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EMPOWERING WATER WITH INTELLIGENCE

REVIVING BUSINESS THROUGH WISDOM

上海电气
SHANGHAI ELECTRIC

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MAKE CITIES SMARTER

On July 20, Henan Province was hit by floods caused by heavy rains. Touching moments when people helped each other amid the deluge were shared by many people in their WeChat Moments. A couple of people saved a woman on the verge of being drowned with a rope, a dozen saved 3 grandparent and grandchildren after cutting an opening on the car roof, and a man passing by saved a family of three and rescue workers trapped in a quagmire with an umbrella. Rescue teams were angles, but they also had to risk their life in the disaster. We are used to horrible scenes of disaster movies, but scared of facing real miseries.

Intense emotions fill our hearts, sorrow, regret and passion. The word "sympathy" is too shallow for this tragedy because one can never truly understand the hardship unless he/she is part of the sad story.

Natural disasters just happen, never leaving any time for men to get prepared or to feel sorrowful.

It is highly possible that one second ago, you believed that you were the last one to be bothered, and now you are in trouble. On July 25, Typhoon "Fireworks" severely affected Shanghai. People "traced" everywhere it would go on Apps and listened attentively to its level forecasted. "Standing water alarm sensors" were deployed in corners of buildings, whose data will be directly transmitted to the center for urban operation that will react according to the water quantity. Therefore, Shanghai people hardly find any ground to say "it just rains a lot" concerning floods in Henan Province.

Videos on places that are easy to stock rainfall and key watercourses, which are closely monitored for preventing floods and typhoons, were broadcast respectively in the center for urban operation based on video data including micro mounts of the city operation platform, road surfaces, some tunnels and underpasses. The "all-in-one net-based management" system developed by Shanghai Electric made remarkable achievements in the fight against Fireworks. It is too important to be able to sound alarm over extreme weather conditions. Although the typhoon cannot tell us when it lands, nor will precipitation informs whether it will overwhelm the city, we can make predictions and estimations via big data that is also useful in rescue work. A "false alarm" probably is the best news when natural disasters come.

The intelligence of a city proves its presence through digitally-empowered control of waterlogging, such as predictions about floods, emergency management and immediate responses. It is the urban intelligence that makes the "false alarm" possible.

Floods in Zhengzhou City uncovers an array of problems to be addressed amid building smart cities, and we are expected to fulfil the corporate social responsibility of developing a "smarter city". Over the long run, we shall invest more resources to upgrade tools for city management, smart water affairs and smart power after being attacked by floods this year to make people have a stronger sense of satisfaction and happiness. It demonstrates how digital economy and social development grow in parallel, and more importantly, aligns with the common vision shared by people on the planet.

ELECTRIC SHANGHAI 上海电气

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ELECTRIC NEWS

Shanghai Electric's Four Brands Awarded as Top 10 Industrial Brands of Shanghai 1921-2021

Shanghai Federation of Industrial Economics (SFIE) and Shanghai Federation of Economic Organizations (SFEO) announced the "100 Famous Industrial Brands of Shanghai 1921-2021 and 10 of My Favorite Brands" recently, who were organizers of the selection. Shanghai Electric Group Co., Ltd. and its three subsidies were awarded "Shanghai Industry 1921-2021 My Favorite Brands (Industrial Product Category)", which were Shanghai Mitsubishi Elevator Co., Ltd., Shanghai Highly (Group) Co., Ltd. and Shanghai Micro Electronics Equipment (Group) Co., Ltd.
In May, social organizations SFIE and SFEO performed their duties by mobilizing industrial organizations to recommend 670 Shanghai-based industrial brands to participate in the selection, who shall have large market shares by production quantity and sales, high brand value and social recognition.

China's Largest Thermal Seawater Desalination Project Produced Water

Recently, Zhejiang Petrochemical Phase II with a capacity of 200,000 t/d undertaken by Shanghai Electric Water Engineering Co., Ltd. produced water in the first trial, which refreshes a number of industrial records. At present, there are no more than three thermal seawater desalination plants whose daily capacity exceeds 10,000 tons, and Shanghai Electric is the sole player with a capacity of over 100,000 t/d and 200,000 t/d. Shanghai Electric Water Engineering owns the intellectual property of the MED-TVC technology that is independently developed by the company after 10 years' research. The model uses low-grade hot water as the heat source for thermal seawater desalination. By avoiding the use of high-grade steam, it has greatly reduced the cost of seawater desalination. Following Brunei Hengyi, Tangshan Fengnan and Zhejiang Petrochemical Phase I, the new project represents a significant breakthrough with a capacity of 200,000t/d, and has been shown to support three heat sources - steam, hot water produced from aromatics units and process condensate, which plays a demonstrative role in helping Shanghai Electric promote this proprietary technology.

High-tech Project Succeeded, Making “A Big Shipbuilding Power” into an “Advanced One”

Recently, the project titled “Research on Key Technologies of Forged Cranks for Low-Speed Diesel Engines”, which targets at advanced shipbuilding technologies, passed the inspection of the expert team. Shanghai Electric SHMP Casting & Forging Co., Ltd. participated in the research. The forged crank of the low-speed diesel engine is considered as the engine’s “heart” due to its importance. Experts of the inspection team agreed that the project was successfully completed after listening to reports by research institutions, examining related documents, conducting on-siting inspections, asking questions and having discussions. They believed that this technological breakthrough will boost China’s upgrading from “a big shipbuilding power” into an “advanced one”.

BRIEF NEWS

Shanghai Electric Power Transmission & Distribution Engineering Won New PV Project Contract in Canada

Recently, Shanghai Electric Power Transmission & Distribution Engineering Co., Ltd. signed a new contract with the Canadian company PCL, according to which it will provide equipment to the 48.3MWac PV plant in Conrad. It is the second tender won by Shanghai Electric Power Transmission & Distribution Engineering in Canada after the 465MWac PV plant in Traverse. It will enhance its presence in the engineering market in Canada, and expand its business scope in the power market of developed countries of North America.

Shanghai Electric’s Philanthropic Activity Covered by Pakistani Media

Shanghai Electric Pakistan Thar Power Generation Company held a philanthropic activity at two villages near the power plant together with the Thar Power Plant Project Department as the Corban Festival approached by sending gifts to over 200 local children. This move was widely covered by local media in Pakistan. Shanghai Electric Pakistan Thar Power Generation Company had collected detailed information about nearby villages and carefully prepared how to send these gifts. On the day of their visit, villagers in ethnic costumes got together at the square in front of the mosque. When children received gifts, laughter and applauds rose from the square.

Shanghai Electric Central Academe Won Global Tech-Matching Fair 2021 Co-Creation Award

Recently, the organizing committee presented the Global Tech-Matching Fair 2021 Co-Creation Award to Shanghai Electric Group Co.,Ltd. Central Academe (hereinafter referred to as "Shanghai Electric Central Academe"). Shanghai Electric Central Academe has participated the 2020 and 2021 sessions of the fair, and exchanged ideas with tech-matching institutions, universities, research institutions and start-ups on intelligent manufacturing, comprehensive energy, high-end health care and environmental protection, shared its experience of innovation input and output ecosystem building and cooperation proposals for open innovation, which attracted a lot of attention and was widely recognized. It lays a good foundation for later cooperation projects on different levels.

Shanghai Electric's Broetje-Automation Made the Biggest Deal So Far

Recently, Shanghai Electric Group's subsidiary Broetje-Automation GmbH (hereinafter referred to as "Shanghai Electric Broetje") signed its biggest contract since its establishment 42 years ago on the assembly line of Airbus' new plane model due to its world-leading solutions for world-leading plane assembly line planning and automation among a number of strong competitors. The project utilizes Shanghai Electric Broetje's world-leading drilling and riveting equipment and production line integration and management systems. Airbus plans to launch its revolutionary new model in 2023.

Shanghai Electric Wind Power Group Collaborated with Danish Enterprise on Wind Power Technololgies

Shanghai Electric Wind Power Group Co., Ltd. and China Denmark Wind Power Group held a meeting to exchange technologies days ago. Attendees included Consul General Jakob Linulf, Royal Danish Consulate General in Shanghai, Yang Hong, Vice President of Shanghai Electric Group, Thomas Muller Anderson, Chairman of China Denmark Wind Power Group, and representatives from 27 Danish companies, and shared insights on technologies. At the meeting, both companies inked a strategic cooperation agreement and agreed to cooperate on blades, gear boxes, control and other technologies.

Shanghai Electric Power Generation Environment Protection Engineering Received AIP from ABS

Shanghai Electric Power Generation Environment Protection Engineering Co., Ltd. (hereinafter referred to as "Shanghai Electric Power Generation Environment Protection") received Approval in Principle (AIP) from American Bureau of Shipping (ABS) for its desulfurization system designed for ships (type-I desulfurizer) after its U-shape mixed desulfurization system approved by Lloyd's Register of Shipping. It means that desulfurization systems designed by Shanghai Electric Power Generation Environment Protection for different types of ships and main motor powers meet requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) and ship classification societies. So far, Shanghai Electric Power Generation Environment Protection has received certifications from two world-class ship classification societies, which enables its desulfurization systems to increase their market share.

SHANGHAI ELECTRIC SEES BRAND VALUE SURGING AGAIN by Over **RMB 145 Billion**

On June 22, the 18th World Brand Summit organized by the World Brand Lab took place in Beijing. At the summit, the ranking of China's 500 Most Valuable Brands 2021 was released. Shanghai Electric placed among the top 50 in this annual list that weighs financial data, brand strength, and consumer behavior, with a brand value of RMB 145.165 billion, up by 37.4% year on year, continuing to lead the machinery category in China.

The summit this year is themed "Sustainable Brands Drive Corporate Growth." A joint survey by the World Brand Lab and SuperFinance shows that the sustainable growth of the Chinese economy is strongly connected to the rise of Chinese brand value. Brands have an impact on production and consumption, eventually driving economic growth.

As a representative of Chinese industrial businesses, Shanghai Electric has a history dating back to 1902. Along with China's industrial development, this century-old brand has been constantly aligning its brand strategy with the times and market demand. From the start of the 14th Five-Year Plan, Shanghai Electric, with the support of connected intelligence, big data, and cloud technology, leverages its industrial ecosystem and data across different professions, and explores application scenarios and tries to structure and model them, converting more potential opportunities into concrete business opportunities. To this end, Shanghai Electric has restructured its brand strategy, defining "synergy" as its brand core and incorporating intelligent manufacturing and industrial digitalization. It seeks to deliver optimal solutions in the sectors of smart energy, intelligent manufacturing, and smart cities, and drive the development of a one-of-a-kind industrial ecosystem.

World Brand Lab is an international brand value research institute, wholly owned by World Executive Group, the world's leading digital business and strategy consulting firm. World Brand Lab was founded on the initiative of Robert Mundell, winner of the Nobel Prize in economics in 1999, who served as its first chairman. The experts and consultants of the World Brand Lab come from Harvard, Yale, MIT, Columbia, Oxford, Cambridge, INSEAD, and other top universities around the world. Its research results have become an important basis for intangible asset valuation in the M&A process for many enterprises.

Tongji University and TST Set Up Research Center for Smart Rail Transit

On June 16, Thales SEC Transport System Co., Ltd. (TST) inked an agreement with Tongji University to jointly set up the Engineering Technology Research Center for Smart Rail Transit. The signing ceremony took place on the Siping Road campus of the university.

As the pioneer in China's rail transit industry, TST has long been engaged in independent innovation and working with customers and industry partners to explore cutting-edge technology and its application in the rail transit sector. The technology center in collaboration with Tongji University this time will focus on ten directions of smart rail transit construction - passenger services, transportation organization, train operation, green and energy saving, intelligent technology, infrastructure, O&M security, network management, cloud computing and big data platforms, and system of technical standards. As part of their industry-university-research cooperation, the two sides aim to develop forward-looking products and technologies and study and incubate technology, equipment, and standards for rail transit.

Being a renowned multidisciplinary university in China, Tongji University ranks among the top in terms of multidisciplinary R&D capacity and owns the country's first Comprehensive Test Platform for Urban Rail Transit. TST and Tongji University have a long history of collaboration, and the new research center will leverage the university's forward-thinking theoretical research and TST's innovative practice in the rail transit industry. The goal is to encourage the application of relevant research findings and contribute to the development of smart rail transit.

Jia Tinggang, President of Shanghai Electric Automation Group, and Lei Xinghui, Vice President of Tongji University, inaugurated the center. Shen Hong, CEO of TST, and Yin Xuefeng, Deputy Dean of the College of Electronic and Information Engineering, Tongji University, signed the agreement on behalf of the two parties.

SHANTOU SITE OF SHANGHAI ELECTRIC WIND POWER AWARDED TYPICAL CASE OF ENERGY HIGH-QUALITY DEVELOPMENT

Recently, the Shantou site of Shanghai Electric Wind Power Group has been awarded the Typical Case of Energy High-quality Development for its Smart Energy Demonstration Project at the Energy High-quality Development Forum 2021 organized by China Energy News Press and China Institute of Energy Economics Research.

The Shantou project, with high penetration of renewable energy, employs the dynamic control technology integrating "grid, generation, load, and storage", and makes the most of the rich wind and solar resources in Shantou to achieve self-organization, self-balancing, and self-optimization of energy, while guaranteeing strict power supply reliability and high-quality power. The project represents a crucial practice of multi-energy complementation and the "integration" of generation, grid, load, and storage, as well as an important demonstration for future low- and zero-carbon-emission industrial parks and even smart cities. It is also deemed a feasible strategy to meeting the targets to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060 and the control indicators for total energy consumption and energy intensity.

The award, based on an evaluation of candidates' innovation, representativeness and social benefits, is intended to praise the companies that have made outstanding contributions to energy transformation and upgrading. This year, the award was presented to a total of 20 businesses across the country.

Shanghai Electric Powers China's First Medium-capacity Digital Rail-guided Tram

On the morning of June 30, China's first medium-capacity digital rail-guided tram - T1 Demonstration Line (T1 Line for short) in the Lin-gang New Area of Shanghai Pilot Free Trade Zone, was put into operation. Shanghai Electric Group is among the companies involved in the project.

During the construction of the T1 Line, Shanghai Electric Automation Group was mainly responsible for the development and construction of core systems, including those for digital-rail transport, operation control and management, and integrated communications. In particular, the intelligent digital-rail transport system (iDRT) developed by the Intelligent Transportation Technology Co., Ltd. under the Shanghai Electric Automation Group uses magnetic markers as virtual tram tracks, leverages rubber tire trams as vehicles, and adopts modern tram operation control methods, so that the system boasts rail-based, digital and intelligent operations.

The T1 Line, a significant project for Shanghai Electric to pay tribute to the 100th anniversary of the founding of the Communist Party of China, was completed in less than eight months from the start of construction to the official opening. It is the first commercialized digital-rail transit system project of the Group after years of technology accumulation.

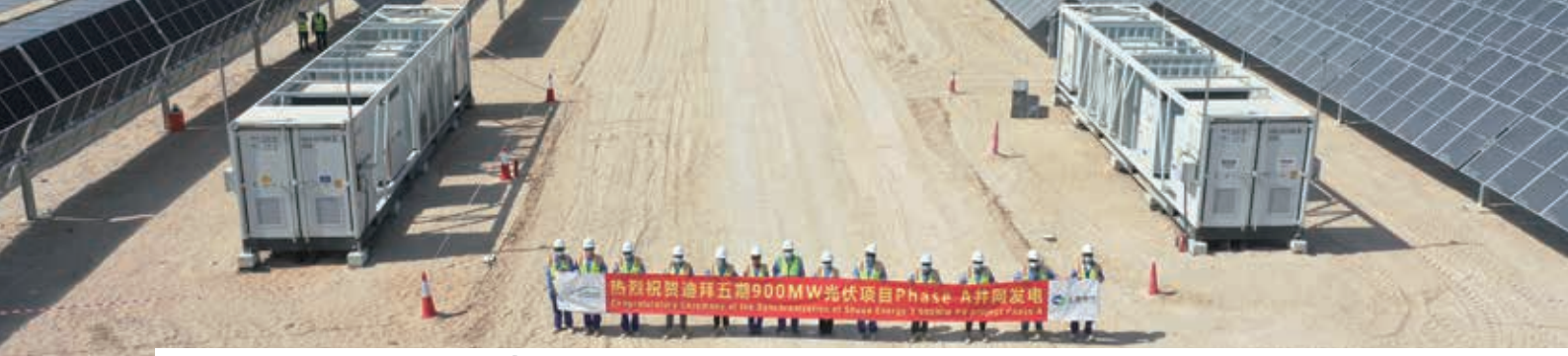
The T1 Line (Dishui Lake - Hongyin Square) extends along the east-west passenger corridor of the Industry-city Integration Demonstration Zone. It spans ten stations across a total length of 21.75 kilometers, passing several functional areas such as the Central Area of Lingang, College Town, Heavy Equipment Industrial Zone and Nicheng Community. As a result, it is considered as a major project in the Lingang New Area that links key locations, serves key projects, and promotes industry-city integration.

