

# SHANGHAI ELECTRIC

上海电气

NEWS

Shanghai Electric New Energy  
Company Established

INTERVIEWS

**LI YUNLONG**  
A Grinding Master of Shanghai

COVER  
TOPICS

## Realize Zero-Carbon Future with Smart Technologies



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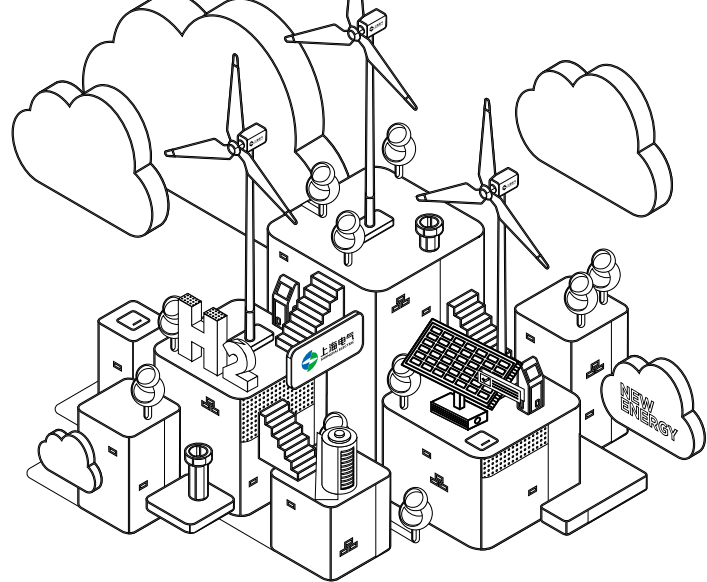
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Shanghai Electric



## TOGETHER WE FORGE AHEAD, STEADILY AND SUSTAINABLY

**A**s early as a decade ago, Wang Chuanfu, whose BYD reigns as king of China's nascent electric vehicle market, laid out the company's three green visions: solar power plants, energy storage plants and electric vehicles.

Another industry leader, Huang Shilin, former vice chairman of Contemporary Amperex Technology, also predicted that the future market size of energy storage may surpass that of power batteries with output value that can be measured in trillions.

As the foundation and source of power for economic and social development, energy is vital to the prosperity and development of a country, the improvement of people's living conditions and the long-term peace and stability of society. With a bright vision in mind, we have initiated the construction of a new power system based on new energy sources. In recent years, China's new energy development—wind power and photovoltaic power in particular—has achieved remarkable success. We rank first in the world in terms of installed capacity, steadily increasing its share of power generation and rapidly reducing the cost. Efforts of energy restructuring and carbon reduction are gradually showing results.

There is no doubt that new energy is a new driving force for the progress of human society as well as the development of the world. How does Shanghai Electric promote energy restructuring and increase its footprint in the new energy industry as a traditional manufacturing company? On July 15, we announced the establishment of Shanghai Electric New Energy Development Co., Ltd., releasing the new energy development strategy of Shanghai Electric. We signed agreements with five partners for new energy projects and developed strategic partnerships with more than ten financial institutions and organizations for industrial cooperation in which we work together on the financial ecosystem of the new energy industry.

It is my sincere hope that we can enhance our mutual understanding and commit to creating value together in the future. With open innovation and win-win cooperation in mind, Shanghai Electric will maintain close ties with the government to improve the quality and efficiency of the industry, build more “zero-carbon” applications and accelerate the building of a “zero-carbon” society; we will work closely with capital to increase the efficiency of resource allocation and use and set an example of green finance and industrial development; we will further our collaboration with clients to build more competitive integrated equipment and create value, driven by innovative technology.

As we continue to build a new power system based on new energy sources, we will boost the development of China's renewable energy industry in terms of both quality and quantity, thanks to which the power system will push the energy industry to work towards the goal of carbon peak and carbon neutrality with resolute determination, steadily and sustainably.

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# ELECTRIC NEWS



BRIEF NEWS

## Shanghai Electric's Innovations Rated "2022 Energy Storage Technology Innovations Award – Ten (10) winners"

In the 6th Energy Storage Innovation Competition held days ago, the technology center of Shanghai Electric Power Transmission & Distribution Group was awarded the "2022 Energy Storage Technology Innovations Award – Ten (10) Winners" under the technology innovation category for its research "Application of Grid-forming Energy Storage Control Technologies in New Energy Power Plant's Black Start". The research includes the technology center's self-invented energy storage converter and energy storage system solution for new energy power plants, which builds a grid-forming energy storage control system through a module-based design and multiple advanced control technologies. It can be used by the low-power energy storage system to conduct a "black start" for a high-power wind turbine (filed) with a couple of successful applications: "black start" of an 8MW full-power offshore wind turbine by a 1MW grid-forming energy storage system (the Shanghai Electric Smart Energy Demonstration Project in Shantou), and that of a 4MW onshore doubly-fed wind turbine by a 300kW grid-forming energy storage system (multifunctional mobile and self-organized grid forming energy storage system).

## Shanghai Electric's Subsidiaries and Employees Awarded by China Machinery, Metallurgy and Building Materials Workers Technical Association

Recently, China Machinery, Metallurgy and Building Materials Workers Technical Association announced the lists of "Outstanding Departments for Labor Union's Economic and Technical Work" and "Outstanding Technicians". Committees of labor unions of Shanghai Electric Wind Power Group Co., Ltd. and Shanghai Turbine Works Co., Ltd. were awarded "Outstanding Departments for Labor Union's Economic and Technical Work", and four individuals "Outstanding Technicians" are Yuan Yalan (Engineer-in-Charge of Shanghai Electric Nuclear Power Equipment Co., Ltd.), Jin Luxiong (Senior Technician and Project Manager of Shanghai Mitsubishi Elevator Co., Ltd.), Wu Jiamei (Senior Engineer of Shanghai Electric Automation D&R Institute Co., Ltd.) and Li Yunfeng (Technical Director of Shanghai Micro Electronics Equipment (Group) Co., Ltd.\*).



## Shanghai Electric's Technical Team Invited to Attend Hearing at Italian Senate on Renewable Energy

At the invitation of the Italian Senate, technical professionals of Shanghai Electric Power Generation Engineering Co., Ltd. attended a hearing on renewable energy development at Palazzo Giustiniani, Rome. Alongside Roberto Cingolani, Italy's Minister for Ecological Transition, and Gianni Grotto, Chair of the Industry Committee of the Italian Senate, Shanghai Electric participated together with the other 6 companies as the only foreign company based outside Europe. At the hearing, Shanghai Electric's representative briefed on the successes and strengths of Shanghai Electric in the global EPC market and the CSP project and the PV unit for Phase V of the Mohammed bin Rashid Al Maktoum Solar Park in Dubai, which was highly acknowledged and enhanced Shanghai Electric's profile in Italian government bodies and main players in this regard.





### Shanghai Electric Blowers Works Awarded Indonesian Order

In the last few weeks, Shanghai Electric Blowers Works Co., Ltd. (hereinafter referred to as "Shanghai Electric Blowers Works") won the bidding for the order for 3 wind turbines in the 7×380MW power plant project in Obi, Indonesia. A nickel project, playing a supporting role to the power plant, will be launched in the western Obi Islands, North Maluku Province, which is an important program under the "Belt and Road" Initiative and co-invested by Lygend Resources & Technology Co., Ltd. based at Ningbo City, Zhejiang Province, China, and Harita Group, to set up a "Chinese model" for the global nickel-cobalt industry. By winning its first overseas bidding in 2022, Shanghai Electric Blowers Works demonstrates its strength as a leading player in China's blowers industry.

### Shanghai Electric Wind Power Group Held No.1 Position in New Offshore Wind Power Capacity for a 7th Consecutive Year

Recently, the China Wind Power Industry Mapping 2021 published by the wind power committee of the China Renewable Energy Society provided a detailed introduction of the offshore wind power installation in 2021 in China. According to the data mentioned, Shanghai Electric Wind Power Group Co., Ltd. (hereinafter referred to as "Shanghai Electric Wind Power") ranked first by the quantity of turbines newly installed in 2021, which is 876 sets with a total capacity of 4204MW, accounting for 29% of the new total capacity. What's more, statistics of years from the wind power committee and BloombergNEF show that Shanghai Electric Wind Power has been No.1 in terms of China's new wind power capacity since 2015, and it was also the world's top in 2016 and 2021 under the same category as a major wind turbine manufacturer. Looking ahead, Shanghai Electric Wind Power will continue to propel China's offshore wind power industry and offer better offshore solutions to boost the development of the offshore market and contribute to the realization of the "dual carbon goals".



