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Recently, Europe has been facing record-setting heat wave, with the temperature in Southern France hitting a record high of 45.9°C; near the entrance to the Arctic Ocean in Russia, the average temperature also soared from 12°C to 29°C. In the face of global warming, electricity consumption keeps climbing. How to dispatch electricity flexibly and meet the future multiple power demand of smart cities has become a matter of great concerns. In recent years, Delta has been developing distributed power grid architecture, employing solar inverter, power conditioning system and energy storage system with renewable energy to regulate electricity. Lately this solution has been integrated in the triple hybrid stand-alone power supply system in the plant of Mitsubishi Heavy Industries, Ltd.. More contents are available in this issue's "Special Report".

Delta's intelligent manufacturing capability of automation is also continuously improving. In intelligent plants, the operating conditions of various machines are uploaded to the management platform through the internet, but the system's efficiency is often held back by enormous amount of data. In "IoT Smart Solutions" in this issue, we introduced Delta's industry-leading "DIABCS (Delta Block Control System)", showing how BCS can make process management more efficient.

As the main venue of the world-renowned Taipei International Computer Show (Computex), Taipei Nangang Exhibition Center has become very different recently. The luminaries of Hall 1 were replaced with Delta's LED High Bay luminaries, which contributed to 70% cost reduction of the venue's annual electricity bill and an average 82% increase of illumination. More success stories are provided in this issue's "Brand Circle".

As the US-China trade war continues and global supply chains are reshuffled, Southeast Asia and India are becoming more strategically important. In this issue of "Brand People", we interviewed, Mr. Jackie Chang. Jackie is the former General Manager of EMEA who led the continuous growth of EMEA's branded business and has just been appointed to his new role as SEA's Vice President in May this year. He shares the market business opportunities and challenges faced by SEA, business strategy, his encouragement and over 26 years of working experience at Delta.

In "Delta Green Life", we will take you to Bonn, Germany to learn about the new concept of "Nature-based Solution" against extreme weather put forward by ICLEI, an international organization that promotes the sustainable development of cities on the long-term basis at the Resilient Cities Congress. Meanwhile, according to the forecast of the International Renewable Energy Agency (IRENA), with the gradual decline of the power generation cost of renewable energy, the cost of solar PV and onshore wind power generation in the future may be cheaper than that of coal-fired power plants. How to match appropriate intelligent power grid, power grid management and energy storage facilities with these green power generation facilities will become more and more important. You will definitely enjoy the contents covered in this issue!

Brand Management Office



Delta's energy storage system integrated in MHIET's triple hybrid stand-alone power supply system

Delta's energy storage system integrated in MHIET's triple hybrid stand-alone power supply system

Text by ESDBD

The world has relied on power systems with centralized power generation for over one hundred years. Overall dispatching and construction are mainly dominated by large-scale centralized power plants, and Japan is no exception. However, with the active promotion of energy saving and carbon reduction as well as falling renewable energy costs, the transformation from centralized power supply to smart power grid and a distributed power supply has become a new trend for future smart cities.