In the transportation plan of the Lingang New Area, there are six 105-kilometer medium-capacity transit lines in total. Following the official opening of the Lingang T1 Line, the T2 Line Phase I and the T6 Line are also expected to be approved and start construction this year. In the future, the six transit lines will be connected into a loop, becoming the public transport artery of Lingang, and playing an important role in fulfilling the "15, 30, 60, 90" goal (i.e. 15min to Pudong International Airport, 30min to Central Shanghai, 60min to Hongqiao International Airport, 60min to the Yangtze Delta) of mobility service in the area.

SHANGHAI ELECTRIC'S 100TH 1000MW COAL POWER UNIT PUT INTO OPERATION AFTER 15 YEARS

On June 21, Changzhi Power Plant of Jinneng Holding Group placed its two 1000MW power units into service, bringing the total number of 1000MW coal power generation units delivered and put into service by Shanghai Electric Power Generation Group to more than 100. It took just 15 years from the delivery of the first 1000MW unit to the Huaneng Yuhuan Power Plant in Zhejiang in 2006 to reach this glorious milestone in 2021, in commemoration of the 100th anniversary of the foundation of the Communist Party of China.

The 100 1000MW units put into production by Shanghai Electric Power Generation Group have captured two-thirds of the market. The first 1000MW unit in China at Zhejiang Yuhuan Power Plant, the single-shaft unit with the largest capacity in China (1240MW) at Guangdong Yangxi Power Plant, the world's first 1000MW double-reheat unit at Jiangsu Taizhou Power Plant, the 1350MW double-reheat twin-shaft generation unit in Anhui Pingshan Power Plant, and three 1000MW units in Cilacap Power Plant and Java No. 7 Power Plant in Indonesia under the Belt and Road... the footprints of the Group in the sector of 1000MW units are solid and powerful throughout its route of coal power technology development, from technology introduction to independent innovation, and ongoing technical upgrades.



Phase A of Dubai Project Phase V by Shanghai Electric Connected to Grid

Recently, the Phase A of the fifth phase of the Mohammed bin Rashid Solar Park by Shanghai Electric was successfully connected to the grid, right after which the hot testing of major equipment like tracking brackets and inverters started. Despite the severe hit of COVID-19, Phase A went on smoothly after it broke ground in October 2020. It received power in the first test at the beginning of this month and was connected to the grid days ago, which was highly acknowledged by the project owner and Dubai Electricity and Water Authority (DEWA).

Located in the innermost region of the desert, the project faces challenges of bad weather and ash accumulation that will hinder the generation efficiency of solar panels. To implement the production plan as scheduled, the project team mobilized all participating units to address defects and tie up loose ends as quickly as possible, and to remove thick layers of ashes on solar panels against the extremely high temperature of over 50 Celsius degrees to ensure the project can get connected on time. Up to now, the load after grid connection has reached 150MW, and is increasing towards its full amount 300MW in order to complete the reliability test and performance test in the shortest time.

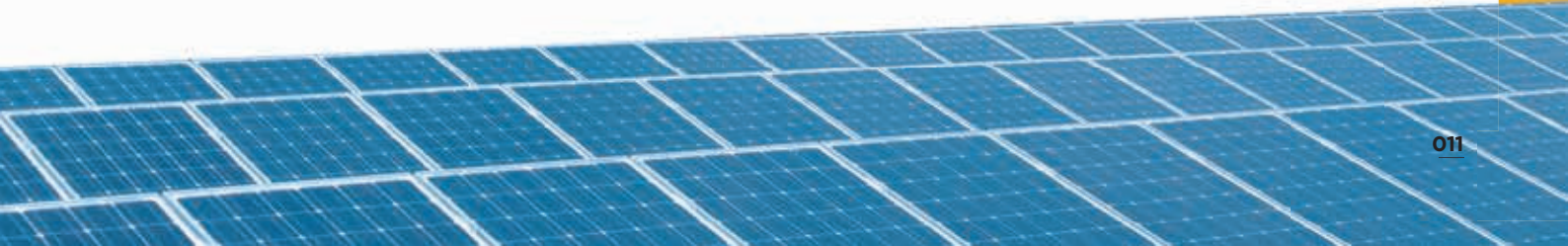
This project is seen as a milestone for the application of advanced PV technology in the Middle East. Due to the fruitful cooperation between Shanghai Electric and ACWA Power in the NE1-700MW CSP+250MW PV Hybrid Project of the fourth phase of Mohammed bin Rashid Al Maktoum Solar Park, at the invitation of ACWA Power, Shanghai Electric participated the tender for the 900MW 5th phase of the solar park together with ACWA Power, and signed the contract on July 28, 2020. D

CCTV Report

870,000 solar panels in the deserts support the implementation of Dubai Clean Energy Strategy 2050

Days ago, a correspondent with China Central Television (CCTV) visited the site of Phase A of the fifth phase of the Mohammed bin Rashid Solar Park, a major project of the "Belt and Road" Initiative undertaken by Shanghai Electric, and gained direct knowledge of how the project will optimize and upgrade Dubai's energy structure after it is connected with the grid in full capacity.

It is worth noticing that ash accumulation on solar panels hinder generation efficiency all the time due to its location that is deep in the desert and the bad weather. However, the correspondent found that the project has come up with "smart" solutions to ensure the project's efficient operation. D



AI Empowers Industries and Digital Technology Upgrades China

Shanghai Electric's Smart Tools Re-presented at 2021 WAIC Industrial Intelligence Summit

Editor's note: The innovative development of the Internet and a new round of industrial revolution happen at the same time when the timeframes of the Two Centenary Goals converge. Industrial Internet, a pivot of the new revolution, has given rise to a number of business patterns. Which are them? What needs and challenges shall industrial upgrading address in the trend of digitalization? On July 9, the 2021 World Artificial Intelligence Conference Industrial Intelligence Summit was held at Shanghai. Yang Hong, Vice President of Shanghai Electric Group, attended the event at the invitation of the conference, and exchanged insights with other participants on what industrial intelligence and digital transformation meant for social and economic development.

As a key event at the 2021 World Artificial Intelligence Conference, the summit, themed "Digital Intelligence, Industrial Empowerment", focuses on the role of industrial intelligence in the digital transformation of the economy, as well as the role of AI technology in the digital transformation of the industrial ecosystem. Through discussions on hot topics such as how to improve the "data-driven" capabilities of AI technology, promote "connected intelligence", drive "industry integration", and establish an "open ecology," it hopes to stimulate the overall digital transformation and revolutionary reshaping of cities in China, and encourage the empowerment of AI in the industrial sector.

Shanghai sees Industrial Internet as a historic opportunity to reshape its advantages in industrial competition. Currently, China is at a crucial stage of economic structure adjustment and industrial transformation and upgrading. Digital transformation is important to make the manufacturing sector more competitive. It is much anticipated by all parties that how to tackle challenges in digital transformation, to build advance manufacturing system, and to truly promote high-quality development of manufacturers. At this summit, Yang Hong shared her views on how to implement Industrial Interconnection innovations and explore new business patterns, who is Vice President of Shanghai Electric Group, a leading high-end equipment manufacturer.

Q: **Why do high-end equipment manufacturers seek digital transformation?**

A: The main idea of digital transformation is to "work more, faster, better with less costs". By replacing human labor with machines, many management problems will be remedied, and quality and efficiency will be improved for companies. Regardless of the size, competence and task complexity, the manufacturing industry always craves for higher productivity, lower unit cost, better product quality, faster market entry, less resource consumption and environmental footprints, and stronger sustainability. Therefore, digital transformation is not a tool that can make something out of nothing or feasible, but helps manufacturers to ascend to a "higher" level by removing obstacles in achieving economic feasibility.

