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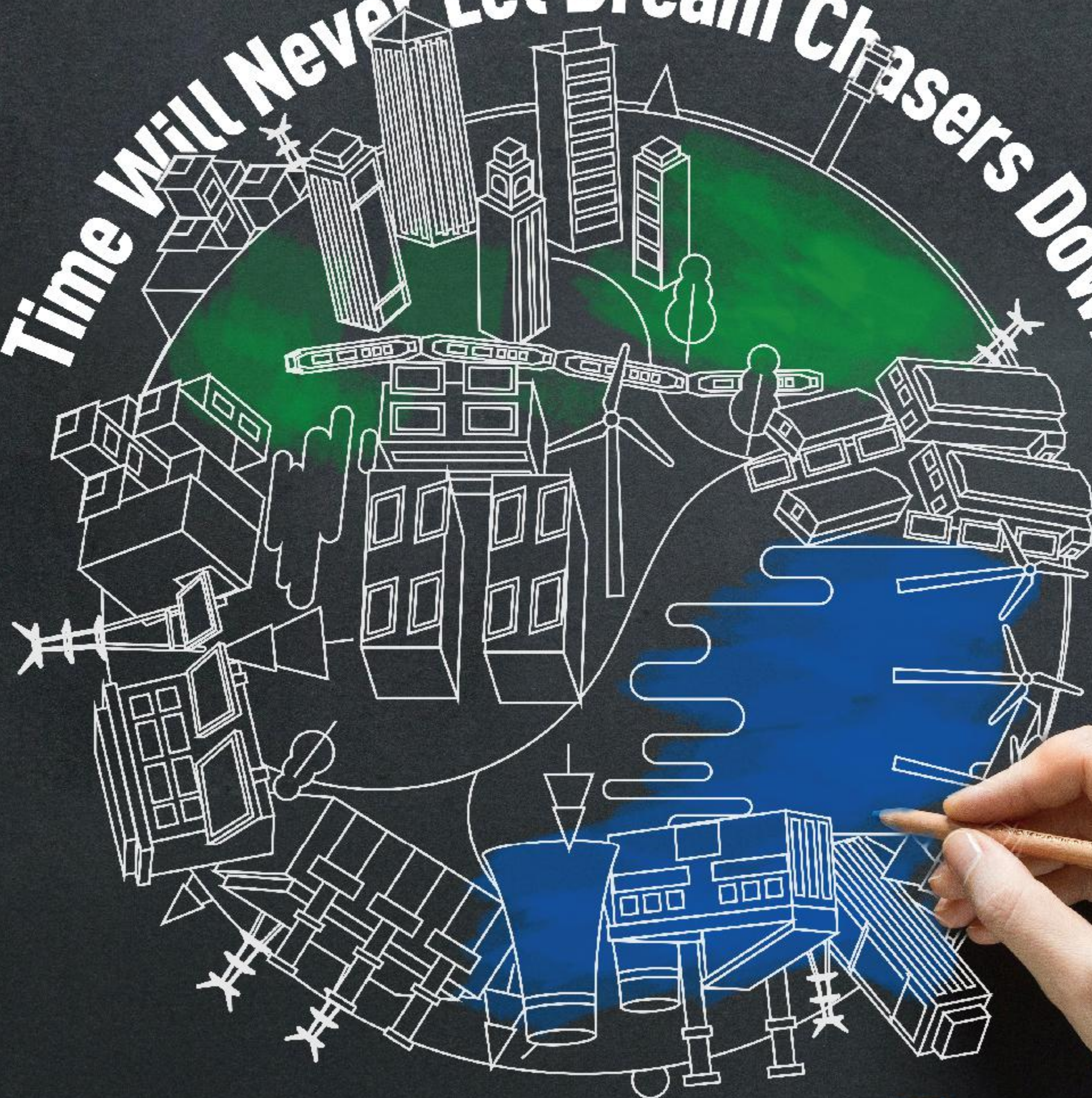
# ELECTRIC

SHANGHAI

上海电气

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Time Will Never Let Dream Chasers Down



上海电气  
SHANGHAI ELECTRIC



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Shanghai Electric

## PULSATE WITH TIME

Bidding a farewell to the unforgettable 2020, Shanghai Electric magazine enters its 5th year. The 5 years has seen successes of every member in Shanghai Electric's big family. They have contributed to ensuring stability in 6 key areas (employment, finance, foreign trade, foreign investment, domestic investment and market expectations), to meeting 6 priorities (people's livelihoods, development of market entities, food and energy security, stable operation of industrial and supply chains, and smooth functioning at the community level), and to the social development due to their formidable growth based on domestic circulation. In the meantime, they tried to find their proper position in domestic and international circulations by exploring new paths, implementing the 14th Five-Year Plan through innovation. Shanghai Electric is a witness, and more importantly and fortunately, a participant and recorder of this inspiring course with its editorials and in-depth reports. The road ahead is long; and striving is the only way forward. Shanghai Electric plays an indispensable role in fulfilling smart transformation and building a strong power in industry. Taking innovation as the strongest driver for growth, Shanghai Electric is not only optimizing its innovation in management, institution, and corporate culture, but also improving innovation systems and talent cultivation. Although 2020 has gone away, the statement "enterprises are building blocks for society and economy" means a lot for all of us. "The Chinese economy is not a pond, but an ocean. The ocean may have its calm days, but big winds and storms are only to be expected. Without them, the ocean wouldn't be what it is. Big winds and storms may upset a pond, but never an ocean," President Xi Jinping metaphorically summarizes current economic conditions and challenges. In 2021, Shanghai Electric will continue to pulsate with time and abide by integrity, objectivity, truth and fairness, resonating with average readers and portraying Shanghai Electric's achievements in 2021.

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**Car-Borne CTs by Kangda Medical Facilitated Cancer Screening at Poor Counties in Fujian Province**

Shanghai Kangda Medical Equipment Group Co., Ltd.\*("Shanghai Kangda Medical" for short), an affiliate of Shanghai Electric, held a health management campaign at Zhouning County, Ningde Ciy, Fujian Province, with Fujian Committee on Education, Science, Health and Sport of CPPCC (The Chinese People's Political Consultative Conference), Fujian University of Traditional Chinese Medicine and No. 3 affiliated hospital of the university, which aimed at cancer screening, early detection and treatment to consolidate the achievements of poverty alleviation. Themed on "Assisting Veterans and the Old Revolutionary Base", this event helped veterans in improving their health management. Medical cars latest developed by Kangda Medical installed with CT were parked just outside houses of villagers in Houyang Village and Lidun Village, Zhouning County, examining over 200 people for free lung CTs.



**Nasdaq Tower Highlighted Shanghai Electric's Smart Solution**

Recently, the Waste Incineration Cogeneration Project by SEEPG Thermal Power (Nantong) Inc. was featured at the Nasdaq Tower at the Times Square, New York, as the first prize winner of Bentley's Year in Infrastructure 2020 Awards. Through technology innovation and expansion, it has raised its annual disposal capacity by 34% or roughly 200,000 tons and reached EU emission standards, which in essence makes wastes less, harmless and recycled. As the only waste-to-energy plant in the competition, it attracted the spotlight by its design defined by comprehensiveness, integration and digital twin. Lighting the Times Square, the Nantong-based project shows Shanghai Electric Environmental Protection Group's fast progresses in Building Information Modeling (BIM), and strength of Shanghai Electric and China's environmental protection measure.

**Shanghai Electric Participated the Green Action in UAE**

Recently, Shanghai Electric's power plant projects took part in the "For Our Emirates We Plant" green campaign in Ras Al Khaimah at the invitation of Emirates Environmental Group (EEG). Habiba Al Marashi, chairperson of EEG, spoke highly of Shanghai Electric's endeavor to fulfill its corporate social responsibilities. Last August, Shanghai Electric was asked by EEG to participate a waste management event "My Community and Our Community" and collected nearly 245kg of waste paper, plastic and glass for EEG to process and recycle, which then entitles the company to join the tree planting in the event. On behalf of Shanghai Electric, the Dubai Project team planted 2 Sidra trees.

**CCTV-2's "Economy in 30 Minutes" Reported Shanghai Electric's Energy Storage Project in Golmud, Qinghai Province**

A few days ago, the "Economy in 30 Minutes" of CCTV-2, the Finance Channel of China Central Television (CCTV), featured the special program "The Green Dream of Exploring Wind and Solar Energy" that showed the green power development enhanced by Qinghai Province in all respects with Shanghai Electric Golmud Meiman Minhang Energy Storage Power Station invested by Shanghai Electric Power Generation Group as a key topic in the interview. As the first independent commercial energy storage power station in China, the project brings a "shared" energy storage model from theory into practice with the integrated advantages of Shanghai Electric's energy system solution. By mitigating local wind and solar curtailment, it is seen as a pilot innovation program in consuming new energy in Qinghai.







### Smart Toilet “No.1 Eco-Island” Built by Shanghai Cyeco Environmental Technology Co., Ltd. Was Launched

The smart toilet “No.1 Eco-Island” by Shanghai Cyeco Environmental Technology Co., Ltd. is launched to the market after passing tests of related departments of Chongming District days ago. It is designed to be a green, smart and human-oriented facility that is able to reuse rainwater and organic wastes collected, and utilize wind and solar power, offering a new experience for users.

### Taizhou Project Phase II Constructed by Shanghai Electric Power Generation Group Won “Chinese Industrial Oscar Award”

Taizhou Project Phase II 2x1000MW double-reheat coal-fired power unit recently won the “Honor Award of Chinese Industrial Award”, the “Oscar Award” for Chinese industrial companies, as the only thermal generation project among the winning projects. It is also a demonstration project rated by National Energy Administration and selected into the 12th Five-Year Period National Major Sci-Tech Support Program on Energy Conservation and Emission Reduction by the Ministry of Science and Technology. Shanghai Electric Power Generation Group independently designed and manufactured power units, boilers and auxiliary equipment, and more importantly, and lifted the double reheat steam temperature to more than 610°C for the first time by installing the world’s first 1000MW ultra-supercritical double-reheat tower-type boiler and 1000MW 5-cylinder and 4-exhaust-port single-shaft steam turbine.

### Shanghai Electric Rises to the 33rd Place on China Energy Top 500 List

Recently, China Energy News and China Institute of Energy Economics Research (CIEER) co-released 2020 list of China Energy (Group) Top 500. Shanghai Electric rose by 2 places from last year to the 33rd. As one of the largest energy equipment manufacturing enterprises in China, Shanghai Electric has been actively driving energy transformation the “3-step” strategy, building a complete portfolio of project development, branding and marketing, investment and financing, and EPC competencies in new energy sectors, including wind, solar, hydrogen, waste-to-energy and biomass. In the future, Shanghai Electric will align national policies to group realities, to reinforce our focus on new energy sector by expanding our footprint, and strengthening our competences in investment, development, exploration, design, and EPC, aiming to become the leader and benchmark in this industry in the shortest possible time.

### Shanghai Electric Included in Hang Seng Corporate Sustainability Index Series

Recently, Shanghai Electric was included in three indexes of Hang Seng Corporate Sustainability Index Series, i.e. Hang Seng (China A) Corporate Sustainability Index, Hang Seng (China A) Corporate Sustainability Benchmark Index, and Hang Seng (Mainland and HK) Corporate Sustainability Index. Meanwhile, Hang Seng also upgraded the ESG (Environmental, Social and Governance) rating of Shanghai Electric to “A”, recognizing the extraordinary performance of the company in environmental protection, social responsibility and corporate governance. Constituent selection is based on a robust process that includes consideration of the results from a sustainability assessment undertaken by Hong Kong Quality Assurance Agency (HKQAA), an independent and professional assessment body, using its proprietary sustainability assessment and rating framework. 7 core metrics, i.e. corporate governance, human rights, labor practices, environmental protection, fair operation, consumers, community engagement and development, are included in the rating framework. ESG data of listed companies are collected through public information acquisition and enterprise questionnaires to evaluate their performance. Shanghai Electric was recognized for its extraordinary results in all 7 metrics, thanks to our commitments to ESG governance architecture optimization, reinforced board focus on ESG governance, labor rights protection, employee development, increased share of new energy business, higher shareholder value, and the open mind on ecosystem cooperation. Especially, Shanghai Electric was among the first to produce pandemic control supplies in the pandemic, which highlighted our CSR as a state-owned enterprise.







## Zheng Jianhua

### Shanghai Electric's Reform and Achievements in CGTN's Interview

**Z**heng Jianhua, Secretary of the Party Committee, Chairman and CEO of the Company, and Chairman of Shanghai Electric (Group) Corporation, received an interview by a group of media outlets including CGTN (China Global Television Network) on January 18th, summarizing Shanghai Electric's achievements in reform as a state-owned enterprise and offering his visions towards how Shanghai Electric plans to deepen the reform and carry out national strategies for the 14th Five Year Plan period. Since 2019, Shanghai Electric has targeted equipment manufacturing, its pillar industry, to become a world-class manufacturer with reform as the main driver, which aligns with the national strategy. With Three-Year Action Plan For State-Owned Enterprise Reform (2020-2022) ("Three-year Action Plan") coming into effect in the second half of 2019, Shanghai Electric studied the policy without any hesitation and pressed ahead with the implementation as required by the CPC Shanghai Municipal Committee, Shanghai Municipal Government and Shanghai Municipal State-Owned Assets Supervision and Administration Commission to further the reform.

Despite internal and external difficulties, Shanghai Electric transformed severe pressure into ambitious goals and grew rapidly by over 20% in revenue for 2018 and 2019. What's more, Shanghai Electric tackled its "insufficiency in development motive, energy and pressure" through new systems and mechanisms. Shanghai Electric delegates management power concerning independent operation, personnel, and distribution within the frame of its main businesses to subsidiaries by systematic measures aiming at streamlining management and enhancing services. At the same time, it has strengthened management in legal affairs, audit, risk control, and compliance. Shanghai Electric also introduces a set of "market-oriented" measures in a number of pioneering companies. For instance, two public companies that are listed in China's A-share market rolled out limited equity incentive plans; two subsidiaries have carried out mixed-ownership reform making its employees shareholders; two companies recruit general managers through open competitions; two industrial groups are selected in the "Double-hundred Action" (a campaign led by the Leading Group for State-owned Enterprises Reform of

the State Council. It selects more than a hundred subsidiaries of the centrally-administered SOEs, and more than a hundred local SOEs to implement reforms). Meanwhile, Shanghai Electric boosts its healthy and stable growth by expanding into new industries. On one hand, it enhances the online new economy with its independently-developed Industrial Internet "SEunicloud" that has connected to over 100 thousand smart devices worth 140 billion yuan including wind turbines, elevators, and machine tools. On the other, it has set foot in strategic emerging industries like high-end medical services\*, energy storage batteries, and intelligent manufacturing, whose business size has grown to more than 10% from a single-digit percentage in 2017. 2021 is the first year to implement of 14th Five-Year Plan. Shanghai Electric will continue to follow the Three-Year Action Plan, carry out requirements on "ensuring stability in 6 key areas, effectively meet 6 priorities" set by the CPC Shanghai Municipal Committee and Shanghai Municipal Government, and support the national strategy "Three Tasks and One Platform". Shanghai Electric plans to reinforce its tenure system on management level and contract-based management by continuously improving the modern company system with Chinese characteristics, and promote market-oriented incentives and restraint mechanisms in order to strengthen the reform on the salary system and wage determination mechanism of company leaders for high-quality development. **D**