### Shanghai Electric Accomplished Hoisting of No.1 Waste Heat Boiler of the Rupsha Project

Days ago, Shanghai Electric successfully hoisted the No.1 waste heat boiler of the Rupsha power project in Bangladesh, paving the way for the construction to follow. Consisting of 18 parts, the boiler has an average hoisting weight of over 170 tons. To ensure smooth fulfillment of the task, the project department had meetings to calibrate the work plan prior to the operation, and supervised the whole execution despite challenges posed by the rainy season, high construction risk and long work hours. In the end, the project team hoisted the boiler after endeavoring for 37 days in a row, laying a solid foundation for finishing the construction as scheduled.



### Shanghai Electric Guoxuan New Energy Entered Hong Kong

In the last few days, Shanghai Electric Guoxuan New Energy Technology Co., Ltd. (hereinafter referred to as "Shanghai Electric Guoxuan New Energy") held an online ceremony for signing the procurement contract of new energy battery clusters and a strategic cooperation framework with a supplier of distributed energy in Hong Kong, marking the debut of its battery cluster in the Hong Kong market. The cluster uses the 96Ah square lithium iron phosphate cells rolling off from world-leading production lines deployed at Shanghai Electric Guoxuan New Energy's factory in Nantong City with characteristics of a long life span and high quality, which will be employed in the owner's first demonstration project.



### **Shanghai Electric Kangda Medical Equipment\* Awarded Two Major Awards**

In the last few days, the publisher of the journal China Medical Devices held the 12th China Medical Devices Industrial Data Release Conference 2022 via live streaming. Shanghai Electric Kangda Medical Equipment Group Co., Ltd. (hereinafter referred to as “Shanghai Electric Kangda”), under Kangda International Medical, obtained the award “Company of Social Responsibilities”, and Kangda Intercontinental Medical Equipment, a sub-company wholly owned by Shanghai Electric Kangda, was honored the “Golden Award of National Brand”. In the past few years, Shanghai Electric has been committed to building new milestones in high-end health care equipment localization by offering cost-effective products and services to health institutes of all levels across China, and has developed a product portfolio of CT\*, MRI\*, C-arm machines\*, ultrasonic devices\* and oral diagnosis devices\*.

### **112m! Shanghai Electric Refreshed China’s Offshore Wind Power Blade Length Record with Its Latest Product Again**

On July 5th, the S112 offshore wind power blade rolled off the production line, independently developed by Shanghai Electric Wind Power Group Co., Ltd. (hereinafter referred to as “Shanghai Electric Wind Power”). The longest in China, the 112-meter blade marks a big step for Wind Power Group towards the era of giant offshore wind turbines. The blade is characterized by high stability of wind power capture, safe and reliable performance, and modular design. During the development process, the design team fully considered all aspects of the production, transportation, installation and maintenance of the large offshore blades to ensure that they can cope with all complex climatic conditions during the lifecycle.

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### **China’s Ambassador to Iraq Inspected Shanghai Electric’s Power Project in Wassit**

Days ago, Cui Wei, China’s Ambassador to Iraq, and Xun Chun, Commercial Consellor, inspected the operation and safety management of Shanghai Electric’s Wassit power plant project on-site. After listening to a report on the project, Cui Wei said that from 2018 on, the power plant has been operating at full load, delivering outstanding results. He hoped that Shanghai Electric’s employees on the project site can continue to explore the local market by promoting the overhaul and ensuring the safe and stable operation of the plant, and at the same time, the embassy will keep supporting the project to achieve higher quality development in the local market.





# Shanghai Electric Ranked Higher in Influential EPC Lists

Shanghai Electric obtained higher ranks in all lists announced at the awarding ceremony for Grade-A international contractors launched on June 28 amid the 2022 China International Contracting Industry Development Conference organized by China International Contractors Association, and entered the Asian and European lists for the first time.

Shanghai Electric has been evaluated as Grade-A again together with the other 73 industrial players thanks to its excellent performance as an EPC contractor for overseas projects including the Dubai CSP project, the PV unit of Phase V of the

Dubai solar park project, the Thar Coal Power project in Pakistan and power plants at Pancevo of Serbia, Rupsha of Bangladesh and Wassit of Iraq. In addition, it ranks No. 16 in the general list of international EPC contractors and No.4 in the power engineering sub-list, recording a higher position in both. It is worth mentioning that Shanghai Electric ranked 10th and 30th on sub-lists of the top 30 Asian and European EPC contractors respectively, which is also the first time it is to be included.

The year 2021 saw multiple waves of COVID-19 and a profound energy structure transformation driven by the "Dual Carbon Goals", producing a complex and

serious situation and huge tasks. However, Shanghai Electric's overseas project teams have striven to maintain the status quo of overseas programs through concerted efforts and made monumental progress after addressing many obstacles: Dubai's NE1-700MW CSP+250MW PV Hybrid Project in Block 1 completed its first grid connection with a total capacity of 70MW; the 900MW 5th phase of the Mohammed bin Rashid Al Maktoum solar power plant was awarded a certificate of provisional handover for the 300MW project in Block A by the property owner Schur Energy, signaling that Block A enters the warranty period; the No.2 generator of the Thar power plant in Pakistan had its generator's stator hoisted to the specific position, indicating that the installation of the No.2 steam turbine began; the No.5 generator of the Thar heavy oil power plant in Pakistan got connected to the grid, indicating that all the 5 generator units of the plant realized grid connection, and the HFO (heavy fuel oil) power plant was put into operation; the Pancevo Combined Cycle Power Plant in Serbia had all its steam turbines connected to the grid, laying a good foundation for the plant's operation in the future; the No.1 and No.2 steam turbines of the 800MW Rupsha combined-cycle power project in Bangladesh poured their foundations with 1,120 m<sup>3</sup> of concrete; and the Wassit power plant in Iraq completed load shedding in summer smoothly. **D**



## Shanghai Electric's Overseas Projects Added Life-Cycle Services to Its Package

On June 29 local time, the signing ceremony of Shanghai Electric Wassit Power Station was held at the headquarter of the Middle Power Generation Company of Iraq's Ministry of Electricity. As stipulated in the contract, Shanghai Electric is responsible for the maintenance, repair and upgrading of all 6 units and public systems in the Wassit Power Station, symbolizing that Shanghai Electric has created a new milestone in tapping into the market of life-cycle services for power plant projects in Iraq.

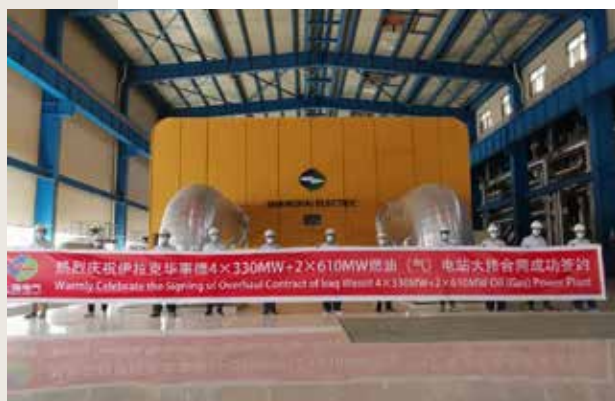
Shanghai Electric and the Iraqi Ministry of Electricity have built a strong partnership amid this project, and inked 9 contracts on engineering services of various kinds. Since its operation, Shanghai Electric has supported the Wassit Power Station, which is Iraq's largest thermal power station, to work stably for 8 years through its maintenance services and has produced over 125 billion kW·h, accounting for 20% of Iraq's aggregate power generation. For the first half of 2022, Shanghai Electric has accomplished the annual maintenance, and all 6 units have been working at full capacity and produced 8.7 billion kW·h, ensuring the livelihood of around 3 million households in the capital Bagdad and its surrounding areas. The project team of Shanghai Electric Power

Generation Engineering Co., Ltd. is managing peak load in summer with all efforts.

A manager with Shanghai Electric said at the ceremony that the project department will continue to implement principles of offering high-quality services to and creating value for property owners, and support the operation of Wassit Power Station to make more contributions to Iraq's power development.

Ali, General Manager of the Middle Power Generation Company of Iraq's Ministry of Electricity, said that Shanghai Electric's project team has fully demonstrated the strength and sense of responsibility on behalf of Chinese enterprises in the Wassit Power Station, and hoped that both parties could enhance communication and cooperation to jointly promote the local power industry.

As for the project, the Iraq Ministry of Electricity is the property owner and Shanghai Electric is the EPC contractor. The Wassit Power Station has 4×330MW units and 2×610MW units with a total capacity of 2540MW. After the project construction began in 2010, the project team realized an all-rounded operation and temporary transfer in June 2015, which was 12 months earlier than scheduled, and the final transfer in October 2018. **D**



## Shanghai Electric Leads in the New 11MW Era

The offshore wind power market is seeing better solutions with bigger capacity and higher power generation. Recently, the first EW11.0-208 wind turbine taking full advantage of the prowess of Shanghai Electric's Petrel platform was installed in Shantou, Guangdong Province. With the largest capacity of 11MW in Asia, it will bring China's offshore wind power industry into a new era.