Q: **What path will Shanghai Electric take in promoting digital transformation driven by Industrial Interconnection?**

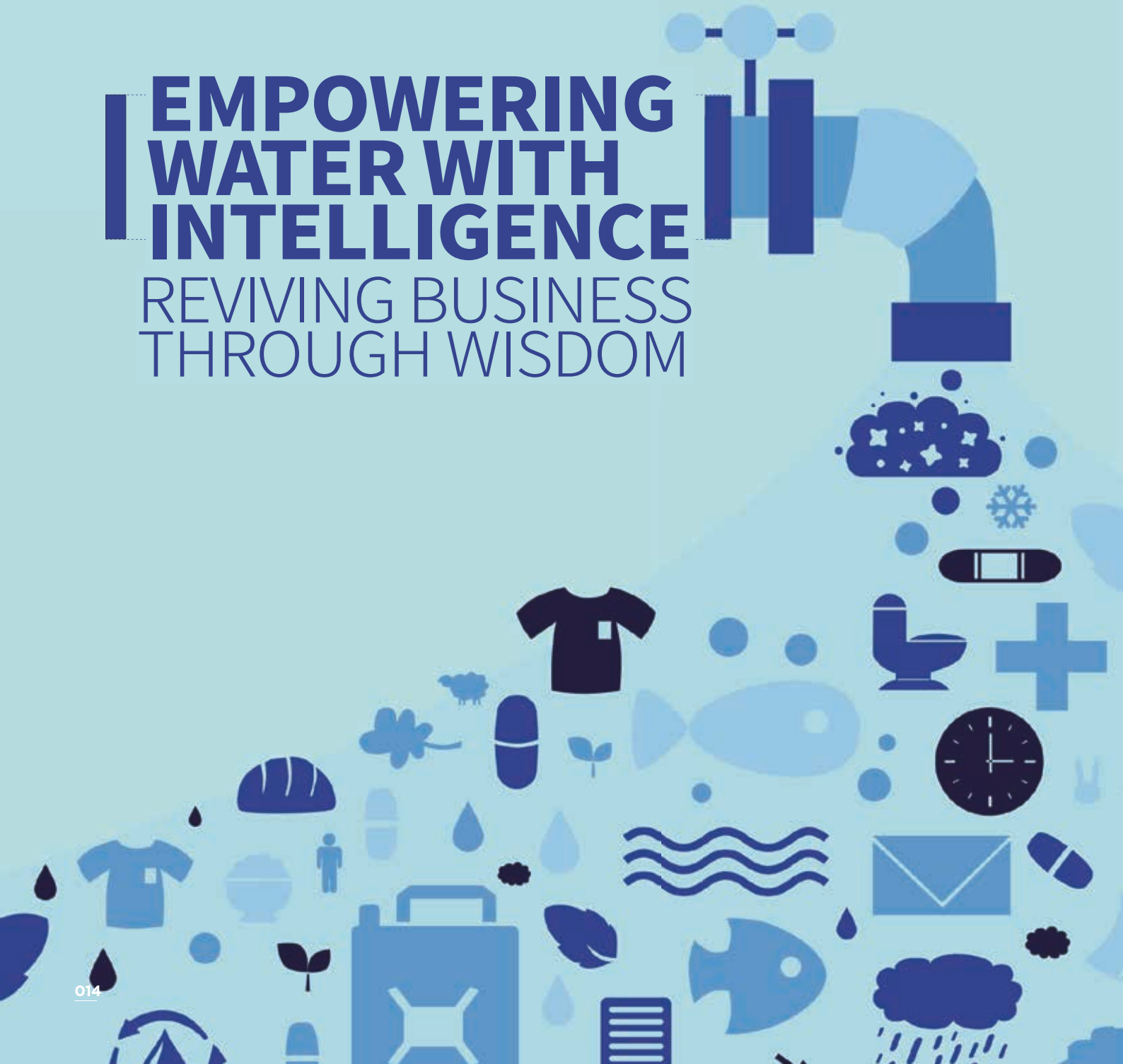
A: Reflecting Shanghai Electric's decades of commitment towards high-end equipment manufacturing, it has made many breakthroughs: going from zero to one and making things better. In this sense, "being professional and highly competitive" is the start point and inherit property of Shanghai Electric, and also serves as its mission and vision. Shanghai Electric is not content with just getting connected to "Industrial Internet", but devotes itself to leveraging the tool to empower enterprises. Through digital twin, AI, big data technologies, Shanghai Electric wants to improve its industrial procedures, upgrade solutions and navigate through the path to make it more professional and competitive.

Q: **What practical measures has Shanghai Electric taken concerning technologies and applications of Industrial Interconnection?**

A: Shanghai Electric has kept optimizing the Industrial Internet platform SEunicloud by adding more functions and equipping more devices with the platform. In this way, it has improved users' SEunicloud experience via offering them with convenient and visualized development and application tools. We collaborate with internal and external partners to develop more platform applications and solutions and to increase amounts of devices connected, Industrial Apps and user traffic. Efforts are made to have Shanghai Electric's internal facilities and applications connected to the SEunicloud and to explore more remote and interconnected business patterns. D

EMPOWERING WATER WITH INTELLIGENCE

REVIVING BUSINESS THROUGH WISDOM



Those who acquire wisdom rule the world. With the penetrating development of a new generation of information technologies such as the Internet of Things, cloud computing, and big data within all walks of life, the era of smart water, like an overwhelming wave, has arrived, together with capital, technology, and talents from various sources.
With the help of "Internet plus", Shanghai Electric has accumulated a proven track record in the field of water treatment for many years, combining strategic thinking in digitalization and intelligentization with cutting-edge technologies in water treatment, to create more refined, dynamic, and intelligent solutions for smart water service, so as to promote water resource integration and sharing, energy conservation and emission reduction, and realization of the collaborative and symbiotic development of a smart city.

SHANGHAI ELECTRIC INJECTS "WISDOM" INTO CLEAR GREEN WATER

Among the verdant bamboo forest, farmhouses stand side by side, with narrow trails winding around, and clear green water tinkling into the lotus fields. This is a portrait of today's Chenjia Township of Chongming Island, which derived its name from water. Water quality is an important index of eco-island construction. Shanghai Electric has created customized "rural sewage treatment solutions" for Chenjia Township, Hengsha Village, Jianshe Township, and Dongping Township of Chongming District, aiming to improve the efficiency of water operation through a "smart water service platform" featuring scientific, refined, intelligent management.

As a new blue sea in recent years, smart water service has become the only channel for transformation and upgrading in the field of water treatment in Shanghai Electric. It's only a few years since the inception of the concept of smart water service in Shanghai Electric but it is a target upgrade of practical application of the "smart city" concept to water service situations after Shanghai Electric launched the three business initiatives of "smart energy, intelligent manufacturing, and smart city."

Every time we talk about smart cities, the topic tends to focus on areas like smart transportation and smart medical care, with rare mention of smart water services. The reasons are not complex, "The core technology of water treatment has matured, whether in the domestic or international market," said Yu Fen, technical chief of Water Treatment Division of Shanghai Electric Environmental Protection Group (hereinafter referred to as "EPG"). Smart water is a typical high-barrier sub-sector, with an extensive industrial chain and interwoven industrial nodes, involving a series of procedures like water resources and water conservation, water supply and drainage, rural water conservancy, water ecology, flood control, and drought mitigation.

However, smart water, which seems to give "no feel of existence," brings the world a sensation of beauty, through a vision of "a creek winding through the green to protect the farmland, and two door-like hills pushed open to usher in the luxuriance of the green. "

Based on national policies and the current status of industrial development, Shanghai Electric analyzes the opportunities and challenges surrounding digital transformation of water services. In combination with the classic practical cases of digitalization of domestic and foreign water enterprises, through the help of a digital platform, it provides the "brain" for the Group through implementation of an effective smart water strategy, vigorously promoting the digitalization process of the whole industry chain, and accumulating energy for sustained growth.

SMART WATER SERVICE: LOW CARBON + GREENIZATION + SUSTAINED DEVELOPMENT

The digital economy has injected long-term impetus into the digital transformation of water. The state has proposed in its Main Indicators of Economic and Social Development for the 14th Five-Year Plan that "the added value of the core industries of the digital economy is estimated to increase from 7.8% of GDP in 2020 to 10% in 2025." The size of the smart water market is expected to increase from RMB6.56 billion in 2014 to RMB25.1 billion in 2023, which contains huge digital dividends.

"During the 14th Five-Year Plan period, domestic desalination is expected to add about 3 million tons of production capacity, with an investment of about 18 billion yuan, mainly due to the fact that domestic desalination costs are close to or lower than the price of tap water in some coastal cities, and that the reduction of groundwater exploitation quotes in the Bohai Economic Circle presents an urgent need for development of new freshwater resources. The coastal areas of Shandong and Hebei provinces are the most important desalination markets in China during the 14th Five-Year Plan period, with Shandong Peninsula planning to have a desalination capacity of more than 1 million tons/day by 2022 and 2 million by 2025," said Fan Zhifeng, General Manager of Shanghai Electric Power Station Water Engineering Company (hereinafter referred to as "Water Company"). In accordance with the national "14th Five-Year Plan" for the new development in digitalization and water industry, the market dividend poses a clear requirement for the imperative transformation of water.

Smart Water ushers in a favorable environment for external development. In 2021, the China Water Association issued An Outline of the 2035 Industry Development Plan for Urban Water, which puts forward the development goals and tasks, implementation paths and methods of smart water. In addition, various local governments have introduced "smart water" and other specific measures to speed up industrial digitization.

"Under the guidance of the new development concept of ecological civilization, and vision and the 'double carbon' goal, the water service industry has focused on the construction of ecological civilization and environmental management, transforming from high-energy consumption and extensive development to low carbon, greenization and sustainable development." Yu Fen said that the scope of water business is also gradually extended to the upstream "water conservation" and downstream "environmental pollution control."