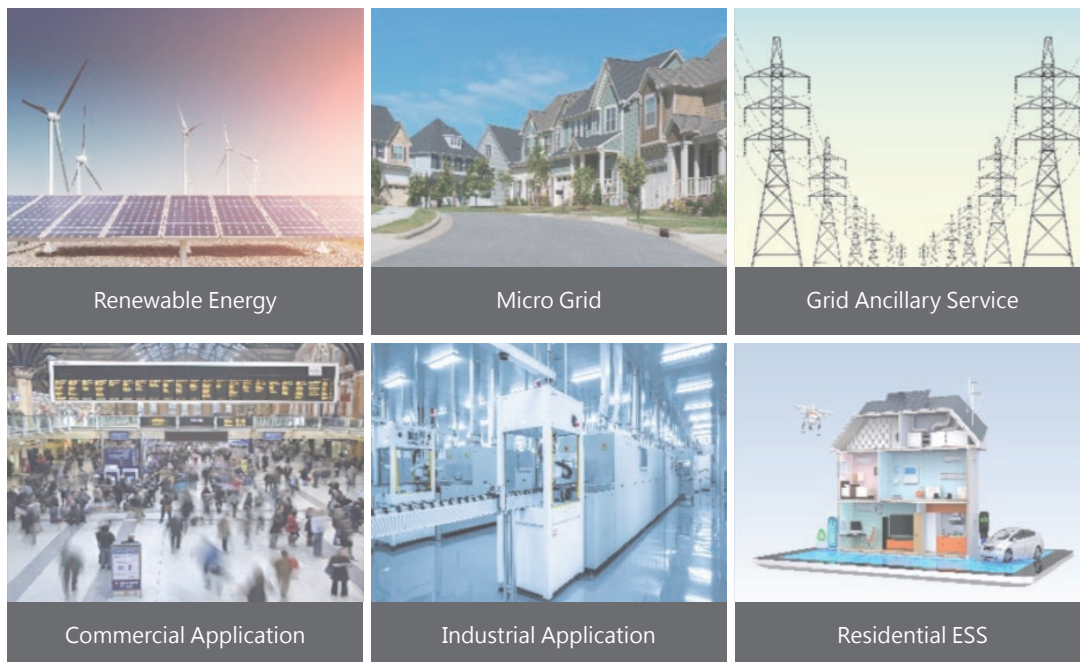
SPECIAL REPORT

In the distributed power grid architecture, the energy storage system is an important part for the distributed power supply. The lithium ion cell and energy storage container developed by Delta's ESDBD and a power conditioning system (PCS) developed by Delta's EISBG are integrated into a complete energy storage system solution. Delta's energy storage system features high reliability, high power output, rapid response and allows to bring out functions such as load shifting, peak shaving and demand response in the power grid.



Functions the energy storage system brings into play in the power grid

Market segments for Delta's energy storage system include renewable energy, ancillary services, micro-grids, commercial and industrial applications and home/residential ESS.



Market segments for the Energy Storage System



Through the efforts of our colleagues, Delta has achieved a number of recent successes in energy storage system solutions. For the energy storage application of renewable energy power plants, Delta built a 500kW/362kWh energy storage system at the Ako Green Energy Park in Japan in 2016 and a 1MW/1MWh system at the Taipower Yong'an Base in Kaohsiung in 2018. For micro-grid and electric vehicle charging station application, Delta built a 250kW/400kWh system at the Taipower Shulin Research Institute in 2017, and a 250kW/500kWh energy storage system that was put into operation at the CPC green energy gas station at the end of 2018.

Traditional gas turbine generators have reached a critical conversion period. To develop a stand-alone power system that is environmentally-friendly and that meets the increasing demands for the event of disaster, Mitsubishi Heavy Industries built a new type of triple hybrid stand-alone power system, EBLOX, demonstrated in Sagamihara. The Mitsubishi triple hybrid stand-alone power system adopts Delta's energy storage system, power conditioning system and solar inverter, and combines them with a gas engine generator, which was verified from November 2018.



Configuration diagram for the Sagamihara Site

Gas Engine Generator



500kW

Solar Power



Solar Panel: 311kW
Solar Inverter: 300kW

Energy Storage System



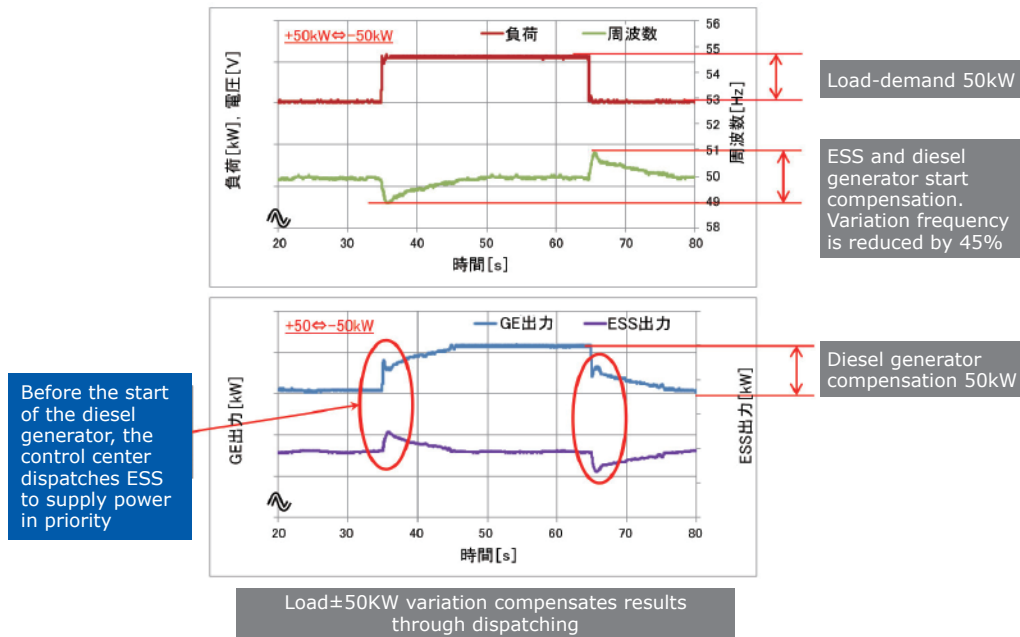
Power Conditioner: 125kW x 4 units
Energy Storage System: 331kWh

Equipment specifications

Purposes of this experiment is not only to verify the stand-alone power supply system operation with triple hybrid power source, but also to verify the ability of real-time frequency containment reserve (FCR) to the primary regulating force through control center dispatching and by combining gas engine power generation facilities and energy storage system. This can be applied for Japan's power supply and demand regulating markets in the future and to achieve the virtual power plant (VPP) concept. The verification results are as follows:

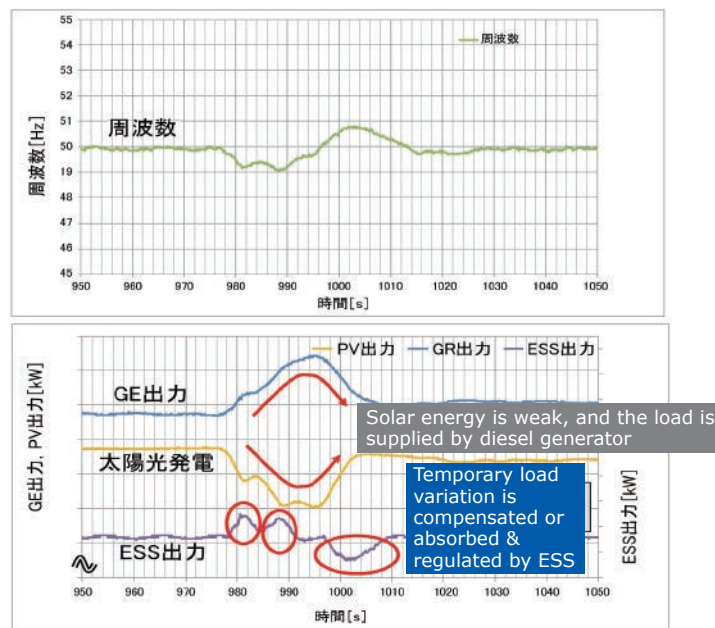


1. At the time of off-grid operation and load increase, the energy storage system can instantly compensate for the gap before the generator starts.



Off-Grid operation results

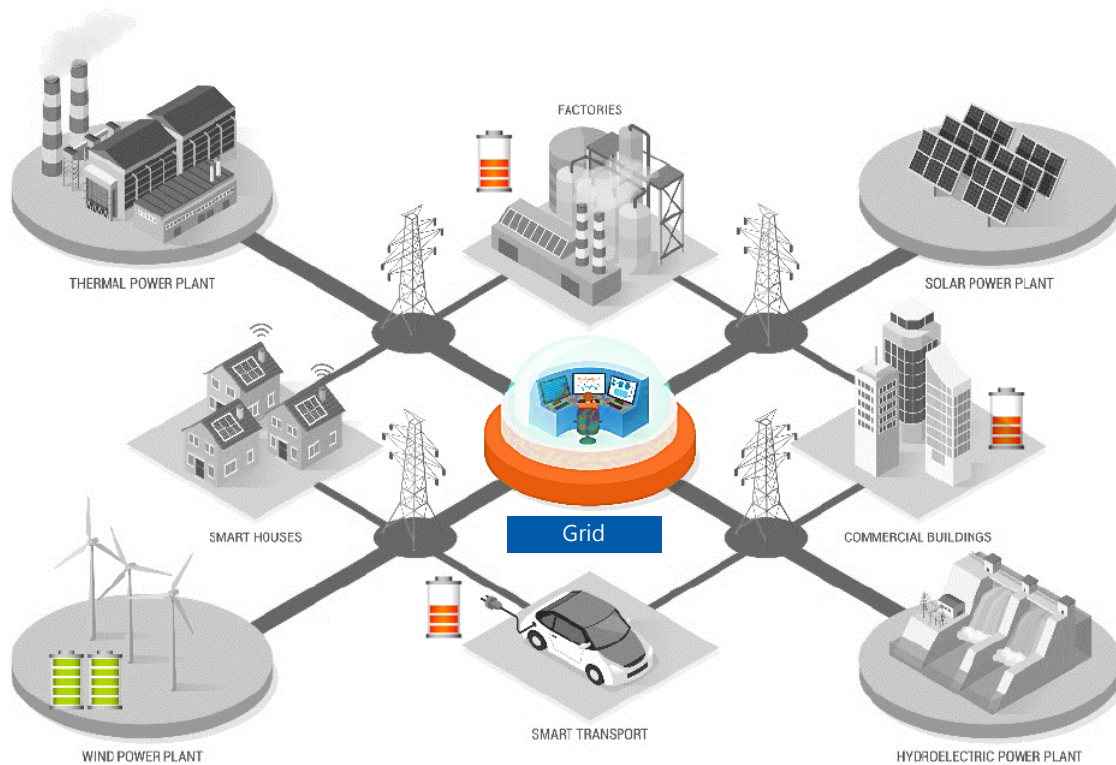
2. When combined with renewable energy, the energy storage system can smooth the output of renewable energy, compensate the peak demand and supply stable power to the load end.



Combined three-power operation, energy storage system provides instantaneous compensation or dispatching



The verification results show that by using ICT and AI technology and using the energy storage system for regulation, the virtual power plant integrates the gas engine generator with renewable energy power generation into one platform. Through the estimation of renewable energy power generation, the control center can remotely control the increase/decrease of power generation of the gas turbine generator, and dispatch the energy storage system to cope with temporary peak loads or renewable energy power generation. This avoids the waste of abandoned PV or wind power generation.



The energy storage system is the key to a stable power supply from the power grid

The demand for virtual power plants is expected to increase in the future in response to a substantial global increase in renewable energy power generation and to satisfy power consumption in off-grid areas. The virtual power plant integrates traditional energy with new energy, uses energy storage system characteristics, adjusts power generation and power consumption efficiency, flexibly dispatches energy according to load demand, and maintains the stability of the power grid. In markets where electricity is freely traded, surplus power generation can be further stored in the energy storage system when electricity prices are low, and then resold to the market when electricity prices are high. Delta's energy storage system is based on advanced power conversion and energy storage technology and will continue to play a key role in the future.

【Data Source】 Mitsubishi Heavy Industries Technical Review Vol.56 No.2 (2019) M-FET



Mr. Jackie Chang, Vice President of Delta SEA

Striving to create new successes

Interview with Mr. Jackie Chang, Vice President of
Delta Southeast Asia and India Region

Text by Brand Management Office

In the context of rapid changes in the industrial environment and the uncertainties stemming from the US-China trade war, how would Delta duplicate the experience of its business development in the EMEA and improve its business performance locally? Following recent adjustments in Delta's Southeast Asia (SEA) organization, in this issue of Brand News we interview Jackie Chang, Vice President of Delta SEA, and ask him to analyze market opportunities and challenges, and share his plans for SEA as well as his management insights after more than 26 years at Delta.



Cultural Diversity Developing business according to local conditions

In May of this year, Vice President Jackie Chang, with his rich experience in market development and management in the EMEA region, was transferred to become Vice President of Delta SEA. The EMEA region includes Europe, Russia, the Middle East and Africa, while the SEA region includes India, Australia, New Zealand, Singapore, Thailand, the Philippines and Malaysia. "Both regions cover a large area, with cultural diversity and high management complexity. In terms of resources and labor, EMEA emphasizes simplification and efficiency. In contrast, due to differences in culture and structure, SEA has relatively loose use of labor and resources." Chang points out clear differences between the two regions.

In employee management, brainstorming often occurs between EMEA employees and management, while in SEA, except for India, Singapore, Australia and New Zealand, employees' are relatively more acquiescent, and provide less feedback. The SEA region also pays more attention to professional titles. The SEA needs localization, just like EMEA, due to language differences. Chang puts forward that the SEA business and FAEs should try to use local talent to cultivate customers.

Compared with the EMEA, the SEA region has relatively more government regulations, so it is more important to maintain government relations, which can also have an impact on customer management. It is also necessary to properly communicate with the local people. For example, general elections were recently held in many countries in the SEA region, causing the suspension of construction projects for nine months to one year, which had a great impact on product promotion. Chang required that the signing of project contracts should be completed six months before the elections. This was a very different experience compared to managing in the EMEA.



Promote Sales Platforms Strengthen resources for excellent performance

In terms of business unit, IABG and CISBU teams have relatively complete sales platforms. It's commendable that Delta achieved the No.1 market share for electric vehicle chargers in New Zealand and the market share for solar inverters in India is also No.1 with limited resources. