non-subsiding areas for reforestation or creating ecological islands.

The second step was to carry out water system connectivity projects, introducing fresh water into lakes to optimize water circulation. Simultaneously, we installed photovoltaic systems on the water surface to provide clean energy, reduce water evaporation, and suppress algae growth, achieving three benefits to empower water ecology.

The third step was to strengthen monitoring, enhance river patrols and water protection measures, and deploy power IoT water quality monitoring terminals to transmit data in real-time such as pH and turbidity, enabling dynamic awareness and intelligent warnings of water quality.

3. Re-greening attracts birds, creating a 'harmonious ecological circle.'

We selected local tree species such as pond cypress and weeping willow to restore vegetation, while also shifting our approach from 'scaring away birds' to 'attracting birds.' Over 200 anti-electrocution artificial bird nests were installed in safe locations near power facilities to guide birds to safely inhabit the area. Additionally, we planted grass in the corridor of the power lines to stabilize the soil, which helps to conserve water and soil while protecting biodiversity.

4. Integrate scenic and electric resources to create an "ecological cultural tourism chapter."

Based on ecological restoration, it supports the development and construction of wetland parks to create a fully electric scenic area, comprehensively developing ecological tourism and distinctive cultural creativity, thereby driving employment. The implementation of intelligent upgrades to the power grid and full coverage of shore power for vessels will provide 22.57 million kilowatt-hours of clean energy annually, reducing emissions by 135 tons, providing reliable support for creating a "zero carbon" living circle.

Project Impact & Sustainability

Electric power has propelled a monumental transformation in the coal mining subsidence area from ecological trauma to a green garden, providing replicable and promotable solutions for resource city transformation and regional sustainable development. The relevant practices and achievements have garnered significant attention from mainstream media, with multiple reports. Regions such as Liaoning, Anhui, Shandong, Gansu, and Guangdong have come to visit and learn, earning the area the title of a "Chinese model" for transforming resource-depleted cities.

Expert Comments

This project integrates the technical strengths of power companies into the ecological restoration of coal mining subsidence areas. It establishes a comprehensive management system comprising 'smart ecological fields - circulating water networks - wildlife habitats - landscape-power integration', transforming the subsidence area into a national wetland park. This provides a model for green transformation in resource-depleted cities. Through integrated application of technologies such as floating photovoltaic systems and IoT-based water quality monitoring, the project has significantly improved water quality and ecological indicators like forest and grass coverage. It represents an outstanding practice of energy enterprises participating in ecological civilization construction and advancing the 'Dual Carbon' goals.

SHENWAN GREENFIELDS, WATERSIDE OASIS: INNOVATIVE PRACTICES IN BUILDING A BIRD-FRIENDLY URBAN GREEN SPACE AT FUTIAN MANGROVE ECOLOGICAL PARK

Project Overview

The project is based in the Futian Mangrove Ecological Park, with a core focus on "scientific restoration,friendly construction,andsocial participation, " systematically advancing the protection and enhancement of the urban wetland ecosystem. By developing bird-friendly streetlights and anti-bird collision systems, the project effectively safeguards bird reproduction and flight safety. Through the recycling of green waste and soil improvement, a material circulation system within the park has been established. Additionally, ecological restoration of the wetland at the Shenzhen River estuary has significantly enhanced biodiversity and habitat quality.

The project integrates diverse resources and addresses the conflicts between ecological conservation and human activities in an urban environment. Since its implementation, it has successfully restored habitats for key species, recorded protected animals such as the horseshoe crab, and achieved an annual ecosystem service value of RMB 192 million. The project has been awarded the Star Wetland Education Centre prize under the Ramsar Convention and multiple provincial and municipal honors, providing a practical model for coastal wetland conservation and urban green development in China.

Company/Organization Profile

Shenzhen Futian District Water Authority is a government department under the Futian District People's Government. Its main responsibilities include implementing laws, regulations, and policies related to water affairs at the national, provincial, and municipal levels.

Project Highlights

The project fully leverages local biological resources and public participation mechanisms. It has innovatively developed bird-friendly streetlights and an anti-bird collision system, effectively enhancing biodiversity, and realized the recycling of green waste and soil improvement. It has been awarded multiple honors including being among the first globally to receive the "Wetland Education Centre Star Award" under the Ramsar Convention and the "Nature Guardian" grand prize. Furthermore, it was selected for the "Wetland Park Plus" pilot initiative in Guangdong Province. Highly praised by visitors alike, the project has become a exemplary model of urban ecological conservation.

Project Outcome

1. Significant improvement in bird breeding and habitats: Biodiversity-friendly street lights and a bird collision prevention system have been successfully developed and implemented, providing safe breeding conditions for birds such as great tits and Oriental magpie-robins. The incidence of bird collisions with building glass has been reduced to zero, markedly enhancing urban bird conservation efforts.
2. Outstanding Achievements in Green Waste Recycling and Soil Improvement: Through high-temperature composting, approximately 170 cubic meters of organic fertilizer was produced annually from green waste. Over 4,500 kg of coffee grounds were recycled and incorporated into the composting process. A total of 1,641 square meters of soil were ameliorated, significantly enhancing soil health and reducing reliance on external fertilizers and waste management costs.
3. Notable Success in Wetland Restoration and Biodiversity Recovery: Following the ecological restoration of the wetland, the nationally protected Class II species Horseshoe Crab (Tachypleus tridentatus) was recorded. Migratory waterbird species and populations increased significantly, the spread of invasive species was effectively controlled, and the stability and ecological service functions of the estuarine wetland ecosystem were substantially enhanced.
4. Energy Savings, Emission Reduction, and Enhanced Ecosystem Service Value: The ecological park conserves approximately 723,000 cubic meters of water annually, reduces cooling energy consumption by 3,009 kWh, mitigates 140,000 cubic meters of stormwater runoff, and provides annual ecosystem service value estimated at RMB 192 million, which is 7.43 times the average Gross Ecosystem Product (GEP) per unit area in Shenzhen.
5. Extensive Public Engagement: The project organizes various nature education and citizen science activities, attracting about 1.3 million visitors annually. It has engaged thousands of citizens in environmental practices such as composting and bird monitoring. Designated as a Shenzhen Young Pioneers' practice base and a National Outstanding Unit for Ecological and Environmental Science Popularization, the project demonstrates profound social impact.

Project Implementation

Futian Mangrove Ecological Park has adopted a core strategy of "scientific restoration,friendly construction,and social participation" systematically enhancing ecological space quality and biodiversity conservation. It has pioneered an innovative pathway for the synergistic development of efficient operational management and ecological service functions in urban nature parks.

I. Implementation Process and Key Initiatives

Since its launch, the project has focused on three major areas: improving bird habitats, promoting resource recycling within the park, and restoring the estuary wetland, carrying out a series of scientific and practical actions.

In terms of bird-friendly facilities, the project team, upon discovering that birds nesting in streetlight structures posed safety and electrical hazards, conducted dedicated research rather than simply dispersing the birds. Through continuous monitoring of species such as Great Tits and Oriental Magpie-Robins, combined with spectral analysis and nest-site selection studies, they successfully developed a biodiversity-friendly streetlight that provides both illumination and breeding support, earning two national patents. These lights use 590-nanometer amber lighting to significantly reduce light pollution and are equipped with detachable nest boxes. As a result, 16 nests of Great Tits in park lamp posts successfully fledged 30 chicks, while seven pairs of magpie-robins using installed nest boxes fledged 25 young, achieving a breeding success rate of 75%. Concurrently, bird collision with building glass was reduced to zero through five years of monitoring and iterative improvements to anti-collision decals.

For resource recycling, the project established an efficient green waste composting system that converts leaves and branches into organic fertilizer through high-temperature composting. Innovatively, it incorporated a collaborative mechanism to recycle over 4,500 kg of coffee grounds, significantly improving composting efficiency and quality. Approximately 170 cubic meters of organic fertilizer produced annually were used to ameliorate 1,641 square meters of soil in the park, enhancing soil health and carbon sequestration capacity and forming a closed-loop "waste-resource-soil" model.

In estuarine wetland ecological restoration, the team addressed challenges such as invasive species and hydrological changes by systematically improving habitats. Efforts included clearing non-native Sonneratia species, replanting native mangroves, and conducting biodiversity monitoring. Post-restoration, the presence of the nationally protected Class II species Carcinoscorpius rotundicauda (Horseshoe Crab) was recorded, and significant increases in migratory bird species and populations were observed, indicating substantially improved wetland ecological function and stability.

II. Pre- and Post-Implementation Comparison and Challenges Overcome

Prior to the project, the park faced issues such as significant light pollution, risks to nesting birds, high costs for green waste processing, and declining biodiversity in the estuary wetland. Through technological innovation, ecological design, public participation, and systematic management, the project facilitated a transition from purely aesthetic functions to comprehensive ecological service enhancement.

The project overcame conflicts between human activity and ecological conservation in an urban setting by using technological innovation to resolve the coexistence of bird nests and electrical safety. Multi-stakeholder cooperation addressed technical support gaps often seen in public-interest projects, with expertise and resources provided by the Mangrove Conservation Foundation (MCF), Shenzhen environmental research institutes, and several enterprises. Effective integration of public and volunteer participation further enhanced social recognition and project sustainability.

Project Impact & Sustainability

The project has achieved systematic technological outcomes in areas such as bird-friendly facility design, resource recycling, and wetland ecological restoration. It led to the development of the Technical Guidelines for the Ecological Construction and Management of Biodiversity-Friendly Parks, which has been submitted for provincial group standard accreditation. This provides critical reference and normative guidance for the operation and management of similar urban ecological spaces.

The project’ s results have gained broad recognition within the industry, receiving numerous honors including being among the first globally to be awarded the Wetland Education Centre Star Prize under the Ramsar Convention and the "Nature Guardian" Grand Award. It was also selected for the "Wetland Park Plus" pilot initiative in Guangdong Province, demonstrating significant exemplary effect. Its social participation mechanism, low-cost sustainable operation strategy, and scientific monitoring and evaluation system are well-suited for enhancing ecological spaces in urbanized areas, holding strong potential for replication and application in similar coastal wetland parks and urban green spaces across the country.

Expert Comments

This case study, centered on bird-friendly initiatives, integrates biodiversity conservation into the management of urban parks. The project developed two national patents—an amber 590-nanometer streetlight and an anti-bird collision system—which yield significant ecological benefits and demonstrate a scientific approach from problem identification to targeted solutions. Additionally, by utilizing high-temperature composting of green waste in synergy with coffee grounds, it establishes a closed-loop system from waste to resources to soil. In terms of public engagement, the project attracts up to 1.3 million participants annually, serving as a valuable site for ecological education.

SHANGHAI SIXTH PEOPLE'S HOSPITAL: A "ZERO-WASTE HOSPITAL" CONSTRUCTION PRACTICE

Project Overview

In January 2022, Shanghai Sixth People's Hospital launched the Green Hospital System Construction Project at its main campus, 600 Yishan Road, Xuhui District, Shanghai. With the goal of building a "green, smart, and humanistic" hospital, the project established a smart energy management platform equipped with nearly 600 metering points to enable real-time energy monitoring and intelligent dispatching. Key initiatives included the implementation of magnetic levitation chillers, variable frequency pumps, and LED lighting system upgrades, which together generated annual electricity savings of over 1 million kWh. The hospital also expanded its use of renewable energy through photovoltaic power generation and solar water heating systems, and constructed a rainwater recycling system with an annual reuse capacity of 2,945 m^3. Furthermore, the hospital comprehensively advanced its zero-waste initiative, achieving full-process informatized management of medical waste. By 2024, the overall energy consumption had decreased by 15.8% year-on-year, and energy intensity per unit building area dropped to 59.3 kgce/m^2, reaching an advanced level in Shanghai. The project has been honored with titles such as "National Public Institution Energy Efficiency Leader" and "Shanghai Zero-Waste Hospital," establishing Shanghai Sixth People's Hospital as a national benchmark for green and low-carbon transformation in hospitals across China.

Company/Organization Profile

Shanghai Sixth People's Hospital is a century-old Grade A, Class III general hospital. In recent years, guided by green, smart, and human-oriented development strategies, the hospital has vigorously promoted energy conservation, emissions reduction, and intelligent construction. It has established a comprehensive smart energy management platform and implemented multiple energy-saving technological renovation and renewable energy application projects, winning multiple national and municipal honors. Through systematic green hospital development, the hospital has achieved synergistic improvements in energy efficiency and resource recycling, becoming a national benchmark for green transformation and high-quality development in the healthcare sector.

Project Highlights

This project prioritizes green upgrades to existing spaces and facilities, leveraging an intelligent platform to integrate resources and achieve high-efficiency operation. It demonstrates outstanding ecological synergy by incorporating rainwater recycling, photovoltaic power generation (with an annual output of approximately 16,000 kWh in 2024), and informatized medical waste management, establishing a comprehensive resource recycling system. The hospital also benefited from policy support through the EMC model.

Project Outcome

1. Comprehensive energy consumption decreased by 15.8% in 2024, with energy intensity reduced to 59.3 kgce/m^2;
2. Annual electricity savings exceeded 1 million kWh, with lighting energy consumption reduced by over 30%;
3. Annual rainwater reuse reached approximately. 2,945m^3, achieving a reuse rate of 93.9%;
4. The hospital achieved full-process informatized management of medical waste, achieving a 3% reduction in total medical waste volume despite rising medical service demand;
5. The hospital has been honored with multiple awards, including "National Hospital Energy Conservation Leading Demonstration Unit", "Shanghai Water-Saving Benchmark Unit", "Shanghai Energy Conservation and Emission Reduction Advanced Collective", "Shanghai Public Institution Water Efficiency Leader", and "2024 Shanghai Zero-Waste Hospital". It was also recognized as an "Outstanding Case of Beautiful Hospital Construction in 2024" by the National Health Commission. Additionally, the hospital has consistently ranked first in energy conservation performance among key energy-consuming institutions in Xuhui District and received an "Excellent" rating.

Project Implementation

Shanghai Sixth People's Hospital consistently upholds the green development philosophy of "harmonious coexistence between humans and nature." It systematically advances hospital construction and precision energy management, achieving the integrated development of energy conservation and resource recycling through technological upgrades, management innovation, and behavioral guidance.

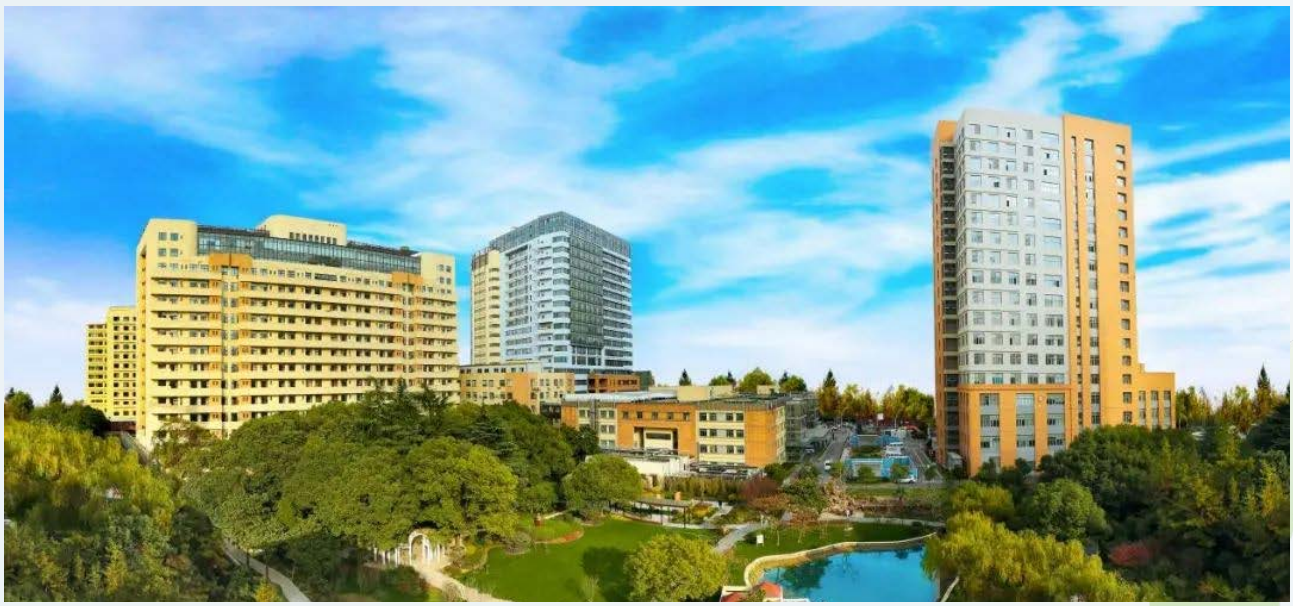
I. Lush Greenery • Sustainable Environmental Optimization: A Pioneer in Green Healthcare

Located in the heart of Xuhui District, the hospital covers an area of 86,000 m^2, with a green space of 28,000 m^2, achieving a greening rate of 33%. A professional landscape design team created a central garden that remains green year-round and blooms with seasonal flowers. Within this lush central garden, a Chinese herbal medicine garden featuring more than 50 species of medicinal plants was established, blending ornamental and educational value. It allows **people** to experience the growth of medicinal herbs firsthand. Today, this garden has become a new landmark of traditional Chinese medicine in Shanghai.

The hospital actively introduces advanced energy-saving technologies, such as rooftop photovoltaic power generation, solar water heating systems, and rooftop rainwater recycling, significantly improving the efficiency of renewable energy use and driving the hospital's green transformation.

II. Smart Energy Conservation • Technology and Management Dual-Drive: A Leader in Energy Efficiency

The hospital has developed an integrated smart logistics operation management platform, installing nearly 600 metering points to enable intelligent monitoring and dispatching of energy, equipment, and materials. Efficiency upgrades—including



magnetic levitation chillers, variable frequency pumps, and ultra-low nitrogen boilers—have reduced annual electricity consumption by more than 1 million kWh. Through the EMC model, the hospital also renovated its lighting systems, cutting lighting energy consumption significantly. The National Center for Orthopedics, completed in 2023, introduced a "Regional Central Energy Center" and "Energy Trusteeship" model. Despite a 44% increase in building area, energy consumption growth was contained to 24%, setting a benchmark for green hospital construction. Guided by both technological measures and management innovation, the hospital continues to refine its smart energy operation system, steadily improving efficiency and lowering carbon emissions. Its energy intensity has remained at an advanced level citywide for years, earning titles such as National Public Institution Energy Efficiency Leader, National Hospital Energy Conservation Leading Demonstration Unit, Shanghai Energy Efficiency Leader, and Shanghai Energy Conservation Advanced Collective, solidifying its position as a national leader in hospital energy management.

III. Resource Recycling • Waste Reduction and Reuse: A Practitioner of Zero Waste

Following the standards of a "Zero Waste City," the hospital has implemented full-process informatized management of medical, hazardous, and laundry waste, achieving classified collection, real-time weighing, and closed-loop disposal. After the commissioning of new facilities in 2023, which added 200 beds and 18 operating rooms, refined management and source reduction efforts still enabled a 3% decrease in total medical waste volume, despite increased service demand. These achievements earned the hospital recognition in 2024 as one of Shanghai's first demonstration "Zero-Waste Hospitals."