The huge market potential of smart water has attracted the self-empowerment, transformation and upgrading of Shanghai Electric's water treatment business. In 2017, the EPG launched the "Smart Water Platform" through the assistance of the Chongming project. In 2020, the "Eco-Intelligent Brain" was developed through upgrading. Riding on the wave, the Water Company has entered the "Smart" ranks. The smart water services of Shanghai Electric have gradually turned away from the past fragmentary, extensive, closed development to large-scale, refined, ecological development, pushing the Group forward to achieve innovative breakthroughs in a number of areas like industrial planning and construction, operation management, technological research and development.

EMPOWERED TO BUILD: " A LIFE BACK TO FIELD"

Listening to the brook "singing", and striking up a "talking" with grass! These were the scenes available only in the fairy tale, but have become realities in Chongming Hengsha Island. Once on the island, you will see clear water in the river dotted with aquatic plants, where from time to time you can spot fish swimming, and white storks seeking food and shelter at the riverside. The return of such beautiful ecological scenes is achieved through the "Eco-Intelligent Brain" jointly created through customization by Shanghai Electric and Chongming Telecom for the government of Hengsha Township. "Water conservation depends on the promotion of

public environmental awareness, on the one hand. On the other, it is inseparable from the island's 'ecological neurons'." Li Shenji, a staff member of the "Eco-Intelligent Brain" in Hengsha Township, said that nearly a hundred "ecological neurons" are distributed in the main river channels on Hengsha Island, transmitting water quality indicators such as dissolved oxygen, water level, water temperature, PH value and so on to the control center. "These contact points within the water are generally located at the bottom of the river, with the solar panels exposed on the surface of the river, ensuring that the data is updated in every 10 minutes, which is doubtlessly timely." Assuming that the water quality levels monitored by several "neurons" in an area change abnormally over a period of time, the data center will then issue an alert to remind relevant departments to deal with them accordingly and the alert will be cleared when the data indicators return to normal. Linked to the "Eco-Intelligent Brain" are more than a thousand ecological sensory points functioning like "neurons" in the island's rivers and farmlands, through which the "brain" constantly records the ecological indicators from the corresponding points, and perceives around the o'clock "every move" of the island's water, air, forest, and soil.

In accordance with the standards for building a world-class ecological island, Chongming District took the lead in Shanghai in upgrading the water quality of sewage treatment in rural areas from "second class" to "first class A". In a public green space of the Huapiao Village in Chenjia Township, a small "container" occupying an area of about 10 square meters, dressed in a painted coat, stands among the flowers. This is Shanghai Electric's customized integrated residential sewage treatment station for Chongming, which has no odor or noise. There are more than 200 such treatment stations spread through the Chongming District, which makes it easy to handle the sewage treatment of more than 230,000 farm households.

The intelligent operation and management system "safeguards" the long-term trouble-free stable operation of the unattended "container" while withstanding the test of low temperature in the winter, and load surge during the spring festival. At the same time, the intelligent supervision platform which covers the whole region, conducts automatic data integration, online monitoring and real-time monitoring of water quality for these "containers."

In the view of Gu Zhiqiang, president of the EPG, it is of great significance to do well in performing the great task of launching ecological public-benefit projects. The EPG will strive for the leading position in domestic water treatment by relying on its technologies and product advantages.

EMPOWERING VALUE: COLLABORATION AND SYMBIOSIS

Shanghai Electric's transformation path is essentially user-centered, so that a fully digitalized, intelligentized strategic thinking permeates the entire value chain to create a highly people-oriented user experience.

If a more efficient and flexible full value chain can be created through digital transformation which can ultimately enhance the user's intelligent product experience, then for EPG, this means very fruitful outcomes. In terms of scientific and technological innovation, the water company has turned in a satisfactory answer. With a number of core technologies in areas like marine engineering, marine resources, marine environment, Shanghai Electric has entered the leading echelon in the desalination industry, leaving competitors far behind, enabling it to have a say in the industry.

Shanghai Electric is one of the nation's first large enterprises involved in the desalination industry. After more than ten years of self-reliant development, it now owes independent intellectual property rights over thermal and membrane desalination technologies. By the end of 2020, Shanghai Electric has undertaken more than 20 desalination projects at home and abroad, with a cumulative freshwater production capacity of 680,000 tons/day, of which 450,000 tons/day are through thermal desalination, and 230,000 tons/day through membrane desalination. Its domestic market share of thermal desalination exceeds 60%, putting it in a leading position.

In terms of scientific and technological innovation, the water company is the domestic leader in desalination. The water company continues to reserve and independently develop desalination and wastewater treatment technologies. It has overcome a number of core technical bottlenecks in the field of desalination and wastewater treatment, thus attaining a series of scientific research achievements with independent intellectual property rights. At present, the company has developed 21 professional computing software, established 9 databases, built 12 experimental platforms, obtained 20 licensed patents, and formulated 13 enterprise standards, leading the nation with its research and development accomplishments.

With the help of scientific and technological innovation, the water company has become a remarkable player within the industry. According

to Global Water Intelligence, Shanghai Electric's cumulative production capacity for desalination contracts from 2009 to 2020 ranks among the top 20 in the world. It has excellent performance in contract capacity for 2019 and 2020, ranking seventh in the world, and taking first tier position in the industry.

"In the future, Shanghai Electric will vigorously develop membrane desalination and rapidly involve itself in the field of in-depth wastewater treatment, while maintaining the leading position in thermal desalination in the desalinating industry." Fan Zhifeng remarked that desalination and in-depth wastewater treatment share a number of common technologies. Especially the zero-discharge treatment of industrial wastewater, which has attracted much attention in recent years, has its core technology in wastewater desalination.

Some may be surprised about the desalination industry extending to the field of wastewater treatment. But you will feel that it makes sense if you think twice about it. "Desalination and in-depth wastewater treatment have a number of common technologies. In particular, the zero-discharge treatment of industrial wastewater, which has attracted much attention in recent years, has its core technology in wastewater desalination." Fan Zhifeng said that the business of zero-discharge of industrial wastewater is the expansion and important complement of desalination business. And the zero-discharge market for desulfurized wastewater in thermal power plants creates excellent opportunities. In-depth wastewater treatment however is a high technical threshold, or a high-end market with desirable profitability. Shanghai Electric's desalination business has taken its aim at this market a long time ago by launching differentiated competitions.

From technology, to equipment, software, operations, and systems, from the accumulation of experience in traditional industries, to new technologies, new capital... and the advent of digitalization, all these have spurred the development of water service and improvement of the operational capacities of water service enterprises. Shanghai Electric is condensing its experience and capabilities into an applicable, easy-to-replicate digital solution for continuous user output and value chain sharing.

Adhering to the development concept of "collaboration and symbiosis," Shanghai Electric is well aware that smart water is a tough battle that needs multi-party cooperation. Only through strong alliance, utilization of complementary advantages, resource sharing, and data sharing, can this upgrade of smart water service be completed.

EMPOWERING TRANSFORMATION: GAINING CLOSE PROXIMITY TO USERS

The source of long-term headache for traditional manufacturing enterprises is the big distance from their users, which results in their inability to closely perceive the change in market demand. Shanghai Electric has achieved the reversal of the situation through a comprehensive digital transformation.
By means of a comprehensive change through digitalization, hardware-centered sales have been upgraded to a new mode that uses software to drive the operation of hardware contents to generate services, which aims to achieve the ultimate goal of first-rate comprehensive user experience.
All processes in Shanghai Electric, from the research and development end, the manufacturing end, the channel end, to the user side, are undergoing continuous digital transformation, forming an inter-locking digital industry chain, which has comprehensively enhanced users' real life experience in intelligentization.
On the research and development side, a true and objective understanding of user behavior attributes is obtained through the use of user big data based on the fast and efficient operation platform tools, which inspires product development of the next generation.
"Through more than two years of operation, we have found that the nitrogen and phosphorus content of rural domestic sewage is very high, whereas the organic content is low." In Yu Fen's analysis, this may be related to the generally high proportion of left-behind elderly parents in rural areas. The EPG proposed an effective solution tailored to local conditions based on the characteristics of rural domestic sewage. Through integrated biological treatment, as well as processes like ion exchange adsorption and phosphorus removal, Chongming has not only completed rural water purification but also achieved world-class water quality standards in its ecological island construction.
On the manufacturing side, its customer-orientation has pushed forward the entire process of flexible manufacturing. Its exploration of application of digital intelligence in multiple situations like safe production and flexible manufacturing, has created an increasing number of differentiated advantages for the efficiency flexibility and quality of production. Fan Zhifeng said, "Up to now, every desalination project we have undertaken is different, which amounts to saying tailor-made. For example, the Qinhuangdao Desalination Project is different from others in its design technique for circular devices which has introduced the concept of square device design for the first time, greatly saving floor space and input costs for the owner."
On the channel side, on the one hand, it has responded rapidly to the needs of thousands of

