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SHANGHAI ELECTRIC
GO GREEN,
GO LOW-CARBON



Editor's words



LOW-CARBON SOPHISTICATION

Women like to talk about dressing.

A friend of mine only wears neutral colors like black, white, gray, and beige and avoids bright colors that might be associated with "immature, unstable, and untrustworthy".

However, another friend said, "Women are like flowers, we should wear colorful dresses. A new color each day can lighten your mood." After discussion, we agreed that dressing is an impartial matter.

As long as you stay fit, plump or slender, with the right cut and comfortable fabric, some clothes can make you look sophisticated. The first element of sophistication is not what you wear, but your experience and insight, that is, your inner world. This is true for individuals, companies and industries.

In mid-June, China's first expo on carbon neutrality, held in the Shanghai National Convention and Exhibition Center, refreshed my understanding of low carbon. After that, I began to deliberately live a frugal and simplistic life. The companies and exhibits showcased sophisticated technology.

"The pursuit of green and low-carbon daily life is never about living without air conditioning or cars, but about being low-carbon and green on the basis of maintaining the quality of life and comfort."

This is a point I heard repeatedly at the recent Shanghai International Carbon Neutrality Expo in Technologies, Products and Achievements. It turns out that I can also have a sophisticated low-carbon life, where we can meet the most cutting-edge green science and technology. Stretchy yoga outfits, breathable and sweat-wicking sports T-shirts, soft and skin-friendly long-sleeved base shirts... These clothes may seem ordinary, but each of them has "low-carbon" genes. Unlike natural textile materials such as cotton, linen and silk, bio-based polyamide materials are more delicate and soft to the touch, with a special synthetic biotechnology, as well as greater absorption and sweat-wicking properties.

Practice enriches knowledge. More knowledge leads to better practice.

With the further promotion of the dual-carbon goal, accelerating green and low-carbon transformation has become the necessary path for industrial development. At present, the momentum of carbon reduction has become intrinsic. With green and low-carbon technology becoming the core competitiveness of enterprises, various sectors of the economy and society are continuously promoting green and low-carbon development and environmental quality. Therefore, green is becoming the color of a good life.

Everything is challenging, technology-rich and dazzling.

Shanghai Electric Group Co., Ltd.

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CONTENTS

P02

**N E W S
O V E R V I E W**

P06

**F O C U S
N E W S**



P14

**C O V E R
T O P I C S**

Energy and industry are the “main battlefield” of carbon peaking and carbon neutrality (dual-carbon policy). As a world-class comprehensive equipment manufacturer, Shanghai Electric, based on its dual-carbon policy, proactively optimizes and improves its industrial structure, and fully leverages its advantages in energy and industrial system solutions, so as to help its clients realize green and low-carbon transformation in their development.

P24

V I E W P O I N T S

Xu Ruizhong :
Revamping a Century-
Old Brand with 36-Year
Unswerving Commitment

P28

O B S E R V A T I O N

Shanghai Electric:
To Be a World-Class
Manufacturer

Cultivating
Shanghai Electric's
Hidden Champions

The Shortest Path to
Success is to Open Yourself

**SHANGHAI
ELECTRIC
GO GREEN,
GO LOW-
CARBON**

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NEWS OVERVIEW



Shanghai Electric Has Been Listed among China's Top 100 Global Contractors for Four Consecutive Years

The 2023 China International Contracting Industry Development Forum was held in Beijing. With its major projects in Romania, Iraq, Pakistan and many other countries, Shanghai Electric was ranked 25th in the 2022 list of China's Top 100 Global Contractors, 8th in the 2022 list of China's Top 30 Global Contractors for Power Projects, 17th in the 2022 list of China's Top 30 Global Contractors for Projects in Asia. So far, the Group has made the list for four consecutive years. In 2022, the contract value of overseas power projects signed by Chinese enterprises reached 36.43 billion USD, of which solar, wind and other new energy projects totaled 20.67 billion USD. The completed turnover of new overseas power projects signed by Chinese companies in 2022 reached 21.68 billion USD. As the world is addressing climate change and vigorously developing renewable energy, Chinese companies' power project portfolio for the global market has seen drastic changes. The number of coal-fired power projects has dramatically decreased, while new energy projects such as PV and wind power, energy storage, substations, and transmission and transformation solutions, have become new growth points.

Three Young Tech Talents Selected for Shanghai's Talent Cultivation Project

Recently, Science and Technology Commission of Shanghai Municipality announced the list of candidates for the Talent Cultivation Program under 2023 Science and Technology Innovation Action Plan. Li Zhe from Shanghai Electric Group Co., Ltd. Central Academe, Zou Yang from Shanghai Boiler Works, and Wang Xu from Shanghai Electric Fuji Electric Power Technology Co., Ltd. were selected.

Shanghai Electric Central Academe Won Accolades in Shanghai Green Technology Innovation Competition

On May 20, the finals and awards ceremony of the first Shanghai Green Technology Innovation Competition were held at the Sci-Tech Innovation Plaza of Grand Zero Bay in Minhang District, Shanghai. Shanghai Electric Group Co., Ltd. Central Academe's water treatment technology team stood out among over 120 competitors and won the Excellence Award for their "Pervaporation for Water Reuse and Recycling". The team won the honor thanks to the technology's forward-looking and innovative quality, green process and great market potential. Meanwhile, the "Water-based Solvent Recycling Solution for Green Coating" jointly developed by the team and a new energy vehicle (NEV) manufacturer in Shanghai won the Excellent Case Award for Green Solutions as it set new benchmarks for the industry.

Shanghai Highly Electrical Appliances* Selected as "Model Smart Factory" of Shanghai

Recently, Shanghai Highly Electrical Appliances*, a subsidiary of Shanghai Highly (Group) Co., Ltd.*, was selected into the first group of "10 Model Smart Factories in Shanghai" by Shanghai Municipal Commission of Economy and Informatization. Highly Electrical Appliances has achieved its goal of mass production at low cost by adopting robots and automation in manufacturing and optimizing production management intelligently in recent years. At the same time, based on its expertise in manufacturing of tailor-made products, the facility has built a flexible manufacturing capacity with smart equipment and digital technology. This has enabled the facility to better meet needs for product customization involving multiple varieties, small lots, and short lead times.





Shanghai Electric's Low Farm Solar PV Park in UK Connected to the Grid

Recently, the 20.8 MW Low Farm PV park, the 7th project of 8 Turnkey PV projects in the UK built by Shanghai Electric, was successfully connected to the grid. These Turnkey PV projects provide integrated services covering investment attraction, construction, grid connection and operation for the global high-end market. They are a testament to the strength of Shanghai Electric in the renewable energy sector, providing a benchmark for Chinese enterprises to expand into global energy markets and contributing valuable experience to Shanghai Electric's future EPC projects in Europe and high-end markets.

Shanghai Electric to Commence Construction of PV Project in Palau, Romania

Recently, a groundbreaking ceremony was held for the 91.54 MW PV project in Palau, Romania, marking the commencement of the project's construction. The project is located in Palau County, Brasov, Romania. Shanghai Electric Power Generation Engineering Co., Ltd. is the EPC contractor responsible for equipment procurement, design, construction, commissioning, and operation and maintenance of the PV plant. The preliminary design of the project's overall layout, access roads and cables has been completed, and procurement contracts for major equipment components, brackets and inverters have been signed.



Shanghai Electric Won the Tender of Renewable Energy Demonstration Project in Malaysia

On April 17, Shanghai Electric won the EPC contract for Phase I and Phase II of the Renewable Energy Power Plant in the state of Selangor, Malaysia.

It is the first waste-to-energy (WtE) power plant in Selangor, and is also a national demonstration project for green growth, energy conservation and emission reduction. The Phase I project has an installed capacity of 25 MW and a daily waste treatment capacity of 1,400 tons; the Phase II project has an installed capacity of 26 MW and a daily waste treatment capacity of 1,500 tons.

Shanghai Electric Completed Delivery of Long San Solar Hybrid Station in Malaysia

On May 11, the Long San Solar Hybrid Station, constructed by Shanghai Electric Power Transmission & Distribution Engineering Co., Ltd., was delivered to the owner in the presence of Sarawak Premier Abang Johari and Xing Weiping, Consul General of the PRC in Kuching. The project includes a 350 kW solar power plant, a 500 kW/1 MWh battery energy storage system (BESS), three 150 kW diesel-fueled generators, and a control building. The microgrid system is mainly powered by PV energy and the BESS, while the diesel engines serve as a backup power source with seamless switchover to ensure uninterrupted power supply. At the ceremony, representatives of Shanghai Electric expressed that they took the project as an opportunity to deepen cooperation with the Sarawak government and contribute to the sustainable development of Sarawak by leveraging Shanghai Electric's expertise and strength in new energy.



