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**SHANGHAI ELECTRIC** 

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#### **ELEPHANTS DANCE**

ho says elephants can't dance? Throughout history, there has been a rule of thumb that says you either innovate or perish.

Typically, large companies are redundant, culturally insular, and often unable to respond to changing competitive environments. However, there is no shortage of

cases in the business world that prove that "elephants can indeed dance".

The world-famous IBM is an excellent positive example.

Throughout its more than 100-year history, it has written a grand epic of self-innovation. In 1969, 4,000 IBM employees supported the Apollo 11 mission with NASA computer equipment, software,

epic of self-innovation. In 1969, 4,000 IBM employees supported the Apollo 11 mission with NASA computer equipment, software, and five System 360 computers. Apollo 11 astronaut Gene Kranz once said, "We would not have landed on the moon without IBM and the systems they provided." In recent years, IBM has been a pioneer in the fields of AI and quantum computing. So what is "corporate innovation"?

Innovation drives the advancement and progress of an enterprise.

As the cradle of China's power industry, Shanghai Electric has more than 120 years of history. As the creator of many Chinese and global "firsts", it relies heavily on self-innovation. Like an agile and graceful dancer, it has maintained its leadership position in the industry through top-down and bottom-up innovation.

In fact, a company's "technological" innovation is often the one that most concerns all walks of life. Technological innovation is the core driving force of sustainable development and competitiveness of enterprises, as well as the key to industrial upgrading and economic transformation. For a manufacturing enterprise, lack of technological innovation is the ever-expanding Achilles' heel and the reflection of its internal systemic dysfunction.

Shanghai Electric's innovation never stops. It is committed to facilitating the national "dual carbon" goal in the energy and industrial sectors with its industry-leading competitiveness. Continuous innovation is the reason why this elephant can dance at every critical moment. A company's resilience is greatly enhanced by its mastery of technology. Without core technology, an enterprise will be rootless. Without innovation, the enterprise will decline rapidly. Only with continuous innovation and core technology, will an enterprise be indomitable.

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# **CONTENTS**

P02
N E W S
OVERVIEW

P14

SHANGHAI ELECTRIC

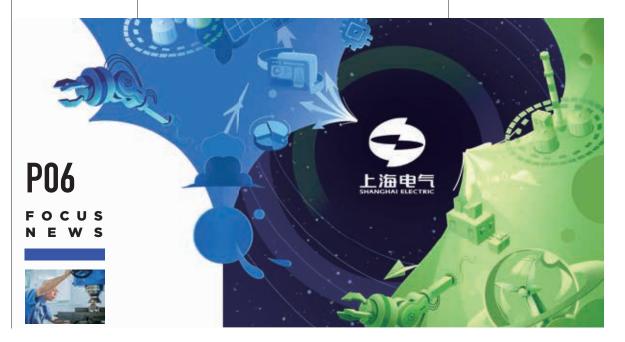
"GREEN" ENERGY
FOR A "NEW" LIFE

V I E W POINTS

**P26** 

winner of Shanghai Municipal May 1st Labor Medal from Shanghai Electric Power Generation Equipment Co., Ltd. Turbine Plant Wu shifang

Heart in Full Bloom



#### Disclaimer

Shanghai Electric Journal is intended to provide relevant information about Shanghai Electric (Group) Corporation and its subsidiaries, investees and associated companies, which could not constitute disclosure of or investment recommendations for Shanghai Electric Group Company Limited. Some companies/projects mentioned in the journal are not investments of Shanghai Electric Group Company Limited. Investors should refer to the announcements and interim/annual reports issued by Shanghai Electric Group Company Limited for information related to the listed company.



#### World's First All-high-temperature Superconducting Tokamak Device Achieved Plasma Discharge

The world's first all-high-temperature superconducting tokamak device, Honghuang 70 (HH70), has recently achieved plasma discharge, successfully finishing engineering feasibility verification. This marks China's first-mover advantage in the field of high-temperature superconducting magnetic confinement fusion. As one of the key suppliers of the project, Shanghai Electric Nuclear Power Group Co., Ltd. manufactured the three core components of the host system, namely the outer vacuum vessel, the vacuum chamber, and the inner and outer thermal shields, providing a strong guarantee of successful device operation.

#### Shanghai's First "PV + Expressway" Low-carbon Expressway Service Center Connected to the Grid

Zhuqiao Service Center, Shanghai's first green and low-carbon expressway service center built by Shanghai Electric Environmental Protection Group, was completed and connected to the grid, which further promotes the "PV + expressway" application scenarios in the field of transportation. The project has a capacity of 243 kWh, with an average daily power generation of about 500 degrees, saving at least 73 tons of standard coal and reducing carbon dioxide emissions by 100 tons per year. It has an incredibly positive effect on promoting energy saving and carbon reduction, and contributes to the green development of the city.

#### New Project of Self-developed World's First 660,000 Double Water Inner Cooled Turbine Generator Put into Operation

On June 15, after turbine No.1 passed the 168 hours full load trial run, turbine No.2 of the new  $2\times660$  MW project of SPIC Baiyinhua Kengkou Power Plant also passed the trial run. During the trial run, the two sets of main equipment, including turbines and generators, provided by Shanghai Electric met all design requirements, and the system was in good operating condition, marking the double commissioning of the project on schedule.



#### Bright-H Technology Gained Both Domestic and International Orders

Recently, Shanghai Bright-H Technology Co., Ltd. won the bidding for the supporting hydrogen production station of a Hunan power plant and the CEEC Songyuan green hydrogen-ammonia-alcohol integration project. Overseas, it has signed a contract for a 5 MW photovoltaic hydrogen production station project in France, demonstrating its remarkable technical strength and competitiveness.

#### Shanghai Electric Won 4 New Main Equipment Orders in the Field of Efficient and Clean Coal Power

In the field of high-efficiency and clean coal power, Shanghai Electric Power Generation Group won the bid for the electromechanical furnace and auxiliary equipment for the 2×660 MW replacement project of Dagang Power Plant in Tianjin, and the bid for the boiler and denitrification equipment for the 2×660 MW ultra-supercritical cogeneration project of Fujian Energy Petrochemical Dongqiao Cogeneration Plant in Fujian, which will play an important role in the region to build a clean, low-carbon, safe and high-efficiency energy system.

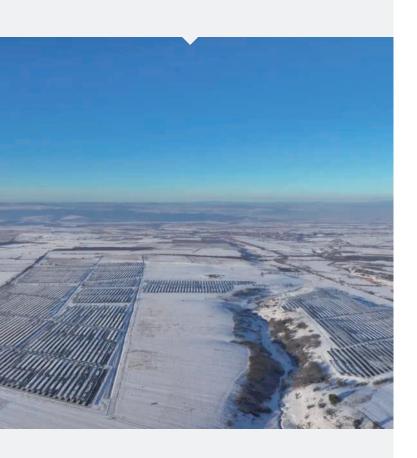
#### Shanghai Hency Solar Technology Co., Ltd. Participated in Drafting Several National Industry Standards

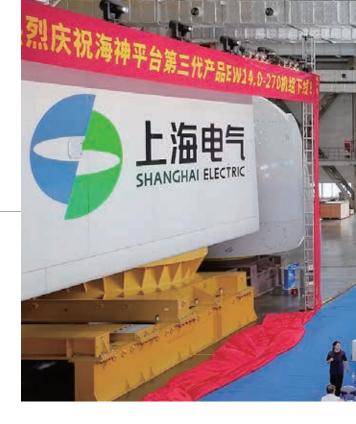
Organized by SAC/TC90 and hosted by China Testing & Certification International Group Co., Ltd. (CTC), the drafting meeting of four national standards, including "Safety Identification of Photovoltaic Modules Part 1: Structural Requirements". "Safety Identification of Photovoltaic Modules Part 2: Testing Requirements", "Photovoltaic System Testing, Documentation and Maintenance Requirements Part 1: Documentation, Commissioning Tests and Inspections for Grid-connected Photovoltaic Systems", and "Photovoltaic System Testing, Documentation and Maintenance Requirements Part 2: Maintenance of Grid-connected Photovoltaic Systems", was convened in Beijing. Shanghai Hency Solar Technology Co., Ltd. attended the meeting as the main editorial unit of the standards, and put forward constructive opinions and suggestions in standard translation, standard terms and the draft standards.