## Shanghai Electric's Contracts on Overseas Power Projects Amounted to 1.379 Billion US Dollars, 87% on New Energy

**R**ecently, China Chamber of Commerce of Import and Export of Machinery and Electronic Products released the "2020 China's Top Overseas Power Project Contractors". Shanghai Electric Group Co., Ltd. ("Shanghai Electric" for short) ranked 6th with a contract value totaling 1.379 billion US dollars, and 3rd in the sub-list of "Overseas New Energy Project Contract Value" with 1.205 billion inked. In 2020, Shanghai Electric signed contracts on 16 overseas projects despite the COVID-19 blow, 13 of which were on new energy, such as the fifth phase of the Mohammed bin Rashid Al Maktoum solar field in Dubai, the waste-to-energy project at Grimsby, UK and the Yabuki photovoltaic project in Japan. In addition, Shanghai Electric was positioned at the 8th place in the sub-list of "2020 Overseas Power Transmission and Transformation Contract Value" with USD 116 million worth of contracts. As a sizable high-end equipment manufacturer, Shanghai Electric has boosted energy transformation with digitalization in implementing the "Three-Step" strategy, taking new energy as one of the main drivers for its future development. To date, Shanghai Electric has basically built up characterful advantages in new energy industry and digital infrastructure by expanding into solar and wind energy, biomass power generation, hydrogen, energy storage and distributed energy, and outlined its development path. **D**





## Digital Smart Future

### Huang Ou Shared Shanghai Electric's Solutions on Industrial Carnival

On January 12, the 2021 Industrial Internet Innovation-driven Digital Transformation Conference and Industrial Carnival themed on "Digital Empowerment and New Economy" was held in Shanghai. Liu Liehong, Vice Minister of the Ministry of Industry and Information Technology (MIIT), delivered a speech online. Wu Qing, member of the standing committee of the CPC Shanghai Municipal Committee and Vice Mayor of Shanghai, participated and addressed the meeting. Other attendees included Chen Mingbo, Vice Secretary-

general of Shanghai Municipal Government, Yu Xiaohui, Secretary General of Alliance of Industrial Internet and Vice Director of China Academy of Information and Communications Technology (CAICT), Wu Jincheng, Chairman of Shanghai Municipal Commission of Economy and Informatization (SHEITC), Chen Jiezhong, Director of Shanghai Communications Administration (SHCA), Zhang Ying, SHEITC Vice Chairwoman, Zhang Lan, Vice Director of Shanghai Municipal Human Resources and Social Security Bureau, Wang Tianguang, SHCA Vice Director, and Huang Ou, Deputy Secretary of the Party Committee and President of Shanghai Electric Group and Chairman of Shanghai Industrial Internet Association. China's 14th Five-year Plan has stipulated that efforts shall be made to develop new infrastructure systematically and speed up the construction of 5G, Industrial Internet, and big data centers, indicating that digital transformation has become the mainstream for these 5 years. New models and businesses keep emerging as the digital economy evolves. Specifically, the "online new economy" and "digital new infrastructure" with Industrial Internet as a representative are booming and becoming a major driver to reboot the economy and shape high-quality industrial chain and value chain in Shanghai. Against this backdrop, the conference aims to implement the Three-Year Action Plan of "Industrial Internet Empowering

Shanghai" that promotes the innovation and upgrading of the Industrial Internet, and facilitate Shanghai's digital transformation in all areas including "economy, life and governance". Huang Ou was invited by the event organizer to share his insights on different roles in city digital transformation and how industrial enterprise can realize digital transformation in a high-end dialogue themed on "Economy's Digital Transformation and Win-win Future" with guests from state-owned enterprises and leading industrial software companies. When asked "how to use digital tools to drive energy transformation", Huang Ou noted that Central Economic Work Conference put "work related with carbon peak emissions and carbon neutral" as a priority, and it required the energy sector to speed up in optimizing industrial and energy structures and the exploitation of new energy. Therefore, digital transformation brings more opportunities than challenges for Shanghai Electric and other energy equipment producers.



As for renewable energy such as wind power generation, Shanghai Electric uses digital tools to reduce the levelized cost of energy (LCOE) and develops commercial models for "the cost-effective era", which solves the problem of overdependence on natural gas in single-form renewable energy-based power generation and increases its cost-effectiveness and stability. As for integral energy, Shanghai Electric employs digital technologies to promote the digital integration of multi-functional and mutually-supportive systems and provides services of "wind-solar-water-coal-storage" integration and "source-grid-load-storage" integration. By digitalizing all links from R&D, design, manufacturing to services, it has accelerated the development of software burned with industrial know-how and the digitalization of industrial expertise. As for traditional energy like coal, Shanghai Electric is shifting towards smart equipment operation with more digital services, for example, connecting users with smart products, tracking their behaviors and needs with Industrial Internet, and creating more value for them via smart supply chain throughout the product life cycle in all respects. In regard to how to build the Industrial Internet platform by investing more in application scenarios, Huang Ou believes that as a big equipment manufacturer, Shanghai Electric is leveraging its advantages of industrial ecology and data covering multiple sectors to develop structured scenario models based on in-depth analysis into all kinds, turning potential opportunities into profitable businesses. Shanghai Electric has spared no efforts in building "SEunicould", its Industrial Internet platform, with intelligent manufacturing, smart supply chain, and smart maintenance as key areas to offer users smart, customizable solutions based on intelligent manufacturing, internet-enabled coordination, and extensive services. In this way, more and more promising opportunities from outside and within will be better explored with the support of SEunicloud and develop into robust industrial ecosystems. The conference highlighted Shanghai's latest achievements in Industrial Internet development in 2020. Ten companies including Shanghai Boiler Works Co., Ltd., an affiliate of Shanghai Electric, were shortlisted for Manufacturing and Internet Integration Demonstration Institutions by MIIT. Zhang Lan and Huang Ou inaugurated the Shanghai Industrial Internet Highly-skilled Talent Training Center and the other 7 projects including the Shanghai Electric x Siemens Energy Smart Energy Empowerment Center. In addition, Huang Ou of Shanghai Electric along with some other 20 enterprise representatives witnessed the establishment of the Industrial Internet-enabled Digital Transformation Innovation Consortium (first batch). Ten affiliate companies of Shanghai Electric including Shanghai Electric Digital Technology Co., Ltd. were rewarded as 2020 Top 10 Industrial Internet Empowerment Enterprises. Zhang Fan, Vice Director of the Smart Development Center of Shanghai Electric Power Generation Group and 9 other individuals were acclaimed as 2020 Top 10 Industrial Internet Pioneers. **D**





## Leading the Digital Upgrade of "Centennial Brands"

**D**ec. 28, 2020 - This morning, Shanghai Renmin Electrical Apparatus Works (SREAW) today inaugurated a digital production line, the Phase I of its Intelligent Manufacturing Program. Huang Ou, Deputy Party Secretary and President, Shanghai Electric Group, pushed the start button on the ceremony and signed on the first product. On behalf of Shanghai Electric, Huang congratulated SREAW on the inauguration of the digital production line, applauding it as "the finishing touch to a successful year of 2020, and an important step forward on the digital transformation journey of Shanghai Electric in 2021." Digital transformation was a natural stepping stone to "high-quality growth". That was why Shanghai Electric was focused on the "Industrial Triangle" ecosystem of Smart Equipment, Industrial Internet and Smart Supply Chain to connect with users with Smart Equipment; provide software subscription, O&M optimization, equipment rental and asset custody through Industrial Internet; and to create values in the full life cycle for our customers through Smart Supply Chain. A vital part of Shanghai Electric's digital transformation initiative, and one of the first Intelligent Manufacturing Demo Programs, the successful inauguration of SREAW's digital production line not only provided expertise and experience to the digital transformation of Shanghai Electric Power Transmission &