Build Sustainable Competitive Advantage in Global Arena

Shanghai Electric Visits Indonesia as Representative of Shanghai

From April 26 to 29, Mayor of Shanghai Gong Zheng led a delegation to visit Indonesia to promote high-level cooperation between Shanghai and Indonesia as a positive response to the important consensus reached by Chinese President Xi Jinping and Indonesian President Joko Widodo on building a shared future for China and Indonesia. At the Shanghai-Jakarta Overseas Investment Symposium, representatives from six Chinese enterprises, including Shanghai Electric, exchanged information on investment and project construction in Indonesia.

At the symposium, Leng Weiqing, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Electric Group, introduced the Group's overseas business and made practical suggestions on how to help enterprises expand their business globally with competitive advantages.

Shanghai Electric is actively implementing its global strategy to support China's "Belt and Road" initiative.

ACCELERATING OVERSEAS EXPANSION IN EQUIPMENT MANUFACTURING

At present, Shanghai Electric has 9,000 employees outside of China. With annual overseas sales of nearly 30 billion yuan, and more than 100 overseas power projects, one-third of Shanghai Electric's power equipment is exported to the global markets.

EXPANDING BUSINESS INTERNATIONALLY WITH DIVERSIFIED MARKET PRESENCE

Shanghai Electric has successfully entered the high-performance automotive fastener industry by acquiring 100% of the shares of Nedschroef, and expanded into the aerospace manufacturing industry by acquiring 100% of the shares of Broetje-Automation.

ENHANCING PLANT CONSTRUCTION AND PRODUCTION CAPACITY OVERSEAS

Shanghai Highly (Group) Co., Ltd.*, a subsidiary of Shanghai Electric, has founded an air-conditioning compressor factory in India, which now holds a 26% market share in India.

Equipment produced by Shanghai Electric is sold to Indonesia in large volume, making positive contribution to local energy security and improvement of energy efficiency. Meanwhile, Shanghai Electric has undertaken a number of major projects in the country, including the O&M of three thermal power generators in Weda Bay Industrial Park, the 2.6 million t/y coke project in Tsingshan Industrial Park, and the JV for automobile air-conditioning heat exchangers. All the projects are advancing smoothly.

Shanghai recently introduced several measures to improve its comprehensive service capabilities to boost global expansion of Chinese enterprises. Leng Weiqing commented that as a global leading supplier of green and smart industrial solutions, Shanghai Electric will actively implement the policy and facilitate the green development of global manufacturing with advanced technology. **D**

Shanghai Electric Completed Its UK-based PV Project

In May, Shanghai Electric received the final handover certificate and contract warranty letter after its 50 MW photovoltaic project in Branston, UK, passed the two-year warranty test and, marking Shanghai Electric's first photovoltaic engineering, procurement, and completed construction (EPC) project operating in the country.

The project sits in Lincolnshire in central England as one of the biggest PV projects in the region. The final handover certificate was a milestone for Shanghai Electric to expand its presence in the UK PV market, and the project accumulated invaluable experience for Shanghai Electric to implement new energy EPC projects in Europe and other high-end markets.

Amid the construction period, the project department ensured the completion of the project as scheduled despite the delayed arrival of equipment and postponed on-site verification of grid connection. Confronting complex local entry requirements for technology and on-site construction, the project department carried out a lot of researches and texts and achieved a successful handover, delivering a high-quality project to the property owner. **D**





Build a Zero-carbon Future Shanghai Electric Presented Solar, Hydrogen and Energy Storage Solutions in the SNEC PV Power Expo in Shanghai

Shanghai Electric participated in the 16th (2023) International Photovoltaic Power Generation and Smart Energy Conference & Exhibition (SNEC) that was held from May 24 to 26 in Shanghai New International Expo Center with the theme "build a zero-carbon future". It shared visionary ideas for the future of the energy industry from perspectives of solar power generation, green hydrogen, diversified measures of energy storage, energy management system and carbon dioxide capture during the exhibition.

Shanghai Electric Guoxuan New Energy Technology Co., Ltd. signed a strategic cooperation agreement with Growatt New Energy Co., Ltd. on 1GW PV inverters and 1GWh energy storage batteries. Under this framework, both parties will jointly promote smart energy innovation and explore segments of energy storage on sides of power generation, grid and user, energy storage by industrial and commercial entities and overseas clients, facilitating energy transition worldwide.

At the same time, Shanghai Electric Hydrogen Equipment Era Technology Co., Ltd. delivered a lecture titled "The Solution for Manufacturing Green Hydrogen from Sustainable Energy and System" at the SNEC International Energy Storage and Hydrogen & Fuel Cell Technology, Equipment and Application Conference, which attracted many listeners and clients.

Shanghai Electric released the "Shanghai Electric PV Energy Storage System Solution", "1500Nm³/h Hydrogen Product Produced through Alkaline Water Electrolysis" and "Smart-One Energy Storage System for Industrial and Commercial Entities" in the "Top 10 Highlights" event. What was more, the first solution was granted the "Megawatt Jadeite Award", and the last one received the "Excellent Application of Energy Storage" award. **D**



Navigate to a Green and Low-carbon Future

Shanghai Electric Releases 2022 ESG Report

In May 2023, Shanghai Electric released its 2022 environmental, social and governance (ESG) report, the 7th edition in a row since the first published in 2016. The 2022 report covered Shanghai Electric's breakthroughs in multiple areas, which included enhancing its ESG system and capability, exploring new paths for green and low-carbon development, promoting the national goal of building a zero-carbon society and high-quality development of the power industry, creating sustainable value for a beautiful life and implementing sustainable governance concepts.

It is worth noting that Shanghai Electric managed to increase its MSCI ESG rating from BBB to A, and obtained many ESG awards including "Best ESG Practice of the Year" and "Zero Carbon Future Leader of the Year 2022" by Jiemian (a well-known Chinese digital media outlet specializing in financial and business news), "Top 500 Chinese ESG Enterprises" by Sina Finance, "Excellent Enterprises of 2022 for Sustainable Development" by Ernst & Young, "CSR of Local SOEs: Pioneer 100 Index", "Best IR Hong Kong-listed Companies" by New Fortune (a Chinese financial platform focusing on evaluation and analysis) and "2022 Forbes China Top 50 Sustainable Development Industrial Enterprises". 

Shanghai Electric's “Manufacturing-Storage-Utilization” Integrated Demonstration Project of Green Hydrogen Passed Engineering Validation

In May, the “manufacturing-storage-utilization” integrated demonstration project of green hydrogen passed the engineering validation test, which was co-built by Shanghai Electric Group Co., Ltd., also acting as the investor, and its subsidiary Shanghai Electric Hydrogen Equipment Era Technology Co., Ltd. (hereinafter referred to as “Hydrogen Equipment Era”). The project was the first application case of the solution “renewable energy power generation + hydrogen production through PEM water electrolysis + hydrogen storage + fuel cell power generation” in an industrial park in China, and also the largest multi-functional test and validation platform for the PEM water electrolysis-based hydrogen production system nationwide. It was designed to build an all-round smart energy demonstration project integrating “source, grid, load, energy storage and hydrogen” in the industrial park in Minhang District, Shanghai with bottlenecks from R&D to engineering application removed, and develop modules of efficient MW-level systems and facilities of PEM water electrolysis-based hydrogen production.

The project consists of hydrogen production workshops, electric rooms, secondary equipment chambers, supporting workshops, centralized control room and display halls, and couples electricity generated by wind and PV sources with grid power. It also features IGBT power supply with a high conversion efficiency, 2~300Nm³/h PEM electrolyzers, 1.5 MW system testing platform plus hydrogen storage tanks and 30 kW hydrogen fuel cell system at the back end. With one-key start and shutdown, unattended operation and remote mobile monitoring, the project achieves a hydrogen production efficiency of over 75%.

What was more, as for high-power hydrogen production through PEM water electrolysis, Hydrogen Equipment Era made a number of technological breakthroughs in electrolytic deposition testing and diagnosis, such as the multi-parameter sensing and highly accurate measuring technology that can be used to improve the operation of the PEM water electrolysis system, fast



testing, accurate positioning and prevention of gas leakage, power supply and control technology for electrolysis that can be applied to multiple testing conditions, and information extraction, diagnosis and evaluation technology of PEM electrolytic deposition. This project enables Hydrogen Equipment Era to perform comprehensive testing and evaluation on the performance and service life of 2~300Nm³/h PEM electrolyzers and systems.