Overcoming challenges such as retrofitting aging equipment, complex system integration, and changes in staff practices, the hospital adopted a scientific, step-by-step approach to implementation. It has since become a national benchmark for hospital green transformation, setting an example for building beautiful hospitals and advancing sustainable urban health. In 2024, it was recognized by the National Health Commission as an "Outstanding Case of Beautiful Hospital Construction," among other honors.

Project Impact & Sustainability

This project has achieved dual innovation in both technology and institutional mechanisms through systematic practices, including the establishment of a smart energy management platform, the enhancement of the EMC model, and full-process digital management of the "Zero-Waste Hospital." Together, these efforts have created a replicable paradigm for green hospital operations nationwide.

The project's achievements have been showcased at multiple authoritative forums, including the 11th National Hospital Energy Conservation Conference (2023), the Green Hospital Construction and Logistics High-Quality Development Conference, and the 8th National Hospital Logistics Refined Management Conference (2024), where they received broad recognition within the industry. Inspired by this model, institutions such as Anhui Provincial Hospital, Shanghai Children's Hospital, and Shanghai Municipal Center For Disease Control & Prevention have conducted study visits and subsequently implemented similar practices.

Looking ahead, the hospital will continue to enhance its smart logistics system, implement refined carbon footprint management, and pursue the China National Water Efficiency Leader designation. It will also move toward becoming a "near-zero carbon hospital," strengthen collaboration with universities and research institutions, and further integrate digital technologies with low-carbon initiatives, thereby advancing the green, low-carbon, and high-quality development of China's healthcare sector.

Expert Comments

This case centers on smart energy management, with solid data showing a 15.8% reduction in comprehensive energy consumption and 3% decrease in medical waste. The resource circulation system incorporating photovoltaics and rainwater reuse demonstrates diverse pathways for low-carbon upgrading of existing spaces. The Shanghai Sixth People's Hospital case has been studied and adopted by multiple medical institutions, demonstrating significant demonstrative effect and potential for advancing toward near-zero-carbon hospital construction.

NANPING ENVIRONMENTAL PROTECTION EDUCATION PROMOTION ASSOCIATION: "ZERO WASTE SCHOOL" CONSTRUCTION

Project Overview

Starting in 2023, the Nanping Environmental Protection Education Promotion Association has focused on the issues of waste reduction and food waste under climate change. The association has promoted the core concept of the "Zero Waste School Construction" project on campuses, disseminating environmental education knowledge and carrying out practical activities such as composting, enzyme production, and worm tower building. These efforts advocate the ecological civilization concept of green, low-carbon, and circular development, while also nurturing a team of "young environmental promoters."

In collaboration with local primary and secondary schools, communities, universities, media, and businesses, the association has launched a series of "face-to-face" environmental activities. These initiatives center on "Zero-Waste School Construction to Support Sustainable Community Living — Practices and Explorations in Source Reduction, Resource Recovery, and Harmless Treatment of Waste Classification."

Company/Organization Profile

Established in October 2015 with the approval and registration of the Nanping Civil Affairs Bureau, the Nanping Environmental Protection Education Promotion Association is an independent legal entity and a non-profit social organization. It advocates sustainable living, builds platforms for public participation in environmental practices, disseminates knowledge and skills related to environmental protection, and promotes the spirit of volunteer service. Over the past decade, the association has conducted nearly 900 public benefit activities in schools, communities, and rural areas, involving over 30,000 volunteers and inspiring more than 100,000 people to pay attention to environmental issues.

Project Highlights

The Zero-Waste Construction for Sustainable Communities project is the result of multi-party collaboration. The Nanjing University (Lishui) Ecological Environment Research Institute, the Vanke Foundation, and the Fujian Provincial Ecological Environment Education Center provided technical and financial support. Local government departments, schools, and enterprises contributed resources such as composting sites and facility construction. Vanguard teams of Party members from universities and enterprises actively participated in a series of activities.

The Yuping Campus of Nanping Experimental Primary School adapted the activities into a situational drama, which won first prize at provincial and municipal youth science and technology video festivals.

Project Outcome

More than 50 themed lectures and experiential activities on zero waste have been conducted at locations including Yuping Park in Yanping District, Nanping No. 1 High School, Nanping Experimental Primary School, Yanping District Experimental Primary School, the Nanping Waste Classification Theme Park in Jianyang District, Yungu Experimental School, Wuyi School, and Wuyi University.

These initiatives have received strong public support, engaging universities, primary and secondary schools, kindergartens, community residents, and Party members and employees of enterprises and institutions. Cumulative participation has exceeded 2,000 people, indirectly raising environmental awareness among nearly 60,000 individuals.

The project has gained support from relevant government departments, leading to the establishment of zero-waste practice sites in public parks. Zero-waste activities in schools have also been recognized by local education institutions, with the organization participating in the design of several zero-waste school practice bases.

Project Implementation

I. Implementation Plan and Process

Through an integrated model of "concept promotion – practice cultivation – system building," the project systematically improved behavioral and capacity development among green-space users.

1. Concept Promotion and Basic Cultivation (2022–2023)

2. Practice Base Construction and Scalable Expansion (2024–2025)

Waste materials were utilized to build "Zero-Waste School" demonstration bases in four schools, and zero-waste practice bases were established in parks and enterprises, including:

- Two urban parks (leaf composting)
- Three primary and secondary schools (food waste composting and planting)
- One university (comprehensive practice base)
- One enterprise (resource recovery from chicken manure and discarded mushroom residues through fermentation)

3. Systematization and Regional Promotion (2024–present)

With guidance from the CCCP Community Composting Platform, jointly initiated by the Nanjing University (Lishui) Ecological Environment Research Institute and the Vanke Foundation, a localized evaluation system for green-space users was developed. The initiative also guided the establishment of new "Zero-Waste Labor Practice Bases" on campuses, expanding project coverage.

II. Achieved Outcomes

- Monthly leaf transportation in parks and food waste in schools were significantly reduced.
- Compost replaced commercial organic fertilizer, greatly lowering planting-area costs.
- Ten composting enthusiasts with professional expertise were trained.
- Seven zero-waste practice bases were established.
- Park composting experiences helped dispel residents' concerns and encouraged voluntary waste sorting.

III. Challenges and Support

Major Challenges

- Funding shortage: Addressed through volunteer collection of discarded materials and independent base construction.
- Site selection difficulties: Initially used parks as demonstration sites; two years of complaint-free operation proved feasibility, enabling expansion to schools and enterprises.
- Public misconceptions: Resolved through hands-on demonstrations and educational experiences.

Internal Support

- The core team includes a certified composting trainer and ten experienced composting enthusiasts capable of training and base construction.
- A standardized curriculum system was developed (food waste composting, enzyme production, upcycling).

External Support

- Policy support: Approved by local governments to conduct composting in public spaces and expected to be incorporated into the "Carbon Inclusive Platform" of the China Carbon Metrology Center in Yanping District, Nanping City, Fujian Province.
- Professional support: Collaboration with Nanjing University (Lishui) Ecological Environment Research Institute for national composting training.
- Social resources: Selected as a partner project of the CCCP Community Composting Platform, receiving technical guidance, compost certification by authoritative institutions, and active participation from local schools and enterprises in co-construction.

Project Impact & Sustainability

One participating school, inspired by practical experience, adapted the project's eco-enzyme production and food waste/leaf composting activities into scenario-based stage plays and produced promotional videos. These works won first prize in Fujian's provincial and municipal youth science video festivals.

The association has built two practice bases integrating environmental education and hands-on learning. Additionally, three primary and secondary schools have expressed interest in collaborating to design and build zero-waste campus practice bases and develop related courses in the upcoming semester.

Expert Comments

The "Zero Waste School Construction" project initiated by the Nanping Environmental Protection Education Promotion Association is an outstanding model of socialized environmental education. Centered on campuses, the project integrates engaging practices such as composting and enzyme production into education through an innovative "concept dissemination + hands-on experience" model, effectively nurturing students' ecological literacy. Its success lies in mobilizing schools, communities, universities, and other stakeholders to establish a collaborative environmental governance network.

WUXI SHUOFANG AIRPORT: ON-SITE CO-COMPOSTING PROJECT FOR FOOD WASTE AND GREEN WASTE

Project Overview

In response to the national call for building a "Waste-free City" and promoting the construction of a "Waste-free Airport," Wuxi Shuofang Airport launched the On-site Co-composting Project for Food Waste and Green Waste in November 2024. The project was completed and underwent trial operation from March to June 2025, entering regular operation in July 2025.

Located on the west side of the office building of Wuxi Sunan International Airport Group and covering about 230 m^2, the project enables on-site composting of all food waste from the airport terminal and staff canteens, together with green waste from landscaping, eliminating the need for external transport or disposal. After solid–liquid separation and crushing, the food waste is processed through three-bin composting units and combined with green waste for co-treatment. Sensors monitor the compost pile’s temperature and humidity in real time.

Once fully decomposed, the compost is sun-dried and crushed to form organic fertilizer meeting the quality requirements of Organic Fertilizer (NY/T 525-2021). The fertilizer is used for airport greening, agricultural production, and sponge city construction. When operating steadily, the system can treat about 360 t of food waste and 200 t of green waste per year, producing 150 t of organic fertilizer and reducing carbon emissions by 8.25 t annually—achieving biomass waste resource utilization and contributing to the implementation of the "dual-carbon" policy.

Company/Organization Profile

Wuxi Sunan International Airport Group Co., Ltd. is responsible for the investment, financing, construction, and management of facilities at Wuxi Shuofang Airport, as well as the operation and management of related industries. The airport officially opened to civil aviation on February 18, 2004. Over the past 20 years, it has maintained a strong record of operational safety and steady growth in both passenger and cargo traffic, with average annual increases ranking among the highest nationwide, providing new momentum for economic and social development.