#### PV Project in Palau, Romania Connected to Grid

The PV project in Palau, Romania, contracted by Shanghai Electric, was successfully connected to the grid. The project can bring new economic vitality to the area, provide green electricity for approximately 70,000 homes, and is expected to reduce carbon dioxide emissions by 6,800 tons per year.





#### The Agriculture and Photovoltaic Power Generation Project Connected to Grid in Fangshan Old Revolutionary Area

The 100 MW agriculture and photovoltaic power generation project, constructed by Shanghai Electric (Jiangsu) Integral Energy Services Co., Ltd., has been connected to the grid in Fangshan Old Revolutionary Area. It will play an important role in optimizing the energy structure in the region, help promote the green and low-carbon transformation of the local economy, and give new impetus to sustainable energy development.

#### Shanghai Electric Debuts at the Smarter E Europe 2024

From June 19 to 21, the Smarter E Europe was held in Germany with the theme of "Light of Tomorrow". Shanghai Electric made its debut at the event with innovative new energy products, including solutions and equipment for various application scenarios across hybrid PV-CSP power generators, CSP energy storage, solar-thermal desalination, and solar-thermal energy-saving heating, sharing its recent innovations and practices in the energy field with domestic and international customers and partners.



#### World's First 18-20 MW Wind Storage, Load and Grid Unit Rolled off the Production Line

On July 5, Shanghai Electric Shantou Intelligent Manufacturing Base simultaneously rolled out the world's first 18-20 MW wind storage, load and grid unit designed and manufactured by Shanghai Electric and the third generation product of the Poseidon platform, the EW14.0-270 unit, which will be used in weak grid power supply for remote islands, decentralized hydrogen production from sea breeze, and flexible and direct power transmission, low-frequency power transmission, floating wind turbines and other multi-scenario offshore wind power utilization.

#### First Set of S98V1A Blades Shipped from Taonan Blade Base

Shanghai Electric Wind Power's Taonan Blade Base has shipped the first set of S98V1A blades, which will be used in the Taonan 22.1 MW decentralized wind power rural revitalization project in Jilin. The project is planned to install 4 sets of Shanghai Electric Wind Power turbines, adopting the 160 meter hybrid tower program, and will be accompanied by the construction of a new 66 kV booster station.

# SHANGHAI ELECTRIC





# **Securing Top 50 for Nine Consecutive Years**



中国最具价值品牌

(6) World Brand Lab

SHANGHAI ELECTRIC | 6

n June 19, the 21st World Brand Summit, organized by the World Brand Lab, took place in Beijing. At the event, the 2024 list of China's 500 Most Valuable Brands was officially released, with Shanghai Electric ranking 47th with a brand value of RMB 215.628 billion. This represents a 25% year-on-year increase and marks the ninth consecutive year that Shanghai Electric has been in the top 50, continuing to lead the Chinese machinery manufacturing industry.

Focusing on the theme "Breakthroughs and Innovations: Mapping the Path for Digital Technology to Enhance Brand Value", the 2024 World Brand Summit brought together academic experts and business leaders to explore how technology can enhance brand value. At the event, the World Brand Lab released the 2024 "China's 500 Most Valuable Brands" report. which is based on financial data, brand strength, and consumer behavior analysis. The annual report saw world-class brands such as State Grid, ICBC, Haier, CNPC, and China Life occupy the top five positions on the list. Shanghai Electric remains committed to serving China's national strategies, closely aligning with the country's needs, and benchmarking against global leading technologies, industry-leading companies, and national exemplars. The company accelerates the cultivation of driving forces for green development, promoting industrial development and transformation through technological innovation. In the digital era, Shanghai Electric continues to build indispensable and irreplaceable new quality productive forces.

The brand evaluation method adopted by World Brand Lab is the currently prevailing "Economic Use Method". By comprehensively analyzing the company's sales, profit, and other data, the current profitability of the company is evaluated and the profitability level is determined using the Economic Value Added (EVA) method.

World Brand Lab also uses its original and leading "Brand Value Added Tools" (BVA Tools) to calculate the degree of brand contribution to revenue, and objectively predicts the profitability trend of the company in the coming period, as well as the proportion of brand contribution to future revenue through mathematical analysis. [7]

## "Power Industry Major Technical Equipment and Project List" released

he China Power Theme Day 2024 was recently held in Fuqing City, Fujian Province under the theme "A closer look at a power giant".

At the meeting, the "Power Industry Major Technical Equipment and Project List" was released, and the million-grade nuclear power turbine set, million-grade double-unit regeneration double reheat high-efficiency ultra-supercritical coal-fired power units, the main equipment for the fourth-generation nuclear island, designed independently by Shanghai Electric, were selected into the list.

Among them, the self-designed milliongrade nuclear power turbine set adopts innovative technologies with completely independent intellectual property rights, such as "new 1,710 mm last-stage blades" and "300-ton large-scale low-pressure welded rotor", and its steam turbine control system, reheat valve group and other key systems and components have been domestically produced and applied for the first time. The project not only achieves international technological leadership but also breaks the monopoly of imported products in this field, filling a void in China and laying a solid foundation for the export of domestically produced nuclear power equipment.

It is worth mentioning that Shanghai Electric's involvement in several projects has also been recognized. These include the Unit 3 of Fangchenggang Nuclear Power Plant, a demonstration project of Hualong I; the Guohe I demonstration project; the demonstration project of Shidaowan high-



temperature gas-cooled reactor nuclear power plant; the Linglong I integrated small pressurized water reactor (ACP100); the "Six Cylinders, Six Exhausts" million-unit turbine; the 1 1,350 MW ultra-supercritical coalfired turbines of the second phase of Anhui Pingshan Power Plant; and the Yingcheng 300 MW compressed air energy storage power plant demonstration project in Hubei.

It is understood that the "Power Industry Major Technical Equipment and Project List" has selected a total of 100 projects, each representing industry excellence, advancement, and demonstration. These projects aimed at demonstrating the strength of a manufacturing giant in the power industry, its commitment to "the country's strategy" and its high level of scientific and technological self-reliance. 

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# Shanghai Electric's Lithium Equipment Technology Won Second Prize of National Science and Technology Progress Award 2023

n June 24, the National Science and Technology Conference, the National Science and Technology Award Conference and the 21st General Assembly of Academicians of the Chinese Academy of Sciences, the 17th General Assembly of Academicians of the Chinese Academy of Engineering were held at the Great Hall of the People in Beijing. At the conference, the National Science and Technology Award for 2023 was announced. The "Precision Manufacturing Core Technology and Equipment for Large-Capacity Lithium-Ion Batteries" completed by Shenzhen Yinghe Technology Co., Ltd., a subsidiary of Shanghai Electric, in cooperation with Huazhong University of Science and Technology and other units, won the second prize of the National Science and Technology Progress of the year.

In this project, Yinghe Technology, together with Huazhong University of Science and Technology, has overcome generic technical problems such as large-width, high-speed production and long-range precision control, and made a series of important breakthroughs in the core process and equipment of lithium battery production, such as coating, roll separation, winding, cutting and stacking. Deeply involved in the lithium equipment industry for eighteen years, Yinghe Technology intensifies

scientific and technological innovation in the field of lithium battery production core equipment such as coating and assembly line, and continues to lead the rapid development of lithium equipment industry with the ultimate "intelligent manufacturing". It has boosted China's lithium equipment business and demonstrated China's strong "intelligent manufacturing" power to the world.

Yinghe Technology leads the industry by introducing a series of breakthrough innovative equipment, such as double-layer Super-E coating machine. 1.6 m wide double-laver coating machine. digital small-gap high-speed coating machine, dry electrode calendaring machine & high-pressure solid calendaring technology, multi-core coiling machine, 46-series laser cutting and coiling machine, ultrahigh-speed multi-position cutting and stacking machine, and second-generation downward sinking pole short knife core assembly line, etc. These machines have made Yinghe Technology the preferred choice for top automakers and battery manufacturers globally when it comes to producing lithium-ion batteries. This helps shape China's large capacity lithium-ion battery manufacturing technology to establish China's global leadership.





## Shanghai Mitsubishi Elevator Sets a Record for Ultra-high-speed Elevators Made in China

n July 30, the launch ceremony of the 12.5m/s ultra-high-speed elevator designed and manufactured by Shanghai Mitsubishi Elevator Co., Ltd. (hereinafter referred to as "Shanghai Mitsubishi Elevator") was officially held in the company's product exhibition hall. Chen Huawen, Deputy Secretary of the Minhang District Party Committee and Mayor of Minhang District, and Wu Lei, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Electric Group, attended the ceremony.

At the launch ceremony, NETEC
National Elevator Inspection and Testing
Center issued the 12.5m/s ultra-high-speed
elevator type test certificate to Shanghai
Mitsubishi Elevator, marking the product's
marketability.

In China, there has been a gap in the 12.5m/s ultra-high-speed elevator technology, which has stringent requirements for elevator traction and drive performance, safety, vibration and noise reduction, among others. Equipped with digital simulation technology, intelligent manufacturing technology, and evaluation and testing technology, Shanghai Mitsubishi Elevator's R&D team conducted independent research in terms of key technologies and components, rose to the challenge, and achieved excellent product performance

For more than three decades, Shangha Mitsubishi Elevator has been dedicated to innovating and upgrading its products. As a result, LEHY 6m/s, 8m/s, and 10m/s ultra-high speed elevators have been launched and well received by users. The 12.5m/s ultra-high-speed elevator has set a record for the highest running speed of "Made in China" elevators, which can comprehensively meet the demand for elevators in ultra-high-rise buildings, and provide close, professional and fast presales, sales and after-sales services for the

Market regulators, industry associations customer representatives and executives of Shanghai Mitsubishi Elevator attended the ceremony.

## Shanghai Electric and Tsinghua University Signed a Strategic Cooperation Agreement

n July 23, in the presence of Qiu Yong, Party Secretary of Tsinghua
University and Academician of the Chinese Academy of Sciences, and Wu Lei, Secretary of the Party Committee and Chairman of Shanghai Electric Group, the two parties signed a strategic cooperation agreement in Shanghai to conduct in-depth exchanges on key scientific research, training of innovative talents, and industry-academia-research integration

According to the agreement, the two parties will cooperate in the fields of advanced manufacturing, digital intelligence integration and low-carbon energy, explore innovative university-enterprise cooperation mode, build a high-level scientific and technological innovation platform, strengthen key technology research, carry out high-level talent exchange and training, promote the deep integration of industry, academia and research, improve the commercialization of scientific and technological

achievements and the level of industrialization, and make greater contributions to the implementation of the innovation-driven development strategy and the realization of technological self-reliance

Qiu Yong said that
Tsinghua University has always
taken the service of the country
as its mission, and now focuses
on key areas following national
strategies, actively promoting
the construction of academic
disciplines and scientific and
technological innovation.
Shanghai Electric closely
follows industrial applications
and cutting-edge technologies,
and constantly strengthens
forward-looking scientific
research and key technology
research. The signing of the
agreement marks a concrete
step to implement the spirit of
the Third Plenary Session of the
20th CPC Central Committee
and to promote integrated
scientific and industrial
innovation. We look forward
to the future cooperation,
which will surely coordinate
innovative resources and forces,
solve challenging national

leading and independent scientific and technological research. We will strengthen strategic dialogue, improve top-level planning, innovate the mode of university-enterprise cooperation, and achieve a high level of scientific and technological self-reliance

Wu Lei welcomed Qiu Yong and his entourage. He said that Shanghai Electric's development of new quality productive forces under the national strategy and its independence in scientific and technological research are strongly supported by Tsinghua University. At present, Shangha Electric is transforming into a world-class equipment company. In this critical period, we need more scientific and technological innovation and talent support from a first-class university like Tsinghua University. Taking strategic cooperation as the new starting point, we hope the two parties will continuously expand highlevel exchanges, improve the mechanism of high-level talent cultivation, and identify more cooperation opportunities, so as to create a new situation of university-enterprise cooperation.

Zeng Rong, Member of the Standing Committee of the Party Committee and Vice President of Tsinghua University, and Zhu Zhaokai, Deputy Secretary of the Party Committee of Shanghai Electric Group and Chairman of the Shanghai Electrical and Mechanical Labor Union, signed the agreement.





# Shanghai Electric and Tsinghua University Jointly Organized the "Industry-Academia-Research Integration and Innovation Forum on High-end Equipment"

n July 6, the "Shanghai Electric-Tsinghua University Industry-Academia-Research Integration and Innovation Forum on Highend Equipment" was successfully held at Shanghai Electric Group Co., Ltd. Central Academe. Mr. Dong Jianhua, member of the Party Committee and Executive Vice President of Shanghai Electric Group, and Ms. Yang Hong, Vice President of Shanghai Electric Group, attended the forum.

In line with the spirit of the National Science and Technology Conference, the National Science and Technology Award Conference, the Academician Conference of the Chinese Academy of Sciences and the Academician Conference of the Chinese Academy of Engineering, the forum aims to effectively implement the instructions of General Secretary Xi Jinping, to "strengthen" the enterprise-led in-depth integration of industry, academia and research, clarify the goals, and improve the transformation of scientific and technological achievements and the level of industrialization." It will resolutely implement the demand of Chen Jining, Secretary of Shanghai Municipal Party Committee, to "be a good and resolute action party for deepening the reform, strive to take the lead in the transition to highend, intelligent, and green development, boldly explore new paths in accelerating the development of new quality productive forces, and be a pioneer in achieving highlevel technological self-reliance and selfimprovement." With Shanghai Electric's rich industrial scene and industrial strength, supported by Tsinghua University's

technology and talent advantages, the forum will promote the further integration in the industrial chain, innovation chain, talent chain and education chain.

This forum closely follows the national strategy of developing new quality productive forces. Focusing on eight cutting-edge technology fields, such as advanced manufacturing, artificial intelligence and robotics, lowcarbon energy systems and building energy efficiency, industrial engineering management, biological manufacturing and medical equipment, future nuclear energy technology, pollution control and resource recycling, and power conversion and transmission systems, it seeks to solve bottleneck problems in the practical application of technology. Scholars and experts from Tsinghua University and Shanghai Electric held highly constructive and forward-looking academic exchanges at the forum.

During the forum, the two sides also held a grand signing ceremony for the eight cutting-edge technology fields, laying a solid foundation for the subsequent joint exploration of multi-pronged cooperation. The Party Committee of the Central Academe of the Group and the Party Committee of Department of Mechanical Engineering of Tsinghua University signed a joint Party building agreement, which will deepen and promote wider and deeper cooperation in the future by consolidating the foundation of scientific research cooperation. D



#### Shanghai Electric's High-quality Motors Inject "Green Momentum" to "West-to-East Gas Pipeline Project"

n June 12, the last motor supplied by Shanghai Electric Machinery Co., Ltd. (hereinafter referred to as "Shanghai Electric Machinery") to the Fuping Station of the "West-to-East Gas Pipeline Project" successfully completed its testing with the witness of supervisors sent by the user. The excellent vibration data was recognized by the user. So far, this year, a total of 11 motors in the four gas transmission stations of Haiyuan, Lingtai, Shangluo and Fuping in the middle section of the third line of the West-to-East Gas Pipeline Project have completed the test, which is a major boost to the implementation of the strategy of western development by the Party Central Committee

These are all high speed and large capacity motors with high rotor processing precision, high manufacturing difficulty and complex structure. In order to "serve the national strategy, meet the national demand and realize high-quality development", Shanghai Electric Machinery rationally planned production and overcame many production bottlenecks, such as milling grooves in the rotor and embedding lines in the rotor, to ensure that each motor passes acceptance with high quality.

The middle section of the third line of the West-to-East Gas Pipeline Project is a national key energy infrastructure construction, which is another important channel for the transmission of natural gas resources from Central Asia and western China natural gas to the central and eastern regions of China. The completion of this

project will connect the already finished western and eastern sections of the third line of the West-to-East Gas Pipeline, effectively bridging western resources with the eastern natural gas market, mitigating gas shortage in central and eastern China. It will contribute to national energy security and enhance the natural gas supply capacity of Hubei and Henan provinces. Furthermore, this project will facilitate the circulation of domestic and foreign resource supplies, thereby improving the natural gas pipeline system in central and eastern China. It is also of great significance to the construction of a "five vertical and five horizontal" trunk gas pipeline, which aims to accelerate the development of a unified national gas network.



# Shanghai Electric Pioneers the Construction of the World's First 660 MW CAES Power Plant with Its Partner

n June 26, Shanghai Electric
Power Generation Group (Power
Generation Group) and China
Energy Digital Technology Group
Co., Ltd. (CEEC Digital Technology Group)
signed the R&D Cooperation Agreement
on the Core Equipment Technical Solution
for the 660 MW Compressed Air Energy
Storage System in Jinan. According to
the Agreement, Power Generation Group
will provide technical support for the core
equipment of the world's first 660 MW
compressed air energy storage power plant.

Guided by China's "dual carbon" goals (i.e. carbon peaking and carbon neutrality), Power Generation Group has recently made significant breakthroughs in compressed air energy storage. Thanks to its exceptional performance in technological research. innovation capabilities, and strong equipment manufacturing abilities, the group has mastered integrated equipment solutions for compressed air energy storage systems ranging from 10 MW to 660 MW. These solutions can meet the needs of various compressed air ESS projects, enhancing the overall operational efficiency of ESS by optimizing equipment parameters. The group provides customers with stable, reliable, and serialized turbine generators, drive motors, heat storage systems, and heat exchange systems.

Shanghai Electric Power Generation Group's subsidiaries, including Turbine Plant, Shanghai Generator Plant, Boiler Works, Electric Machinery, and Shanghai Power Station Auxiliary Equipment Plant, have collaboratively conducted comprehensive technical research and development for the



660 MW compressed air energy storage project. They have successfully developed efficient and safe air turbine generator sets that can handle ultra-high power and flow rates, accommodate rapid and frequent start-stop cycles, and are suitable for peak shaving. Their 10-200 MW TWS series synchronous motors feature more startstop cycles, high reliability, maintenancefree operation, high efficiency, and long lifespan. Given the project's large scale and high parameter requirements, Shanghai Electric has pushed the boundaries of heat storage and exchange systems, and planned various optimization measures. Currently, verification and selection work is underway to further reduce the unit cost of the heat storage and exchange system and promote rapid industry development through scale economies. D

SHANGHAI





World's Largest Single Capacity Voltage-Source Water-Cooled Inverter Rolls off the Production Line at Shanghai Electric

n July 5, on the occasion of the 10th anniversary of Shanghai Electric Fuji Electric Power Technology Co., Ltd. (hereinafter referred to as "Shanghai Electric Fuji"), the world's largest single capacity (10KV 50MVA) voltage-source water-cooled inverter successfully rolled off the production line and a product launch ceremony was held. Shiro Kondo, Representative Director and President of Fuji Electric, Jin Xiaolong, Party Committee Member and Vice President of Shanghai Electric, and other executives attended the event and witnessed this milestone. The development of this product took 15 months, during which the R&D team overcame multiple technical challenges. built a high-power electric drive integrated technology platform, and launched the innovative water-cooled inverter and electric drive system solution featuring high frequency, high efficiency, high reliability,

high performance, intelligence and integration. This inverter adopts a multilevel voltage source unit series connection. The internal power unit adopts modular design, which consists of rectifier module, capacitor module and inverter module, and the modules are electrically connected by stacked busbar. With a multi-pipe parallel design for heat dissipation, the maximum capacity of a single unit can reach 50 MVA (under the condition of 10 kV voltage). The world's largest single capacity (10KV 50MVA) voltage-source water-cooled inverter has two unique benefits. First, its excellent energy-saving performance minimizes full-cycle investment costs, thus bringing great economic value. Second. it strongly supports the realization of the "dual carbon" goal and promotes the localization of key ultra-high power equipment in the fields of new energy air storage, chemicals, gas-to-electricity conversion and water conservancy, which have significant social value. This innovative achievement is not only a major milestone in the research. development and expansion of the product line, but also a strong demonstration of the company's leading position in the field of inverters in China.

As a model of outstanding cooperation between Shanghai Electric and Fuji Electric. Shanghai Electric Fuji is committed to the continuous development of inverters, helping Shanghai Electric strengthen an industrial drive system of "motor + inverter + control". It also invests in new energy PCS, helping Shanghai Electric build a "battery+" new energy storage system. With the profound brand heritage, great technical strength and strong market influence of the two parent companies. Shanghai Electric Fuii will continue to pursue excellence. innovation and breakthroughs, and provide high-quality, high-performance power transmission products and system engineering solutions to customers around the world.



n July 9, Shanghai Electric New Energy Promotion Conference 2024, themed on "Green Energy for a Smarter Future", and the launching ceremony of the first heterojunction cell of Shanghai Hency Solar Technology Co., Ltd. were held simultaneously in Shanghai and Nantong. The conference was organized by Shanghai Electric Power Generation Group and co-organized by Shanghai Electric Wind Power Group. More than 300 industry leaders, technical experts and partners from across the country witnessed the launch of Shanghai Hency Solar Technology Co., Ltd.'s first heterojunction battery cell, shared innovative practices in the fields of wind, solar, storage and hydrogen, and explored the new trends and opportunities in the energy industry to achieve carbon neutrality. Yang Hong, Vice President of Shanghai Electric, attended the event and delivered a speech.

In her speech, Yang Hong said that Shanghai Electric has always been committed to providing energy customers with safe, reliable, energy-saving and environmental-friendly energy products. In recent years, Shanghai Electric, together with partners in the energy field, has been actively exploring the new energy industry, and has successfully created a series of solutions for wind, solar, storage and hydrogen and integrated solutions for energy generation, grid, load, and storage. As a leader in achieving the "dual carbon" goal and manufacturing new energy equipment, Shanghai Electric is an innovator and promoter of emerging industries.

Concurrently, the launching ceremony of the first heterojunction cell of Shanghai Hency Solar Technology Co., Ltd. was held in Nantong. The first industry-leading heterojunction cell, using N-type

thin silicon wafers, adopts industry-leading uniform micro-textured process, double-sided nanocrystalline process, high relocation and high-transparency TCO (transparent conductive oxide) technology, narrow grid line printing technology, SMBB (Super Multi-Busbar) and other technologies to increase the surface current density of the battery and light trapping performance, helping the battery achieve higher photoelectric conversion efficiency. The first heterojunction cell shows that Shanghai Electric has independently mastered the core technology of heterojunction and taken a solid step forward in the field of photovoltaic cells.

At the conference, Shanghai Electric promoted new energy solutions for wind energy, energy storage, hydrogen energy, CSP and other fields. Specifically, Shanghai Electric's subsidiaries signed cooperation agreements with a number of industrial customers and partners to jointly promote the development of new energy.

In the model display area, Shanghai Electric comprehensively showcased its key new energy equipment and solutions for desert, gobi and wilderness, offshore energy base, zero carbon industrial parks and other major application scenarios, demonstrating its technical strength and innovation capability in high-end energy equipment manufacturing and system integration.

The wind, solar, storage and hydrogen session attracted many industry experts and partners, who provided very constructive and relevant insights for Shanghai Electric's energy transformation. Going forward, Shanghai Electric will work with industry partners to develop the new energy field, promote new quality productive forces and low-carbon energy transformation, enhance energy security, and contribute to China's modernization. 2



# SHANGHAI ELECTRIC "GREEN" ENERGY FORA "NEW" LIFE

y the end of 2023, the installed capacity of wind power and photovoltaic power increased 10 times compared with a decade ago, while the new clean energy power accounted for more than half of the increased electricity consumption of the whole society. In a decade, primary energy production capacity increased by 35%, and fixed asset investment reached about 39 trillion yuan.....

Since the 18th CPC National Congress, China has seen a surge in green energy, as evidenced by the white paper "China's Energy Transition" released by the State Council Information Office on August 29. Clean energy is taking a leap forward in development, and related industries have become a new pillar for upgrading the industrial system, giving new impetus to China's high-quality economic and social development.

Given the size of this thriving new energy market, how should companies adapt to the fierce competition? What principles should be followed in the transition process? How to align with the dual-carbon goal, realize the zero-carbon concept, and promote the development of a low-carbon economy?

As an industry pioneer, Shanghai Electric has a comprehensive plan in wind power, photovoltaic, energy storage, hydrogen energy and other fields, and accounts for more than 30% of China's offshore wind power installed capacity. Although the new energy field faces great challenges in the short term, but in the long run, the global new energy market still shows a trend of rapid development. It is worth noting that with the rapid green and low-carbon transformation of global energy, the fact that "technology is a resource" will be felt even more strongly. Over the past decade, Shanghai Electric has invested heavily in green energy technology, and technological innovation is becoming a new engine for Shanghai Electric to maintain competitiveness through cycles.