users through a strong intelligent supply chain; on the other hand, it has brought consumers a better experience by enabling linkage between data from both online and offline channels. In the field of industrial wastewater, "wastewater and waste liquid produced in industrial production contain materials, intermediates, and by-products for industrial production and pollutants produced during production, all carried away in water. Industrial wastewater has a wide variety of complex composition." Li Haihong, deputy director of the Technical Center of the Water Company, said, "We have obtained data on more than 300 points and positions from the 'Nebula Box' installed in the Jinling River Conch Cement Project, and transmitted the relevant data to the Nebula Intelligent Gathering Platform through the box, where we can get data about the temperature, pressure, liquid level, and flow. An analysis of the data leads to accurate addition of liquid and desalination." Ultimately, the goal of zero discharge of industrial wastewater will be achieved. "In the future, this method will be applied to the harbor project where there will be more than 1800 point data for upload. By then, the water volume, water quality and other related changes, can be controlled in real time, including the life cycle of accessories, which will allow convenient and timely replacement of spare parts. Thus, the owner is expected to save on operational costs."

On the user side, the expansion and layout of digital technology have provided users with a panoramic full-scaled experience of numerical intelligence. "Most of our users are governments and enterprises," said Yu, adding that the Anhui Huaiyuan's Sewage Treatment Plant (Station) and the supporting sewage network engineering project which was recently undertaken by EPG, involves construction of 16 townships and 2 beautiful villages, serving a total of about 51,800 households and treating a volume of about 13040 m3/d of wastewater, which benefits about 180,000 people of Huaiyuan." When completed, the project can not only detect water quantity, water quality, etc., at the network end, but also have online access to the financial system, which will make water business operations more efficient, its management more scientific, and its service more accommodating."

In the practice of empowering water with intelligence, Shanghai Electric has vigorously promoted the process of digitalization within the entire industrial chain, and constantly replenished itself with new capabilities. In the transition from being a traditional manufacturer to a technological enterprise, Shanghai Electric has found a unique development path through exploration. But for Shanghai Electric, its new journey has just begun. D

ZHOU ZUQIAN

MAKE ONE THING YOUR LIFE-LONG CAREER

Leaders believe that he can deal with all urgent or difficult tasks. Colleagues know well that he has won many awards and is specialized in removing bottleneck product problems. His apprentices see him as a resourceful master. This man is Zhou Zuqian with Shanghai No.1 Machine Tool Works Co., Ltd. (hereinafter referred to as "No.1 Machine Tool Works").

When he was just a little boy, he showed great interest in disassembling things, which made him scolded by parents many times in years of austerity. He became more careful later, and was able to rebuild everything he took apart. Once he surprisingly fixed a broken radio, and was praised by parents. From then on, he became more keen on and capable of repairing.
In 1988, he took over his father's position in No.1 Machine Tool Works, making the first step towards his "dream of repairing". He was admitted by the constant temperature workshop that was the most difficult to get enrolled thanks to his excellent score in the generation examination for all new employees after the orientation program. "Technically speaking, workers to serve in this workshop must have worked for over 3 years, and show as strong work ethic."
"The boring machine is the most accurate one of all finishing machines." In early 1990s, Zhou Zuqian who was obsessed with machine tools began to operate his first digital control device, a boring-milling machine made by Italian company PAMA. This machine's accuracy of positioning was 20um, with a 12-meter X axis and height of 4 meters. At that time, there were only 6 such machines in Shanghai.
It was the start of Zhou Zuqiang's story with the boring machine. As a veteran who has devoted more than 3 decades to nuclear power equipment manufacturing, he has formed an excellence-driven and accurate work style, which aligns with the values of Shanghai Electric. He has participated in the national "Plan 863", National Science and Technology Major Projects and other major research programs, and made many "firsts" in Chinese nuclear power equipment manufacturing.
"Looking back on my life, there are highs and lows, and I feel more appreciation and gratefulness. Like all employees at No.1 Machine Tool Works, I am nobody. I am doing a common job, and I just try my best. I didn't expect that the company would give me so many opportunities and honors. I just do what I am supposed to do." Zhou Zuqian implements "integrity and responsibility" as much as he can throughout his life. In his opinion, one lifetime is only enough for one thing, and we shall do it to the fullest.

WITH THE RIGHT METHOD, EVERY GOAL CAN BE NAILED

Zhou Zuqian undertook an important project in 2008. The whole set of equipment used before was imported from Korea. In accordance with national regulations, equipment of this kind must be developed and manufactured by Chinese entities after the first set was imported. In other words, No.1 Machine Tool Works must build the second set on its own when the first was made in Korea.
The set has a core part that was a core barrel welded with the supporting floor. It would add a lot of difficulties to the finishing work. Why? The fuel pinhole of the Korean set showed position shift after thermal treatment. Although Korean experts had tried many methods, the problem was not solved completely, making this machine an imperfect one.

"We faced a huge challenge. Let's take a look. Process 157 units of fuel pinholes with a position less than 0.15mm on a supporting panel that is beneath a core barrel with a diameter of 3,400mm and a depth of 2,626mm. What's more, there is a dowel hole with a diameter of 112mm that is only 69 mm away from the barrel wall. The dowel hole's position is 0.8mm with a roughness of 0.8mm. The difficulty in processing this part is beyond imagination. " Zhou Zuqian said with a smile. "To put it simply, the deviation between X axis and Y axis must be less than 0.02mm."

Zhou Zuqian engraved these numbers in his mind. Once he had a plan, he would discuss with colleagues on its technical feasibility and refinement and tested it. If this one did not work, he would move on to the next. He wrote down every idea that occurred to him, even if it sparked at midnight while he was in bed.

A week passed by. He had the last problem to be solved: how to reduce the surface toughness? He was inspired by several technicians who were polishing a part. What about polishing the part with a polisher? He made a polishing panel with which he collected a set of polishing parameters after many tests. Based on these data, he polished pinholes which met requirements on toughness and position accuracy. Thus, he found the perfect solution.

How he analyzed the problem and processed parts not only ensures the finishing of the part that was a core barrel welded with the supporting floor, but also offers a new method to the processing of pinholes in barrels in the future. Zhou Zuqian succeeded in processing 157 pairs of fuel pinholes in 3 months, which ensured the project to be completed on time. It meant that this project was localized, which was of great importance.

Zhou Zuqian believes that as long as you can come up with the right method, no problem cannot be solved. In October 2018, Zhou Zuqian was chosen for the task of deep hole processing of the EPR heavy reflector at Taishan. After being informed, he immediately researched on the task and found that internal and external discharge drills were necessary for this kind of deep hole processing.

A heavy reflector is made up of 12 special nuclear-level stainless steel cylinder forgings with a diameter of 4,400mm×417mm which are joint together and folded. Its middle part has to be processed into the shape

of a ladder. To ensure that every SLAB panel can be fully cooled, there are 932 breakdown holes on each piece whose positions are irregularly distributed with a 13-mm diameter, a 460-mm depth and a 0.05-mm perpendicularity, and diameters on the reverse side are 8 mm and 12mm. During breaking down, the coaxiality shall be less than 0.2mm. It would drive most people crazy when they were to process such a complex part, but Zhou zuqian responded calmly.

Thanks to his decades of work experience in the area of nuclear equipment, he finished the task on April 18, 2019, which earned him the second prize of the Science and Technology Progress Award presented by China Nuclear Energy Association in the same year. He said that by having the work done, expenditures on cutting tools was reduced by 30% and enormous expertise was learnt.

WE NEED TO STICK TO AND LEVERAGE CRAFTSMANSHIP

Decades of dedicated work bring him acknowledgement of leaders, colleagues, and external partners, and make him the first one they will turn to when a problem happens. He is always on the way to solve a problem or working on one, which is evidenced by his steps on the campus, over 20,000 per day, and over 100 calls he takes up.