Distribution Group, but also offered application scenarios to facilitate the development of "as-service" and "as-product" capabilities of Shanghai Electric Automation Group and Shanghai Electric Digital Technology Co., Ltd. Huang said, 2021 marked the 100th anniversary of CPC. As a "centennial brand", how could SREAW leverage the development opportunities in the new era to gain competitive advantage, revive national brands and shape our business' continued success? Digitalization offered an answer. From R&D to delivery and services, digital technologies must be embedded in every step, every process, and every product, equipment, facilities and operation system to support decisions, drive businesses and optimize operations. It was imperative for SREAW to meet or exceed the highest international standards on quality, and leverage the opportunities of mixed ownership reform and digital production line inauguration to build it into an example of contemporary intelligent factory. Huang emphasized that, "innovation is the only answer to the future of high-end equipment manufacturing industry". He said: "In the digital transformation journey, we must be focused on product and business model innovations. Only through reform and innovation can we add more momentum to the 'high-quality growth' of the Group, and make greater contributions to the goals of Shanghai Electric's '3-Step' strategy." Yang Hong, Vice President, Shanghai Electric Group; Zhang Mingjie, Chief Investment Officer and Industrial Development Department, Shanghai Electric Group; and other executives of Group Office, Science and Technology Management Department, Digital and Information Management Department, Industrial Development Department, Market Development Department, Shanghai Electric Power Transmission & Distribution Group, Shanghai Electric Automation Group and Shanghai Electric Digital Technology Co., Ltd., were also present at the ceremony. **D**

# Shanghai Electric

## Facilitated the First Hualong One Nuclear Reactor in Commercial Operation, Ensuring Nuclear Safety and Green Development

**O**n January 30th, the world's first Hualong One nuclear reactor begins operations, indicating that China is now one of the handful countries having third-generation nuclear technologies. CNNC Fujian Fuqing Nuclear Power Co., Ltd. sent a letter of thanks, appreciating Shanghai Electric's technological contribution for the smooth progress of Hualong One. Hualong One reactor internals, the most critical part of a reactor, is designed to the highest standards in the world, which comprise 13,487 components of 236 categories with a height of 11.036 meters, weight of 160 tons and largest diameter of 4.188 meters. Compared with internals used in Gen II reactors like M310, they are much more complicated in production and precise in structure. Essential

manufacturing technologies ranges from processing, soldering, testing and assembly that shall be performed with high precision, so it is seen as the peak of China's nuclear reactor in terms of equipment R&D and manufacturing. Shanghai No.1 Machine Tool Works Co., Ltd. ("No.1 Machine Tool" for short), an affiliate of Shanghai Electric, spent 33 months on manufacturing the internals since the project was started in 2015. It tackled 71 process-and-test-related difficulties and made a couple of innovations including 2 technologies on material localization, 5 on soldering, 4 on testing and 7 on processing. It has obtained 10 invention patents, which makes it possible to fully localize all links related with Fuqing No.5 reactor internals from manufacturing, processing, assembly, testing, soldering to tooling design and manufacturing for inspection & acceptance. Shanghai Electric also provided many other products to the No.5 unit, such as the bridge crane, auxiliary crane, charging pump, secondary and third-level pumps (safety injection pump, safety sprayer pump, residual heat removal pump) and condensate pump, elevators for factories, 1E thermometer\*, electric control box of 1E instruments\*, regulating valves for nuclear facilities.

In April 2020, Made in Shanghai: New Achievements was published, composed by Shanghai Municipal Commission of Economy and Informatization and people.com.cn to celebrate the 70th anniversary of the founding of People's Republic of China and the liberation of Shanghai. The chapter titled "Critical Equipment Made After Decades of Devotion and Hualong Internals Back China's Nuclear Development" dived into how No.1 Machine Tool tried their best to remove obstacles in Hualong One project, and acknowledged their courage, diligence and competence in implementing national major tasks as a large state-owned enterprise. It is reported that every unit of Hualong One can generate nearly 10 billion kWh of electricity every year, which is enough for the production and households of 1 million people in a moderately developed country on a yearly basis. Moreover, it is equivalent to reducing standard coal consumption by 3.12 million tons and CO<sub>2</sub> emission 8.16 tons. **D**





On the first day of 2021, the Medium-Capacity T1 Demo Line was commissioned at Dishuihu Station, Lingang Special Area of Shanghai Pilot FTZ. Zhu Zhisong, Vice Secretary-General of Shanghai Municipal Government, and Chairman of Party Working Committee and Vice Director of Lingang Special Area, announced the official departure, and joined with guests and media for a test ride from Dishuihu Station to Qiqing Road Station.

## China's First DRT Commissioned at Lingang, Shanghai

As one of the constructors of T1 Demo Line, Automation Group, an affiliate of Shanghai Electric Group, delivered China's first iDRT solution for the medium-capacity Digital-rail Rapid Transit (DRT) tram used by T1, including the supply, installation and debugging of electromechanical systems, such as digital rail, train operation management system, specialized wireless communication for trams, specialized backbone communication for trams, intelligent platform system, and control center. Besides, Shanghai Electric's world leading surface magnetic markers and underbody sensors also provided lots of benefits in terms of construction period, footprint, energy efficiency and emission reduction. The total cost per km of the Demo Line was only 50% of convention tram lines, which offered a strong fit for Lingang Special Area's green, smart and integrated transport system. The core of iDRT solution was a lightweight, smart, medium-capacity rapid transit system, which consisted of magnetic marker-based virtual digital rail and auto-tracking, self-directing virtual rail rubber-tired tram operated in contemporary control model. By integrating accurate sensing and positioning, coordinated control and intelligent operation management, iDRT enabled automatic tracking, assisted operation and safe protection in train control and management. It not only ensured the high-precision movement of trains along magnetic marker based digital rail, and high-level autonomous driving with independent right of way or under extreme weathers, but also provided other benefits including low costs and excellent flexibility, which made it a perfect



choice for urban medium-capacity transport. Now this solution has entered marketing and pilot stages. The commissioning of Demo Line not only provided a great opportunity to showcase the commercial operation of iDRT solution, but also facilitated the iterations of current products to lay a solid foundation for its industrialization at home and abroad. The commercial use of iDRT-powered rubber-tired trams (digital rail trams) at Lingang will drive the research and development of DRT standards of Shanghai, accelerate the implementation of iDRT solution in unmanned Demon Line, and add more momentum to the development of railway transport related industries, such as smart maintenance and repair. It is learned that the planned 105km medium-capacity DRT network of Lingang will include 6 lines to provide more convenient transport for Shanghai people. **D**

## Shanghai Metro Line 5

### Integrated O&M Project Successfully Delivered

Dec. 26, 2020 - This morning, a ceremony was held at Jianchuan Road Site for the delivery of Shanghai Metro Line 5 Integrated O&M Project and the inauguration of Integrated Operation, Maintenance and Scheduling Command Center. As a co-created demo initiative for Integrated Intelligent O&M, this project highlighted that Shanghai Electric Group and Shentong Metro Group (SMG) were making remarkable progress in their strategic cooperation on rail transit.

Song shared some insights into Shanghai Metro, and the key role of intelligent integrated O&M in driving the development of urban rail transit. He also recognized Shanghai Electric's deep expertise and complete industrial system in the past two decades. Song said, the extensive competency of Shanghai Electric in rail transit electromechanical equipment R&D and manufacturing, and the abundant experience of SMB in rail transit construction, operation and maintenance, made this project an excellent opportunity for both parties to consolidate their strategic partnership. He hoped Shanghai Electric and SMB could maximize the combined forces to drive the "interdisciplinary innovation of integrated O&M models", and the development of "Intelligent O&M and Health Management Platform", so we could contribute to the transformation and "high-quality growth" of Shanghai rail transit system with industry-leading, innovative O&M models. Besides, this would also drive the integration of advanced manufacturing and modern services, and help to create full life cycle integrated, intelligent O&M solutions for three 1,000-km rail transit systems of Shanghai and the rail transit market of Yangtze River Delta area.