With the validation, the project offers strong support for the green hydrogen industrial chain as an excellent example, and reinforces Shanghai Electric's resolution and commitment to implementing the hydrogen strategy with greater efforts and advocating large-scale application of green energy consumption for raw materials. **D**



Shanghai Electric and ACWA Power Held Talks in Shanghai for Coordinated New Energy Development

On May 12, Marco Arcelli, CEO of International Company for Water and Power Projects ("ACWA Power") arrived at Shanghai Electric to share his views with Liu Ping, Vice Secretary of the Party Committee and Chairman of Shanghai Electric Group, on project collaboration and strategic cooperation between the two companies in new energy. Marco Arcelli introduced ACWA Power's Energy Transition Vision 2030 and expressed his hope for the future cooperation with Shanghai Electric in hydrogen energy, PV, seawater desalination, and WtE solutions.

On behalf of Shanghai Electric, Liu Ping welcomed Marco Arcelli and his delegation and congratulated him on his new appointment. Liu Ping said that he hoped both parties would uphold win-win strategies, strengthen exchange and mutual learning, and work together to find solutions to challenging problems. He added that Shanghai Electric attached importance to collaborative innovation with its partners. He hoped that the two sides could work together to achieve a win-win situation in energy coupling technology and other areas. **D**

First in China!

80 MW Ultra-high-speed Variable-frequency Explosion-proof Synchronous Motor Successfully Developed



In May, Shanghai Electric Machinery Co., Ltd. ("Shanghai Electric Machinery") launched the 80 MW ultra-high-speed variable-frequency explosion-proof synchronous motor that was independently developed by itself after it was validated, creating a new milestone for Shanghai Electric in the area of high-speed motors applied to large compressors.

According to external professionals participating in the on-site validation, the motor was scientifically designed with leading technologies and well-chosen materials, and its performance parameters met requirements of R&D technology, testing guidelines and other standards. As a product with independent intellectual property right, it was the first of its kind in China with major technological indicators reaching the same level of leading foreign products under the same category.

Following the principle of efficiency, stability and credibility in its design, the

motor is created to offer sustainable system solutions. The system can be applied to multiple industries including metallurgy, petrochemical, oil gas and new energy, covering areas that are essential for industrial development, such as the compressed air energy storage, liquid air energy storage, large-scale air separation, blowers of blast furnace, cracked-gas compressor, propylene compressor, ethylene compressor, propane dehydrogenation, liquefied natural gas and carbon capture.

The R&D team invented many structures and carried out simulation calculation with digital technologies to meet the motor's specific technological characteristics and standards of International Electrotechnical Commission (IEC). Consequently, the motor was made much more reliable, credible and quiet, and highly energy-efficient, easy to install and maintain, and resistant to frequent starts and shutdowns with smart operation enabled. **D**

Unit 2 of Zhundong Power Plant in Xinjiang Entered Commercial Operation

On May 7, Unit 2 of State Grid Zhundong Power Plant in Xinjiang passed the 168-hour test run with smooth operation and excellent performance in all aspects. Shanghai Electric supplied the turbine, generator and auxiliary equipment of the unit. Unit 1 of the power plant had been put into operation on January 18. The plant has been completed. It is worth mentioning that the plant is equipped with a 660 MW-level double water inner cooled turbo-generator independently developed by Shanghai Electric, which is the world's largest water-cooled generator featuring streamlined structure, easy installation, operation and maintenance, and hydrogen-free design for better safety. With its state-of-the-art equipment and excellent service, Shanghai Electric enabled Unit 2 of the Zhundong Power Plant to complete all project milestones and to pass the 168-hour test run smoothly, delivering a satisfactory result that exceeded the owner's expectations. **D**

Top 1!

Cumulative Installed Offshore Wind Capacity Connected to Grid Exceeds 10 Million kW

According to the 2022 Stats Brief of Chinese Offshore Wind Capacity Hoisted released by Chinese Wind Energy Association of the China Renewable Energy Society in March, Shanghai Electric's cumulative installed capacity accounted for 32.6% of the national aggregate as of December, 2022, and its newly-added capacity in 2022 28%, both ranking first in the list of Chinese wind power enterprises.

By May this year, Shanghai Electric's cumulative installed offshore wind capacity with grid connection has exceeded 10 million kW. It is a monumental figure demonstrating Shanghai Electric's decades-long devotion to the Chinese wind power market, and a symbol of the blooming Chinese wind power industry.

The past decade has witnessed how Shanghai Electric explores the offshore wind power market, which is largely the outline of China's development in this area. As early as 2011, the Donghai Bridge Offshore Wind Farm in Shanghai, adopted the 3.6 MW turbines produced by Shanghai Electric for its second phase, indicating that China commissioned over 3 MW capacity in its first offshore project.

From importing and learning to invention and independent development, Shanghai Electric has developed many wind turbines tailored for the domestic market through practices and researches, and enhanced its leadership and innovation capacity project by project. **D**

SHANGHAI ELECTRIC GO GREEN, GO LOW- CARBON




“**A**

t present, China's installed electricity-generating capacity from non-fossil fuels has reached 50.9%, surpassing the installed capacity

from fossil fuels for the first time.” This significant milestone was announced by Yang Yinkai, deputy head of the National Development and Reform Commission, at the opening ceremony of the first Carbon Neutrality Expo in Technologies, Products and Achievements, held from June 11 to 14 in Shanghai.

As China aims to achieve carbon peaking and carbon neutrality, it is crucial for industries to speed up their green and low-carbon transition. Currently, the motivation to reduce carbon emissions is shifting from external pressure to internal drive, and adopting green practices is becoming a key competitive advantage for businesses. With the continuous promotion of a low-carbon economy across various sectors, environmental protection is making significant progress, and green living is becoming increasingly important for a better quality of life.



SHANGHAI ELECTRIC BOOSTS GREEN ENERGY SOLUTIONS FOR A CARBON- NEUTRAL FUTURE

At the Carbon Neutrality Expo, which opened on June 11, Shanghai Electric unveiled its official Action Plan for Carbon Peaking and Carbon Neutrality. The plan outlines a commitment to achieve carbon peaking by 2030, while proposing to achieve carbon neutrality in operations by 2035, and carbon neutrality throughout the entire value chain by 2055. Additionally, the group showcased its latest products in wind, solar, energy storage, and hydrogen.

While moving to the net-zero future, the top priority in achieving our carbon reduction goals is the transformation of the energy and industrial sectors. According to research by China International Engineering Consulting Corporation (CIECC), the sectors are responsible for the largest share of carbon emissions in China, accounting for 51% and 28%, respectively.

To address the challenges in these areas, Shanghai Electric strives to build new power systems and zero-carbon industrial parks through energy efficiency improvement, energy transition, reuse and recycling. These initiatives aim to help the company achieve its carbon reduction goals and promote the green transformation of industries. At the Carbon Neutrality Expo, Shanghai Electric demonstrated its expertise in several areas, including clean coal technology, renewable energy, new energy storage technology, and hydrogen energy.

SHANGHAI ELECTRIC ACTION PLAN FOR CARBON PEAKING AND CARBON NEUTRALITY

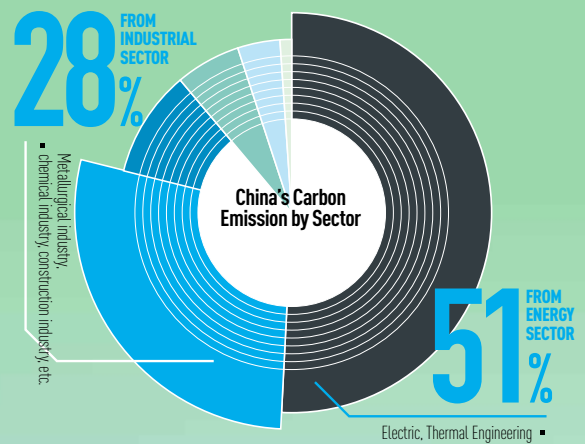


HIGH-QUALITY DEVELOPMENT CAN ONLY BE ACHIEVED THROUGH A GREEN AND LOW- CARBON TRANSITION

In September 2020, China announced its overarching climate policy goals: to peak emissions before 2030, and achieve carbon neutrality by 2060. China's '30-60' decarbonization goal has become a top priority for China to achieve its high-quality development.

In the past few years, the promulgation of policies such as the "Working Guidance For Carbon Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy" and "Action Plan for Carbon Peaking Before 2030", has led to the issuance of carbon peaking action plans by various industries, governments at all levels, and urban and rural construction sectors. The "1+N" policy system has been established with clear objectives, a reasonable division of labor, powerful measures, and a systematic approach that provides continuous impetus for China's decarbonization goals. According to projection, China's carbon reduction initiative is expected to create investment opportunities worth more than a trillion yuan. This will create a huge new market space for enterprises embracing green and low-carbon transition.