Born from Shanghai Electric's 10-year experience in offshore wind farms, Petrel is a platform independently developed in three years to cope with the complicated marine environment characterized by high temperature, high humidity, high salinity, typhoons, and earthquakes. Driven by China's goals of achieving carbon peak and carbon neutrality, Shanghai Electric developed the EW11.0-208, the first product based on the platform. It's a highly economical direct-drive offshore turbine for high-wind-speed areas while achieving the grid parity of wind power to deal with both normal weather and typhoon conditions. In September 2021, China's first 11MW turbine rolled off the production line in Shanghai Electric's Shantou Base, Guangdong's largest smart energy project and the first "Energy Internet Plus" demonstration industrial park of Shanghai Electric Wind Power Group Co. Ltd.

The turbine adopts the concept of a life cycle in digital design, production, operations and maintenance management, reduces operational load, and enhances operation stability thanks to the application of the latest LeapX control system. After being connected to Shanghai Electric's Fengyun System, it will be an intelligent and connected turbine that continuously improves availability and customer profitability.

Shanghai Electric will continue to provide optimal solutions for customers with superior products and services to promote the development of the offshore wind power sector and contribute to the achievement of China's carbon peaking and carbon neutrality goals. **D**

Shanghai Electric is exploring opportunities in the green economy and cultivating new impetus for low-carbon development. On July 15, the inauguration ceremony of Shanghai Electric New Energy Development Company was held in Shanghai. At the ceremony, the new energy strategy of Shanghai Electric Group was announced; collaborative projects on new energy were signed online with five partners; and strategic cooperation with more than ten financial institutions and industry partners on the financial ecosystem for new energy was launched.

The "Dual Carbon Goals" require a revolution in economic and social systems that is thorough and wide-reaching, and to achieve a "zero-carbon" society is the common pursuit of mankind. As a world-class manufacturer of high-end equipment, Shanghai Electric actively builds a comprehensive new power system and three-dimensional, integrated solutions for net-zero industrial parks, striving to be a pioneer in achieving the carbon peaking and carbon neutrality goals. For its 14th Five-Year Plan, Shanghai Electric has established the "4+2+X" development strategy, specifying its orientation towards "4 plus 2" emerging fields supported by advanced technologies with a focus on "wind-solar-hydrogen-storage" integration.

The company is founded as an important initiative to implement the Group's strategy during the 14th Five-Year Plan period and to achieve the national carbon peaking and carbon neutrality goals. It is established by Shanghai Electric Group and its subsidiary Wind Power Group with a joint investment of 3 billion yuan. Its vision is to be the most integrated, innovative, and life-cycle service

SHANGHAI ELECTRIC



# COMMITMENT TO THE NEW LOW-CARBON MARKET AND DEVELOP MILESTONE PROJECT IN ACHIEVING THE “DUAL CARBON GOALS”

## Shanghai Electric New Energy Company Established

provider for new energy integrated development. With a global perspective, the company will strive to gain a firm foothold in China by building a life-cycle service platform for new energy projects with “wind-solar-storage-thermal-hydrogen” multi-energy complementation and “generation-grid-load-storage” integration. The platform will provide a vital path for the high-quality development of the Group’s new energy business through a comprehensive solution with system optimization, simplified equipment and an intelligent control system as its core. Shanghai Electric will embrace openness, innovation and win-win cooperation, put emphasis on the dual drive from industry intelligentization and service industrialization, as well as the collaborative development of Energy Internet and Industrial Internet, work with government-owned parks, customers, investors, technology partners and financial institutions to empower global industrial development, and contribute to the better life of all humankind.

Li Zheng, Secretary of CPC Fengxian District Committee, Shanghai Municipality, and Leng

Weiqing, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Electric Group, delivered speeches at the ceremony. Together with Yuan Quan, Deputy Party Secretary and District Chief of Fengxian District, Liu Ping, Deputy Secretary of the Party Committee and President of Shanghai Electric, Zhang Shouchuan, President of Bank of China Shanghai Branch, Shou Weiguang, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Guosheng Group and Chairman of the Board of Directors of Guosheng Capital, Jiang Lindi, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Electric Power Construction, and Shi Shunhua, Vice President of China Merchants Bank and President of China Merchants Bank Shanghai Branch, they pressed the button to unveil the Shanghai Electric New Energy Development Company.

The ceremony was also attended by leaders of major banks, brokerage firms, trusts and other financial institutions, media guests and leaders of Shanghai Electric Group. **D**



## Shanghai Electric's Waste-to-Energy Solution Leads the Industry

**O**n June 17, The No.3 high-parameter generator of Phase II of Guangzhou No.7 Resources Thermal Power Plant, a waste-to-energy plant with the highest integrated parameters so far in the world whose main equipment and solutions are provided by Shanghai Electric, finished its "72+24"-hour trial operation, meaning that two generators of the plant have begun operation, taking No.4 generator that had started working into consideration. During the pilot run, the equipment worked well with all performance parameters reaching or exceeding benchmarks designed.

All steam turbines used are supplied by Shanghai Electric Power Generation Equipment Co., Ltd. Turbine Works and Turbine Generator Works, and two waste heat boilers by Shanghai Boiler Works Co., Ltd. Compared with regular generators producing power by burning wastes, the steam turbine self-developed by Shanghai Electric record a thermal efficiency that is over 10% higher together with other advantages like high reliability and flexibility. Thanks to its leading and reliable strength design, it supports the 10-year overhaul plan.

These boilers use the scheme of reheater

inside the furnace, a challenging technology, with the main steam pressure up to 13MPa and a steam temperature 485°C. Based on the advantages of high efficiency and stability as well as low emission, it solves the problem of chloride stress corrosion hindering waste-to-energy power generation. After being put into operation, the two high-parameter boilers act as a leading example in boosting the technological upgrade and development of the waste-to-energy industry in China, and also a key reference and benchmark for the industry to develop towards the direction characterized by high parameters, efficiency and capacity.

What's more, Shanghai Boiler Works Co., Ltd. has participated in a number of other programs in the segment after taking this order, including the 4×850tpd high-parameter boilers in Baoshan District, Hanlan Sanshui 2×900tpd high-parameter boilers and Wangneng 1000tpd ones. As of now, high-parameter boilers for waste-to-energy plants manufactured by Shanghai Boiler Works Co., Ltd. account for nearly 60% of the Chinese market, including both layout schemes of reheater inside and outside the furnace. **D**



# Shanghai Mitsubishi Elevator's SUPER-HIGH-SPEED

## Elevator Moving at 10m/s "Entered" Changsha's New Landmark

On the afternoon of June 22, Shanghai Mitsubishi Elevator Co., Ltd. (hereinafter referred to as "Shanghai Mitsubishi Elevator") held an online signing ceremony for the project of delivering the LEHY-H elevator, a super-high-speed one moving at 10m/s, to Xinchu Jingtian Plaza at Changsha City, Hunan Province. Leng Weiqing, Secretary of the Party Committee and Chairman of the Board of Directors of Shanghai Electric Group, and Wen Huiming, Chairman of Hunan Xinchu Property Co., Ltd., attended the event, witnessing the pivotal step for Shanghai Mitsubishi Elevator to bring its self-developed super-high-speed elevator from the "test tower" to "commercial buildings".

Having devoted more than 3 decades to technologies of super-high-speed elevators, Shanghai Mitsubishi Elevator has been progressing consistently, selling hundreds of elevators moving at a speed over 6m/s. Xinchu Jingtian Plaza is designed to be a complex for the modern service industry and a new commercial landmark of the largest size in Changsha's downtown area. As a professional manufacturer of super-high-speed elevator in China, Shanghai Mitsubishi Elevator specifically chose the LEHY-H elevator for this project because it is a super-high-speed elevator designed for high-end scenarios like landmark plazas, class-A office buildings and luxury hotels. The LEHY-H elevator with a speed of 10m/s is independently developed by Shanghai Mitsubishi Elevator who fully owns the intellectual property, and characterized by proven operation performance and mature technologies. In terms of technology, it uses the upgraded tractor, brake control technologies that are silent, new super-power modules and a high-performance and

smart CPU control system with all core parts manufactured by Shanghai Mitsubishi Elevator, ensuring high speed, comfort experience, security and low energy consumption. This project is seen as a landmark in the elevator market of Changsha and surrounding areas.