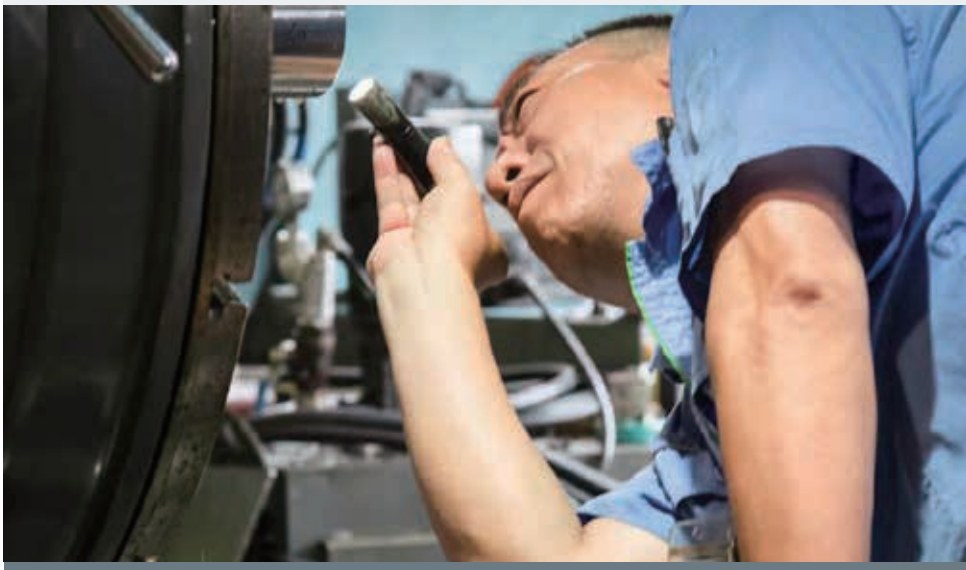
"I take the cell phone with me all the time. I go wherever a problem happens without a pause. If the problem cannot be solved through phone calls, I will go there to give directions and demonstrate how. " Zhou Zuqian believes that craftsmanship means perseverance, responsibility, recognition and the ongoing pursuit for excellence.

We need to stick to and leverage craftsmanship "People felt impressed by my stories, but it lingers on my mind that a good story is far from enough. It shall inspire them to continue the journey, and become brilliant people themselves. He notices that many people he knows share the same attitude "earn more by doing less". He worries that young employees would end up with nothing if they bought this shallow idea, and the company would suffer as well. "When no one commits himself/herself to our jobs, working will become a null concept, let alone craftsmanship. This scenario shall never happen."

Therefore, Zhou Zuqian intentionally creates more chances for young people. "Only when they do the job well on themselves, can they be trusted by clients. No remarkable delivery, no good feedback." He thinks that the sense of crisis is necessary all the time, which will drive you to go further and further. "No matter how small it is, do the job to the fullest. Team spirit and craftsmanship will rise in the society as time passes by. A strong sense of crisis forces people to work diligently and pass down the entrepreneurship generation by generation. Bubbles born in illusions will burst in real life."

As long as stay true to your original aspiration, all goals can be achieved unless your ambition is unrealistic. "Products you make symbolizes what kind of person you are." What Zhou Zuqian has learnt from his life is that one lifetime is enough for just one thing, then try your best to do it well. This might be the key to his success.

From an apprentice to a Shanghai Master, Zhou Zuqian's story is enlightening and inspiring, igniting our hidden passion towards career and dream. The caterpillar has turned into a butterfly, and the beautiful creature is about to explore the sky!



PASSION AT MORI

KAZAKH AUTONOMOUS COUNTY IN WINTER

What will occur to you when we talk about Xinjiang? Turpan's grapes? Hami's melons? The vast Bayanbulak Grassland? The big Takla Makan Desert? The picturesque Kanas? Or the Sayram Lake known as the last tear drop of the Atlantic Ocean? It is true that Xinjiang boasts countless cuisines and beautiful landscapes, and more importantly, it has abundant wind and solar power.

On October 8, 2017, Shanghai Electric Environmental Protection Group broke ground on its first new energy project in Xinjiang. From then on, it has completed a number of PV and wind power projects whose total capacity exceeds 1GW. It built wind power projects with a total capacity of 500MW in 2020 alone.

In March 2020, there were big external challenges in front of the company. Local governments at Xinjiang imposed strict epidemic control measures which did not allow construction machines and workers outside Xinjiang to enter the region. At the same time, the supply chain suffered from major equipment shortages because project teams across China raced against time to install wind turbines as the interim subsidy policy approached its end.

At that time, the project team only completed the design and construction of some roads for the early stage, which meant that the project progress was behind the schedule. The team timely modified their working methods and mitigated problems from the periphery by taking active measures. All of us had thought that the difficult time finally ended and everything would be fine, but the sudden blow of COVID-19 to Urumchi on July 17, 2020 led to a second round of lockdown in Xinjiang, forcing the construction that was slightly faster to be suspended. Concerning the current situation, the Party Committee of Shanghai Electric Environmental Protection Group set up the "Command Office of Xinjiang Wind Power Projects" and a number of special working teams which enrolled 50 employees to push ahead the project construction. Once again, it appeared that everything was brought back to the right track. The major team came back to the construction site on September 6, 2020. No one knew that the biggest challenge was about to show its muscles.

It was a typical winter in Xinjiang. Construction was made impossible due to the 0°C soil temperature. Hoisting operations were difficult to be performed, there were not enough transport trucks, workers, equipment or materials, and natural conditions were harsh. More than 3,000 workers and over 400 pieces of facilities had to stand up to this dire situation. Only 10% of hoisting tasks were finished by the end of October when snowflakes covered the sky.

Management measures were implemented at the basic group level. In the morning, tasks were informed in detail and in the evening, daily progresses were collected. In this way, more than 50 groups fulfilled their respective responsibilities in a more practical way. Plans were made by day and by work-plane, and it was our routine to have meetings before midnight and make plans and review progresses after midnight. By taking a wide range of factors into consideration including daily weather, wind speed, group capacity, human fatigue, characteristics of turbines in different locations and path efficiency, we achieved higher efficiency in resource allocation and properly organized groups of hoisting, moment of force, transportation, snow cleaning, wire installation,

electrical engineering and construction. The flat management executed in big groups led to bigger workload and more importantly, a higher engineering efficiency. Our efforts finally paid off.
It was December 25, 2020, 5 days before the deadline of grid connection. It was minus 30 Celsius degrees on the construction site with the northwest wind roaring outside sheds. To make things worse, the snow layer on the road was as thick as 2 meters due to heavy snows. The project was nearing its end. At this crucial stage, everyone was striving to accomplish the task while a string of problems awaited them.
There are always heroes who stand up to difficulties that cannot be The A42 turbine was hit by strong wind when workers hoisted its blade. As the gigantic impeller swung in the air, the heavy crane could roll over any second. Li Guangzhou, Director of the New Energy Business Department, was appointed to solve the problem. Without any hesitation, he led a team to climb up the turbine tower and managed to connect the impeller with the nacelle before the wind speech broke the critical value by adjusting the impeller's direction, increasing the holding power of hawsers and hoisting speed. A veteran hoisting worker with China National Nuclear Corporation was enormously impressed and said: "If Shanghai Electric's team was not so brave and decisive, it would be a mess. "
At the same time, Feng Shigang was busy with giving directions on installation and debugging to workers at a 220kV booster station 30 kms away. As an experienced director of the designing institute, he volunteered to come and worked here for 2 months. Terrible working conditions drove workers out. Xinjiang workers went away after just a few days, and then Ningxia and Sichuan workers followed. Therefore, the construction was in great shortage of labor. To ensure grid connection achieved on time, Director Feng and his Shanghai-based team came to Xinjiang and finished laying cables.
Worse still, many blades could not be transported to turbines' positions because roads were buried by thick snow. Liu Weidong, a project manager, spared no effort to make the path through. With his direction, workers started to remove snow layers with the help of machines from 3 a.m. every day. They could only clear less than 1 km in one hour, but they pushed ahead despite all difficulties. It is highly risky and difficult to transport blades in mountains, which is known by all. The situation was even harder for the Xinjiang project because mobile signals were not available. Liu Weidong sat in the transport truck every time to navigate through mountains until blades were soundly delivered when he would rest assured. He spent more than 10 hours on driving from one site to another every day, solving the most urgent problems. Fellow workers liked him a lot and called him "Xinjiang Bro Liu".
The most memorable things are the lamp soup and nang (the local staple wheat bread in Xinjiang) which I had while patrolling around construction sites after midnight when the project was going to be finished. Amid dense snowflakes flying in the sky, I sat with night-shift workers, "the most familiar strangers", by the fire. We, drained and worn-out, had boiling soups and chatted with each other, which refueled us for tomorrow.
If you ask me, "Did you feel tired when you worked there?" "Yes, it's exhausted." I would answer. "Is the work hard?" "Yes, very tough." Difficulties are hammers that sharpens blades out of raw iron. Many people see the Mori project as a miracle. However, I think miracle is another word for endeavor. It is our joint efforts, strong will and unyielding perseverance that make the construction and grid connection of the 500MW wind power plant in Xinjiang successful.