The energy sector is the primary battleground and the power industry is the main driving force to achieve these ambitious goals. Technological innovation and green and low-carbon development in these fields are critical to promoting ecological civilization and high-quality socio-economic development in China. Therefore, the green and low-carbon transition has become an essential tool for Shanghai Electric to achieve high-quality development.



Data source: China International Engineering Consulting Corporation



Energy Sector



BUILD COMPREHENSIVE SOLUTIONS FOR NEW POWER SYSTEM

The new power system is a crucial tool to achieve China's decarbonization goals and a key focus of Shanghai Electric's green transition.

As a top manufacturer of advanced energy equipment in China, Shanghai Electric has been actively promoting the shift towards sustainable development and is determined to become the market leader in new energy equipment. The company has taken steps to conserve energy and reduce consumption in coal-fired plants, as well as in heat supply and flexibility transformation. These efforts have set new records for the world's lowest coal consumption in coal-fired plants and added new vitality to the development of efficient clean coal technology. The ultra-supercritical 1000 MW double reheat generator at Datang Dongying Coal-fired Power Plant achieved a power generation efficiency of 49.4% and reduced its coal consumption to 248.86g/kWh. Shanghai Electric has been pursuing excellence in gas turbine technology, which is considered the "jewel in the manufacturing industry's crown", to achieve import substitution. The company has also developed a comprehensive product portfolio in nuclear power, with 40 key technologies in core fields and 469 intellectual property rights. It has delivered 232 sets of main equipment of nuclear reactors to all domestic nuclear power plants, contributing to the safe and orderly development of the nuclear power industry in China.

New energy is a central aspect of the new power system. However, the fluctuation in power generation from sources such as wind and solar energy means that the power system still requires fossil energy and energy storage solutions for peak-shaving to ensure stable operation. Shanghai Electric is utilizing its experience in traditional energy equipment and forward-thinking approach in new energy and energy storage to actively develop new and emerging equipment for wind power, CSP and PV, energy storage, hydrogen energy, smart grid, and other fields. The company is leveraging its strengths in coal-fired power, gas-fired power, nuclear power, waste-to-energy, and hydropower to achieve its goals. By coordinating its development in multiple sub-sectors, it aims to provide comprehensive new power system solutions to its customers and partners.

On June 11, Shanghai Electric announced its latest achievements in wind, solar, energy storage, and hydrogen technologies. These include 16+MW wind turbines, 20GW heterojunction PV modules, 500kW/3000kWh modular flow batteries, and 2000Nm³/h alkaline electrolyzers. These advanced technologies offer robust solutions to net-zero transition.

16+MW

Shanghai Electric's 16+MW wind turbine propels China's offshore wind power to a new height

Shanghai Electric has always been committed to leading the development of China's onshore and offshore wind power. One of its subsidiaries, the Shanghai Electric Wind Power Group, has set numerous records both domestically and internationally. For eight consecutive years since 2015, the Wind Power Group has been at the forefront of new installed capacity for offshore wind turbines in China and was also recognized as the world's top manufacturer in 2016 and 2021.

The Wind Power Group is leading the way of China's wind power industry, with several notable achievements, including the first 3.0MW+ offshore wind turbine, the first 7.0MW offshore wind turbine, the 8.0MW offshore wind turbine, the world's largest commercial offshore wind turbine with the longest rotor diameter (230m), and the world's largest commercial offshore wind turbine with an installed capacity of 11MW.

Shanghai Electric's new 16+MW wind turbine, developed on the Poseidon platform and introduced at Carbon Neutrality Expo, is an upgraded product based on the largest offshore wind power database in China. As the world's largest turbine in terms of installed capacity and rotor diameter, the platform-based turbine can be customized to fit different wind farms, water depths, and all wind grades on the sea. It can even be upgraded

to 18MW.

The 16+MW wind turbine features 262m long rotor diameter, 123m long carbon fiber blades, highly integrated drive chain, highly reliable electric pitch system, proven yaw system and a comprehensive and optimal electrical system to help customers achieve higher returns with lower investment. The 16+MW wind turbine, compared with the current largest 11MW turbine in commercial use, offers several advantages. In a project with a capacity of 1000 MW, it can reduce the number of installation sites by 31% and the initial investment by 2 billion yuan. The latest turbine's annual power generation capacity is 40% higher, and the use of full carbon fiber main beam blades increases power generation by 5% compared to fiberglass blades with the same weight and load. The prototype components of the 16+MW wind turbine have undergone over 40 additional tests to ensure their reliability, in addition to their high profitability. The wind turbine can generate over 66 million kWh of clean power annually, which is equivalent to reducing coal consumption by 22,000 tons and CO₂ emissions by 54,000 tons.

Furthermore, the 16+MW wind turbine can serve new application scenarios, such as wind power & hydrogen production, wind power & marine pasture, and wind power & oil & gas platform power supply, based on Shanghai Electric Group's planning in 3 major industries and its 4+2+X development strategy.

20GW

20GW HJT Module Leading the Industry into the Era of Micro-crystalline HJT Solar Cell

Shanghai Electric has many years of technology expertise and manufacturing experience in new energy, enabling it to provide system solutions for all photovoltaic scenes. Currently, HJT solar modules are entering mass production, and Shanghai Electric and Ideal Energy Sunflower have jointly launched 20GW HJT solar cells at the Carbon Neutrality Expo, leading the industry into the era of micro-crystalline HJT solar cells. Shanghai Electric's 20GW HJT modules can achieve a mass-production cell efficiency of over 25.3%, start-up rates of over 90%, and yield rates of over 98%. The next-gen automation technology enables mass production of ultra-thin cells of 120μm

Achieving carbon peaking by 2030



No less than 1000 low carbon and digital solution providers

2035

Strive to achieve carbon neutrality in operations by 2035



2055

Strive to achieve carbon neutrality throughout the entire value chain by 2055

Shanghai Electric's Ten Action Plans for Carbon Neutrality



By 2030

Achieve the Carbon Neutrality Goal



System solutions for Two Application Scenarios

New Power System

Zero-Carbon Industrial Park



Three Paths Towards Low-Carbon Development

Energy efficiency improvement

Energy transition

Reuse and recycling



Four Supportive Platforms

Carbon Reduction Strategy

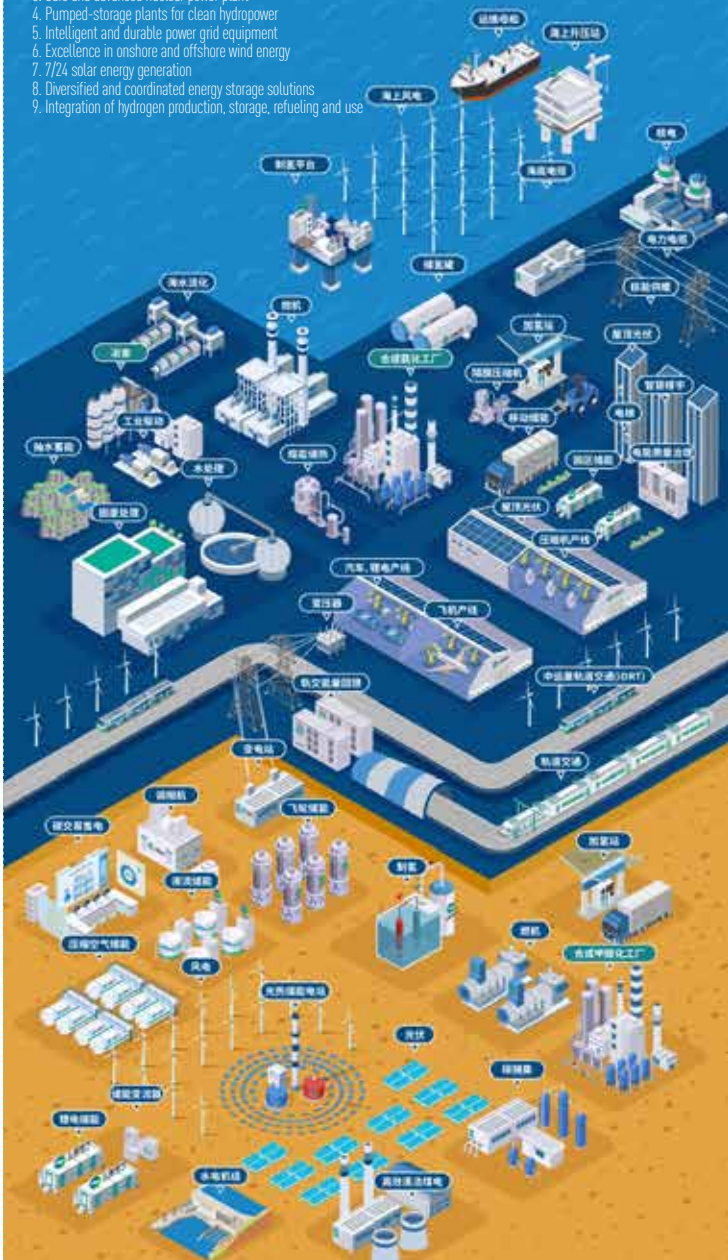
Carbon Capture Technology

Industrial Innovation

Industrial Finance

Build "All-Round" Solutions for New Power System

1. Efficient clean coal technology: energy saving and consumption reduction for coal power plants, heat supply transformation, flexibility transformation
2. Efficient and flexible natural gas power
3. Safe and advanced nuclear power plant
4. Pumped-storage plants for clean hydropower
5. Intelligent and durable power grid equipment
6. Excellence in onshore and offshore wind energy
7. 7/24 solar energy generation
8. Diversified and coordinated energy storage solutions
9. Integration of hydrogen production, storage, refueling and use