# GLAD TIDINGS SHANGHAI ELECTRIC MADE NUMEROUS INNOVATIONS IN THE FIELD OF NEW ENERGY

n 2024, many parts of the world experience frequent high temperatures, heavy rainfall, floods, droughts, and other extreme weather and climate events. The World Meteorological Organization (WMO) recently stated that extreme weather and climate events have become the new normal, and that climate change, induced by greenhouse gas emissions, is the primary cause. According to temperature monitoring data from several organizations around the world, the average global temperature has risen by more than 1.6 degrees Celsius in the 12 months from July 2023 to June 2024.

With the frequent occurrence of extreme weather events around the world, the recent "Resolution of the CPC Central Committee on Further Deepening Reform Comprehensively to Promote China's Modernization" was put forward to synergistically promote carbon reduction, pollution reduction, greening and growth, and actively respond to climate change. It is necessary to build a carbon emission statistics and accounting system, product carbon label certification system, product carbon footprint management system, improve the carbon market trading system. greenhouse gas voluntary emission reduction trading system, and actively and steadily promote Carbon Peak and Carbon Neutrality.

The "dual carbon" goal has created an industry consensus to build a new power

system with new energy as its primary source. Progress and innovation in new energy technology have attracted much attention.

"As the cradle of China's machinery industry, Shanghai Electric has always been committed to providing energy customers with safe and reliable, energy-saving, lowcarbon, and eco-friendly technologically advanced products. In the field of largecapacity, high-parameter power generation, it has successfully built many benchmark demonstration projects, leading the power industry to continuously achieve leapfrog development and breakthrough progress, laying a solid foundation for efficient, safe and reliable power supply." Yang Hong, Vice President of Shanghai Electric, stated at Shanghai Electric's New Energy Promotion Conference 2024 themed on "Green Energy for a Smarter Future"

In the future, the "dual carbon" strategy will continue to guide the direction of sustainable development in China and the

## MANAGEMENT SYSTEM OF CARBON EMISSION

According to the recently released "Progress Report of China's National Carbon Market (2024)", the low-carbon awareness is taking shape. The carbon market is playing an increasingly important role in controlling greenhouse gas emissions and promoting energy restructuring. In 2023, the national thermal power carbon emission intensity (carbon dioxide emissions per unit of thermal power generation) decreased by 2.38% compared to 2018, and the electric power carbon emission intensity (carbon dioxide emissions per unit of electric power generation) decreased by 8.78% compared to 2018

The new energy industry has great development potential as an important support for realizing the strategic adjustment of energy structure and promoting high-quality development. In recent years, the development of new energy has been in full swing, and the application scenarios have accelerated the iteration of new energy technology. At



this critical juncture of new energy, only technological innovation can lead the future.

On July 9, Shanghai Electric New Energy Promotion Conference 2024, themed on "Green Energy for a Smarter Future", and the launching ceremony of the first heterojunction cell of Shanghai Hency Solar Technology Co., Ltd. were held simultaneously in Shanghai and Nantong. Shanghai Electric promoted new energy solutions for wind energy, energy storage, hydrogen energy, CSP and other fields. More than 300 industry leaders, technical experts and partners from across the country witnessed the launch of Shanghai Hency Solar Technology Co., Ltd.'s first heterojunction battery cell, shared innovative practices in the fields of wind, solar, storage and hydrogen, and explored the new trends and opportunities

in the energy industry to achieve carbon neutrality. Shanghai Electric's subsidiaries signed cooperation agreements with a number of industrial customers and partners to jointly promote the development of new energy, empowering industrial growth, and creating a better future.

Yang Hong said that in recent years, Shanghai Electric, guided by the market and customer needs, driven by scientific and technological innovation, relying on new quality productive forces, with a focus on "wind, solar, storage and hydrogen" and other emerging energy equipment, together with partners in the energy field, has actively explored the new energy industry, and has successfully created a series of solutions for complementary wind, solar, storage and hydrogen, and integrated solutions for source, grid, load and



storage. It has found the way of efficient, flexible, green, intelligent and high-quality development.

Since the commencement of the "14th Five-Year Plan" period, Shanghai Electric has been building a new type of power system, taking the responsibility of serving the national energy strategy and promoting the high-quality development of the industry. It will promote new quality productive forces and low-carbon energy transformation, enhance energy security, and contribute to China's modernization.

As a leader in achieving the "dual carbon" goal and manufacturing new energy equipment, Shanghai Electric is an innovator and promoter of emerging industries. Shanghai Electric's key new energy solutions for desert, gobi and wilderness, offshore energy base, zerocarbon industrial parks and other major application scenarios will meet your energy needs and provide you with a Management System of Carbon Emission.

#### HARNESSING WIND AND HYDROGEN

Recently, the Nihon Keizai Shimbun reported that in 2023, China topped the list of wind turbine patents for the first time. In addition, Shanghai Electric Wind Power Group has built a sustainable industrial ecosystem and officially put into operation the world's largest wind power test platform, ensuring that Asia's first service operation vessel (SOV) for offshore wind power to successfully complete the first wind farm effective trial voyage. It also participated in the launch of the world's first floating wind power-fishery fusion project, "Guoneng Sharing", with highly reliable products and services to promote the formation and upgrading of the new quality productive forces of China's wind power.

Keywords for the new offshore wind power: farther, bigger, cheaper. The approaches of Shanghai Electric Wind Power mainly include exploring ways to reduce the cost of development and construction in the deep and distant sea,





analyzing the characteristics of the new "desert, gobi and wilderness" projects, and formulating special solutions. It has the full coverage of sea and land products and platforms. With a total deep-sea and far-sea solution, the "Poseidon" platform promotes the deployment of large turbines, and a flexible low-frequency schedule helps extend operations from offshore to deep sea and far sea. At the same time, the SOV ensures the deep-sea and far-sea operation and maintenance.

Shanghai Electric Wind Power researched the grid forming-type wind turbine technology, established the joint simulation design and verification platform for simulated grid large systems, and demonstrated and tested key technical points. The world's largest 10 MW gridforming wind turbine rolls off production line in Dongtai in 2024.

From offshore to onshore, from plains to plateaus, Shanghai Electric Wind Power Group provides products that boast competitiveness in technology, quality and price, benefiting more regions with efficient green power resources.

In recent years. China has accelerated the innovation and development of wind power, reaching an internationally leading level. The industrial chain has been basically localized, forming a complete industrial system from equipment manufacturing, development and construction to operation and maintenance. "In the field of wind power, Shanghai Electric has a rich heritage. Its new installed capacity of offshore wind power from 2015 to 2022 ranked first in the country for eight consecutive years, and it has now developed the offshore wind turbine with the world's largest single capacity and the largest rotor diameter. We have mastered the key technologies of offshore wind power," remarked Yang Hong.

The "hydrogen economy" is also a critical link in the "dual carbon" transition. In the field of hydrogen energy, Shanghai Electric has a solid foundation in core equipment across the "production-storageprocessing-use" link and integrated hydrogen energy system solutions, to promote the use of renewable energy and raw materials for large-scale energy development, and has successfully achieved breakthroughs in green chemistry, hydrogen metallurgy, hydrogen transportation, hydrogen storage and other applications, said Yang Hong. On March 30, the first phase of Taonan wind power plant in Jilin with a capacity of 50,000 tons, coupled with biomass green methanol integration demonstration project, was officially launched, realizing the first industrial application of related technologies and equipment at home and abroad.

At present, Shanghai Electric has achieved breakthroughs in green chemistry, hydrogen metallurgy, hydrogen transportation, hydrogen storage and other applications. In the field of transportation, it promotes stationtype/skid-mounted hydrogen refueling stations and demonstrates an "integrated hydrogen energy production, storage and refueling station". In the field of energychemical integration, there is Baofeng Energy's "Green Hydrogen +" coal-toolefin project in Inner Mongolia. In the field of thermal power and hydrogen cooling, generator cooling, thermal power equipment and PEM hydrogen production provide a complete range of solutions for customers. In green industrial parks, it is constructing a new energy ecology of "source-grid-load-storage-hydrogen" and creating a comprehensive intelligent energy demonstration of "wind-solar-storagecharging-hydrogen".

#### **SOLAR AND STORAGE**

In the field of concentrated solar power, Shanghai Electric has the world's leading technology and the world's largest single project - Dubai 950 MW CSP + PV hybrid power generation project, which has been successfully put into operation using 100% renewable energy for 24 hours continuous and stable power generation, Yang Hong introduced.