Yang Hong thanked the project team for their outstanding work. She said, Shanghai Electric was actively exploring the "Interdisciplinary Fusion and Multi-source Data Sharing" model, aiming to drive the intelligent transformation of asset management, O&M management, health management and emergency management in rail transit sector, and improve their reliability and safety in operation. The industry-leading "i-PH Mart" Rail Transit Intelligent O&M and Health Management Platform was an example. Shanghai Electric wished to join hands with SMB in leveraging the combined strengths of "Made in Shanghai" and "Shanghai Service" to drive explorations and pilots in areas like organizational structure reform and compound training. Only in this way could we pull together an interdisciplinary rail transit O&M team, create an intelligent O&M and health management platform, and build an integrated O&M talent development system. In turn, these would enable us to improve the safety, reliability and intelligence of O&M services, by offering a full life cycle, integrated, intelligent O&M solution and technical supports to the mega rail transit network of Shanghai. Besides, this would also contribute the win-win growth of both parties. **D**

CHINA PAVILION EXPO  
2020 DUBAI UAE OFFICIAL PARTNER





# COVER TOPICS



# TIME WILL NEVER LET DREAM CHASERS DOWN

S tars light the way for dream chasers, and over time efforts will pay off. Time is the fairest measure. When we look back on the past five years as a team, we know that time has recorded our efforts and our growth. Shanghai Electric, in its accelerated transformation, provides a huge platform on which young people can develop their career, explore in trial and error, and grow amid difficulties until they become leaders in the new business and new field. The headline of our cover topic decides to focus on recording their growth – the beautiful process of growing, be it resolute or circuitous. Between the lines, we will see that they carefully safeguard and stay true to their ideal in the course of their growth. We can also see ourselves – our past or our future, and find our direction forward. Amidst springtime flowers, the breeze is urging us to move forward, accompanied by melodious song from far away.. Time will support growth, Growth will support dreams, Dreams will support life, And life will support you and me.





## WANG YONG

**MAKING PROGRESS  
AMIDST CHANGES**

“**F**ive years ago, I was in charge of procurement at Shanghai Electric Wind Power Group Co., Ltd., and now I am working on the digital transformation of manufacturing at Shanghai Electric Digital Technology Co., Ltd.” In 5 years, from a professional post to a management and optimization job in the group and to the role of deputy general manager at Shanghai Electric Digital Technology Co., Ltd., Wang Yong has perfectly shifted his career path in a most challenging way. According to Chinese zodiac, people born in the year of Tiger are particularly independent with strong willpower and adventurousness, who are extremely confident and natural leaders. Wang is 35 years old, and the key word for him since his joining the group in 2007 is “change”. “5G”, “Internet of Things”, “intelligent manufacturing”, “industrial robots”, “intelligent factories”, etc., these new words have made

one thing clear to Wang Yong: in the next thirty years, only people versed in digitalization can be masters in the electric industry. Wang Yong studied at the Institute of Robotics, and after graduation, he took up IT. Now he works on the digital transformation of the manufacturing industry, fixing his career path on IT, “I have also associated my future career development closely with the digital transformation of the electric industry.” Digital industrialization drives industrial development, and industrial digitization empowers countless industries. For the past 5 years, he has been the bridge between the industry and the group as well as between the group and the enterprise, “In the past, I always heard people talk about difficulties and problems, and in the last two years, they talked more about indicators, goals, and ways to achieve them.” Wang Yong is exposed to tangible problems, which prompts him to think deeply in order to clarify his thoughts and find the optimal solutions to the problems.



# W

PERSISTENCE

In October 2018, the 4th MIC1000, hosted by Guojiang Industrial Internet Crowdspace, Guojiang Academy and Suzhou Gaozheng Technology Park Technology Business Incubator, was held in Suzhou, where the roundtable forum “The Path to the Integration of Real Economy and Industrial Internet” attracted many participants, during which the view shared by Wang Yong from Shanghai Electric Group was well-received by most of the participants, and Shanghai Electric Digital Technology Co., Ltd. attracted many followers. Looking back, “I have encountered many challenges and difficulties in my work, some of which even seemed unsolvable at that time, but I managed to come through eventually by perseverance. So in hindsight, perseverance is the dumbest as well as the most effective way. And I am grateful for my perseverance over the years.” He firmly believes that “in the future, Shanghai Electric Group will be the lighthouse in the industry!”

**THE PATH TO THE  
INTEGRATION OF  
REAL ECONOMY AND  
INDUSTRIAL INTERNET.**

## LI XIAOMING

**THE BEST VERSION  
OF MYSELF**

# L

i Xiaoming is a Leo. He is concise, organized, and extremely thoughtful.

He always thinks ahead and prepares everything in advance. Our WeChat conversation reflected his image vividly: mature, competent yet heart-warming. After graduation, Li joined Shanghai Electric in 2007. He did office work in a subordinate enterprise of Shanghai Electric for some time, and later was responsible for joint venture negotiations and investment management in the group headquarters. In this way, a well-rounded young man gradually grew into a comprehensively accomplished talent of the enterprise. “My requirement for myself at that time was to study

hard, and the most basic rule is: be an expert in front of the laymen, and never be a layman in front of the experts.” Looking back, he thinks he has benefited from continuous learning, which granted him not only the desired offer but also recognition, and every progress was made as if passing an exam. In 2017, Li was appointed the assistant director and deputy director of the strategic planning department of Shanghai Electric Power Transmission & Distribution Group. “It can be said that this job is both familiar and unfamiliar to me.” Shanghai Electric’s businesses cover 12 industries, and Shanghai Electric Power Transmission & Distribution Group happened to be one of the businesses that Li was tracking and studying. To describe his core responsibility in one sentence: to ensure that the Transmission & Distribution Group maintain steady growth in terms of efficiency, stability, safety, and foresight from a strategic planning perspective in order to reach the first-tier level. In the next year, the sales revenue of the Transmission & Distribution Group exceeded 10 billion yuan, reaching 11.3 billion yuan.





L  
LEARN

**“MY REQUIREMENT FOR MYSELF AT THAT TIME WAS TO STUDY HARD, AND THE MOST BASIC RULE IS: BE AN EXPERT IN FRONT OF THE LAYMEN, AND NEVER BE A LAYMAN IN FRONT OF THE EXPERTS.”**

In 2019, Li served as the head of strategic planning department of Transmission & Distribution Group, mainly responsible for plan-making, industry research, equity investment budget management, and investment and acquisition project promotion for the power transmission and distribution industry. That year, the transmission and distribution sales revenue hit 12.8 billion yuan, and in 2020, the sales revenue continued to grow steadily during the epidemic, “We expect that by 2023, the sales revenue will reach 20 billion yuan.” Li is pleased with the growth of power transmission and distribution business but is even more excited about the future. He attends meetings during the day, writes reports at night, and studies new developments on weekends, but he is happy working at Shanghai Electric Power Transmission & Distribution Group. “At age 35, I already find my place and play an important role in Shanghai Electric, which would be impossible if I work for foreign companies.” From Li’s resume, we can see that he has a clear career path, which fits well with the work he is doing. He keeps changing for the better and tries to be the best version of himself in one transition after another.