Considering the tight delivery schedule, Shanghai Mitsubishi Elevator rated this project "SEP project", which grants it a higher priority in utilizing the company's resources for the delivery of higher quality. The SEP method was inaugurated in Shanghai Center Super-High-Speed Elevator project, which can leverage Shanghai Mitsubishi Elevator's strengths to ensure the product quality and operation at a high level.

Leng Weiqing expressed gratitude for Hunan Xinchu Property's trust and support towards Shanghai Electric, and said that building economics has entered a 2.0 era that emphasizes software, services and commercial ecology. Xinchu Jingtian Plaza follows a high-performance design idea and employs low-carbon and energy conservation technologies, which aligns with Shanghai Mitsubishi Elevator's product values of low energy consumption, high quality and excellent durability. With many opportunities to be further explored in cooperation, she hoped both parties could turn this project into a new start for more in-depth and all-around collaboration on smart elevators and maintenance in properties in the future, achieving win-win results by mutual empowerment. **D**



# 100-MILLION YUAN ORDER!

## After Partnering with BMW, Shanghai Electric Became a Supplier to Volkswagen's First Lithium Battery Production Line in Europe

In the last few weeks, Shenzhen Yinghe Technology Co., Ltd. (hereinafter referred to as "Yinghe Technology"), a subsidiary of Shanghai Electric Automation Group, won a tender, worth 100 million yuan, of offering main lithium battery equipment and solutions to Volkswagen's 20GWh super factory. Shanghai Electric had been the sole Chinese supplier of manufacturing equipment for lithium to BMW, and collaborated with Automotive Cells Company (ACC), a leading battery venture in Europe, a couple of times.

By inking the contract, Volkswagen showed its high recognition of Shanghai Electric's strength and performance. Both companies will promote the construction of the Salzgitter plant in Germany to speed up its development towards the European battery center and the achievement of the "New Auto" electrification strategy.

As the era of new energy vehicles is approaching at a faster speed in the world, Volkswagen is expanding its battery business landscape and plans to build 6 big battery factories in Europe. The Salzgitter plant, one of the six, is designed to be Volkswagen's battery center, and therefore, Yinghe Technology will cooperate with Volkswagen on this plant by supplying the main equipment and services required in lithium battery production to its first mass production line in Europe, including coating, laser cutting and lamination, which will help Volkswagen to boost its building of a battery supply chain based in Europe and to grow into the biggest manufacturer of electric vehicles in the world.

At present, the European Parliament has voted to ban the sale of new diesel and gasoline vehicles from 2035, and as the clock ticks, the fuel car's epilogue may come earlier. With Volkswagen launching more all-electric vehicles at a faster speed, Yinghe Technology sets a good example for Chinese lithium battery equipment enterprises who want to explore overseas markets by winning this tender, and demonstrates its strength as a competent partner who will help battery companies on the continent to address supply-chain-related problems, and to increase their production capabilities. **D**





# HENGXI 110KV POWER

## Transmission & Distribution Project Started Construction, Shanghai Electric's Subsidiary Jiangsu Comprehensive Energy as Constructor

In the last few days, the Hengxi 110kV Power Transmission & Distribution project broke ground, which is contracted to Jiangsu Comprehensive Energy Co., Ltd. owned by Shanghai Electric Power Transmission & Distribution Group. The transformer station covering an area of 988 m<sup>2</sup> sits on Hengxi Street, Jiangning District, Nanjing City, Jiangsu Province, and is designed to build 31.5-km-long cables and overhead power lines in total and add 2 sets of 50MVA main transformers. After it is put into operation, areas supported by 110kV substations will be re-arranged more logically, which helps to improve the grid's voltage quality at Hengxi and the distribution network's structure, and to enhance the power supply reliability and serve local economic development. **D**



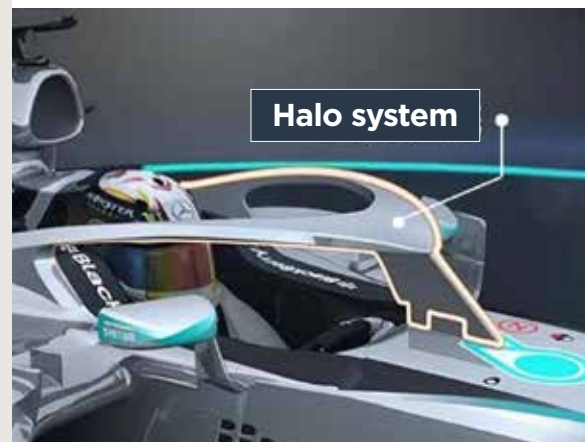


## Shanghai Electric Awarded 3 F-Class Gas Turbine Contracts Consecutively

Recently, Shanghai Electric has won 3 F-Class gas turbine contracts with Jiangyin Gas Turbine Thermal Power Plant, Phase II of Wuxi Western Gas Thermolectric Plant, and Zhenhai Combined Cycle Power Plant owned by Zhejiang Provincial Energy Group through “e-bidding” respectively and consecutively, and will offer main facilities of F-Class gas turbines, combined cycle gas turbines and electric generators, which is another major step forward in the backdrop of pressing ahead COVID-19 containment and economic growth in a coordinated way and exploring the market despite difficulties.

The bidding period fell between April and May when Shanghai’s pandemic control was the most rigorous. Implementing principles of promoting virus control and commercial operation, the sales team of Shanghai Electric Power Generation Group was awarded the above-mentioned 3 contracts of clean energy projects thanks to seamless remote collaboration throughout the whole bidding process, from decision-making and mutual support to timely creation of the winning tender document and video for clarification.

The 1X489MW project of Jiangyin Gas Turbine Thermal Power Plant is the first project supplemented in public tendering of the Zhejiang provincial gas turbine innovative development demonstration program. As the first F-Class gas-fired power plant in Wuxi City, the plant of Wuxi Western Gas Thermolectric Plant saw the operation of its phase I project in 2016, and after phase II is completed, it will produce more power from clean sources and better the environment of the Huishan Mountain sight in the city’s west and along the Grand Canal. Zhenhai Combined Cycle Power Plant of Zhejiang Provincial Energy Group plans to build F-Class gas turbines in Wucheng District, Jinhua City, Zhejiang, and will enhance Wucheng’s power supply and its peaking shaving capacity. The project again endorses Shanghai Electric’s in-depth cooperation with Zhejiang Provincial Energy Group. **D**



At about 22:00 on July 3, there were multiple collisions of 5 cars in the first lap of the British Grand Prix 2022, involving Zhou Guanyu, China’s first F1 driver racing for Alfa Romeo, in a scary accident with his car flipped. Thanks to the Halo system, Zhou Guanyu was saved without serious injuries. CP-Tech, the provider of the life-saving system, is a holding subsidiary of Nedschroef, a subsidiary of Shanghai Prime Machinery Co., Ltd. under Shanghai Electric.

Although the roll cage failed to provide any protection in the crash, Halo, the last barrier

# SHANGHAI ELECTRIC'S HALO SYSTEM SAVED CHINESE DRIVER **F1**

between the driver and severe danger, kept all collisions and fractions away from Zhou Guanyu. Zhou posted on Weibo on the early morning of July 4: "I'm ok, all clear. Halo saved me today. Thanks everyone for your kind messages!" "Halo also saved Romain Grosjean in the F1 Bahrain Grand Prix held on November 29, 2020.

Numerous crashes have proven that the Halo system is crucial to car racing. The 2018 Circuit de Spa-Francorchamps in Belgium saw how Halo kept Nico Hülkenberg, Fernando Alonso and Charles Leclerc unharmed in serious crashes, and the acknowledgement from both drivers and teams towards it.

The Halo safety system can protect the driver's head from flying objects during high-speed racing. With a weight of around 7kg, the Halo protective headgear is made of titanium alloy, and uses a number of Ti structural parts with a diameter of 50mm. In tests, Halo can

endure a static load that is 10 times the vehicle's total weight in collisions, allowing it to greatly mitigate potential harm. The 7-kg part is capable of supporting a vertical weight of roughly 12 tons, making it the hardest part of the vehicle.

CP-Tech, the supplier of the Halo system, has been committed to high-performance vehicles and system R&D for years, whose business landscape covers segments of special vehicles, racing cars and the aerospace industry. It is also a highly-recognized partner by Federation Internationale de l'Automobile thanks to its rich experience accumulated in rare metal-related lightweight design, processing and manufacturing, research on cutting-edge technologies as well as trial and small-lot production. **D**





# COVER TOPICS



COVER TOPICS



# *REALIZE ZERO-CARBON FUTURE WITH SMART TECHNOLOGIES*



ew energy is necessary for sustainable development in the future.