A "BOILING" DJIBOUTI

Editor's note

As an EPC contractor, Shanghai Electric Power Transmission & Distribution Engineering Co., Ltd. (hereinafter referred to as "Shanghai Electric Power Transmission & Distribution Engineering") has completed a number of big projects in Djibouti including the Djibouti part of the Ethiopia-Djibouti Railway Power Supply Project Lot 2 and substations in Doraleh and Goubet, Djibouti. The Goubet Substation, the third project, is under construction, which includes the expansion of the original 230kV substation and additionally building a 230kV substation and 74-kilometer 230-kV dual-circuit lines on the same tower. These exemplary projects in overseas markets make local people's life more convenient and enhance Shanghai Electric's strength and international influence, making the brand "Construction by China" brighter.

"If it wasn't for the project, I could hardly had the chance to visit Djibouti. It is literally a piece of barren land with few plants, let alone habitats. Few birds live here except crows that are highly adaptive to different environments. They fly across the sky sometimes, cawing, as if they are telling the past and future of this country. When I came here for the first time, I saw myself as an explorer ".

Djibouti is a small country in East Africa, which is probably beyond the knowledge of most Chinese. With a population of a little more than 900,000, it occupies an area that is only 1.5 times of that of Beijing. Compared with Ethiopia and Somalia, its neighbors, it has a much lower profile. However, it is destined to be the center of attention due to its Bab el Mandeb strait that connects the Red Sea to the Indian Ocean and the geographic location that is adjacent to Africa, Asia and Europe.

The "Belt and Road" Initiative encourages many Chinese enterprises to come here and invest on infrastructure construction. With this backdrop, Shanghai Electric inked a contract on the Djibouti part of the Ethiopia-Djibouti Railway Power Supply Project Lot 2 with Djbouti National Electric Company as an EPC contractor in 2014. With the first step made, Shanghai Electric Power Transmission & Distribution Engineering entered the local power engineering market.

My first impression of this country started with the dramatic change of natural landscapes I saw on the plane flying from Ethiopia to Djbouti, which deeply shocked me. I transferred from the airport in Ethiopia's capital Addis Ababa that has a pleasant climate and thick vegetation, and is only over 600 kms away from Djibouti city. As the plane left the plateau behind and clouds got thinner, more and more land were covered by rocks and sands rather than plants. Once the plane entered Djibouti's airspace, I could see nothing but deserts. For a moment or two, I thought I was going to land on Mars. It was not until 15 minutes before the plane landed that the capital Djibouti city revealed itself on the sea shore far away, which was small with clusters of low buildings.

I was immediately greeted by heat once I got off the plane. In front of me, there stood an old airport terminal and an air base for foreign troops side by side. From entering the airport, finishing customs clearance procedures to leaving the airport, it was a path of only around 100 meters. Sitting in the pickup truck driven by my colleague who came to fetch me, I found that there were only a handful of buildings that were 3-stored or higher. I realized I was now actually in a third-world country that I had only seen on the television.

I came with beautiful dreams and expectations. As I knew more and more about this mysterious country, I began to fall in love with it.

吉布提

POWER TRANSMISSION AND TRANSFORMATION PROJECTS ERECTED IN HOT DESERTS

The main construction parts of the substation in Goubet were a 230kV substation and the 74-kilometer 230-kV dual-circuit lines on the same tower, which were crucial to the whole project. The project locates in a deserted area which was extremely hot and dry throughout the year, and has no population with weak and unstable mobile signals. All construction materials and foods needed must be transported from the downtown area of the Djibouti city 70 kms away. The working conditions were quite harsh.

As for the expansion and renovation of the 230kV substation in Jaban'as, an old substation expanded for several times, it was difficult to design the project and implement construction while keeping it in operation. Therefore, it was our priority to ensure construction quality and speed at the same time. The vital experience Shanghai Electric learnt from the first two power projects in Djibouti was utilized in the construction of the third, which was to maintain close and effective communication with the project owner.

It was highly necessary to gain support from the project owner and local government for the construction of electricity transmission lines and substations. All links were interconnected: land acquisition, visa approval for Chinese employees, reporting and approval of design drawings, customs clearance for equipment and devices imported, and inspection of concrete pouring on rebar and templates. If any step was not fulfilled on time, the whole project would be affected. Hence, we, employees of the project department, were frequent visitors of Djibouti National Electric Power Company customs authority, freight agencies and construction sites to make communications more effective and collect project updates. Our counterpart was deeply impressed by how responsible, meticulous and serious we were.

The four months after the groundbreaking day witnessed an array of incidences that might slow down the construction speed, which included changes of design drawings due to the pro jectowner's requirements or actual conditions, customs clearance of vehicles and equipment imported, disputes with local people on the basic right to use the land for building transmission line tower bases, and work permit for Chinese employees. Everyone at the construction site, busy and noisy, was confident with high hopes, and all problems were addressed smoothly and quickly.

As more and more drawings were approved by the project owner, transportation of materials and equipment and on-site construction went on as scheduled concurrently. By March, 2020, all tower materials, fittings, cables, insulators and auxiliaries arrived at the construction site, and all primary and secondary equipment needed by the substation were in transportation except that transformers, reactors and some others parts due to design changes were still not delivered yet. As for construction progress, 166 transmission tower line bases out of the 169 dotted on the 74-km line were poured, over 50% of hoisting work for tower assembly finished, construction site for substations at Goubet and Jaban'as built and leveled, and civil construction for equipment bases, cable chutes and buildings roughly completed. In addition, the project progressed into the stage of electrical installation from civil construction, and the assembly of brackets and ground wire towers and installation of primary devices were executed in order including CVT, CT, breakers, insulation knives and arresters.

"CRAFTSMANSHIP" EMBEDDED IN EVERY DETAIL

Insiders of the engineering industry see the power transmission and transformation project a product to be finely manufactured, which is gigantic in size and requires a long time and a large territory to be finished. It makes engineering different yet fantastic. While implementing the project, every employee of Shanghai Electric will repeatedly analyze and improve every detail ranging from civil construction to parts of lines because the warning "A miss is as good as a mile" keeps us alert.

There were 169 tower bases in total along the 230-kV 74-km power transmission line, most of which were laid in deserts with few population. Actual conditions of these bases could only be known after excavation.

In terms of quality and security, the power line corridor was quite narrow with rises and falls and needed to traverse a couple of other power lines and high-grade highways. There were also many underground cables which were temporarily invisible because there were neither surface marks nor drawings or documents kept. Take the No. 56 tower base for example. Before breaking the ground, we noticed a narrow newly-refilled trench where probably lay a water supply line, which was not mentioned in plan drawings provided by the project owner. Taking the finding seriously, we informed the power company, the project owner, of this situation and proposed that we together with the water utility department could survey the site.

The water supply company strongly denied our proposal at first, but we finally talked their engineer into doing the survey with patience and perseverance. This engineer failed to accurately locate the water line at the site. Then we suggested to have workers dig out a small hole to see if it was a water line. Witnessed by the water supply company, we dug a hole and found out that it was not. Although our worry did not happen, we were recognized by Djibouti National Electric Power Company and Djiboutians who had no idea of Shanghai Electric thanks to our earnest way of working.

Both technologies and equipment of Chinese engineering industry become more and more advanced by solving a wide range of problems, which develops into "Chinese standards". "Chinese standards" are recognized and adopted by more and more countries, which go out together with overseas projects.

Amid the project construction, we communicated with the project owner Djbouti National Electric Company every day, whose team participated from start to finish: design, selection on equipment type, construction, trial operation and the final hand-over. The project owner often came with proposals that were familiar to them based on our design and equipment types, and we would optimize our plan while ensuring their technological requirements were met. Chinese electrical equipment manufacturers were prioritized in our recommendations, which featured Shanghai Electric's subsidiaries. Since the project owner knew little of Chinese players' strength in this regard, they inclined to purchase from European companies at the beginning, but they changed their idea after visiting Chinese manufacturers and inspecting equipment used in Chinese grids in personal.

Construction and electrical engineers of their team learnt from us on project construction. Our high-quality and efficient progresses were highly praised by the project owner, which was impossible without the comprehensive construction plans made before groundbreaking. This project enhanced our know-how on localization by recruiting the Djiboutian and collaborating with local parties. Deeper understanding and recognition can only be achieved by learning from each other and immersing yourself in one other's culture.

At present, the substation in Goubet was under smooth and construction based on the collaboration between the project department and subcontractors, which demonstrated a momentum as inspiring as the burning sun in Djibouti. This power channel built in deserts will transmit electricity generated by wind mills in loosely-populated Goubet to places in shortage of power after being put into operation, which will be of vital importance. It will drive Djibouti's economic development and endorses the fruitful cooperation between China and Djibouti. D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