## YANG LINLIN

### SCIENTIFIC RESEARCH IS A “MARATHON” AND EVERY STEP COUNTS

**B**efore the interview, we were told that Yang Linlin was a “geek”. She graduated from Fudan University with a PhD in physical chemistry. She compared the research of flow battery to a “marathon”, in which the winner will be the one “who crosses the finishing line last”. On this marathon course, she has completed nearly 20 scientific researches for Economic and Information Commission, at group level and institute level, published 5 academic papers and applied for more than 30 patents. After joining Shanghai Electric Group Central Academy, she moved her research from the university to Shanghai Electric.

Maybe there are not many people who know about flow battery. But flow batteries are widely used in wind storage, light storage, peaking, frequency regulation and safety backup power, etc. At the end of 2017, Yang Linlin led the establishment of an all-vanadium flow energy storage product room and got much attention. After only one year of industrialization practice, she led her team to focus on fundamental R&D work in product design, technical mechanism research, product performance improvement, etc. Based on the previous technical and product advantages and directing at the competitive advantages of core products, her team made a series of breakthroughs and blazed new trails in the field of flow battery for energy storage. Recently, Shanghai Electric Group Central Academy set up the Shanghai Electric (Anhui) Energy Storage Technology Co.

Ltd. (hereinafter referred to as “Energy Storage Co., Ltd.”), which has begun its market-oriented operation. “In 2020, the newly established company started its market-oriented operation, and has established dozens of domestic and international sales channels, breaking the barriers of overseas sales, and has successfully received orders from Australia and Japan and realized the commercialization of energy storage products at home and abroad.” When talking about her research field and the products that she sees as her babies, Yang Linlin spoke with great fluency and showed her vision. The all-vanadium flow battery and other energy storage product systems developed by the company respond to Shanghai Electric Group’s strategic layout of energy storage technology and industry, fill the gap in the domestic energy storage industry in large-

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STEADFAST

scale energy storage technology, and provide the market with a safe, economic, green and comprehensive solution for large-scale energy storage. She naturally thinks that only when the industry itself is sound will the development of energy storage be better. “In three to five years, we can achieve the transformation from the manufacturer of energy storage battery and single system to researcher of energy storage technology, products, and system development as well as leading supplier of comprehensive energy solutions and energy storage system products including source-grid-load-storage network, wind and solar power storage and transmission, and multi-power, marine power, shore power supply.” We should manage well the key demonstration projects in Yancheng and Xuzhou in Jiangsu Province, Haixi in Qinghai Province, Datong in Shanxi Province and other cities, deliver the orders from Australia, Japan and other developed countries, accelerate the expansion of the market of Australia, Japan, Europe, South Africa and other international markets, and seize the opportunity of the international energy storage market.

**BASED ON THE PREVIOUS TECHNICAL AND PRODUCT ADVANTAGES AND DIRECTING AT THE COMPETITIVE ADVANTAGES OF CORE PRODUCTS, HER TEAM MADE A SERIES OF BREAKTHROUGHS AND BLAZED NEW TRAILS IN THE FIELD OF FLOW BATTERY FOR ENERGY STORAGE.**







## GU XIAOJIAN

### NUCLEAR POWER AS A LIFELONG CAREER

# G

Gu Xiaojian was attracted by the “mysterious” nuclear equipment. When graduating from the Department of Mechanical Engineering, Nantong Institute of Technology in 2007 with a degree in mold design and manufacturing, he was recommended by his teacher to Shanghai No 1 Machine Tool Co., Ltd. to work as an intern assembly inspector because of his excellent

performance in school. The first time he came into contact with a nuclear site, he was almost buried by a large number of procedure documents and drawings, and overwhelmed by the identification of parts, dimensional checks during manufacturing processes, verification and validation during assembly, and on-site technical service. But difficulties did not thwart him. “You should love what you do, and be highly responsible and dedicated to do a good job.” Guo Xiaojian is a man of his words.



**“YOU SHOULD LOVE WHAT YOU DO, AND BE HIGHLY RESPONSIBLE AND DEDICATED TO DO A GOOD JOB.”**

# G

STRUGGLE

After a period of tempering, he was recommended by his master to the workshop director to do the alignment measurement of 300MW guide sleeve components and barrels.

Gu Xiaojian received no professional training, but he invented a practical patent called “the laser alignment measurement system”, which was awarded a national invention patent certificate. This invention has achieved a 100% pass rate in alignment inspection control. He stood out right away from the production line.

In the past 5 years, he has always enriched his career with perseverance and a pragmatic spirit, sticking to his post in nuclear power quality inspection. Step by step, he has participated in a number of national major science and technology research and testing projects, and from the second generation plus, third generation plus to the current fourth generation of nuclear power, he has completed the testing of a total of 33 units of components inside the reactor. Now, Gu’s work achievements have also been recognized by the company and the city. He has received many honors from the company and the group, and has also been awarded the titles of “Excellent Migrant Worker”, “May 1st Labor Medal” and “May Fourth Youth Medal” by Shanghai Municipality. Gu Xiaojian said ardently, “the progresses cannot be made by me without my company’s training. And the development of nuclear power has empowered every employee who is inquisitive and hands-on.”

## WANG XIAOFANG

### ACCEPTING THE PAST WITH NO REGRETS AND FACING THE FUTURE WITH NO FEAR

# T

he biggest secret to a woman’s success is reason. Wang Xiaofang, a native of Hunan, graduated from Southeast University in Nanjing with a master’s degree and joined Shanghai Electric Heavy Machinery Co., Ltd. (hereinafter referred to as “Shanghai Electric Heavy Machinery”) in 2008. Wang Xiaofang

has a unique insight, “in a hot-working enterprise where there are relatively fewer females, you have to play down your gender at work and highlight your gender in life. Women should be wise and gentle, persistent and calm at the same time, and they should excel at work and enjoy life. This is my understanding of how to be a happy woman.”

After Wang Xiaofang joined Shanghai Electric Heavy Machinery in 2008, she was fortunate to meet the team led by academician Pan Jiansheng from Shanghai Jiaotong University. At that time, Shanghai Jiaotong University and Shanghai Electric Heavy Machinery conducted the industry-university-research cooperation, which was a good learning opportunity for her. Because for researches on the special characteristics and process equipment of the materials, from the product structure that Shanghai Electric Heavy Machinery researched at that time, such as megawatt ultra-supercritical thermal power rotor forgings, nuclear power large forgings, process equipment research, academician Pan Jiansheng’s team provided strong technical support, and also helped her gain great progress in this professional field.

**“TIME WAITS FOR NO ONE, BUT THE FUTURE IS PROMISING. ALTHOUGH THE ROAD AHEAD IS LONG, WE CAN REACH OUR DESTINATION EVENTUALLY AFTER THE LONG TRAVEL; THINGS CAN BE DONE NO MATTER HOW DIFFICULT THEY SEEM. MAY YOU AND I NEVER FORGET OUR ORIGINAL GOAL. WE SHOULD ADHERE TO OUR IDEAL, TAKE UP OUR MISSION, AND FORGE AHEAD!”**





**“YOU SHOULD LOVE WHAT YOU DO, AND BE HIGHLY RESPONSIBLE AND DEDICATED TO DO A GOOD JOB.”**



“Compared with the Internet, electronic products, and other rapidly renewing fast-consuming industries, our industry requires a long period of technical accumulation, ‘it takes three or five years to just get started, and ten years to be a professional’. I know that there is no shortcut to technical work, I have to be down-to-earth, rely on the accumulation and inheritance of past generations, and constantly

study the boring material data and make progress little by little. You have to ‘know it and its nuts and bolts’ to ensure the steady improvement of product quality.” And all of this is attributed to rational thinking. A reasonable woman can keep her head clear at all times and from being affected by emotions. The more rational a woman is, the more charming she is. She can take the initiative at work

**W**

REASON

and use rationality to solve problems. To end this interview with Wang Xiaofang's words, “Time waits for no one, but the future is promising. Although the road ahead is long, we can reach our destination eventually after the long travel; things can be done no matter how difficult they seem. May you and I never forget our original goal. We should adhere to our ideal, take up our mission, and forge ahead!”