Achieving the “Dual Carbon Goals” is an extensive and profound transformation, and building a zero-carbon society is a shared value and aim for mankind. Shanghai Electric, a world-class comprehensive and high-end equipment manufacturer, is committed to new-type power systems in all respects and three-dimensional, integrated solutions for net-zero industrial parks, trying to take the lead in achieving the “Dual Carbon Goals”.

Guided by the two goals of “hitting peak emissions by 2030 and carbon neutrality by 2060”, Shanghai Electric makes every effort to explore “4+2+X” emerging markets (“4” refers to wind power, solar power, energy storage and hydrogen, “2” refers to industrial smartization and high-end medical equipment, and “X” refers to other new niche markets) to amplify its influence in energy and industrial decarbonization, the main competition. On one hand, it is trying to develop new-type power systems in all respects and three-dimensional, integrated solutions for net-zero industrial parks, and on the other, it presses ahead with new energy equipment manufacturing for wind power, solar power, energy storage, hydrogen power and smart grid segments while leveraging its long-lasting strengths in equipment manufacturing for power plants based on coal power, gas power, nuclear power, biomass and wastes to maximize the combination of traditional and new energy.



## DEVELOP A NEW-TYPE POWER SYSTEM MAINLY DRIVEN BY NEW ENERGY

# A BIG MARKET AWAITS SHANGHAI ELECTRIC IN THE BACKDROP OF THE CARBON NEUTRAL GOAL



W e are always in pursuit of safe and stable energy supply and low-carbon green energy production.

The traditional energy industry has entered a new chapter thanks to leading IT technologies, such as big data, cloud computing and artificial intelligence. Looking forward, what new changes and growth drivers will the energy revolution and digital revolution, mutually impacting each other, produce for Shanghai Electric?

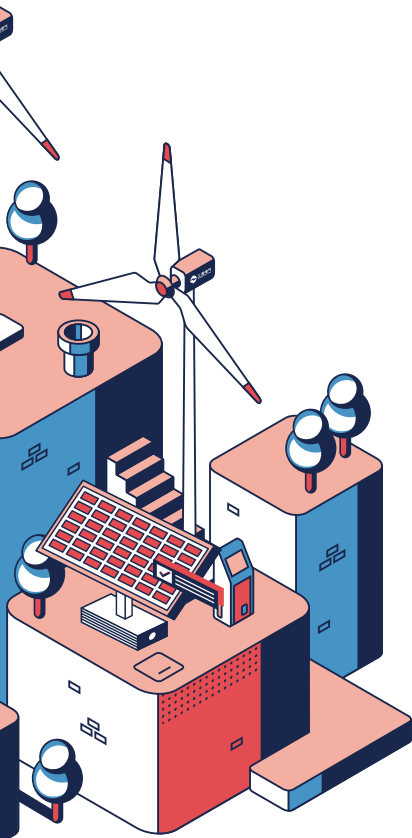
On July 15, Shanghai Electric New Energy Development Co., Ltd. (hereinafter referred to as "Shanghai Electric New Energy") was inaugurated in Shanghai. Shanghai Electric Group announced its new energy strategy at the ceremony and inked contracts online with 5 partners on new energy development, and with a dozen of financial institutions and industrial organizations on strategic collaboration on finance ecosphere for the new energy industry.

The establishment of Shanghai Electric New Energy is a crucial move for the Group to carry out its 14th "Five-Year Plan" under the framework of the "Dual Carbon

Goals". With a total investment of 3 billion yuan from Shanghai Electric Group and Shanghai Electric Wind Power Group Co., Ltd., Shanghai Electric New Energy aspires to become a supplier of life-cycle integrated and innovative solutions and services for all-rounded new energy development. Taking both domestic and international markets into consideration, it makes utmost efforts to build a platform of life-cycle services for new energy projects by actively promoting multi-energy complementation of "wind-solar-storage-thermal-hydrogen" together with "generation-grid-load-storage" integration. This platform supports integrated product solutions defined by "optimized system + streamlined equipment + smartly-controlled system", which plays an important role for Shanghai Electric Group to pursue high-quality development in the new energy sector.

The newly-established Shanghai Electric New Energy will boost Shanghai Electric to realize its goals: a primary company in attaining the "Dual Carbon Goals", new energy equipment manufacturing and high-end equipment localization.





## HOLD ADVANTAGES IN TRADITIONAL ENERGY

Take the whole picture into consideration and make visionary plans before exercising disruptive measures. The National Development and Reform Commission and the National Energy Administration restressed fundamental principles for energy development in the recently-issued implementation plan to promote the high-quality development of new energy in the new era. Therefore, while leveraging its advantages on equipment for traditional power plants based on coal power, gas power, nuclear power, biomass and wastes, Shanghai Electric strives to the development of equipment manufacturing for emerging sectors of wind power, solar energy, hydrogen power, energy storage and smart grid, which facilitates the maximization of combination between traditional and new energy.

According to the list of coal-fired units' energy efficiency in the power industry in 2021 released by the China Electricity Council, Shanghai Electric's electromechanical equipment accounted for all units in the AAAAA-grade list for 1000MW wet cooling generators, and 90% in the AAAA-grade list, consolidating its leading position in the traditional sector.

The comprehensive upgrading, integration and improvement technology combination for coal-fired generators, which is independently developed by Shanghai Electric, supports all-rounded improvement for holistic localization of equipment including major and auxiliary devices of steam turbines, boilers, generators and heaters, and integration of piping systems including four major pipelines and bypass ones and other systems like waste heat utilization and reheating optimization. It facilitates the enhancement of energy efficiency and decarbonization, flexibility and heat supply of coal-fired power plants, which is demanded

by the national strategy of "three improvements". On March 29, an AE94.2KS gas turbine installed in a project at Bensteel Group fulfilled the 96-hour trial operation at full load, which is Shanghai Electric's first low-heating-value turbine. It represents a breakthrough in power generation from associated gases, a state-of-the-art technology, and a new start for Shanghai Electric to supply this kind of turbine to steel corporations. On May 14, Shanghai Electric announced its success in developing its first 1300MW nuclear power generator that is engineered for Hualong One, a leading Chinese 1000-MWe Generation III pressurized water nuclear reactor based on its world-leading comprehensive performance. On June 17, the No. 3 high-parameter generator of Phase II of Guangzhou No.7 Resources Thermal Power Plant, a waste-to-energy plant with the world's highest comprehensive parameters and Shanghai Electric as its supplier of major equipment, accomplished its "72+24"-hour pilot run, setting an excellent example and significant benchmark for the waste-to-thermal application that is to expand its capacity with higher parameters and efficiency.

Targeting the "Dual Carbon Goals", Shanghai Electric is exploring the green low-carbon market at a faster speed amid energy structure transformation. On July 15, Shanghai Electric New Energy Development Co., Ltd. was inaugurated in Shanghai, and Shanghai Electric announced its new energy development strategy at the inauguration ceremony. Shanghai Electric has made it clear in its "4+2+X" development strategy formulated for the 14th "Five-Year Plan" period that the cutting-edge technology "X" will drive business growth in "4+2" markets of which "4" refers to new energy markets of wind, solar and hydrogen power and energy storage.





## COVER TOPICS

### NEW ENERGY DEPENDS ON TECHNOLOGICAL INNOVATION



#### WIND POWER

Shanghai Electric Wind Power Group Co., Ltd. (hereinafter referred to as "Shanghai Electric Wind Power"), China's first company that gets listed after spinning off from a state-owned enterprise, has held the first position for a 7th year consecutively by offshore wind power market share in China, and rose to the world's top in 2021 with a capacity of 4.1 GW newly commissioned. Shanghai Electric Wind Power has stuck to the development strategy of "pursuing lower costs after mastering leading technologies" and enhanced its two main advantages of "technology R&D" and "agile organization". In September 2021, the 11MW direct-driven offshore wind turbine successfully rolled off the production line, which is independently developed by Shanghai Electric Wind Power for sea areas with high-speed winds and is the largest in Asia. On June 10, 2022, EW8.X-230 semi-direct-driven offshore wind turbine, the "ace" turbine engineered specially for areas of medium- and low-speed winds, rolled off the assembly line, setting a new milestone for grid parity of offshore wind power in China. In terms of onshore wind turbines, the cost-effective EW7.X-202 turbine developed by Shanghai Electric Wind Power has won a tender, which tops in all bid-winning onshore turbines disclosed in China by unit capacity and rotor diameter, and is seen as the start of big rotor and high capacity for the onshore wind power market. Under the "Dual Carbon Goals" framework, Shanghai Electric Wind Power will continue to press ahead with innovation-driven growth, supply chain visibility and digital transformation to achieve in-depth integration of "digital design and intelligent manufacturing", and its long-lasting strategic goals of "top 1 in offshore sector and top 3 onshore".