Build Comprehensive Zero-Carbon Solutions for Industrial Parks

1. Design and construction of green plants
2. Distributed supply of renewable energy sources
3. Green and intelligent manufacturing
4. Energy efficiency improvement in the industrial sector
5. Combined cooling, heating and power system
6. Low-carbon operation of smart buildings
7. Low-carbon rail transportation
8. Waste heat utilization in desalination
9. Integrated management of solid waste, waste gas and waste water

and below, and can connect with the MES system for data visibility, real-time upgrading, and full automation. Shanghai Electric also provides technical support and one-stop solutions for PV plants that adopt its 20GW HJT modules.

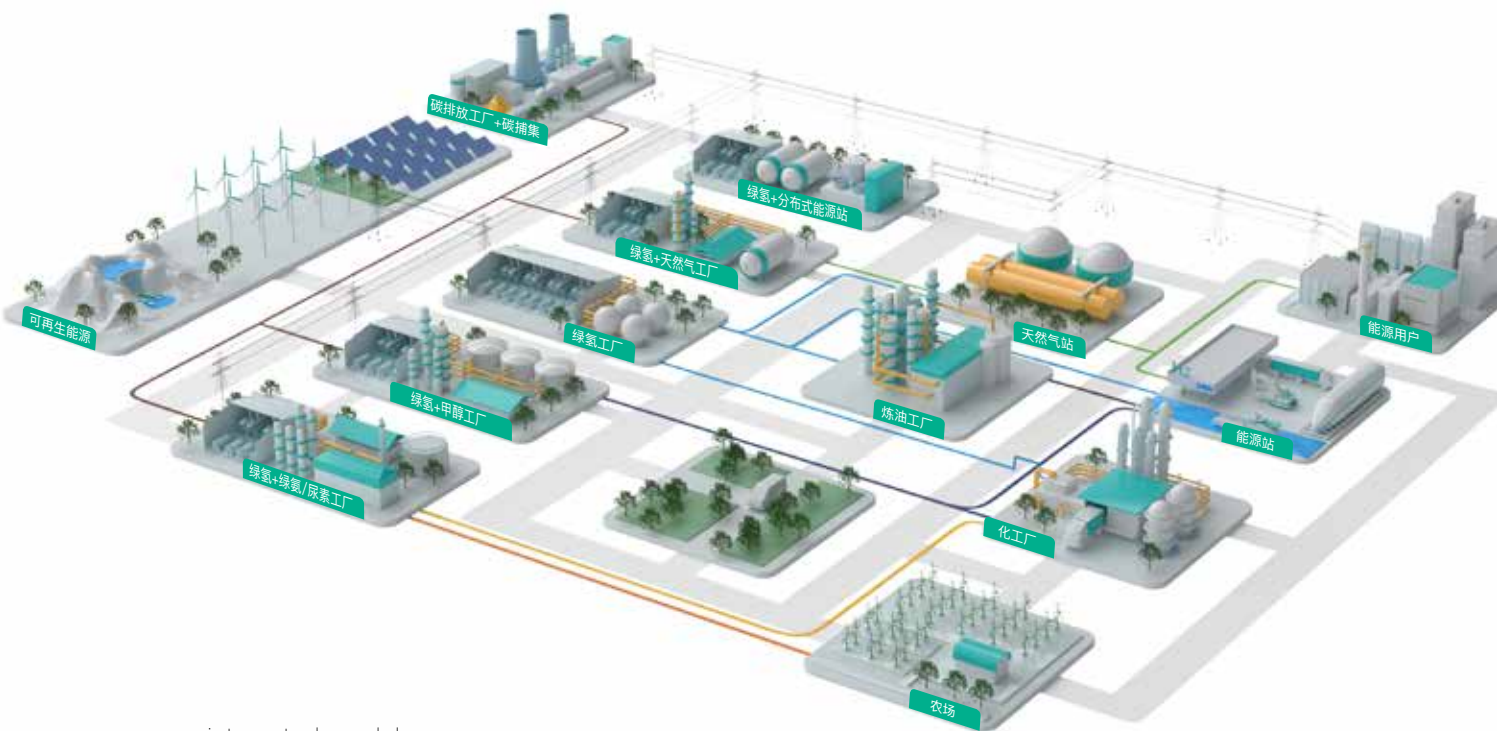
The 700MW CSP +250 MW PV Hybrid Project in Dubai, constructed by Shanghai Electric, is the world's largest concentrated solar power project in terms of installed capacity, investment amount and heat storage of molten salt tanks. Shanghai Electric is committed to promoting the green and low-carbon transition of the energy industry with its advanced and reliable solar power solutions, enabling 24/7 clean solar power for residential use.

500kW/3000kWh flow BESS, the best solution for long-duration electrochemical energy storage

Shanghai Electric has developed diverse energy storage technologies, including compressed air energy storage, flywheel energy storage, lithium-ion BESS, and flow batteries, to build a coordinated eco-system for the energy storage industry. The company facilitated the establishment of new power systems with its comprehensive advantages in energy equipment manufacturing.

Shanghai Electric's new 500kW/3000kWh prefabricated modular BESS was introduced at the Carbon Neutrality Expo, showcasing the company's proven experience in all-vanadium flow battery technology. This safe, efficient, and durable BESS is designed for wind and solar hybrid power systems, with improved safety, economic efficiency, high performance, and wide adaptability. As

500kW/3000kWh



an integrated, modular and intelligent solution for energy storage, the 500kW/3000kWh prefabricated BESS represents Shanghai Electric's formidable industry-leading capabilities.

Its technical attributes of decoupling power and capacity of flow batteries are fully embodied, with a high-performance 65kW power stack and a 4-series-2-parallel configuration for a 500kW battery pack. Its DC efficiency exceeds 85% and energy efficiency reaches 90%. Its combined heat and power (CHP) system can reduce the cost of electricity per degree to 0.2 yuan. The integrated, modular, and intelligent BESS provides reliable technical support for the development of new power systems driven by new energy.

As China moves towards its carbon peaking and carbon neutrality goals, the energy storage market has a promising future, and flow battery technology has great development potential as the cutting-edge energy storage technology. Shanghai Electric's 500kW/3000kWh flow BESS will inject strong impetus into the development of global green energy sector.

2000Nm³/h

2000Nm³/h alkaline electrolyzer, a new milestone in the development of green hydrogen

Shanghai Electric is actively developing core equipment for the integration of hydrogen production, storage, supply and utilization. One of its subsidiaries, the Shanghai Electric Hydrogen Equipment Era Technology Co., Ltd., boasts a world-class R&D laboratory for electrolytic hydrogen production, providing comprehensive support for material development, component and product manufacturing, and testing. The company has already built the largest multi-functional V&V platform for PEM electrolyzer in China, with a capacity of 300Nm³/h, as part of the first "manufacturing-storage-utilization" integrated demonstration project of green hydrogen for industrial parks in the country.

At the Carbon

Neutrality Expo, Shanghai Electric unveiled its latest innovation, the 2000Nm³/h alkaline electrolyzer, with the largest hydrogen production capacity among similar products in China. Its maximum hydrogen production capacity can be expanded to 2500Nm³/h to meet the needs of wind and solar hybrid plants, green chemical/metallurgy, and other fields with high hydrogen demand.

The 2000Nm³/h alkaline electrolyzer boasts impressive technical specifications, with increased current density of 3500A/m², reduced DC energy consumption to 4.15kWh/Nm³ H₂ @3000A/m², and improved overall performance by 8% YoY. Additionally, the production cost of hydrogen per Nm³/h has been reduced by 6% YoY, and the floor space



DEVELOP COMPREHENSIVE SOLUTIONS FOR ZERO-CARBON INDUSTRIAL PARKS

has been reduced by 33% YoY for the same scale of hydrogen production.