Shanghai Electric is equipped with a complete set of solar and molten salt thermal storage solutions, including solar concentration, heat collection, heat storage and exchange, power generation, and has accumulated rich project experience. Shanghai Electric participates in many CSP projects and PV projects at home and abroad, and provides customers with a package of engineering solutions through general contracting, core technology support, project operation and maintenance guarantee and other methods. Haimen Power Plant is expected to procure no less than 8 sets of equipment from Shanghai Electric. After the project is put into operation, it will be mainly used for power system peak regulation, thermal power flexibility transformation, and distributed energy integration, etc., which is of great significance for building a new type of power system and realizing the carbon neutral goal.

In the PV field, Shanghai Electric has carried out in-depth research and development. In April, heterojunction components rolled out of the production line, and today, the first heterojunction battery also successfully rolled out of the production line, marking Shanghai Electric's full mastery of high-efficiency N-type heterojunction battery core technology and mass production capacity, and opening a new era for Shanghai Electric's full-scale entry into the photovoltaic industry, Yang Hong stated.

In the field of energy storage, Yang Hong pointed out that we give full play to the synergistic development in nine multienergy storage areas, including compressed

air, redox flow battery, lithium batteries, flywheel energy storage, thermal storage and other areas, from the second level. hourly level to daily and seasonal level. As a leader in the field of compressed air energy storage, we signed the research and development cooperation agreement for the world's first 660 MW compressed air energy storage power plant core equipment technology program. Through capital empowerment, with the A round financing of 400 million yuan, we accelerated the planning of the key supply chain, promoted the development of vanadium-iron, all-iron energy storage system products, and stood out in the field of long-term energy storage.

It is worth mentioning that Shanghai Electric, relying on industry-leading alkaline electrolytic water hydrogen production and PEM electrolytic water hydrogen production core products, is committed to providing customers with integrated "productionstorage-processing-use" system solutions. Among them, the highly efficient, flexible and modular PEM electrolyzer and systems are suitable for distributed and flexible hydrogen production scenarios. For centralized and continuous hydrogen production scenarios, highly efficient, low-cost, modularized alkaline electrolyzers and systems are more appropriate.

In terms of redox flow battery technology, with more than ten years of deep engagement in vanadium redox flow technology, Shanghai Electric can design and manufacture a series of electric stacks. electrolytes and modularized systems. At present, Shanghai Electric has delivered more than 50 KW-MW class energy storage projects, covering a variety of application scenarios. These projects have not only serviced domestic markets but also exported to regions such as Europe, Japan, and Australia. In terms of overseas expansion, starting from key regions and standardized products, we are collaborating with internal and external partners, gradually moving from demonstration projects to large-scale deployment.

For our intelligent lithium energy storage system solutions, for example, the Nantong production base is designed to



for lithium-ion battery energy storage systems in the region, specializing in R&D, testing, production and integration. The performance includes power supply side, grid side, user side and other areas, such as the 60MW/180MWh Energy Storage Project of the Xinjiang Production and Construction Corps (XPCC), the 100MW/200MWh Grid-side Energy Storage Demonstration Project in Jinzhai County, Anhui Province, and the 3MW/12MWh Minhang Smart Energy Demonstration Project. In addition, there are other industrial and commercial energy storage projects, including Kunshan Intelligent Low Carbon New Energy Microgrid Project and Tibet Solar Storage

Shanghai Electric has pioneered a new path in compressed air energy storage and developed air storage equipment products with the world's largest power at the international level. Innovative expansion turbine generator sets, electric motors and heat exchange systems, etc. with ultrahigh power and large flow rate are suitable for diverse application scenarios and various types of optimized structure with fast, frequent start-stop and deep peak regulation to provide a variety of reliable and effective solutions for the fixed pressure system.

Microgrid Project.

# ZERO-CARBON TECHNOLOGY WILL BE APPLIED FOR THE FIRST TIME

The ocean is a treasure trove of resources and strategic space for future development. In recent years, the development of the ocean has gradually become a new trend in the industry. The 20th National Congress of the Communist Party of China (CPC) made "developing the marine economy, protecting marine ecosystems and building a strong marine country" a national strategy.

Shanghai Electric Group State Owned Huanqiu Engineering Co., Ltd. (hereinafter referred to as "Huanqiu Engineering") has recently won the bidding for the green methanol plant EPC project of Yantai Ocean Energy Island Phase I Pilot Demonstration Project of CIMC Raffles Offshore Engineering Pte Ltd (hereinafter referred to as "CIMC Raffles"). This will be the first application of Shanghai Electric's CO<sub>2</sub>-rich syngas methanol synthesis technology on an offshore energy island.

The project is a modification of an offshore platform of CIMC Raffles, which is

fixed in the sea far away from the coastline and integrates a photovoltaic power generation system, a green hydrogen generation facility, a green ammonia synthesis equipment and a green methanol synthesis plant, aiming to build an efficient offshore energy conversion and storage center.

Among them, the green methanol synthesis plant adopts Shanghai Electric's CO<sub>2</sub>-rich syngas methanol synthesis technology, which achieves a high degree of integration and efficient energy conversion rate through modular design and skid-mounted delivery. CO2-rich syngas synthesized methanol technology is a new type of green and low-carbon technology developed in response to the national "dual-carbon" goal, which can efficiently convert feedstock gases containing varying concentrations of CO2 into green methanol, and it is an important technology in the field of Power to X. The application of this technology opens up a new way for the realization of offshore clean energy production and utilization, and marks a solid step in the expansion of Shanghai Electric's high-end marine equipment business.

The offshore energy island is mainly used to connect offshore photovoltaic units, which not only can effectively utilize the rich wind energy resources of the sea, but also has the functions of power generation, energy storage, hydrogen production and green fuel production. With the energy island as the core, a network of more offshore wind power generators can be established, further promoting the development and utilization of far-sea wind power and giving impetus to the green development of China's marine economy.

## SHANGHAI ELECTRIC'S FUTURE NEW ENERGY R&D

With the deep integration of a new generation of information technology and traditional manufacturing industry, the level of digitalization and intelligence of China's manufacturing industry is constantly improving, and new technologies continue to emerge, giving rise to new industries and new products.

Shanghai Electric has introduced the "1+2+N" products in the PV industry, i.e. one type of high-efficiency N-type heterojunction cell, two types of highefficiency N-type modules (heterojunction and TOPCon), and a variety of functionspecific application modules (e.g. fullscreen anti-dust modules, smart modules, etc.), to meet the market needs. The first heterojunction cell uses N-type thin silicon wafers and incorporates a number of industry-leading technologies, positioning it at the forefront of the industry. Modules encapsulated with Shanghai Electric's proprietary 210R heterojunction cells are expected to achieve mass production of mainstream power of 625 W-630 W by the end of 2024, with a low carbon footprint of 366 g CO2eq/W, which will bring better economic and carbon value to customers. The first heterojunction cell shows that Shanghai Electric has independently mastered the core technology of heterojunction and taken a solid step forward in the field of photovoltaic cells. This completes Shanghai Electric's zero-carbon "PV+" full-scenario solution. With strong technical strength and manufacturing capacity in high-end energy equipment manufacturing and system integration, Shanghai Electric provides customized package solutions and value-added services



for different types of customers, and helps develop the application scenarios of PV module products.

Shanghai Electric is delving deeper into the field of new energy, accelerating the formation of new quality productive forces, and transforming the industry into a highend, intelligent, green future.

In addition, with the rapid development of new energy and the challenges of safely connecting to the grid, a new type of synchronous condenser as a grid "stabilizer" is very promising. Shanghai Electric's integrated complete sets of technical capabilities can provide users with customized system solutions. The first closed air and water cooling system in China has strong environmental adaptability.

Synchronous condenser + flywheel exhibits high inertia and fast response time. Highly modular and integrated design offers great flexibility in deployment. Intelligent O&M solution integrates digital technologies, facilitating smart operation and maintenance. Customized life-cycle services ensure tailored support. Currently, it has the largest domestic market share with the highest export performance.

Flywheel energy storage has high power density, numerous charge/discharge times, low environmental requirements, and no pollution. It is one of the most promising new high-power, short-duration energy storage technologies. In the field of pulse power supply, grid frequency regulation, high quality uninterruptible power supply, energy recycling, etc., there are great application prospects.

The integration of digital technology and the real economy is accelerating at a rapid pace, while artificial intelligence, big data and other new-generation information technologies are leaving an all-round impact on the traditional manufacturing industry. The new smart manufacturing technology will greatly enhance production efficiency, help enterprises improve quality, reduce costs and increase efficiency, and promote the strength and core competitiveness of the manufacturing industry.