#### SOLAR POWER

Shanghai Electric, the EPC contract and supplier of main equipment for the NE1-700MW CSP+250MW PV Hybrid Project in Dubai known for its largest scale and most advanced technology around the globe, is making utmost efforts to develop this "Belt and Road" demonstration project that can produce power stably and 24 hours continuously from solar power only by optimizing, integrating and utilizing resources and technologies of over 40 countries. This hybrid project acts as a benchmark in terms of large-scale, low-cost and long-term adjustable power supply for China to build mega wind and concentrated solar power/photovoltaic projects. What's more, Shanghai Electric, a major supplier of key CSP equipment, has won a couple of domestic bids for steam turbines, steam generators and air cooling equipment, and at the same time, it endeavors to develop equipment set with improved system design and parameters. Considering the PV sector, Shanghai Electric promotes centralized and distributed models in a parallel way. Centering on primary steps of manufacturing PV cells and components, Shanghai Electric launches open cooperation alliances with leading companies across the supply chain, and strives to amplify Shanghai Electric Group's key values throughout the PV equipment industrial chain building on its basic advantage of intelligent pan-semiconductor manufacturing and market strength of "PV +" integrated solutions with institutional reform as a guarantee.



**ENERGY  
STORAGE**

With the large-scale photovoltaic and wind power grid connection, multi-energy storage technologies are ushering in enormous opportunities for fast development and huge challenges on how to cut costs and realize commercialization. Shanghai Electric will fully exploit its advantages in multi-energy equipment manufacturing and carry out the implementation plan for the development of new energy storage in the national 14th five-year plan. It will further integrate and improve its capacities in energy storage, enrich application scenarios for relevant technologies and create more valuable energy storage system solutions for clients through collaboration. The Group will gain a foothold in the

energy storage market for pumped storage, molten salt energy storage, compressed air energy storage, and flywheel energy storage based on its strengths in hydropower sector and manufacturing of boilers, steam turbines and generators, to efficiently integrate its existing advantages in manufacturing into the energy storage business. In terms of molten salt energy storage, Shanghai Electric has taken more than one-tenth share of the global molten salt thermal energy storage market with its 700MW CSP project in Dubai. In terms of compressed air and flywheel energy storage, the Group is stepping up its product development process for future commercial operations. Shanghai Electric has made a forward-looking strategy for its development in the rapidly developing electrochemical energy storage market. It has set up a Li-ion battery company and a flow battery company, both of which are in rapid development. As for Li-ion battery energy storage system (BESS), the group has completed landmark projects for different scenarios including the 32MW/64MWh shared energy storage project in Golmud, Qinghai, the 12.5MW/20MWh solar-plus-storage project in Tibet, the 26MW/13MWh thermal power storage (TES) & frequency regulation project in Yangxi, Guangdong. In respect of flow BESS, Shanghai Electric Energy Storage Technology Co., Ltd. was rated as a High- and New-Technology Enterprise (HANTE) for its strong capability in independent innovation. The company has developed the domestic-leading 500kW flow BESS, laying the foundation for the large-scale and long-term demonstration project with high safety standards. The company has completed its Pre-A round of financing and is scaling up its business at a rapid pace.





## COVER TOPICS



### HYDROGEN POWER

Shanghai Electric will vigorously implement China's national medium and long-term plan for the development of hydrogen energy industry (2021-2035) and strive to achieve breakthroughs in the manufacturing of key equipment for "hydrogen production, storage, refueling and use" to overcome the obstacles to the development of hydrogen energy industry. For hydrogen production, the Group will work on key equipment manufacturing and systematic process planning for the production of green and blue hydrogen, namely the development of equipment for industrial hydrogen production via alkaline water electrolysis (AEL) and the application of carbon capture devices in the use of by-product hydrogen. In terms of hydrogen storage, Shanghai Electric will leverage on the establishment of Shanghai Metrology and Testing Center for Hydrogen Storage Equipment to build a metrology and testing service platform for hydrogen storage equipment covering the industrial chain, equipment life cycle and traceability chain together with its partners, so as to lay the cornerstone for the safe and efficient development of hydrogen energy sector. As for hydrogen refueling, Shanghai Electric will focus on the core technology and equipment of diaphragm compressor and provide integrated solutions for hydrogen energy production, storage and refueling based on the hydrogen refueling station design capability of its subsidiary, Guokong Global Engineering. For the use of hydrogen, the Group will focus on three major application scenarios: green hydrogen production

from large wind and solar farms & green ammonia production, large-scale hydrogen production & chemical products such as methanol converted from carbon capture, and large-scale hydrogen production from offshore wind power & pipeline transmission to internal combustion engines fueled by natural gas—hydrogen mixtures. Shanghai Electric will fully exploit its advantages in system design and core equipment manufacturing in power and chemical industry, actively promote the completion of relevant demonstration projects, facilitate the use of renewable energy and the large-scale development of energy-based raw materials, and seek a cost-effective and feasible path for efficient carbon reduction in energy and industry.







## SMART GRID

To cope with the impact of a high proportion of renewable energy and high power electronics on the stability of the grid, Shanghai Electric, relying on its capability in power generation equipment, independently developed a series of world-leading synchronous condensers, which are applied in DC converter stations and distributed energy systems to effectively support the reactive power regulation and rotational inertia of the grid. In addition, the energy storage converter and system solutions for energy storage developed by Shanghai Electric are applied to the commissioning and testing of new wind power and PV farms before they are connected to the grid, which facilitates efficient grid connection and solves the problem "black start". The solution has been successfully applied to the black start of an 8MW full-power offshore wind turbine for a 1MW energy storage system (the Shanghai Electric Smart Energy Demonstration Project in Shantou), and that of a 4MW onshore doubly-fed wind turbine for a 300kW

energy storage system (multifunctional mobile energy storage system). With its industry-leading innovative application, the technology was listed among the "2022 Top 10 Innovative Energy Storage Technologies" under the Technology Innovation category of the Sixth International Energy Storage Innovation Competition. Cross-linked polyethylene (XLPE) cables, which are widely used in the wire and cable industry, pose problems in their end-of-life disposal. As the first manufacturer in China to successfully apply polypropylene (PP) cable to power system, Huapu Cable, a subsidiary of Shanghai Electric, can conduct end-of-life disposal properly for environmental protection and reduce energy consumption during production, which can reduce carbon emission by 40% compared with the production of XLPE cables. According to the technology evaluation for new products by the China Electricity Council, the comprehensive performance of the PP cable has reached the international advanced level, filling a market gap in China.







## DIGITAL EMPOWERED NEW ENERGY SECTOR

We believe that the digitalization and green transformation of the energy industry is the only way to make green and low-carbon energy; the improvement of intelligent technology makes electricity more stable and reliable; and the intelligent management system plays a key role in reducing carbon and energy consumption. The higher stability and efficiency of new energy sources are fundamental to sustainable energy development and a modern economic system.

Shanghai Electric's SEunicloud, a cloud-based open industrial internet platform, has become a hub for data asset management and allocation in the high-end equipment industry by bringing all partners together and enabling multi-industry compatibility and cross-industry applications through product and service optimization. SEunicloud has now provided 15 industry applications and formed eight industry solutions such as the digitalization of wind, solar and energy storage integration, enterprise asset management, MOM for digital manufacturing and intelligent environmental protection, covering more than 100,000 intelligent devices worth a total of 140 billion yuan.

Shanghai Electric's "Shang He", an online commercial and smart supply chain platform, supports

internet-based supply chain management, coordination and interaction throughout the value chain, from customers to suppliers as well as from sales and delivery to procurement and execution, and provides whole-process services and guarantees in areas of financing, logistics and credit risks. The e-commerce platform "Shang He" facilitates transactions between partners thanks to its aggregate resources and trade guarantee services based on the smart supply chain. In addition, the platform empowers vertical markets in different areas including energy services, equipment manufacturing and standard industrial components, boosting the business of partners along the value chain.

Since entering the 14th FYP period, Shanghai Electric has been leveraging its advantages in industrial ecosystem and industrial data in multiple fields with the support of smart connectivity, big data and cloud technology, and actively exploring application scenarios and modeling them to discover real business value from potential opportunities. To this end, Shanghai Electric has restructured its brand strategy. With "win-win collaboration" as its brand concept, the Group integrates intelligent manufacturing and industrial digitization to power the construction of a one-





of-a-kind industrial ecosystem and provide optimal solutions for sectors of smart energy, intelligent manufacturing and smart infrastructure.

Xu Jilin, deputy director of the Department of Energy Conservation and Sci-tech Equipment of the National Energy Administration, said, "In the future, we should not only empower the energy system with digital technology, but also introduce new development concepts, new ways of organizing factors and new market rules unique to the digital era into the existing energy system. With data as the core production factor, we will use digital technology as the driving force to make profound changes in the energy sector, so that the energy revolution and digital revolution can be deeply integrated to benefit economic development and people's livelihood more extensively."