As China moves towards its decarbonization goals, the strategic importance of hydrogen production via water electrolysis is gaining momentum, and Shanghai Electric is well-positioned to meet the growing demand. The company's expertise in advanced equipment manufacturing and system integration, combined with its commitment to reducing costs and increasing efficiency through collaboration, makes it a trusted provider of comprehensive solutions for the integration of hydrogen production, storage, supply, and utilization.

Shanghai Electric is also developing power transmission and distribution products with integrated and smart electrical technologies, including ultra-high voltage transformers, smart switch cabinets, and low-voltage components, as well as offering testing and maintenance services. Shanghai Electric's commitment to green and low-carbon transition is gaining momentum through technological advancements and innovative products, which are driving the company's continued success.

Industry, the backbone and booster of national economy, is vital in promoting green transformation of development paradigm. Shanghai Electric makes every effort to develop comprehensive solutions for zero-carbon industrial parks. Leveraging its diversified business landscape, Shanghai Electric can help industrial parks realize "full-stack" low-carbon performance from design, planning, and construction to operation. Leveraging its diversified business landscape, Shanghai Electric can help industrial parks realize "full-stack" low-carbon performance from design, planning, and construction to operation.

Comprehensive solutions are the highlight of Shanghai Electric's efforts to build zero-carbon industrial parks. The low-carbon solution covers the whole process of park planning, engineering design, equipment matching, EPC, production and operation. It supports both green factories and intelligent production lines. The energy consumption solution pushes industrial companies to use energy in a more green and efficient way due to two drivers: "optimization of current energy use" that means to achieve a higher energy efficiency through

industrial means, and "filling the gap with renewable energy" that means to make energy consumption greener through distributed new energy facilities. Shanghai Highly (Group) Co., Ltd., a subsidiary of Shanghai Electric, has become an industry leader with over 30 years' commitment towards core heating and cooling technologies, offering key products like AC compressors and heat management system solutions for vehicles. Shanghai Mitsubishi Elevator Co., Ltd. and Shanghai Rail Transit Group, both affiliated to Shanghai Electric, have increased operation efficiency of vertical and ground transportation with digitalized comprehensive maintenance, contributing to low carbon operation of smart buildings and rail transit. Shanghai Electric takes good care of every aspect in the park's operation, from air conditioning and elevators to smart buildings, acting an excellent housekeeper indeed.

The smart energy industrial park built by Shanghai Electric in Shantou City, Guangdong Province, marks the provincial largest, and also the first "loE+" demonstration park for Shanghai Electric that integrates wind power, solar power, energy storage,



power charging and smart technologies. Shantou's rich wind and solar power enables the park to produce approximately 27.86 million kWh every year by itself, 36% of which are used internally and the left connected to and transmitted through the grid. Therefore, the park can reduce annual carbon dioxide emissions by 6,500 tons thanks to such practices. Meanwhile, the project's operation know-how is valuable for zero-carbon parks and smart cities to be built in other regions.

In Yantai City, Shandong Province, Shanghai Electric's seawater desalination plant produces freshwater with waste heat and power generated by the refining and chemical project located on Yulong Island, which will again be used in refining and chemical processes. In this way, waste heat is recycled, and less freshwater and groundwater are used. With the ownership of IP rights of multiple thermal and membrane desalination technologies, Shanghai Electric manages to sign a number of desalination contracts including the phase 1 and phase 2 projects of Zhejiang

Petroleum & Chemical Co., Ltd., and set its foot in overseas market like Brunei, empowering Chinese and foreign coastal regions to remove the bottleneck of freshwater shortage.

In June, Shanghai Electric initiated the formulation of the group standard "Implementation Path Planning and Evaluation Guidance for Zero-carbon Industrial Parks" together with its first 11 partners, namely East China Architectural Design & Research Institute (ECADI), Shanghai Environment and Energy Exchange, Shanghai Energy Efficiency Center, Johnson Controls, Schneider Electric, Meijin Energy, Nomura Research Institute (Shanghai), China Gas, Ti Testing and Certification Group and Pony Testing International Group, with the aim of developing an internationalized implementation path and evaluation criteria that give a clearer carbon reduction path with carbon footprint traceable and sustainable life-cycle evaluation feasible, which will support the high-quality development of zero-carbon industrial parks in China.

It is worth noting that collaboration between

energy and industry sectors becomes the "new blue sea" for deep decarbonization as new technologies like digitalization develop. The project of desalination driven by waste heat utilization is a typical example of the "interaction between the Energy Internet and Industrial Internet", a path promoted by Shanghai Electric.

Digitalization and smartization will replace old growth drivers with new ones more rapidly, increasing production efficiency and enhancing green manufacturing and production safety, which has been well proved in Shanghai Electric's digital transformation. Concerning energy structure transformation, China enjoys a huge potential in renewable energy. By opting for renewable energy rather than fossil energy, paper-making enterprises will make a substantial leap forward in low-carbon transformation.

Technological advancement is always the most essential driver for either removing fundamental constraints of resources and energy, or delivering a better life for more people. In other words, technological development provides more possibilities for green and low-carbon transformation. In the future, Shanghai Electric will stay on the new track of "decarbonization through energy-industry collaboration", making bigger contributions to attain the national "Dual Carbon Goals". **D**

XU RUIZHONG

Plant Manager of Shanghai Renmin Electrical Apparatus Works and recipient of the "Shanghai May 1st Labor Medal"

REVAMPING A CENTURY- OLD BRAND WITH 36-YEAR UNSWERVING COMMITMENT

Aspirating to revitalize China's manufacturing sector, he worked tirelessly to achieve this objective. With the innovator's enterprising spirit, he led a successful digital transformation for the enterprise. With his enduring devotion, he demonstrated his commitment as a manager of state-owned enterprises. Under his leadership, Shanghai Renmin Electrical Apparatus Works ("Renmin Works") overcame all challenges and brightened the century-old Shanglian brand with brilliant performance. Aiming to be an enterprise specializing in intelligent and advanced manufacturing, the Renmin Works has enabled new highs in operational management, continuous progress in corporate management, steady improvement in economic efficiency, sound management of safety and quality, significant enhancement in brand image, and a new mentality among its employees. Now, we are going to visit Xu Ruizhong, a man with a scholarly and poised demeanor, a recipient of "Shanghai May 1st Labor Medal", who has been working in the Renmin Works for 36 years.

LEADING THE FACTORY OUT OF DOLDRUMS

In June 2018, the Renmin Works were facing many unfavorable conditions in its operations, such as sales decline in consecutive years, weak market efficiency, incompetence in product development and declining profitability. At such a critical moment, Xu was appointed as the plant manager. He knew that a tough battle was waiting for him ahead, and that the Renmin Works would need the unity and courage of all employees to tide the factory over difficult times.

Without any hesitation, he shouldered the heavy burden and applied precise measures to address problems in production, processes, R&D and other aspects. To accurately estimate the value of assets, he optimized the enterprise information management system and streamlined cost settlement to control expenditures comprehensively. He spent two years disposing tens of millions of non-performing assets (in CNY) for the factory, pulling it back to the right track.

He restructured the marketing strategy for the Renmin Works to reach out to the front end of the market and enter the new energy sector. He reorganized the sales force by implementing a performance-oriented talent strategy to create a positive sales culture. For product development,



he leads the technical R&D center to launch new products and improve product performance with an emphasis on market demand. Under his leadership, the Renmin Works developed a molded-case circuit breaker that fill a tech gap in the industry, and its other new products such as e-frame circuit breakers and IoT molded-case circuit breakers have become industry benchmarks. He initiated optimization of parts inspection processes, standardized quality inspection requirements, and brought in visual inspection systems to improve product quality and reliability. He initiated comparative bidding to select best suppliers, and optimized the supply chain through quality and price comparison, leading to an unprecedented reduction in procurement costs for the Renmin Works. He adjusted the production system structure, standardized the production management, enforced production plan improvement, and adjusted the production strategy to improve the expertise and efficiency of all workshops. Through these measures, the Renmin Works overcame the bottlenecks in business and got rid of the sluggish morale, and the century-old factory got a new lease of life.



XU JI HONG

Xu is deeply inspired by his experience in the past five years: "If a company always waits for external forces to bring about a change for it, it has no way out. As a manager, you must have deep emotions for the enterprise, pursue excellence relentlessly, and lead all employees towards a brighter future with perseverance, excellent skills and efficient measures." Over the past five years, he has kept absorbing new ideas and bringing in modern management philosophies to carry out digital transformation, build a lean production model, continuously optimize organizational structure, enhance resilience of supply chain, and make safety a top priority. As a result, the Renmin Works has achieved an average annual revenue growth rate of over 15%, and an even better corporate profit in 2022.