"Manufacturing is the foundation of the modern industrial system. We should further accelerate digital transformation, promote advanced and applicable technologies, and strengthen high-end, intelligent and green development." According to industry experts, to make good use of the innovative elements, we should promote the application of big data, cloud platform, artificial intelligence, Internet of Things and other technologies, to lay a solid technological foundation of new industrialization, and promote the high-quality development of the manufacturing industry.





AN ENERGY INDUSTRY
"ENCYCLOPEDIA",
HONED THROUGH
FRONTLINE PRODUCT
DEVELOPMENT

WINNER OF SHANGHAI MUNICIPAL MAY 1ST LABOR MEDAL FROM SHANGHAI ELECTRIC POWER GENERATION EQUIPMENT CO., LTD. TURBINE PLANT

WU SHIFANG ocated on the southwest border of China, Dazhou City in Sichuan Province is known as the hometown of Ba Ethnicity and the natural gas capital of China. The main character of our story, Wu Shifang, was born here. Since childhood, she dreamed of leaving Sichuan and contributing to the country. Two decades ago, as a fresh university graduate, she came to Shanghai, the place where her dream began.

In Shanghai Electric Power Generation Equipment Co., Ltd. Turbine Plant (hereinafter referred to as "Shanghai Electric Turbine Plant"), Wu Shifang has been a frontline product developer for twenty years, and has made outstanding contributions to the construction of stable conventional power and the development of key equipment for new power systems.

In the field of high-efficiency thermal power generation, to drive the innovation of Shanghai's power equipment industry and meet the strategic needs of China's power industry for sustainable development, she has led teams to develop a series of the first high-efficiency, high-parameter steam turbines in China and participated in the construction of many benchmark projects in the power industry. In the field of compressed air energy storage, which is the key of the new power system, Wu, as the leader, has developed a series of air energy storage turbine equipment, which promotes the innovation-driven transformation and development of Shanghai's electric power equipment industry, and lays a solid foundation for China's construction of a new power system. The products developed by her, which have applied for 23 patents (16 have been granted), have won 7 China Machinery Industry Science and Technology Progress Awards, 3 Shanghai Science and Technology Awards, In May, 2024, she won the Shanghai Municipal May 1st Labor Medal.

#### PROFOUND KNOWLEDGE AND EXPERTISE

"As a fresh graduate, I did not know much about the industry. My mentor was very responsible and the working atmosphere in the department was great, so I was able to make progress. My mentor was truly conscientious, relentlessly pointing out our mistakes to help us develop the necessary qualities and skills of a designer. Although some of my less resilient colleagues were often in tears after being scolded by the mentor, years later, every one of us deeply appreciates her strictness." Wu Shifang said.

Back then, Wu Shifang was as confused as today's fresh graduates. She was apprehensive about her drawings being directly utilized in production and didn't have a clear plan for her future career. Wu Shifang's mentor, Cui Yuhuan, is known for her strictness. Her words are still fresh in Wu Shifang's mind: You must know why an element is embodied in the drawings. This is firmly engraved in Wu Shifang's mind, "knowing what it is and why it is" has become the guideline of her work for the past 20 years.

As the saying goes, a strict teacher produces outstanding students. Under the high standard and strict requirements of her mentor, Wu Shifang soon became an engineer who could undertake the tasks alone. In only six months, she became the

project leader of 300 MW steam turbine. In addition to learning the fundamentals of the turbine, she worked tirelessly in her spare time to learn about heat, system and control. The table behind Wu Shifang was always full of drawings and materials borrowed from the archive room, and colleagues around her would ask her jokingly, "Are you going to move the archive room here?"

Highly involved in the product line, after two and a half years of work, she was appointed lead designer of the body structure of the first set of independently designed 660 MW ultra-supercritical steam turbines. "I have the full confidence of the leadership, which put a lot of pressure on me. But the leadership was under even greater pressure. After the







successful commissioning of the first independently designed ultrasupercritical steam turbine, it won the first prize of China Machinery Industry Science and Technology Progress Award 2011, and I was ranked third in the name of the person who built it, and several people behind me were actually my leaders. I felt a great sense of accomplishment when the product I designed was successfully put into operation and won the provincial and ministerial awards. "Wu Shifang said proudly. After the successful development of the turbine, Shanghai Electric Turbine Plant started to design and develop a series of high-efficiency and high-parameter ultra-supercritical steam turbines, and each of which won provincial and ministerial awards, and the ultra-supercritical steam turbine has since become Shanghai Electric Turbine Plant's ace product.

In addition to successfully developing products, Wu Shifang has also upgraded her academic qualifications. She received a master's degree in engineering from Shanghai Jiao Tong University in 2008 and a Ph.D. from Shanghai Jiao Tong University in 2013. She studied in the midst of her busy work and has now successfully completed the doctoral program. The work experience inspired her thirst for professional theoretical knowledge, which in turn enhanced her work skills.

### STRONGER INDUSTRY THROUGH INNOVATION

Under the guidance of the national "dual carbon" policy, the renovation and efficiency improvement of steam turbines has become an important trend for the entire industry. When the Daihai Phase I renovation project was just getting started, Wu Shifang's team realized it was a tough nut to crack: How to design the flow path to significantly increase efficiency? How to design the high and medium pressure modules when the inlet steam temperature rises to 596? How to design the low-pressure module if the wet cooling is changed to air cooling? How to ensure the overspeed performance of the turbine when the inlet steam pipe is long and the temperature has increased? Does the retrofit program match the original steam turbine foundation? How to implement the one-button start/stop function? These are the problems they need to solve.

In order to crack this tough nut, the team discussed various issues such as overall structural scheme, thermal flow path scheme, module scheme, detail scheme, etc. Under Wu Shifang's leadership, the team came up with a new plan in just two weeks, which was approved by the design institute and the owner unit. For specific products, Wu Shifang led the team to design a new shaft system, a new expansion system, the first canceled oblique stationary blade and other innovative programs, which were successfully integrated into the products. Hard work pays off. The turbine was successfully commissioned, making it the first 600 MW steam turbine project in China to switch from wet to air cooling and upgrade the parameters of a sub-critical turbine. This technological breakthrough also facilitated the successful implementation of subsequent upgrade projects at Taishan and other locations. This product also won the second prize of the China Industrial Science and Technology Progress Award 2021.

"There are two employees in Daihai Power Plant who happened to be my university classmates, so when I was given the task, I thought I must develop a product that satisfies the client and I must impress my classmates with our steam turbine products. The design of this turbine was very innovative, and our designers were still worried about whether it could be successfully started at one go, and we were fully prepared to provide on-site support. However, to our delight, before we even embarked on our journey, we received good news from the owner that the turbine had been successfully started up and brought on load. The successful implementation of a project is inseparable from the shared innovation and good cooperation between the owner unit and the design institute." Wu Shifang recalled the special memory.

National electric power "14th Five-Year Plan" development plan clearly states that China will build a clean, low-carbon, safe and efficient energy system, and strive

to build a new energy power system. As the country's wind power, photovoltaic power and other new energy installed capacity continues to grow, the importance of energy storage has gradually come to the fore, while compressed air energy storage technology is considered to be the most promising. In order to accelerate the transformation of energy structure and vigorously promote the high-quality development of new energy, Shanghai Electric has actively developed compressed air energy storage. In May 2022, Wu Shifang was appointed as the team leader of the design and development of compressed air energy storage turbine.

Although both air energy storage turbine and steam turbine are both turbine equipment, the working medium, heat cycle method, and equipment operating conditions are fundamentally different from those of conventional steam turbine. In order to design and develop a competitive air energy storage turbine, Wu Shifang led the new team to understand the thermal system of compressed air energy storage and the operational requirements of air turbine from the basic T-S cycle, and carried out innovative air turbine scheme design. In September 2022, the new team participated in the bidding for the first air energy storage project in 2023 in Yingcheng.

"Although it was the first bidding in air energy storage turbines, we were very confident. However, we also had to admit, despite the reality that we are a strong player in the field of steam turbine, the owners were still taking a wait-and-see attitude as we haven't proved ourselves with product performance." Although the first bidding failed, Wu Shifang did not get discouraged. She led the team to continue to refine the technology, forming a series of 1 MW to 350 MW air turbine solutions. With pre-project cooperation with a number of design institutes, Wu Shifang's team won unanimous acclaim with its professionalism and responsiveness. Where there's a will, there's a way. Wu Shifang's team won the bidding of Dingxi 10 MW project in June 2023, Tai'an 350 MW project and Jiuquan 300 MW project in September 2023, and Guoxin Huai'an 2×300 MW project in January 2024.