Shanghai Electric will adhere to open innovation and win-win cooperation to boost the integrated development of industry intelligence and service industrialization, and the synergy between IoE and IIoT. It will join hands with government-owned industrial parks, clients, investors, partners and financial institutions to empower global industrial development with technology and create a smarter life for all. **D**

# VIEWPOINTS



INTERVIEWS

LI YUNLONG, SHANGHAI MODEL WORKER,  
SENIOR GRINDER OPERATOR OF SHANGHAI  
MACHINE TOOL WORKS

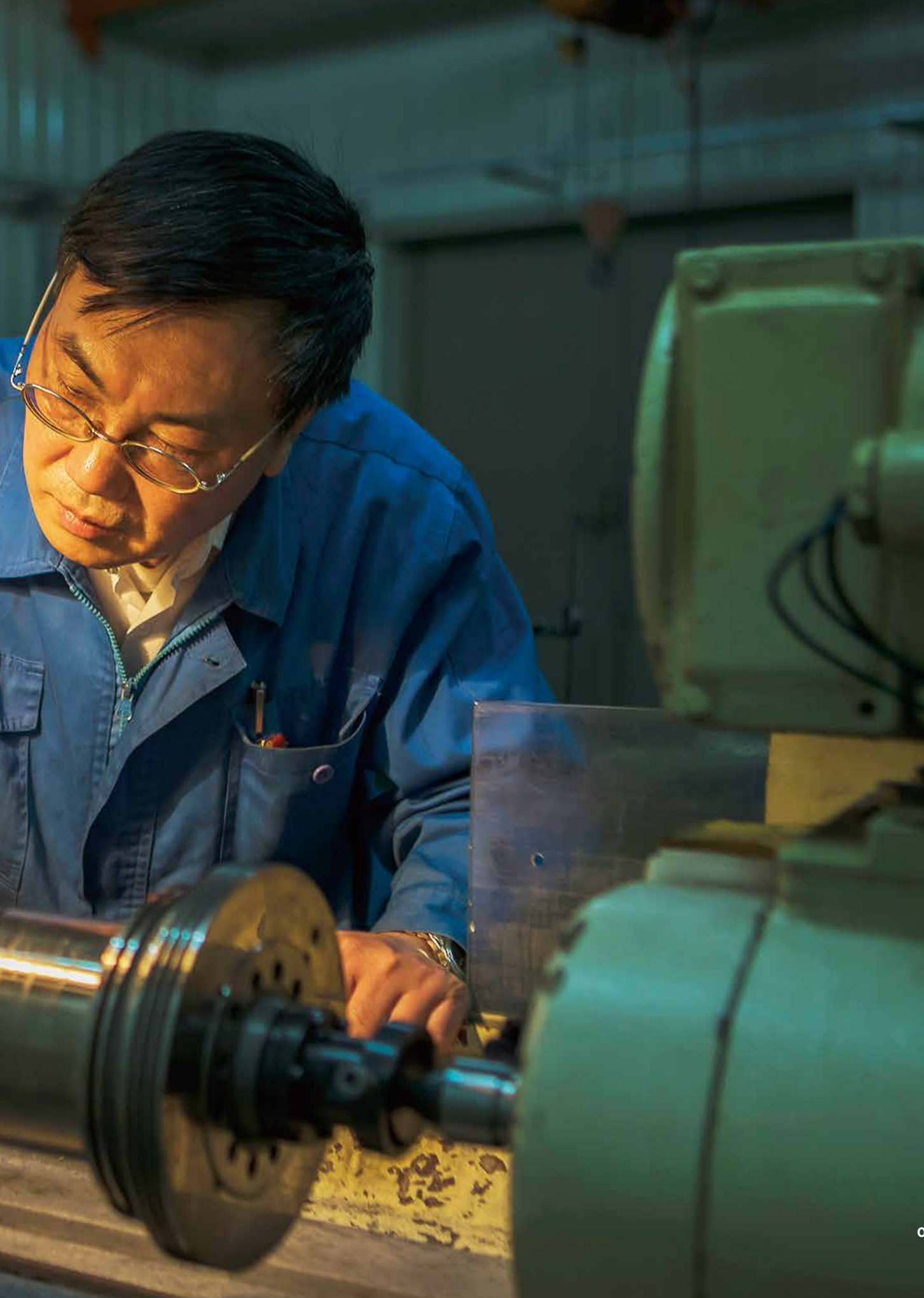
# LI YUNLONG

## A GRINDING MASTER OF SHANGHAI

**T**

he grinder is started to warm up, the parts are fixed, and the grinding wheel is running fast. Li Yunlong, a grinder operator at Shanghai Machine Tool Works, leans down to stare at the machine through the shield with bated breath, discerning the subtle changes in sound and sparks. How accurate can precision machined parts be? The accuracy of the parts machined by Li can reach up to  $0.2\ \mu\text{m}$ , equivalent to  $1/400$  of a hair's diameter. Li believes that when a technician strives to become a "Chinese craftsman" with knowledge, skills, experience and expertise, he must also have a true passion for his work.









## EACH MACHINED PART IS RECORDED IN DETAIL

Li has a workshop of his own in the constant temperature workshop of the Shanghai Machine Tool Works, where two grinders are placed side by side. They are his most familiar working partners. Every weekday morning, he turns on the two machines to warm them up, and every day after work, he oils and wipes them. He still remembers what his teacher said: for us, the grinder is like a gun to a soldier.

In 1983, at the age of 20, Li graduated from the Shanghai Mechanical Industry School and joined the Shanghai Machine Tool Works as a grinder operator, where he has worked for 38 years. He still remembers when he first joined the factory, "when I first heard about grinding, I thought of the people who sharpened kitchen knives on the street. After entering the industry, I realized how wrong I was. That was the first time I saw grinding wheels 'fly'." The Shanghai Machine Tool Works, located at 1146 Jungong Road, is a machine tool manufacturer. As the pioneer and birthplace of China's grinding machine manufacturing industry, the factory has set several national records. In 1950, it succeeded in producing the first grinder in the PRC, No. 13 Universal Tool Grinder, through imitation; in 1975, it succeeded in producing the first M82125 crankshaft grinder in China on a trial basis; in 2005, it produced the first CNC cylindrical grinder with a diameter of 3m and a length of 13m, which has been exported to the U.S.

In the 1980s, the factory was enjoying a booming development and its workers were competing to become best technicians. Starting as a grinder operator, Li, with his talent and tenacity, improved rapidly under his teacher. The work that others can do only after six months of study, he can operate independently in less than two months, and the quality of machined parts by him can gradually be comparable to those by "master technicians". However,

it's not that easy to become a "master". Li recalled that once machining an axle, he was confident because he had done this job before, but the finished product failed to pass the examination. The teacher explained to him, "That's quite normal. What we operate is a grinder, which is much more accurate than a lathe. Even if you are machining the same part, if your operation, the process flow, or even the temperature during machining is different, there would be different results. Therefore, it is important to be familiar with the entire machining process of the part, and you should even understand the work of others."

From then on, Li has developed the habit of making records. For each machined part, he learns the entire process in detail and records the machining date and operation steps, which allows him to improve at a faster pace.

Today, the Shanghai Machine Tool Works has become the enterprise with the highest brand value, the most extensive product lines and the strongest technical capability in precision grinder manufacturing industry in China, and Li has turned into a real grinding master.



## HIS TECHNIQUE WAS INCLUDED IN THE NATIONAL TEXTBOOK

Thanks to his work notes, we were able to appreciate several "masterpieces" of Li, and see how he grew from an ordinary grinder operator to the famous "grinding master" of Shanghai Machine Tool Works.

In 2008, the factory was involved in the manufacture of core parts of China's first laser ranging astronomical telescope, a key component of the BeiDou Navigation Satellite System. The cylindrical and taper error of the key parts is required to be within 0.00015mm, the runout is required

to be less than 0.0005mm, and the surface roughness cannot exceed Ra0.024 $\mu$ m. As long as one of the three data is out of the specified range, it is a failure. Such machining accuracy is equivalent to building a skyscraper in a hair, the difficulty of which is beyond imagination.

"After accepting the task, I visited the library every day to look up information, and then buried my head in designing solutions and tools. After dozens of trials, I finally found a solution. The story was featured in the news back then, and the leadership of the observatory praised our factory." Li said cheerfully.