EMBARKING ON THE PATH TOWARDS MANUFACTURING INTELLIGENCE

"To achieve sustainable growth, our production line has to be more advanced than those of our competitors. The same degree of automation will not be enough for us to maintain our market share. We can only be considered a leader in the areas where automation has not yet been reached by others, and we have successfully implemented automated production." When it comes to digital transformation, Xu has his own unique insights.

At the initial stage of the Renmin Works' intelligent manufacturing project, all the production line suppliers challenged the specifications put forward by the factory, believing that it was impossible to build such a line. However, the production line project team led by Xu, with tenacity and courage against difficulties, kept developing new solutions, testing them repeatedly, communicating with the technicians patiently and making modifications to the solutions tirelessly. Finally, the first phase of the project was successfully completed.

The new production lines have greatly improved production efficiency and stability. The intelligent production line for medium-voltage vacuum circuit breakers, which had a capacity of more than 20 units per shift under the original manual operation, can now reach about 70 units per shift. The inspection of intelligent production



lines of low-voltage frame circuit breaker and medium-voltage vacuum circuit breaker have been fully automated, and the quality management of the products has been greatly improved through the fully automatic data collection and inspection, avoiding the previous errors caused by manual inspection. Now, the Renmin Works' Phase I and Phase II intelligent manufacturing projects have both been successfully put into operation, with three new smart production lines added for AC contactors, molded case circuit breakers and automated warehouse. These renovations have once again opened a new chapter for the factory by quality and efficiency improvement.

As a conventional manufacturing enterprise with a history of 100 years, the Renmin Works has comprehensively enhanced its core competitiveness and is making great strides towards high-quality development with innovative business philosophy, sound management system and advanced manufacturing capabilities.



HE PROVIDES THE STRONGEST SUPPORT FOR US

"I was born after 00s. I joined the intelligent manufacturing project team managed by the plant manager upon I entering the factory, and my peers were envious of me." Ma Shaokang, a young employee of the factory, was thrilled and worried at the same time when he learned that he would join the intelligent manufacturing project team: the challenges are exciting, but will his ideas and creativity be accepted by the unsmiling plant manager?

It usually takes about two years to develop a production line from planning to operation, but the Renmin Works has shortened the period to one year, and the fastest one took only four months. "Thanks to Mr. Xu, he gives us enough room and freedom to try new ideas and techniques, and he also escorts us with his professional knowledge and experience. For example, in the assembly station of the drawer socket on the circuit breaker production line, the robot arm needs to put the circuit breaker into the guide rail of the drawer socket, and ensure that during this process, the drawer socket does not tilt forward, and the guide rail does not expand outward. The project team proposed three different solutions, and everyone had their own opinions and could not reach a consensus. In the end, Mr. Xu, with his product knowledge and rich experience in mold design and manufacturing as well as electrical control system,

tidied up the ideas and finalized the solution for us."

During the advancement of the intelligent manufacturing project, the most impressive remark Xu made to Ma was, "You are free to raise new plans, and if they succeed, it is your credit. If they fail, I will bear the results." Xu makes young people feel more comfortable exploring new horizons, even if there are setbacks and risks, and they always keep a positive mind.

Xu is well aware that this is an era full of passion and vitality. Energetic and brave, young people are willing to undertake urgent and difficult tasks. They hold the key for sustainable development, and they are the main driving force for innovation and entrepreneurship. He wants to give the strongest support to young people, which is perhaps one of the recipes of Renmin Works' success.

Innovators never stop moving forward and always strive to reach new heights. Xu is leading the Renmin Works to build the Phase III of Intelligent Manufacturing Project to deepen lean management. In the course of factory transformation, he firmly follows the leadership of the CPC, strives relentlessly for excellence, and takes it as his duty to open up new horizons for Shanglian. He steadfastly forges ahead towards the goal of creating a century-old enterprise that is respected by its employees and the outside communities. **D**

DIALOGUE WITH SHANGHAI'S STATE-OWNED ENTERPRISES

SHANGHAI ELECTRIC: TO BE A WORLD-CLASS MANUFACTURER

Upholding the innovator's spirit, the spirit of excellence, the spirit of diligence, while dedicated to whole-hearted customer service and independent advancement, Shanghai Electric has been forging ahead for China's industrial modernization for 120 years. The company keeps on innovating and exploring new paths with enduring vitality and a forward-thinking mindset.

It is committed to persevering traditional values and blazing new trails for the future. "Aiming to be a world-class manufacturer, Shanghai Electric is firmly embarking on a path towards prosperity and modernization with Chinese characteristics. We pursue high-quality development with our competitiveness in cutting-edge technology, talent and innovation." Liu Ping, Deputy Secretary of the Party Committee and President of Shanghai Electric Group Co., Ltd., commented recently in the 2023 Media Interview with Shanghai's State-Owned Enterprises.

TECH BREAKTHROUGHS AND TECH SELF- RELIANCE

"Shanghai Electric has always put science and technology at the core of its strategy and taken innovation as the primary driving force for high-quality development." Liu said, "In the past five years, our R&D expenditure has reached 25 billion yuan, and the annual average expenditure in R&D has accounted for more than 3.6% of our operating income. In 2022, the Group's R&D expenditure accounted for 4.18% of all costs, the highest in the past three years."

The data is a testament to Shanghai Electric's full commitment to sci-tech innovation. Liu explained how the Group has taken up key tasks for China's sci-tech development by leveraging hard and core

technology and focusing its actions on tech breakthroughs and tech self-reliance.

The Group serves China's innovation-driven strategy with advanced equipment. As the only equipment manufacturer in China supplying nuclear island, conventional island and instrumentation and control systems at the same time, Shanghai Electric's products are widely used in all nuclear power plants in China. The Group has successfully developed the world's first RUV Wet Winding Reactor Coolant Pump with an investment of 800 million yuan over a period of 8 years. It has completed many major national high-tech projects to provide machine tools for various industries including automobile, construction machinery and aerospace. Relying on its strong technical expertise and manufacturing capability, Shanghai Electric has embraced time-consuming and daunting challenges and accomplished numerous technological innovations that beat back developed countries' tech hegemony.

The Group also fills the tech gaps in manufacturing of key components of major equipment and strengthens the foundation of manufacturing industry. "Taking China's import substitution strategy as its own mission, Shanghai Electric strives to achieve breakthroughs in core technologies in key fields to enable China's tech self-reliance goal in the key components of major technical equipment based on its strong and reliable manufacturing capacity." According to Liu, Shanghai Electric's product portfolio spans from major core cast and forged parts for mega ships to micro bearings for aircraft

engineering and aerospace technology. It keeps boosting tech self-reliance in key fields to make contributions to total domestic supply across the industrial chains.

GREEN DEVELOPMENT ENABLED BY BOTH TRADITIONAL AND RENEWABLE ENERGY

Guided by China's national strategy, Shanghai Electric is committed to facilitating national "dual carbon" goal in the energy and industrial sectors with its industry-leading competitiveness. While driving green transition, the Group has not merely abandoned traditional energy, but leveraged the advantages of both traditional energy and new energy to build a comprehensive new power system and total solutions for zero-carbon industrial parks.

"Green transition, low-carbon economy and GHG reduction cannot be achieved overnight, we must advance towards the carbon peaking and carbon neutrality goals in a steady and patient manner with good knowledge of China's energy resources featuring fairly rich coal reserves and less oil and gas reserves." According to Liu, Shanghai Electric is vigorously developing new energy equipment for wind power, PV, energy storage, hydrogen-based energy, and smart grid to create a multi-energy integrated solution. In addition, the Group is also consolidating and expanding its technological advantages in traditional energy equipment for coal, gas, biomass and waste-to-energy (WtE) generation. "Our innovative 1000 MW ultra-supercritical double reheat units continue to

set new records for lowest coal consumption in the world, with a recent record of 248.86 grams per kWh," he said.

In a rough calculation, if the average coal consumption of China's existing coal-fired generators is reduced to 250g/kWh through retrofitting, the country could reduce carbon emissions by 700 million tons per year, or about 7% of total emissions, representing a huge green potential.

"We are capable of more than that," Liu told us, Shanghai Electric has developed total solutions for zero-carbon industrial parks, which are widely applied to the design and construction of green plants, supply of distributed renewable energy, green and intelligent manufacturing lines, industrial energy efficiency improvement, low-carbon operation of smart buildings, low-carbon rail transportation, waste heat utilization, seawater desalination and "solid-gas-water" collaborative management. "We will also collaborate with institutions such as Shanghai United Assets and Equity Exchange to develop industry standards for zero-carbon industrial parks to help high-energy-consuming enterprises reach their 'dual carbon' goal."

ACHIEVING HIGH QUALITY DEVELOPMENT THROUGH DIGITAL TRANSFORMATION AND OVERSEAS EXPANSION

Digitalization and internationalization are crucial to the future development of Chinese manufacturing companies. Shanghai Electric is also working on digital transformation and overseas expansion.