### NURTURING AN EXTRAORDINARY TEAM

An enterprise is a living organism, and talents are the soul of it. The inheritance and development of traditional energy or the technological innovation in new fields both call for excellent products and services that can create value for customers, and high-quality products and services require the joint efforts of customers and employees. Wu Shifang said, "Although the compressed air technology team is small, we aim to develop products that represent the highest level of the factory."

Wu Shifang's team mainly consists of new employees, and she is a master in fully mobilizing their work enthusiasm. Working side by side with Wu Shifang, her apprentices or colleagues nearby, all have grown into the backbone of Shanghai Electric Turbine Plant. Wu Shifang sees the team members as partners, and with whom she seeks common growth. She passes on the rigor of her mentor. She inspires and motivates. She and her team share a sense of accomplishment through product design, which is extremely important for progress. During the interview with Wu Shifang, some colleagues kept interrupting to communicate specific technical details. In their exchanges, we can feel the team's vitality and the sense of achievement they derived from working on new product development.

"I joined the plant with Wu Shifang in the same year and we have been working hard together. Over the past 20 years, I have witnessed her growth. In Wu Shifang's view, product design and development transcend mere job duties; they represent a sense of responsibility and a mission. She always maintains the love and pursuit of technology, constantly exploring new areas. Her professional knowledge and unique insights have made her an 'encyclopedia' of the energy industry." Mei Haiyan of the nuclear power department of the power station said.

In this vast ocean of the energy industry, Wu Shifang is an outstanding front line worker. With her unwavering determination, exceptional intellect, and endless enthusiasm, she has become the navigator of the energy industry in the new era. 

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# **Shanghai Electric Built a Real Home for Talents**

fter I got my offer and decided to join Shanghai Mitsubishi Elevator Co., Ltd., I was worried about where to live for a long time. I have considered many options, including sharing accommodations and commercial-residential apartments, but safety, affordability, commuting times and other issues have been troubling me," said a new employee of Shanghai Mitsubishi Elevator. "As a newly hired employee, I found it economically challenging to rent an apartment. However, the Shanghai Electric 1638 Talent Apartment relieved my worries with a warm and clean environment, coupled with a competent management team that ensures timely response to any issues I may encounter. Moreover, the relationship between the tenants and staff in the apartment is very harmonious.

Youth are important for the development of the city, and a secure place to live is a necessity for their well-being. In recent years, Shanghai Electric Group has been practicing the concept of people's city and implementing the strategy of strengthening enterprises with talents. By focusing on

talent attraction, training, use and retaining, it has solved the difficulties of unaffordable housing and high rental costs faced by its young employees with the building of talent apartments and rental residences.

Along the Jiangchuan Road all the way to the west, through the Shanghai Electric Power Generation Equipment Co., Ltd. Turbine Plant, Shanghai Electric Machinery, Shanghai Generator Plant and Shanghai Mitsubishi Elevator, a block of neat white housing, engraved with "Shanghai Electric 1638 Talent Apartment", will pop into the eyes. Sitting in the north, the apartment has a glass door, a spacious hall, a simple and bright design style, and a warm tone, which together create a comfortable and livable atmosphere.

According to Li Jun, the project manager from the Engineering Department of the real estate company, phase I of the project covers two buildings and phase II will renovate three buildings. The project can provide more than 500 apartments, involving a renovation area of more than 10,000 square meters. 356 apartments have recently passed the acceptance, and are

ready for delivery.

It is understood that the Shanghai Electric 1638 Talent Apartment has a total of two phases. Located in the former Shanghai Heavy Machinery Plant's factory buildings and staff dormitory area, the project is funded by the Group and will upgrade five old buildings in total. The project will deliver more than 500 apartments. Currently, all 151 apartments of phase I have been rented out. Each apartment is equipped with an independent bathroom, and the common area is equipped with diversified service spaces such as a dining room and a laundry room. A total of 356 furnished apartments of phase II have also been ready to deliver. Each apartment has an area of about 23 square meters, not only exquisitely furnished, but also equipped with comfortable soft furnishings and common home appliances and furniture, ensuring move-in condition. In addition, the Talent Apartment also has a series of

living facilities, including shared kitchen, laundry, public living room, activity room, gym, basketball court, etc. The surrounding restaurants and shopping supermarkets also make life very convenient, and it's worth mentioning that it's only a 15-minute walk from the station of Railway Line 5, which makes the transportation extremely convenient and makes the commuting and life unhurried.

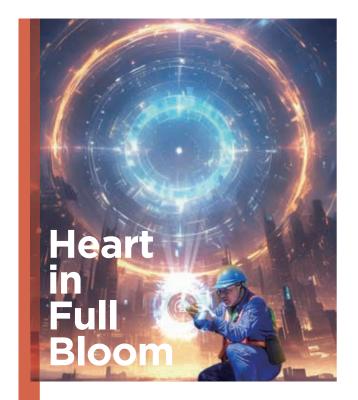
In 2018, the Group's Human Resources Department, Department of Industrial Development, Labor Union, Communist Youth League Committee, as well as relevant departments and enterprises such as real estate companies and electromechanical design institutes, jointly launched the Shanghai Electric Talent Apartment construction project. Before the launch of this project, sufficient preliminary preparations, including resource mapping, demand research, site survey, and planning and design, were made to ensure that the Talent Apartment project could truly meet the residential needs of young employees. The project is a positive response to the concerns of the employees, as well as an important initiative to implement the talent strategy and to enhance employee welfare.

"The biggest difference between the Talent Apartment and other apartments is that the tenants are all from the Group, and we all share the similar pace of life, thereby eliminating the usual neighborly troubles." About the Shanghai Electric 1638 Talent Apartment, an employee of the Shanghai Electric Machinery who has lived in here for 4 years praised its convenience and safety.

The Talent Apartment not only provides a place to live, but is also committed to creating a real home for employees. This consensus was reached by the relevant departments of the Group at the beginning of the project construction. In the future, the Group will continue to improve the rules for moving into the Talent Apartment to ensure that employees who meet the conditions can move in as soon as possible, so that they can live and work in peace and contentment at Shanghai Electric. It will serve as a real home for all our talents.







n a utilitarian society, people often prioritize gaining experience from life. In fact, it's important to recognize that the value of life extends beyond mere experience acquisition.

Every second of our life, all the things that happen to us, and all the emotions we experience, are all unique. Experience is used to guide our action. It is created through social practice, as the reflection of objective things and the beginning of understanding.

The acquisition of experience is certainly meaningful. All our industrial or agricultural production is accomplished by experience. Experience gives us an objective way of looking at things, but is also homogenizing us into machines. The white-collar and bluecollar workers of today do mechanized

labor based on experience, which deprives them of time and diversity of experience.

Life is short, but our experience can be very rich. We can decide this. We do seemingly meaningless things, which don't create value, in exchange for a moment of peace. We may gain no new knowledge in the process of toil, but we will cherish the memory of working hard.

Our experience has meaning in itself. It is about our past, present and future, and it will enrich our life. When Siddhartha traveled in the world, experiencing the love and hate, bitterness and joy of the world, what he gained was not the experience of life, but the fulfillment. The value of experience is not in the process. It can be the company of the family or a moment of coziness. Li Bai did not care about fame and money, and he gained the beautiful gift of the grand rivers and mountains. Maybe we will never be able to use our experience for reference, but isn't it unique enough already?

In today's society, people are becoming more and more accomplishment-oriented. They get too caught up in the swamp of utilitarianism and lose the chance for a more colorful experience. They overemphasize the importance of experience and turn it into a shackle. Zhuangzi travelled freely between heaven and earth. Oscar Wilde once said, "To regret one's own experiences is to arrest one's own development." We have engaged in too many repetitive tasks, and we have even incorporated this dangerous idea into our subconscious, which is what Elon Musk is worried about: As the human mind gets closer to the artificial intelligence, it will take experience as the only meaning.

The world is a big place and we have little time. We can't explore the whole universe in our life time, but we can never stop loving life, as our hearts are always in full bloom.



# SHANGHAI ELECTRIC CREATE OUR FUTURE TOCETHER