There are many more challenging experiences like this recorded in his work notes. The MK8220 machine tool is dedicated to SAIC-GM, and the arc tailstock center would cost more than 10,000 yuan each if imported from Switzerland. Li made his own arc measurement tooling and improved the method of correcting the arc grinding wheel. After the parts were ground, the technical specifications reached 0.001mm in accuracy, saving nearly 80,000 yuan as a good example of import substitution.

If one asks Li what is the most memorable task in his 38-year career, he will first mention the grinding machining of the grinding wheel holder spindle of the H402-AZ CNC surface grinder, a national key project. It is the part with the highest requirements for machining skills since the establishment of Shanghai Machine Tool Works. The roundness and runout of the two bearing gears and the 1:10 external cone are required to reach 0.2 $\mu$ m, while the roundness and runout of the rest of the externals are required at 0.5 $\mu$ m and the surface roughness Ra0.024. After careful analysis, Li formulated a reasonable machining process and grinding steps, choosing the grinding wheels and grinding parameters carefully. He made his own auxiliary tooling to ensure that the cylindrical and conical parts were machined at one time. Because of his domestic leading grinding techniques,

Li established himself as a leader in the field of metal ultra-precision grinding and became the "Grinding Master" of Shanghai Machine Tool Works. Afterwards, he wrote a monograph on high-precision spindle grinding process and grinding skills, which was included in *Grinder Operator*, a national vocational qualification training textbook.

## THREE THE DEMONSTRATION EFFECT OF THE WORKSHOP

With the in-depth transformation and upgrading of the machine tool industry and the overall improvement of the manufacturing industry, the machine tool industry's demand for versatile and high-level talent is growing. It's urgent to bridge the talent gap.

At present, the whole industry is concerned about talent recruitment and training issues, especially for front-line technical personnel. The enterprises are actively exploring feasible ideas and practices. Reassuringly, on November 16, 2018, the Shanghai Machine Tool Works established the "Li Yunlong Innovation Workshop".

As a traditional precision manufacturing enterprise hoping to achieve high-quality and high-efficiency development, the Shanghai Machine Tool Works needs to continuously innovate in technology and manufacturing process, and constantly overcome key technological problems and technical bottlenecks encountered in manufacturing to improve product quality and win the market. Li is famous for his expertise in high precision grinding and his skills are unanimously recognized by his colleagues. During his continuous practice, he has overcome many challenges with innovative grinding techniques. He is a typical technical worker with a wealth of knowledge and skills.

The purpose of establishing Li Yunlong Innovation Workshop is to

solve the critical technical problems and bottlenecks encountered in manufacturing process. The workshop will carry out technological research, skill training, learning and exchange activities with the aim of technological innovation, technique improvement, talent cultivation and cost reduction.

For the important task set by the leadership, Li is under great pressure. "I can't let them down. I must deliver a nice report card." He made up his mind to dedicate all his knowledge and skills to the first workshop named after a worker in Shanghai Machine Tool Works.

Shanghai Electric has several innovation workshops named after model workers, some of which have a high reputation in Shanghai and even in the whole country. They are the most valuable assets of the company. The "Li Yunlong Innovation Workshop" has a clear vision, sound rules and regulations and incentives, the best workers of Shanghai Machine Tool Works, and senior engineers of the Technology Development Department, making it well equipped for development.

People who pass by the workshop can see the bustling scene inside. Sometimes, they are having a brainstorm for innovation projects, discussing which solution is the best; sometimes they are celebrating the workshop's excellent inventions, creations, innovations, designs, suggestions were adopted; sometimes it is the apprenticeship ceremony, where they are enthusiastically witnessing the new apprentice toasting the teacher in tea.

"Every day after work, I sit in the workshop to summarize the day's results and things that can be improved," the gentle, humble, sincere and open-minded Li said.

The workshop is in a very good location. Right out of the workshop leads to Li's operation room, where there is a high-precision universal cylindrical grinder made in 1973 by Shanghai Machine Tool Works. Li said, as long as he is with this "old partner", he feels reassured. At the

other end is the Grinding Research Institute. "This is H376, a high-precision compound grinding center, a typical compound machine tool comparable to similar machines manufactured by developed countries. It is suitable for military, aviation, tooling, automotive and other fields." "This is H377, similar to H376, only more powerful, with a maximum cylindrical grinding diameter of 500mm," said Li Yunlong, introducing the high-end machine tools developed by Shanghai Machine Tool Works. Who would have thought that many of the key components on these two new models, which are comparable to Studer, were produced by Li and his team on the old machine tools. "The industry keeps developing and grinders are becoming ever more advanced. However, in practice, the operations, processes, and even subtle temperature and environmental changes can affect the machining, which require manual correction by workers. It is something that even the best equipment cannot do."

Machine tool manufacturing is the cornerstone and cradle of the entire industrial system. It is in the heart of the industrial chain and determines the level of industrial development and comprehensive competitiveness of a country or region. One of the most critical factors is the people. Currently, it has become the consensus of the whole Chinese society to promote craftsmanship and enhance the Chinese manufacturing industry.

The "Li Yunlong Innovation Workshop" gives the company a new platform to promote technical and technological innovation, as well as a base for the training of talents. The establishment of the workshop is of great significance to bring into play the demonstration effect of the model workers, stimulate the enthusiasm of the employees for learning, improve the quality of the workforce, promote the enhancement of manufacturing technology and process, and further facilitate the transformation and upgrading of the company. **D**

# OBSERVATION



DEPTH REPORTS



# SHANGHAI ELECTRIC





# Confront

# Extreme Heat

**H**

Have a restroom break with the AC on when it is too hot. Have a cup of salty drink or mung bean soup when you are thirsty. Sit down and rest when you are tired, and the team head will ask someone else to take your turn. High temperatures dominate the Sanfu period (in the Chinese Lunar Calendar, Sanfu refers to the three 10-day periods that are predicted to be the hottest days of the year and usually fall between mid-July to mid-August). However, Shanghai Electric's employees stick to their positions, tiny as they are, despite extreme heat only to ensure that every task is delivered on time and annual targets are attained as planned. **D**





## INNOVATIVE APPROACH

# ARTIFICIAL INTELLIGENCE, A SHIP TICKET TO FUTURE

**W**

we have acquainted ourselves with artificial intelligence or AI in life and work. I once came across a little cutie in a corridor of an office building, which was a smart robot delivering some documents to the lobby. It moved quickly towards the elevator,

gave a voice direction and got into the lift after the door opened. The elevator stopped at the ground floor, and it moved out and towards the reception desk, then it handed the documents to an office lady.

There are various kinds of robots often seen in our life, such as sweeping robots, bank robots and robot chefs. The fast development of AI technologies has possession of many industries, like parcel sorting, unmanned driving and room services, replaced by robots.

However, China is still at an initial stage in AI development and far from what the technology is capable of, to be honest. Many factories' assembly lines in China only use AI robots to do part of the work while keeping control and management positions held by the man. Therefore, the status quo cannot be seen as an AI application in a real sense, and in the future,

more advanced AI technologies will be employed by all industries and sectors.

Take a video I have watched for example. It was about a foreign robot enterprise that had operated as a "lights-out factory" for years. It could manufacture robotic arms of all types around the clock that were sold to many countries. Even production management was executed by robots, creating a real scenario of "robots making robots". In this way, the company maximizes product quality and minimizes its costs and delivery period.

As the world develops fast, many believe that it is definitely impossible to find a new continent with an old map. It perfectly makes sense. The world changes, technology changes, and so we must alter the way we think and keep up with the advance of the times. Many countries have been fully aware of the fact that AI is a ship ticket to the future, and committed to intensive exploration and development for a long time.

In July 2017, China issued the Development Planning for a New Generation of Artificial Intelligence that stipulated guiding principles, strategic goals, major tasks and supporting measures for the development of a new generation of AI by 2030, laying a good foundation for accelerating our development in this regard.

Seen as a "national strategy", AI brings us to an era when "man and machine walk side by side", which is and will be irreversible no matter whether you like it or not.

Experts say that AI will produce a fundamental disruption in the world in the next 10 to 20 years by making everything smart. In other words, AI will be everywhere. The rise of robots and AI will erase 5.1 million positions in 15 major industrialized countries, most of which are labor-intensive with a low cost.

It is daunting, but true. One day, AI will change the world completely including laying off millions of employees and restructuring the global economy with each and every one of us as a witness.

Enterprises take AI as the next opportunity to get aboard the ship towards a new market. As a pioneer in high-end manufacturing, Shanghai Electric tapped into the new market years ago. Under the guidance of Shanghai Electric's Smart Manufacturing Development Plan for the "14th Five-Year Plan" Period, Shanghai Electric will speed up automation, digitalization, networking and intelligentization to reduce costs and enhance efficiency, transformation and upgrading, and to improve its competitiveness and profitability.

Shanghai Electric will sail forward with great courage across the sea named "AI". **D**