## LI GUANGZHOU

CHASING DREAMS AT “ELECTRIC SPEED”

**L**  
WATCHMEN

**W**ho are the loveliest people in the world? Perhaps we all have different opinions. But all in all, the answer is surprisingly consistent: people who have dreams! “Engineering works involve great responsibility and can be extremely tiring. But the most important thing is to have a dream, because it is impossible to succeed if you don’t dare to dream.” Since 2017, when Shanghai Electric Environmental

Protection Group first considered new energy projects at large bases, Li Guangzhou, engineering director of the New Energy Division, began his journey of new energy. He has even been called by the locals the unbelievable “madman”, because he stationed on site in Xinjiang for more than 600 days, leading his team to complete a total of five PV projects there with a grid-connected scale of 500 MW. The Xinjiang project has not only yielded results in Xinjiang, its experience has also been shared by Li Guangzhou in Guangzhou, Heilongjiang, Ningxia and other

parts of the country. In June 2019, Li Guangzhou once again surpassed himself and set the new record of the “electric speed”. The combined PV project in Xinjiang, led by him, was connected to the grid and generated electricity in only 43 days, setting the new speed record for PV projects in northern Xinjiang. However, Li Guangzhou never took a break. Because he has one dream, “Let the blue sky and white clouds we see as children return to our life.”

**WHO ARE THE LOVELIEST PEOPLE IN THE WORLD? PERHAPS WE ALL HAVE DIFFERENT OPINIONS. BUT ALL IN ALL, THE ANSWER IS SURPRISINGLY CONSISTENT: PEOPLE WHO HAVE DREAMS!**







**IN FACT, ROBOTS ARE NOT MYSTERIOUS. THEY ARE MERE EQUIPMENT AND JUST SPECIAL EQUIPMENT THAT IS FAST AND TIRELESS WITH HIGH PRECISION.**

## YU ZHENYU

**LEADING ACTOR BEHIND THE “STAR”**

“

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n fact, robots are not mysterious. They are mere equipment and just special equipment that is fast and tireless with high precision. Of course, they also require operators of high level of skills.” Although never trained in this field, Yu Zhenyu believed that mechanical automation shares some “similarities” with equipment maintenance, his previous work. In order to improve his professional skill, Yu Zhenyu went

to many training classes and studied on his own. When he was most obsessed, he was still thinking about robots when he was eating and reading relevant operation information while sitting in the car. In recent years, as a technical support staff, Yu Zhenyu has participated in the construction of many branch plants, including the equipment relocation and maintenance for Nanchang Haili, Haili India, Mianyang Haili and other plants at home and abroad and the construction of intelligent plants. In addition to his own work, he also conducts

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induction training and operation assessment for employees of off-site factories, so that they can be more familiar with the installation, commissioning, operation and maintenance of robots. In 2016, Yu Zhenyu’s team won the second prize for the research and development of “the flexible automatic assembly production line” issued by China Mechanical Manufacturing Technology Association. Besides the daily contact with industrial robots at work, Yu Zhenyu also has a strong interest in a variety of intelligent equipment and cutting-edge information in the field of robotics. “As they say, love what you do.” Yu Zhenyu led the Haili intelligent manufacturing automation team to win the championship of Pudong “Kangqiao Cup”, aka the first robot application skills competition with the idea of “Haili Water Bar”. This creative product was also exhibited at the Industrial Expo and highly praised by the visitors to the booth. The “Haili Water Bar” is a robot that can make drinks on site to meet different needs of users. The design won the favor of the judges because of the smartness, gracefulness, smoothness and exquisite details of the robot. Visitors at the robot exhibition could get a personalized drink by scanning the QR code on the robot, and that’s why “Haili Water Bar” was favored and praised by a large number of visitors. “Since the birth of the first robot in the 1960s, there have already appeared three generations of robots in the world. The robot industry is likely to yield trillion-dollar output value in the near future, just like the automobile industry, and become a pillar industry of our country. I feel honored to be part of it.” Yu Zhenyu is full of hope.

## JIANG YONG

### UNDERSTANDING THE WIND

Jiang Yong’s life motto is: if you put your heart into your work, you can definitely do good work. That’s what he preaches and practices. In 2016, he was awarded Shanghai Electric’s Top 10 Model Youths Medal. In 2017, he was awarded Shanghai Young Model Worker, and in 2019, he contributed a great deal to the 10 billion output value of the wind power. He independently developed the “active assisting technology” for wind turbines, “the third-generation wind power control technology” and “load and control integration simulation platform”. “The results of these years are based on the field experience accumulated and the first-hand data obtained in previous years.” In 2020, he embarked on the digital transformation of wind power. “In the end, wind power is all about the use of data. Ultimately, it’s about how to make use of digitalization to enhance the efficiency of our business processes.” Jiang Yong is very clear that digital technology can bring greater changes to the wind power industry. Why is digital transformation particularly critical and important for wind power? “In the end,

what is wind power all about? It’s about the statistics, the use of data.” Jiang Yong said the main reason is the uncertainty of wind power. “For example, when designing a wind field, we can completely follow the European standards, but this is not the optimal design, because the wind field in each place has different wind speeds and wind directions. So we will adopt different designs for mountainous areas and plains in China. The wind generated in these areas is different, so we cannot rigidly follow the European standards, because that will not be optimal.” Throughout the interview, Jiang Yong kept talking about “wind direction, wind speed, wind

power, wind volume”, as if he understands the wind naturally, and you have to admit it is the truth. He does not follow the tide of the times or the rigid standard. As an expert in wind power, he just practices self-restraint to the extreme and designs valuable wind turbine products. **D**

J  
CIRCUMSPECT



**HE JUST PRACTICES SELF-RESTRAINT TO THE EXTREME AND DESIGNS VALUABLE WIND TURBINE PRODUCTS.**



# SHANGHAI ELECTRIC SOLUTION TO “TEXAN COLD-AIR OUTBREAK”



ON FEBRUARY 20, US  
PRESIDENT JOE BIDEN  
DECLARED A STATE  
OF MAJOR DISASTER  
IN TEXAS, A COLD-AIR  
OUTBREAK SWEEP  
ACROSS THE STATE.

**O**n February 20, US President Joe Biden declared a state of major disaster in Texas, a cold-air outbreak swept across the state. Texas, as a major energy State, has a warm climate. However, its local energy system has encountered an unprecedented impact due to the extreme weather. A large number of people have been left living without electric power and water, ended up suffering from cold. Fifty-eight people have died at present, which has drawn continuous attention of the whole world.

On Zhihu, @People's Daily Online raised a question: if Texan cold-air outbreak hit China, would such a “tragedy” take place as well?

Shanghai has been “the window for the world to observe China’s electric power” for a long time. In the beginning of this year, Shanghai has gone through a cold wave that broke the record of the lowest temperature of the same period in this century, and Shanghai’s power grid beat a new record high in its power grid load. However, the stable operation of the power grid has not been affected by the cold-air outbreak.

Nevertheless, the frequent occurrence of global extreme meteorological disasters and what is happening in Texas should be a wake-up call for the world to pay attention to the safe running of cities. If the temperature in Shanghai dropped to minus 20 degrees Celsius like that in Texas, what would it look like? How should we respond? Professionals in Shanghai Electric Group have been all concerned about this issue and conducted in-depth analysis and study in this respect.

## SHIFT FROM PASSIVE DEFENSE TO ACTIVE DEFENSE

No final conclusion has yet been reached in the cause analysis of the Texas’ large-scale blackout. However, no matter which link of power supply was damaged by the cold-air outbreak, an obvious weakness was exposed by local government, its isolation and helplessness.