无锡苏南国际机场集团有限公司
Wuxi Sunan International Airport Group Co.,Ltd

Project Highlights

1. Constructed at the original site of the Group’s former construction department, with no new permanent facilities.
2. Established an ecological closed loop of "waste – compost – plants" within the airport.
3. Selected for inclusion in Wuxi City’s 2025 list of comprehensive Taihu Lake management projects.

Project Outcome

1. Reduced approximately 360 t of food waste and 200 t of green waste annually from external incineration, cutting about 8.25 t of CO_2 emissions per year.
2. Produced 150 t of compost annually—20 t used for airport landscaping (fully replacing the 5 t of compound fertilizer previously used) and 130 t sold externally, generating about CNY 200,000 in annual revenue and achieving resource utilization of biomass waste.
3. The compost improves soil porosity and organic matter content, providing water infiltration, retention, and purification functions, effectively reducing initial rainfall runoff and pollution load and lowering nitrogen, phosphorus, and heavy-metal inflow to Taihu Lake.
4. Organized a "New Life for Kitchen Waste" science-popularization event on National Ecological Day 2025.

Project Implementation

In April 2024, the Wuxi Office for Pollution Prevention and Control issued the Implementation Plan for the Construction of "Waste-free Cells" in 2024, encouraging Wuxi Shuofang Airport to explore a pilot for "Waste-free Airport" development. With this policy support, Wuxi Airport cooperated with the Environmental Geotechnical Engineering Team of Southeast University to carry out relevant research.

Project implementation covered several stages: investigation of biomass waste generation, planning of composting sites, fabrication and installation of composting facilities, on-site co-composting operations, and compost product processing and reuse.

Because of the initially low separation rate of food waste, the Airport Group strengthened waste-sorting management and removed non-compostable items such as plastic bags and bottles. Based on the quantity of food waste generated, the processing scale and equipment specifications were determined, employing nine three-bin composting units made with steel frames and plastic-wood panels, each accommodating about 4.15 t of mixed food and green waste.

A kitchen-waste processor was purchased for solid–liquid separation and crushing (moisture ≈ 80%, particle size < 2 cm), and a crusher reduced green waste to < 5 cm to accelerate decomposition. The composting piles adopted a "sandwich-like" layered structure of alternating food and green waste. Two three-bin units formed one group (six chambers total); each day, one layer of food waste and one layer of green waste were added to each chamber.

Temperature and moisture sensors placed in the pile cores continuously monitored conditions. When temperature increased too slowly, the material ratio was adjusted; when exceeding 70 °C, the pile was turned. When temperature dropped to ambient levels, the compost was discharged. The full composting cycle lasted about 40 days, with a 21-day thermophilic phase (> 55 °C). The compost was then dried, crushed, granulated, and tested to produce usable and saleable organic fertilizer.

After implementation, all kitchen and green waste from the airport can be composted on site, producing about 150 t of compost per year—20 t used for airport soil improvement and 130 t sold—eliminating external disposal, reducing costs, and realizing waste resource utilization. The project also supports environmental education activities promoting "food saving, waste classification, and resource recycling," delivering social, economic, and environmental benefits.

Project Impact & Sustainability

Impact: The project aligns closely with China’s "dual-carbon" strategy, reducing about 8.25 t of CO_2 emissions annually through waste resource utilization. It serves as a green-airport model for the civil aviation industry, showcasing the circular-economy concept through an airport platform and achieving triple value in policy implementation, industry innovation, and environmental education.

Replicability: The "food waste + green waste" co-composting process provides a transferable technical model for other public venues generating similar organic waste, such as transportation hubs, schools, and parks.

Sustainability: Beyond environmental benefits, the project generates about CNY 200,000 in annual revenue from compost sales, forming a positive operational cycle. It also strongly supports Wuxi’s "Zero-Waste City" and "Zero-Waste Airport" goals, offering a valuable reference for related standards and policies.

The "Food Waste–Green Waste Co-composting Project" at Wuxi Shuofang Airport converts the airport’s two major organic waste streams into high-quality organic fertilizer on site, successfully establishing a closed-loop model of "using waste to treat waste." Its key highlights include achieving zero off-site transportation of waste, producing high-quality recycled products, and creating a self-sustaining greening cycle within the airport, significantly reducing carbon emissions. This model provides a replicable and scalable systematic solution for managing organic solid waste at public transport hubs.

Expert Comments

CHENGDU METRO: GREEN MOBILITY SCENARIO DEVELOPMENT PRACTICE

Project Overview

Chengdu Metro, taking the promotion of spatial operation optimization, the innovative application of green and intelligent technologies, and the advocacy of green and low-carbon travel as its key measures, has effectively integrated the concepts of energy conservation, emission reduction, and ecological friendliness into the entire process of daily space utilization and management.

Summary of project outcomes:

1. Chengdu Metro has innovated and quantified the green travel structure by continuously carrying out the green travel network initiative. It has offered travel discounts to 943 million passenger trips and increased the share of public transportation in overall travel to 64%.
2. Chengdu Metro has strengthened the foundation of green travel through technology. It has driven innovations in metro operation at Wuhou Shrine Station with AI intelligent agents, increasing operational efficiency by 33%.
3. Chengdu Metro has implemented precise management and control over green initiatives and energy conservation. As a result, it saves over 10 million kWh of electricity annually and has won the "Excellence Award" at the National Youth Vocational Skills Competition.

Company/Organization Profile

As a wholly-owned subsidiary of Chengdu Rail Transit Group Co., Ltd., Chengdu Metro Operation Co., Ltd. is primarily responsible for metro network operation and management, equipment and facility maintenance, and key system construction of new lines, among other tasks.

成都地铁运营有限公司
CHENGDU METRO OPERATION CO.,LTD.

Project Highlights

1. Chengdu Metro has innovated and quantified the green travel structure, fostering broad social engagement. It has not only strengthened the effective connection between rail transit and existing bus stops, taxi stops, P+R parking areas, and bicycle parking areas, but also promoted "same-platform transfers and mutual security check recognition" between the metro and high-speed railway and launched direct trains to Chengdu Shuangliu International Airport and Chengdu Tianfu International Airport.
2. Chengdu Metro has pioneered technological applications by establishing an integrated platform that incorporates AI intelligent agents and a digital intelligence foundation. Services: predictive services, seamless security checks, and intelligent recognition of special passengers. Management: one-touch station opening and closing, digital twin monitoring, and passenger flow early-warning systems. Maintenance: equipment self-diagnosis, hazard prediction, and remote inspection. Digital intelligence foundation: the integration of data and devices, support for business collaboration and rapid application development, and the foundation laid for intelligence.
3. Significant strides have been made in energy conservation and carbon reduction, setting a benchmark for achieving both energy conservation and passenger comfort. Chengdu Metro has developed phased measures for "daily", "energy-saving", and "enhanced energy-saving" modes across its network, promoted them in all stations, and formulated the *Energy Conservation Policy per Station*. These efforts have effectively achieved graded management and control over energy conservation for station equipment and ensured "on-demand operation". Chengdu Metro Dayuan Station has innovatively carried out research on dynamic human thermal comfort standards adapted to Chengdu’ s environment. Based on the model, it has developed a ventilation and air conditioning comfort model that balances comfort and energy conservation, supported by a control system optimization algorithm. As a result, the thermal comfort in the station hall and platform meets the national grade II comfort standard.

Project Outcome

1. Chengdu Metro has proposed a quantitative model for the green travel structure in the central urban area, implemented the green travel network initiative, and promoted the construction of supporting transport facilities around stations, leading the country in the industry. It has initiated the "Green and Low-Carbon Travel Day" and launched the "Tanhui Jiaotong" ("Carbon Discount Transport") mini program. In 2024, it has organized 665 joint construction activities, such as "Civilized Travel" and "Green Travel", implemented 53 branded green travel service projects, provided discounts for 943 million passenger trips, and achieved a 64% rail transit ratio in the public transport system.
2. Focusing on technological innovation, the application of technological achievements, and the intelligent development of metro stations, Chengdu Metro piloted at Wuhou Shrine Station the building of an integrated platform that incorporates AI intelligent agents and a digital intelligence foundation. This has led to a 33% improvement in operational efficiency, a 10%-20% reduction in energy consumption, and an 8% decrease in operational and maintenance costs.
3. Through graded management and control over energy conservation, the total power consumption of the metro network in 2024 decreased by 10.1 million kWh compared to 2023, resulting in cost savings of approximately RMB 6 million, energy savings equivalent to 1,241 tonnes of standard coal, and a carbon reduction equivalent to 6,267 tonnes of carbon dioxide.

Project Implementation

The implementation of the project follows a systematic path of "Top-Level Design—Pilot Verification—Network-Wide Promotion" and is advanced in a structured manner:

1. System Building and Standard Development Phase

Firstly, focusing on the core challenges of energy consumption management in Chengdu Metro's ultra-large network and the core requirements for green development, the project established a cross-departmental special team. The team conducted full-chain energy consumption audits and data analysis on 12 categories and 37 types of key electrical equipment, formulated the Energy Conservation Policy per Station, and developed differentiated and actionable measures for each phase. These efforts provided an institutional basis for network-wide and precise energy conservation management. Additionally, to address the issue of unsuitable temperatures in metro stations, the project conducted studies on dynamic human thermal comfort standards adapted to Chengdu's environment and research on AI-powered smart stations in accordance with Chengdu Rail Transit Group's requirement for the development of smart stations.

2. Sample Selection and Technical Breakthrough Phase

Dayuan Station (Green Low-Carbon Model)

Focusing on optimizing passenger thermal comfort, the station implemented precise adjustments to its ventilation and air conditioning systems. Key strategies included reducing the operational frequency of main ventilation fans, activating energy-saving ventilation modes, fine-tuning air supply and exhaust volumes to a "slightly positive pressure", adjusting chilled water supply temperatures, and setting specific conditions for activating cooling systems.

Wuhou Shrine Station (AI Smart Benchmark)

Driven by scenario-specific needs and based on 30 smart application demands (including automated station operations, intelligent construction supervision, services for passengers with special needs, detection of abnormal passenger behaviors, and digital emergency plans), the station accurately identified business challenges and restructured traditional business workflows. Supported by a digital intelligence foundation, technologies such as cloud computing, the Internet of Things (IoT), big data, and AI were leveraged to provide strong analytical support and intelligent analysis capabilities for station operations.

3. Ecological Integration and Network-Wide Promotion Phase

Based on the actual situation of Chengdu rail transit, the project proposed a green travel ecosystem integrating "rail + bus + slow transport". While continuously tapping into energy conservation, emission reduction, quality enhancement, and efficiency improvement through technological innovation, the project implemented the green travel network initiative to actively foster a culture of green travel, transform technological strengths into daily travel habits of citizens, and promote graded management and control measures across the network.

Project Impact & Sustainability

1. Project Impact

The "rail + bus + slow transport" green travel structure will enhance the synergy of Chengdu's green and low-carbon transport network and support Chengdu's goal of building itself into an international comprehensive transport hub city. As a key step in the development of a smart Chengdu, AI-empowered smart stations provide a model for the intelligent operation and management of rail transit in cities with ultra-large transit networks. Graded energy conservation management and precise equipment management will significantly reduce the operational energy consumption of Chengdu Metro's ultra-large network, setting a benchmark for green development in the industry. Research on station temperatures and human thermal comfort can simultaneously advance low-carbon standards and improve passenger experience to enhance public recognition of and satisfaction with green travel.

2. Promotability & Sustainability

The project covers innovations across multiple dimensions, including technology, management, and services. Technical solutions such as the graded energy conservation model and the AI intelligent agent platform can be adapted to urban rail transit systems of different scales. The human thermal comfort standards and green travel system offer transferable solutions for cities in similar climate zones. The whole project will be implemented across a wider scope, operated in the long term, and adapted to future energy policies and technological development trends.

Expert Comments

This case establishes a "rail + bus + non-motorized transport" green mobility system through systematic planning, achieving three-dimensional innovation in technology, management, and service within an ultra-large metro network. The project demonstrates solid results, saving 10.1 million kWh of electricity and reducing carbon emissions by 6,267 tons annually. Its "design–pilot verification–network-wide promotion" pathway is clear, and the hierarchical energy-saving management model shows strong replicability, providing a paradigm for the green transition of urban rail systems. Further exploration of carbon-inclusive mechanisms and green collaboration across the supply chain is recommended to enhance its demonstration value.

ZHUANZHUAN: AN INNOVATIVE ONLINE-TO-OFFLINE SPACE FOR IDLE ITEMS REUSE AND RECYCLE

Project Overview

In January 2022, Zhuanzhuan Group officially transformed into a company dedicated to the circular economy. Through innovative online and offline integration, it has created green recycling spaces for idle items, generating notable environmental, social, and economic benefits. These spaces are integrated into business districts, subway stations, and other everyday environments, effectively promoting green living and sustainable consumption.

Since 2022, Zhuanzhuan has accelerated the establishment of integrated online and offline consumer spaces. As of August 2025, the company has opened more than 1,000 branded stores nationwide, combining recycling, retail, and consignment services. In 2025, Zhuanzhuan launched China's first multi-category second-hand recycling warehouse store, "Super Zhuanzhuan," in Beijing, and opened its first new-model multi-category "Circular Shop" in Zhengzhou, integrating recycling and retail services.

Company/Organization Profile

Founded in 2015, Zhuanzhuan Group is a leading enterprise in China's second-hand goods recycling and circular consumption sector, and a pioneer in digital circular economy solutions. The platform currently has over 400 million registered users and 50 million monthly active users.

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Project Highlights

In December 2024, Zhuanzhuan won the Paulson Prize for Sustainability in the "Green Innovation" category.

In 2025, it launched China's first multi-category second-hand recycling warehouse store, "Super Zhuanzhuan," in Beijing, and its first multi-category "Circular Shop" in Zhengzhou. By August 2025, Zhuanzhuan had opened over 1,000 branded stores nationwide, integrating recycling, retail, and consignment services.

Project Outcome

1. Environmental Benefits

By promoting the secondary circulation of idle goods, Zhuanzhuan and its users jointly reduced carbon emissions by 5.185 million tons by the end of 2024, saving 7,136 GWh of energy—equivalent to the annual energy consumption of about 600,000 Chinese households. Through the transaction of 32.08 million second-hand books, the company helped preserve approximately 270,000 trees. Zhuanzhuan has also expanded public access to green recycling spaces through the rapid development of its physical store network.

2. Social Benefits

The expansion of green recycling spaces has created a range of new green jobs, including idle item quality inspectors, circular consignment store staff, and door-to-door recycling specialists. Zhuanzhuan prioritizes hiring fresh graduates and providing stable employment. To date, it has trained over 2,500 quality inspectors and 3,000 recycling specialists, generating substantial social value.

3. Economic Benefits

Zhuanzhuan provides convenient channels for users to recycle idle goods, helping them monetize underutilized assets while boosting the circular economy. Since the establishment of the Qingdao Intelligent Quality Inspection Center four years ago, the company has achieved over 25 billion yuan in revenue and paid more than 500 million yuan in taxes in Qingdao alone.

4. Dissemination of Green Concepts

In 2024, Zhuanzhuan partnered with the Center for Environmental Education & Communications under the Ministry of Ecology and Environment to establish Green and Low-Carbon Public Education Centers. Centers in Qingdao and Shenzhen have welcomed local teachers and students for educational visits. In June 2025, Zhuanzhuan collaborated with the Hainan Academy of Ocean and Fisheries Sciences to launch the "Blue Carbon Seagrass Bed Ecological Restoration Initiative."

Project Implementation

1. Infrastructure Development for Green Recycling Spaces

- Quality Inspection: To enhance trust in second-hand trading, Zhuanzhuan established a robust credibility system for circular transactions, pioneering an independent "Official Inspection" mechanism to guarantee product authenticity and reliability.
- Physical Stores: After surpassing 100 offline stores in 2022, Zhuanzhuan accelerated the rollout of integrated consumer spaces. As of August 2025, it operates more than 1,000 stores across China, offering recycling and retail services for 10 major 3C product categories—including mobile phones, laptops, watches, and cameras. Some locations also handle gold and luxury item recycling. Customers can additionally purchase digital accessories or enjoy value-added services such as cleaning and screen protection.
- Building on its retail network, Zhuanzhuan pioneered "instant retail" with an "hourly delivery" model, extending the accessibility and reach of green recycling spaces.

2. Technological Innovation in Green Recycling

Zhuanzhuan has developed a leading domestic quality inspection system, holding over 90 patents in areas such as smart scheduling, computer vision, intelligent interaction, and VR recognition. By integrating software and hardware automation, the system greatly improves inspection accuracy and efficiency.

3. Establishing China's First Multi-Category Recycling Warehouse Store

Leveraging its strong technical and operational foundation, Zhuanzhuan launched "Super Zhuanzhuan" in June 2025—the nation's first second-hand multi-category recycling warehouse store, representing a new milestone in online-offline circular economy integration.

Project Impact & Sustainability

In 2025, Zhuanzhuan was approved to join the second batch of national-level service industry standardization pilots (commercial circulation specialization) led by the Ministry of Commerce and the State Administration for Market Regulation. The company will continue to promote high-end, intelligent, and green development of the "trade-in" sector for consumer goods, accelerating the nationwide expansion of idle-item recycling spaces.

Zhuanzhuan aims to play a leading and demonstrative role in forming replicable, scalable pilot models. Also in 2025, two Zhuanzhuan subsidiaries were selected as first-batch pilot enterprises under the national second-hand goods circulation program launched by the Ministry of Commerce and three other ministries. These pilots are expected to promote green consumption in the commercial sector and shape new trends in low-carbon lifestyles.

Moving forward, Zhuanzhuan will continue to innovate mechanisms for second-hand goods circulation, further refine institutional standards, and ensure that green recycling spaces for idle items operate sustainably and deliver long-term environmental and social impact.

Expert Comments

Driven by a "quality inspection trust system + 1,000 physical stores + AIoT technological innovation" framework, Zhuanzhuan has built a large-scale, standardized circulation network for idle goods. Its integrated online–offline stores and "Super Zhuanzhuan" warehouse model activate social stock resources while fostering new green professions such as quality inspectors and recycling specialists, generating both economic and social value. It is recommended to further strengthen cross-regional coordination and extended producer responsibility mechanisms to establish a more mature paradigm for a circular economy.

ONEWO: INDUSTRY'S PIONEERING CARBON ACCOUNTING METHODOLOGY AND APPLICATION OF INTELLIGENT CARBON MANAGEMENT PLATFORM (ICMP)

Project Overview

Against the backdrop of advancing the "30・60" Dual Carbon Strategy and the capital market strengthening ESG disclosure requirements, the value of carbon management in the property management industry has become increasingly prominent. However, the industry faces pain points such as the lack of carbon benchmarks and inefficient carbon inventory. In response, Manwu Cloud (Wanyun) has developed a dual-core solution featuring a proprietary carbon accounting methodology and the ICMP platform.

The methodology, the first guideline dedicated to the domestic property management industry, clarifies the scope of emissions across all scenarios, standardizes the process of "data collection - accounting - verification", and innovatively proposes an accountability mechanism based on the principle of "whoever controls shall be responsible". It has undergone academic validation and third-party certification. The ICMP platform is deeply integrated into business processes and digital systems, enabling automatic collection of data related to energy consumption, procurement, business travel, etc., intelligent completion of carbon accounting, and visual presentation of emission data.

The project has been rolled out across over 8,000 projects under more than 10 business divisions (referred to as "military units" internally) covering Manwu Cloud's entire business portfolio. It achieves an annual direct cost reduction of 250,000 yuan and saves 48,000 person-days of labor, effectively addressing the issue of capital stagnation. This solution fills the gap in industry standards, leads the digital transformation of carbon management, supports the company's "Capability O4" strategy, and contributes to the low-carbon upgrading of the property management industry and the implementation of the national Dual Carbon goals.

Company/Organization Profile

In September 2022, Onewo Co., Ltd. (Onewo) listed on the Main Board of the Hong Kong Stock Exchange under stock code 2602.HK. As a technology-led, full-spectrum spatial service provider, Onewo is committed to building an industrial-grade shared service platform. Leveraging spatial IoT technology and applications, it constructs an industrial interconnection ecosystem. As of December 31, 2024, Onewo Cloud reported revenue of RMB 36.22 billion, managing 4,261 residential property service projects nationwide, 2,482 commercial property service projects, and 290 university and hospital service projects.

Project Highlights

The project prioritizes the reuse of the enterprise's existing digital systems, cloud resources, and business data, with no new hardware added or external development conducted, achieving optimal cost efficiency. In terms of ecological collaboration, it has joined hands with industry, academia, and research institutions to develop methodologies, and initiated a green alliance to promote industry-wide synergy. The project has gained industry recognition and won praise from experts as an innovative practice in property carbon management. After its implementation, it has effectively improved employee efficiency and saved working time, thus winning favor from clients who value ESG carbon management capabilities.

Project Outcome

1. Outstanding Economic Benefits: Annual cost savings amount to 250,000 yuan, including 200,000 yuan/year for external carbon inventory consulting and 50,000 yuan/year for data platform maintenance. It identifies capital stagnation issues and improves capital turnover efficiency, with the cost-reduction effect continuously expanding as the business scales up.
2. Workforce and Efficiency Optimization: It replaces manual carbon inventory, saving a total of 48,000 person-days of labor costs annually for over 8,000 projects across the company. The accounting frequency has been upgraded from annual to monthly, allowing employees to focus on core operation and service work and improving per capita efficiency.
3. Significant Environmental Benefits: Through timely inventory, analysis, and sharing of trend changes, it integrates energy management with carbon management effectively. Energy conservation and carbon emission reduction are promoted efficiently by means of trend analysis and key issue identification.
4. Achievements in Industry Empowerment: It provides replicable carbon management solutions, filling the gaps in the industry's carbon benchmarks and accounting standards.
5. Release of Social Value: It drives the property industry's transition from the extensive carbon management stage to the standardized operation stage, supporting the implementation of the national "30・60" Dual Carbon Strategy.

Project Implementation

I. Brief Implementation Plan and Process

1. Plan Construction Phase: Establish an inter-departmental team and collaborate with universities including Tsinghua University and Renmin University of China, as well as the Climate Future Think Tank. Conduct research across all business units (residential, commercial, etc.), collect data from dimensions such as energy consumption and materials, develop 10 sets of segmented business carbon accounting

models, and integrate them into a universal carbon accounting methodology. Simultaneously, initiate the research and development (R&D) of the ICMP platform: relying on the internal team, reuse existing digital systems to develop functions including automatic data collection, intelligent accounting, and visualization.

2. Verification and Optimization Phase: Invite third-party institutions such as China Certification Center (CCSC) to verify the methodology, and conduct expert review through institutions like the China Electronics and Information Industry Development Research Institute (CCID Research Institute). Select some projects to pilot the ICMP platform, test the accuracy of data collection and accounting efficiency, and optimize model algorithms and platform functions based on feedback.

3. Implementation and Promotion Phase: Adopt a "unified digital deployment" approach to promote the methodology and ICMP platform across over 10 business units and more than 8,000 projects of the company. Realize real-time synchronization of business data and carbon data, and complete full-cycle carbon accounting for 2024-2025.

II. Comparison Before and After Implementation

1. Challenges and Solutions

- Before implementation: There was a lack of industry carbon benchmarks (making it difficult for enterprises to define emission boundaries), and carbon inventory was inefficient (manual data aggregation was error-prone, incurring an annual consulting fee of 250,000 yuan).
- Solutions: Develop a methodology through industry-university-research collaboration to clarify emission scopes and responsibilities; replace the manual model with the ICMP platform's automatic data collection and intelligent accounting functions, thereby addressing core pain points.

2. Internal and External Support

- Internal support: Rely on existing digital systems and cloud resources, with a fixed cost investment of 365,000 yuan to complete the R&D.
- External support: Obtain academic support from university think tanks; secure verification from third-party institutions; and gain recognition from industry experts for the methodology's innovativeness.

3. Changes in Results

After implementation:

- Carbon accounting has upgraded from "annual manual work" to "monthly intelligent operation", with the error rate reduced to within 5%.
- Annual direct costs have been cut by 250,000 yuan, and 48,000 person-days of human resources have been freed up.
- The problem of fund stagnation caused by the collection and payment of water and electricity fees on behalf of others has been resolved, improving operational efficiency.
- The company has become the first enterprise in the industry to implement large-scale standardized carbon management, promoting the transformation of the enterprise's ESG (Environmental, Social, and Governance) disclosure from "qualitative" to "quantitative", and facilitating the implementation of the "30・60" Dual Carbon Strategy (peaking carbon dioxide emissions before 2030 and achieving carbon neutrality before 2060).

Project Impact & Sustainability

The project features dual innovations in both mechanism and technology:

Mechanism-wise: It pioneers a dynamic authority-responsibility division mechanism of "financial + operational control rights", which clarifies the boundaries of carbon management between property management companies and property owners.

Technology-wise: It has developed a "cost-reverse deduction" data conversion model and a latitude-longitude mileage algorithm, breaking through the bottleneck of data collection. Meanwhile, the ICMP platform enables the automatic linkage between business operations and carbon data.

The project exerts a significant driving force in the property management sector:

It fills the gap in the industry's carbon benchmark, transforming carbon management from labor-intensive and extensive practices to intelligent and standardized operations.

By providing solutions, establishing a carbon factor database, and initiating an ecological alliance, it facilitates the low-carbon transformation of the industry and provides strong support for the national "Dual Carbon" strategy (carbon peaking and carbon neutrality).

The project boasts high promotability and clear sustainability:

High Promotability: The solution is adaptable to all property business formats. It can be deployed by relying on existing digital systems, with low implementation costs.

Clear Sustainability: In the future, it will integrate blockchain technology, expand value-added services for carbon management, and continuously deepen its capacity to empower the industry and support corporate strategies.

Expert Comments

Addressing key challenges in carbon management within the property sector, Onewo pioneered China's first property-specific carbon accounting methodology and intelligent management platform (ICMP). By introducing a "who controls, who accounts" accountability mechanism and automated data collection, it upgraded carbon accounting from manual annual reporting to intelligent monthly assessments, reducing the error rate to below 5%. The project has driven a shift from extensive to standardized carbon management, offering adaptable, low-cost solutions that serve as a model for the industry's low-carbon transformation.

HAINAN ENERGY TRADING BUILDING

Project Overview

The Hainan Energy Trading Building was developed and constructed by Shanneng Intelligent Supply Chain Management (Hainan) Co., Ltd., commencing construction in November 2019. It is located in Meilan District, Haikou City. The total site area is 11,295.58 m^2, with a building height of 80 meters and a total gross floor area of 65,298.19 m^2. The project involves the construction of a headquarters office building housing an energy trading hall, along with supporting infrastructure such as outdoor roads, plazas, water supply and drainage, power and communication systems, fire protection, landscaping, and landscape lighting within the project area.

Company/Organization Profile

Shanneng Intelligent Supply Chain Management (Hainan) Co., Ltd. was established in 2019. Its business scope includes construction engineering design, tourism services, etc.

海南智慧国际
HAINAN INTELLIGENT INTERNATIONAL
山东能源 SHANDONG ENERGY
山能智慧供应链管理(海南)有限公司
SHANDONG ENERGY INTELLIGENT SUPPLY CHAIN OPERATION (HAINAN) CO., LTD.

Project Highlight

The architectural volume precisely shapes a dynamic central atrium. Abundant greenery within the atrium and the circulation of natural air create a pleasant microclimate. This approach echoes the traditional design concept of "returning water to the hall," blending technology-driven rigor with the softness brought by nature. The building facade resembles a Chinese "Duobao Ge" (antique display cabinet) standing by the bay, with finely detailed curtain wall divisions that evoke associations with traditional Chinese window lattices. On all four orientations—east, west, south, and north—elevated outdoor viewing platforms are provided every four floors, not only enhancing natural ventilation but also offering users a green-filled workspace.

Project Outcome

I. Core Energy-Saving Achievements of the Project

Equipment Energy-Saving Results The project is equipped with switch rooms and distribution rooms on the first floor and the first basement level, where four 1600kVA SCB12 energy-efficient dry-type transformers are installed, with a total installed capacity of 6400kVA. Leveraging the "low-noise, high-efficiency, and low-power consumption" features of these transformers, the project achieves an annual electricity saving of 23,400 kWh, equivalent to conserving 2.88 tce of standard coal.

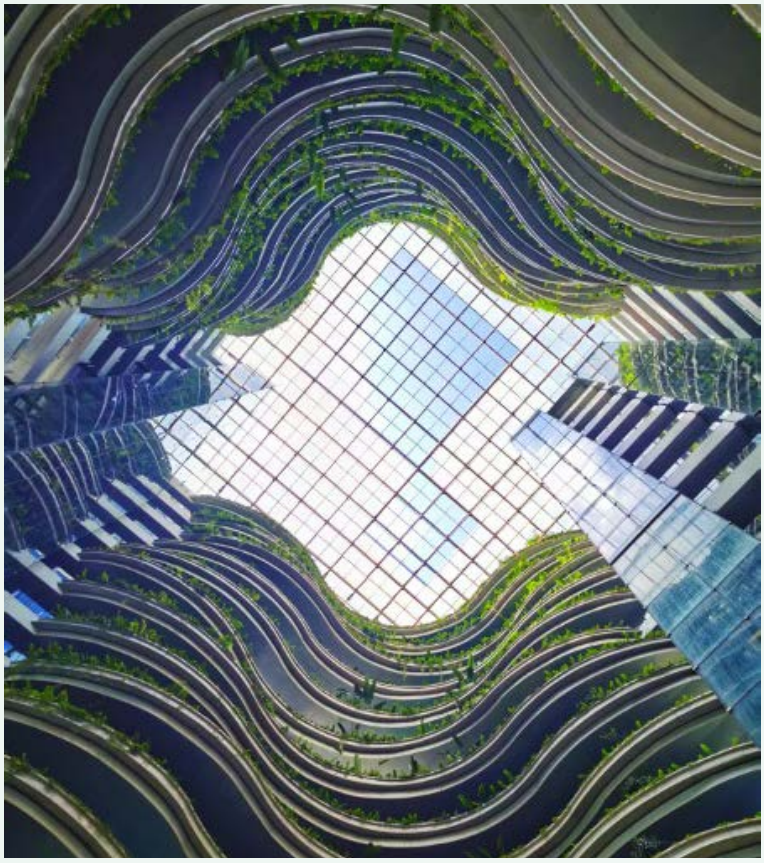
Lighting System Energy-Saving Results The project primarily uses energy-efficient lighting fixtures such as T5 fluorescent lamps and LED lights. Compared to traditional ordinary fluorescent lamps, these effectively reduce lighting electricity consumption, resulting in an annual electricity saving of 1.4265 million kWh, equivalent to conserving 175.32 tce of standard coal.

II. Comprehensive Benefits

Emission Reduction According to calculations, the project has achieved cumulative energy savings equivalent to 178.2 tce of standard coal through equipment energy efficiency, lighting optimization, and renewable energy utilization. This corresponds to a reduction in carbon emissions of approximately 606 tons, effectively lowering regional carbon emission intensity.

Environmental Benefits The project's emission reduction measures, centered on the "application of energy-saving equipment + development of renewable energy," reduce indirect pollutant emissions from energy consumption. This contributes positively to improving regional air quality and alleviating ecological environmental burdens.

Economic Benefits The project achieves an annual cumulative electricity saving of 1.45 million kWh, directly reducing electricity costs during its operational phase. The long-term stable operation of energy-efficient equipment and renewable energy systems sustainably reduces energy expenditures, delivering significant cost-saving benefits to the project.



Project Implementation

Hainan Energy Trading Building was designed by international architect Yao Renxi. As Hainan's first vertical ecological landmark, it adheres to the "Rainforest Garden Office" design concept, creating a "16-story hollow ecological atrium + 8 large sky gardens."

The project is the first building in Hainan to achieve 2A-level prefabricated construction and has been honored with the "China Steel Structure Gold Award."

The building’ s facade features an external circulation breathable unitized curtain wall system. By integrating sky gardens and a green atrium, it creates a "business oasis." The entire structure introduces the concept of "photosynthetic office," combining "sky gardens" and a "green atrium" to pioneer a new rainforest garden-style office model.

Green Building: Complies with the national basic-level green building standards (or national green industrial building standards and industrial building energy efficiency standards).

Prefabricated Building: Prefabricated building components account for 100% of the project, with a prefabrication rate of 80.85%. The main prefabricated techniques include:

- Main structure: steel columns, steel supports, steel beams, steel truss floor decks, and steel stairs.
- Enclosure walls and internal partitions: double-glazed curtain walls, external circulation double-glazed curtain walls, lightweight concrete hollow panel walls, and integrated interior partitions with pipelines and decoration.
- Decoration and equipment pipelines: fully decorated.

Green and Low-Carbon Technology Highlights:

- Adoption of high-efficiency energy-saving air conditioning systems and electrical products, along with an intelligent lighting control system that significantly improves lighting efficiency and reduces building operational energy consumption.
- Landscape design incorporates permeable pavements, sunken green spaces, and water-saving irrigation, which not only create excellent landscape resources and effects but also reduce the heat island effect on the project site.
- Recycling of building materials: throughout the construction process, various construction wastes were tracked and recorded, greatly improving material utilization and waste conversion rates.

Project Impact & Sustainability

The Hainan Energy Trading Building has successively won awards and honors such as the China Steel Structure Gold Award and the LEED Gold Certification for Green Building.

Expert Comments

The project adopts Grade 2A prefabricated construction (with an 80.85% prefabrication rate) and an external circulation double-skin façade system. It integrates green technologies such as high-efficiency transformers, LED intelligent lighting, and permeable paving, while ensuring full-process tracking and recycling of construction materials. Achieving notable energy savings and emission reductions, the project exemplifies a replicable, full-lifecycle low-carbon model for green public buildings in tropical regions through the synergy of ecological design, industrialized construction, and intelligent operation.

LIAONING CARBON EMISSION TRADING CENTER: CARBON CREDIT APPLICATION FOR A LOW-CARBON CAMPUS

Project Overview

The "nation's first carbon credit application low-carbon campus" demonstration project was jointly planned and designed by the Liaoning Carbon Emission Trading Center and Shenyang Institute of Engineering, and officially launched on June 27, 2024, at Shenyang Institute of Engineering. The project quantifies the daily green and low-carbon behaviors of students and faculty members into carbon credits and incorporates student carbon credits into the academic credit system.

Relying on the "Tan ZhongHui" mini program—developed and operated by the Liaoning Carbon Emission Trading Center in 2022—the project tracks various low-carbon behaviors such as green travel, water and energy conservation, recycling, old item recovery, waste sorting, the "Clean Your Plate" campaign, and green consumption. Carbon credits can also be used to purchase goods and services at discounted prices through the platform, with on-campus merchants prioritized as consumption scenarios to encourage teachers and students to actively participate in low-carbon actions.

In addition, the project has implemented one-stop new energy facilities on campus, including a new energy leisure square, distributed photovoltaic corridors, PV charging piles, energy-saving lighting systems, and a new energy power system training base. The project is also being expanded to other universities such as Shenyang University of Chemical Technology.

Company/Organization Profile

Liaoning Carbon Emission Trading Center Co., Ltd., established in 2011, is the only institution approved by the Liaoning Provincial Government to conduct carbon emission trading within the province. It was the third entity in China to launch carbon trading and remains the only platform engaged in international carbon credit trading. The Center has extensive experience in dual-carbon services and currently operates five business segments: international carbon credit trading, carbon inclusion, carbon asset development and management, government–enterprise dual-carbon consulting services, and dual-carbon capacity building.

辽宁碳排放权交易中心
CHINA LIAONING EMISSION EXCHANGE

Project Highlight

This project innovatively integrates carbon credits into the university's talent cultivation system, creating the nation's first demonstration of a carbon credit application in a low-carbon campus. Teachers and students can use their carbon credits for discounted purchases while practicing low-carbon lifestyles. The project launch was successfully held in June 2025 and was featured on Liaoning TV and other channels.

Project Outcome

1. From June 27, 2024, to September 15, 2025, over 38,000 teachers and students at Shenyang Institute of Engineering registered on the platform, achieving a registration rate exceeding 98%. The platform records over 15,000 emission-reduction actions daily, accumulating more than 2.8 million entries covering categories such as green travel, energy conservation, and the "Clean Your Plate" campaign. These activities have generated over 627 tons of CO_2-equivalent emission reductions.
2. Through new energy construction and promotion of low-carbon behaviors, the proportion of green electricity used on campus has reached about 85%, and overall carbon emissions have been reduced by approximately 75%, forming a replicable model for low-carbon campus development.
3. In the second half of 2025, promotion of the low-carbon campus project expanded, with Shenyang University of Chemical Technology and several other universities joining the initiative.
4. The project integrates low-carbon concepts into university teaching, research, and daily management, transforming low-carbon education from an "elective" into a "compulsory," and setting a model for green, low-carbon education in the higher education sector.

Project Implementation

1. Based on the "Tan ZhongHui" mini program, which serves as a digital ledger for green and low-carbon behaviors, the project customized features for universities to establish a carbon credit and academic credit system. It collects real-time data on low-carbon activities such as walking, subway and bus use, cycling, food waste reduction, recycling, and water and electricity conservation. These actions are quantified as emission reductions and carbon credits, which are recorded in each participant's personal carbon account. Teachers and students can also organize and participate in low-carbon activities through the platform to earn additional credits. The project incorporates these carbon credits into the academic system, with "500 carbon credits = 1 academic carbon credit," equivalent to four credits over four years for undergraduates and two credits over two years for graduate students.
2. The project follows 15 "Carbon Inclusive and Low-Carbon Behavior Quantification Methods" filed by the Liaoning Carbon Emission Trading Center, covering behaviors such as walking, cycling, subway and bus use, water, electricity, and gas conservation, the "Clean Your Plate" campaign, waste sorting, recycling, second-hand trading, tree planting, online meetings, purchase and use of new energy vehicles, and purchase of first-class energy-efficient appliances.
3. A diversified carbon credit consumption system has been established. Currently, over 40 consumption scenarios are available. When introduced into universities, on-campus facilities such as canteens, cafés, cultural and creative shops, and school buses are added as carbon credit consumption venues. Teachers and students can conveniently use carbon credits to redeem vouchers for products and services both on and off campus.
4. For new energy construction, photovoltaic power stations, corridors, carports, charging piles, and a jointly built "carbon inclusion square", as well as photovoltaic leisure corridors, dual-carbon workshops, and zero-carbon cabins, have been installed on dormitory and teaching building rooftops and other campus spaces. These facilities provide convenient venues for study and daily life while embedding low-carbon concepts into campus culture.

Project Impact & Sustainability

On June 27, 2025, the "National First Carbon Credit Application Low-Carbon Campus" demonstration project press conference was jointly hosted by the Municipal Ecology and Environment Bureau, the Trading Center, and the Institute of Engineering. The event was simultaneously covered by Liaoning TV, Liaoning Economic Channel, and Shenyang News Channel.

By integrating the resources and technological strengths of universities and enterprises, the project promotes cooperation in low-carbon campus construction, dual-carbon talent development, scientific research, and student–teacher social practice. It has attracted visits from many universities and will be further promoted across provincial, municipal, and national higher education institutions. The project serves as a benchmark for carbon inclusion and low-carbon campus development, advancing simple, green, low-carbon, and healthy lifestyles and consumption patterns.

Expert Comments

This case deeply integrates the carbon-inclusive mechanism with the university credit system, creating the nation’s first demonstration project of "a low-carbon campus with carbon credit applications." It transforms low-carbon education from an "elective" to a "compulsory" component and has been replicated across several universities in Shenyang, showing strong scalability. It is recommended to further diversify carbon credit consumption scenarios and explore linkages with regional carbon markets to amplify its demonstration impact.

CHONGQING ARCHITECTURAL DESIGN INSTITUTE: PEOPLE-ORIENTED AND DATA-DRIVEN LOW-CARBON OPERATION PRACTICE

Project Overview

Chongqing Architectural Design Institute adheres to the concept of co-governance and shared benefits, with enhancing users' sense of gain as the core, and advocates energy-saving and low-carbon working methods. By establishing volunteer teams, optimizing operation systems and tracking data, it has formed a "people-oriented, data-driven" operational carbon reduction practice paradigm.

After the Architecture Research Center was put into use in 2023, the institute established a "Low-Carbon Operation Volunteer Team", compiled the Low-Carbon Operation Guide for the Architecture Research Center, and guided low-carbon commuting, rational use of equipment and garbage classification through publicity, education and supervision mechanisms. At the technical level, it optimized operations through energy audits and user comfort surveys, and adjusted equipment operation modes to tap carbon reduction potential.

After two years of practice, the carbon emission intensity per unit building area of the Architecture Research Center has decreased by 6.05% to 30.24kgCO_2/m·a, and user satisfaction has increased by 10%. This practice paradigm has won multiple industry awards and been reported by provincial-level media, making the Architecture Research Center an educational case for architectural carbon reduction practice for college students and industry practitioners.

Company/Organization Profile

Chongqing Architectural Design Institute was established in 1950. After decades of development, it has become a comprehensive engineering design and consulting enterprise with profound heritage and distinctive characteristics, providing excellent and efficient services for the entire industrial chain of construction projects.

The company deeply engages in green low-carbon and sustainable fields, maintains good cooperation with industry authorities, enterprises, universities and research institutions, leads multiple pioneering green low-carbon projects, and has improved the internationalization level of this field in western China.

重庆市设计院有限公司
CHONGQING ARCHITECTURAL DESIGN INSTITUTE CO.,LTD.

Project Highlight

Good Operation: Achieved a 6.05% annual reduction in building carbon emissions through "people-oriented, data-driven" operational carbon reduction practices; Good Reputation: While reducing carbon, attention was paid to user needs, with satisfaction exceeding 90%, achieving dual improvement in carbon efficiency and satisfaction; Good Model: Awarded multiple honors, the carbon reduction model leads industry transformation through popular science publicity and research projects.

Project Awards:

- April 2023, Net Zero Carbon Building Certification - Low-Carbon Operation Outstanding Level.
- November 2023, Net Zero Carbon Building Pioneer Project Award.
- November 2024, 2024 Carbon Neutral Building Pioneer Case by iGreen.
- July 2025, China Green and Low-Carbon "Good Houses, Good Communities, Good Neighborhoods, Good Districts" Cases.

Project Outcome

1. **Emission Reduction:** Through the "people-oriented, data-driven" operational carbon reduction practice, the total carbon dioxide emissions of the Research and Development Building decreased by 9,700 kg in 2023, with per capita carbon emissions reduced by 48.5 kg/year.
2. **Number of People Participating in Science Popularization/Mobilization Activities:** 200 users participated in green and low-carbon office themed education, and cumulatively received over 500 visits from university students including those from Chongqing University and industry peers.
3. **Social Benefits:** It has obtained the Net Zero Carbon Building Certification and the TÜV Rheinland "Pioneer Project Award", was selected as a case by the iGreen and the China Association of Building Energy Efficiency, and was featured in a special report by Chongqing Satellite TV.
4. **Technical Benefits:** Promoted the approval of the scientific research project "Research on the Compilation Method of Chongqing Building Low-Carbon Operation Instruction Manual" by the Chongqing Urban-Rural Construction Commission, and the results will be promoted throughout the city.

Project Implementation

Based on the concept of co-governance and shared benefits, Chongqing Architectural Design Institute takes enhancing users' sense of gain as the core, advocates energy-saving and low-carbon work styles, and forms a "people-oriented, data-driven" operational carbon reduction practice paradigm through the construction of volunteer teams, operation system design, and tracking of operational data.

After the Architecture Research Center was put into use in 2023, at the institutional level, a "Low-Carbon Operation Volunteer Team" was established to carry out green and low-carbon office education and compile the "Low-Carbon Operation Guide for the Architecture Research Center". Each floor has volunteers to guide and supervise energy use behavior. The guide focuses on regulating three types of low-carbon behaviors: in terms of lighting, turn on single-group lighting during working hours, adjust to low brightness or turn off during lunch break, turn off lights except for work needs after work, and turn off lights near windows when natural light is sufficient; for air

conditioning, do not turn it on during the transition season (March to May), adjust through fresh air or opening windows, turn off except for work needs after work, set the summer temperature not lower than 26 ° C (not lower than 24 ° C when the outdoor temperature exceeds 40 ° C), winter temperature not higher than 18 ° C, and keep doors and windows closed when in operation; for office behaviors, turn off equipment (computers, printers, etc.) during non-working hours, set unused equipment to energy-saving mode, turn off all electrical equipment and close doors in idle rooms, and encourage taking stairs, green commuting, and garbage classification. The volunteer team conducts daily inspections and guidance, and users' unconscious energy waste has significantly reduced in the past year.

At the technical level, a building energy audit was conducted for the operation of the Architecture Research Center to analyze carbon emission characteristics and tap potential. Through data analysis, the operation time of garage and landscape lighting was adjusted to reduce operation duration on the basis of ensuring functions, thereby reducing carbon emissions. At the same time, a user satisfaction survey was carried out, covering space quality, thermal, light, acoustic environment and air quality, and problems were rectified to respond to demands accordingly.

After two years of practice, the carbon emission intensity per unit building area of the Architecture Research Center has decreased by 6.05% to 30.24kgCO_2/m・a, and the overall user satisfaction has increased by 10%. This practice paradigm has won multiple industry awards and been reported by provincial media, and the Architecture Research Center has become an educational case of building operation carbon reduction practice for universities and industry practitioners to visit and learn from.

Project Impact & Sustainability

The "people-oriented ・ data-driven" operational carbon reduction practice paradigm of CQADI has achieved remarkable results, winning multiple industry awards, receiving special reports from mainstream news media, and becoming a practical case for university students and industry practitioners to visit and study.

On this basis, the technical team of CQADI has promoted the methods and experience of this practice paradigm to multiple commercial and office projects it serves, supporting the green and low-carbon operation and sustainable concept dissemination of projects such as The Ring Center Tower A&B and The Ring Shopping Mall, which has been praised by the project property operation teams. Among them, The Ring Shopping Mall, obtained the LEED v4.1 O+M Platinum certification in 2023.

In addition, the "people-oriented ・ data-driven" operational carbon reduction practice of the Architecture Research Center of CQADI has promoted the approval of the 2023 scientific research project of Chongqing Urban-Rural Construction Commission, Research on the Compilation Method of Chongqing Building Low-Carbon Operation Instruction Manual. The results will be further widely promoted and applied in Chongqing, providing strong support for the green and low-carbon operation of existing buildings.

Expert Comments

Chongqing Architectural Design Institute achieved a 6% reduction in carbon emission intensity per unit area through volunteer engagement, institutional optimization, and data tracking. Notably, the model prioritizes activating behavioral carbon-reduction potential within existing spaces, improving carbon management standards during the building’ s operational phase. Successfully extended to other commercial projects and municipal research initiatives, it has become a replicable, low-cost benchmark for green operation in existing buildings.

DISCLAIMER

The content included in this case collection is provided or recommended by the declaring units and local ecological environment bureaus, and has been compiled and partially translated by the project team. The project team is not responsible for the accuracy of the information and data contained in the cases.

For further information, please contact CCCA@cteam.org

Supporting Organizations

Onewo Space-Tech Service Co., Ltd.

Institute of Climate Change and Sustainable Development Tsinghua University

Center for Environmental Education and Communications of the MEE of China

C Team