For its digital transformation, Shanghai Electric is promoting the collaborative development of intelligent manufacturing and smart energy, developing combined forces of industrial intelligence and service industrialization, and implementing a two-pronged approach in the development of IoE and industrial Internet. "We are carrying out intelligent manufacturing practices in the four dimensions of 'point', 'line', 'plane' and 'network'. At present, our six plants have been selected into the list of Shanghai's Top 100 Smart Factories," Liu said.

Shanghai Electric has been accelerating its overseas expansion since its first offshore investment in 1993. As an active practitioner of China's "Belt and Road" initiative, it represents the country to participate in the global competition and cooperation in advanced equipment manufacturing.

Among all its overseas projects, there are two that deserve our special attention: the 950MW CSP-PV Hybrid Project in Dubai with the largest installed capacity and highest technical standards in the world, which represents China's entry into the global market of advanced mechanical and electrical systems; the Thar Coal Block-I Integrated Coal Mine and Power Project, a key part of the China-

Pakistan Economic Corridor (CPEC).

The latter project was successfully put into operation on March 22, 2023, after which it took the first place in Pakistan's power generation ranking, fully demonstrating Shanghai Electric's state-of-the-art technology in high-efficiency clean energy equipment.

In a balanced and steady manner, Shanghai Electric has embarked on a new development path with advanced, green and intelligent technologies. Liu said that Shanghai Electric will accelerate its entry into emerging industries while improving quality and efficiency across its established businesses. With the two-pronged approach, it will achieve the carbon peaking and carbon neutrality goals through sci-tech innovation, digital transformation, service transformation and incubation of new business and products, rebuild the industrial foundation and reshape the industrial landscape to develop a powerful driving force for Shanghai Electric's high-quality development.

The 2023 Media Interview with Shanghai's State-Owned Enterprises is guided by Shanghai State-owned Assets Supervision and Administration Commission, sponsored by Xinhua News Agency Shanghai Office and China Economic Information Service, with SAIC Volkswagen Viloran MPV as the automobile sponsor. The seven-seat VM passage car provided a pleasant and intelligent mobility experience for the guests in the event. **D**



CULTIVATING SHANGHAI ELECTRIC'S HIDDEN CHAMPIONS

By Wang Xiang



I recently read a book "Hidden Champions" written by German management expert Hermann Simon, and I highly agree with some of the ideas he proposed. I have always thought that the mission of an enterprise is to become bigger and stronger, which is how most people understand business, and the ranking of the global Fortune 500 companies is also largely decided by scale. However, when we look back at the history of business development, we find that some large companies couldn't really withstand the test of time, on the contrary, many small and medium-sized enterprises have lived to become century-old brands. Just as in super disasters like an asteroid strike, dinosaurs became extinct, while frogs, mice and small animals have been able to reproduce to this day.

Compared to the Fortune 500 companies with their shimmering halo, the invisible champions listed in Hermann Simon's book are "hidden". They are small in scale, with annual revenues mostly in the range of a few hundred million to a few billion, far from reaching the threshold of being a Fortune 500 company. Secondly, their products are not for the end customers, but for a certain segment of the industry chain. As suppliers of end products, they are not well known to the public. Finally, most of them pursue an international strategy and are unrivaled in the global segment. Due to relatively narrow business areas and limited space in their home markets, these companies have to take the broader international market and eventually become global champions in this field. For example, the German company Flexi holds 70% of the global market share of retractable dog leashes, 3/4 of the world's chip cards use adhesives produced by Delo, and a German company called Gerriets, the world's only manufacturer of large-format stage curtains, has 100% of the global market share.

There are three secrets to the success of hidden champion companies. The first secret is to focus on the main business, use limited resources to enhance their strengths, and create high value-added products, thus building a stronghold that is difficult for competitors to overcome, with great market competitiveness. Most of the hidden champions are manufacturing companies with healthy cash flow and an average of 14% return on total assets before tax, which is the



basis of their long-term vitality.

The second secret is a lean organization. Almost none of the hidden champions adopts a pyramidal structure. According to business, they are divided into different business units, where each business unit is close to the users, with business-centric resources allocation. The staffing is streamlined, and there are always more jobs than people. Employees are required to be multi-talented, able to switch roles and handle different matters on request, directly facing customers and responsive to customer needs. This decentralized organizational structure brings extremely high efficiency to the organization.

The third secret of the hidden champions is outstanding innovation capability. Germany's hidden champions spend an average of 6% of their revenue on R&D, which is twice as much as the average company, and some hidden champions spend 10%. Compared with the high R&D investment of large enterprises, the efficiency of the hidden champions' R&D investment is outstanding. Their R&D results can be quickly transformed into productivity, realizing the iteration of

products, further enhancing user stickiness and consolidating competitiveness. The innovation of hidden champions is rarely disruptive, but through small and low improvements, they improve user experience, solve small pain points, and finally achieve product upgrading.

To the outside world, Shanghai Electric is a giant in the field of machinery industry with hundreds of billions of assets, however, from the perspective of our own segmentation business, compared with ten years ago, this is no longer the fact. For example, the power generation equipment segment based on the four major plants and the 10 billion-scale industry leaders like Mitsubishi Elevator were once the core businesses of Shanghai Electric, but today, its hundreds of small and medium-sized enterprises with independent business are generating more revenue. Especially under the pressure of dual-carbon target, traditional industries are trying to transform and looking for new business growth points. For each company, focusing on becoming the industry benchmark in a niche area is a pragmatic choice instead of hitting out in all directions. Special motors, air compressors, industrial pumps, seawater desalination, air-cooled equipment, and exhaust gas treatment, in these seemingly small market segments, we have a number of competitive enterprises to provide support. They serve as a business support platform for the headquarters, providing services for enterprises to relieve policy, talent and capital pressure. In addition, these enterprises should also be well-positioned, provide high-quality products and services, improve organizational structure and management processes, get closer to customers, and become one of the best in the industry. In this way, Shanghai Electric can become a complex of small giants in many segments, and a base camp for leading enterprises to solve the technical problems that plague the development of high-end manufacturing industry in China. Becoming a Fortune 500 company is not our goal. We just want to stay true to our mission as a technical craftsman and become the backbone of China's manufacturing industry. **D**

THE SHORTEST PATH TO SUCCESS IS TO OPEN YOURSELF

By Wei Wei

Many years ago, there was a benchmark enterprise in China, which was unrivalled in the industry. However, the head of the company had a strong sense of crisis, because the products in this industry were upgraded quickly and may be overtaken by competitors anytime with a little slip. In order to continuously improve their management and to quickly enter the international market, they decided to look for problems from within and rectify them, but with limited success. It is difficult to find problems when people have been in the familiar environment for a long time. So, they invited foreign industry giants to find problems for them.

When the foreign expert delegation came, the company opened itself completely. The delegation found many problems after thorough research and issued a detailed report of the problems. It was quite a shock. The report showed that the enterprise had problems with everything except the infrastructure.

A year later, the enterprise invited back the delegation to carry out rectification and assessment. Strikingly, in such a short period of time, the image of the enterprise had been renewed, and the

rectification completely met the expected goal. It was also during this year that this benchmark company was successfully entered into the global supplier list.

This story reminds me of a saying: the shortest path to success is to open yourself to show your wounds. In fact, there are many paths to success, but finding the problem and solving it in time must be the fastest one.

Tide and time wait for none, and we should seize every hour. Many enterprises and entrepreneurs, aiming to grow bigger and stronger, often cannot find the best path, because "with the old map, you can never find the new continent."

For a long time, Shanghai Electric is a traditional energy equipment-based manufacturing enterprise. But now, the era of traditional energy has become a thing of the past, the traditional thermal power market shrinkage has become a foregone conclusion, and the digital transformation of traditional energy enterprises is imminent. This has long been a consensus. At the same time, many enterprises of the Group still lack competitiveness and profitability, and urgently need to transform and develop. And the essence of the digital transformation of enterprises is - the change and optimization of business management. "to cope with the uncertainty of the world with the certainty of management."

We need to open ourselves to show our wounds: The change and optimization of business management is a big task. Digital technology can be used to reconstruct the enterprise strategy framework, resource elements, organizational methods, incentive mechanisms and other systems, innovate development models and development paths, make major strategic adjustments, and provide ideological, institutional, technical and organizational safeguards and support. The focus can be on four aspects, including establishing a unified strategy and values, promoting optimization and innovation of mechanisms and systems, focusing on core technologies to implement digital solutions, and building an organizational structure that is compatible with the strategy.

But we shouldn't just engage in idle theorizing. We can only get closer to the new continent and success if we keep exploring. **D**





**SHANGHAI ELECTRIC
CREATE OUR FUTURE TOGETHER**