Power supply in the US is supported by the individual power grids managed and run by different shareholders. Determined by their capital flow, these power grids act in their own ways and lack coordination among them. And the power grid of Texas is independent from the power grids of the other states.

The direct factor contributing to the blackout is the increasing load of the local power grid. In simpler terms, the power consumption of user end rises so sharply that the power company cannot supply, so the company has to cut off the power supply to some users in order to guarantee its power grid safety.

Regarding the power supply in China, according to the Achievements of China’s Power Industry in Seven Decades published by Price: Theory & Practice in 2019, the power industry in new China had grown from the weak to the strong, and from the backward to the advanced, making remarkable achievements. The power grid of poor safety in

early years has been developed to be one of the safest power grids worldwide, guaranteeing the high reliability of power supply. Moreover, “all power grids have been integrated into one national grid”. Statistics have shown that East China has experienced for many times the extreme cold in 2016, 2018 and the end of last year and the beginning of this year respectively, when Shanghai power grid has realized its full power supply every







time and avoided any energy supply disturbance or power restriction resulting from insufficient power supply capacity.

Some power experts believe that another major cause of the blackout in Texas, US lies in its underestimation of the extreme meteorological disaster. Despite the early warning issued by the local weather forecast, local power companies lacked the experience to timely respond to, to prevent and to mitigate the disaster, as they have a warm weather and abundant energy supply all year round.

By comparison, China has a vast territory and sees different climate conditions in different regions, and all power grids have been integrated into one national grid. Therefore, Shanghai, a city located in a subtropical monsoon climate zone, can also share the experiences of the cold temperate and middle temperate zone nationwide.

"Extreme meteorological disasters have happened more frequently in recent years. However, there is always a 'window period' for emergency response after disaster forecast and before serious consequences are produced," Zhang Fan, the Deputy Director of Shanghai Electric Power Generation Group Intelligent Development Center, introduced emergency response with power generation equipment suppliers as an example. According to him, the power generation equipment made in Shanghai are sold all over China and the world. Along with the development of industrial intelligent technology, application of advanced sensing technology, analysis of massive data, accumulation of rich experience and consolidation of mechanism knowledge, the new generation of power generation equipment can better adapt to different operating conditions. Therefore, equipment suppliers can prepare spare products and parts in advance to assure rapid service response, and meanwhile support operation and maintenance companies and power grid companies to work out effective solutions.

In recent years, emergency supplies for power failure such as candles and flashlights have become things of the past for Shanghai citizens, and sudden blackouts have become rarer. Shanghai power grid's reliability rate for overall power supply reached 99.9923% in 2020, making it the first provincial power grid that has exceeded a reliability rate of "four nines" (99.99%) for two consecutive years. Moreover, the power supply reliability of the urban power grid in Shanghai core built-up area has attained 99.9991%, and hence Shanghai power grid took the

lead among all other municipal power grids of China to pass the critical point of "five nines" (99.999%). These achievements suggest that the urban distribution network of Shanghai has stuck out from the world first-class networks and grown to be the international leader.

Power supply reliability constitutes an important indicator to evaluate the development level and service quality of a power grid. A power supply reliability rate of 99.999% is regarded as the internationally recognized "gold criterion" for the first-class power grids, which requires that the average blackout time of each power customer per year shall not exceed 5 minutes. At present, only a few cities including Tokyo and Singapore in the world have reached or exceeded such criterion. Shanghai core built-up area even realized a power supply reliability rate of "five nines", indicating that the average annual blackout time of each user is less than 4.6 minutes. However, the past and present experiences may not be enough for us to respond to possible

contingencies in the future.

The newly published Shanghai 14th Five Year Plan Outline puts forward that Shanghai shall strengthen the concept of safety and resilience adaption, maintain flexible in terms of infrastructure construction, emergency material storage and support and improve the city's capability of disaster response.

At present, Shanghai is building a "resilient power grid" that further improves power supply reliability, responds to various risks and enables quick recovery. Shanghai Electric Group is now exposed to three major trends, the change of focus from products to the product system, the Internet of Everything and the transformation from single manufacturing to service & manufacturing. After intelligent equipment is produced, by connecting equipment and processing data, Shanghai Electric can not only improve its insights into business, market research and strategic layout, but also acquire the capability to offer industrial solutions and change passive emergency response to active defense.

## NEW ENERGY JUSTIFIED ITSELF

A piece of news about Texas blackout has attracted the attention of Shanghai Electric: During the blackout, some locals kept themselves warm in their Tesla in cold nights.

A netizen wrote on social media, "Last night the electricity was cut off for 6 hours. We had no heat or firewood left in the house, so my wife, our baby daughter, I and my dog slept in Tesla which was warm and comfortable."

The camp mode developed by Tesla can turn the car into a comfortable and breathable space that maintains certain airflow, temperature and indoor lighting, as long as the battery is no lower than 15%. Under normal circumstances, the battery can support the camp mode running for 7-8 hours, while electricity consumption will be greater in extreme cold.

"Though the battery of electric vehicles cannot support the long operation of such mode, this case can bring us inspirations to attach greater importance to energy storage of the power system," said Zhang Fan.

Shanghai Electric has established a smart microgrid system integrating "wind energy and solar energy storage" in Sanxing Town of Chongming. In such system, Shanghai Electric rents farmers' roofs for photovoltaic power generation, and the power generated is mainly for self-use among farmers, with the surplus electricity incorporated into the power grid to get profit. In the meantime, the energy storage battery system is newly adopted, to stabilize photovoltaic power, realize peak load shifting to off load and improve power quality. In both Shanghai Minhang Industrial Zone and Qinghai Golmud, the smart energy system centering on energy storage has been established by Shanghai Electric. Zhang Fan explained that general users were helpless in the large-scale blackout resulting from







## DEPTH REPORTS

Texan cold-air outbreak." A new energy expert explained that the basic loads should play a primary role during the disaster, but the failure rate of the basic loads power supply system in Texas was even higher than that of new energy. Therefore, either traditional energies or new energies shall constantly improve equipment and system reliability for power supply, optimize the algorithms for coordination and jointly improve power protection capability of cities. "Despite our advantages, we shall be aware that the fundamental cause for Texas blackout is global warming." According to Kang Pengju, the Wind Power Technology General Manager of Shanghai Electric, who have long working experience in both American and Chinese enterprises, every city will take economy into consideration while designing safety redundancy, instead of lifting safety redundancy without limit.

Kang Pengju introduced that the power generation equipment in Texas failed to incorporate the extreme cold weather in its requirement on environmental adaptability. For example, the gas turbine is generally mounted outdoor for the purpose of heat dissipation (which is generally mounted indoor in China). Such environmental adaptability shall be improved. However, cities in the south will never put as much effort on freezing prevention as in the north, and cannot put into consideration all extreme cases in safety redundancy design.

Kang Pengju said, "The fundamental solution to future risks still rests in developing new energy, reducing carbon emission and uniting together to respond to extreme meteorological disasters caused by global warming."

"Rome was not built in a day." It takes a long time to improve equipment and unblock power grids. Despite the extreme weather of low temperature, rain, snow and freeze from one year to another, we shall supply power to every family and never leave anyone behind. **D**

the overload of the major power grid. However, the flexible small-scale distributed energy system can be used by general users to support their small electricity demand, which can effectively reduce the electricity load of the power grid and accelerate the power supply recovery of the whole city.

As introduced by the electrical power administration, along with the constant emergence of new business models including electrical vehicle, distributed power and virtual power plant, Shanghai is now studying on the utilization of these new resources to speed up the power supply recovery for critical loads and improve the flexible resilience of the power grid against different disturbances.

"Compared to basic loads such as fire coals, gas and nuclear power that supply stable electricity continuously, new energies including wind and solar power are borne with the defects of discontinuity and instability in power generation. However, new energy has justified itself to some extent in the



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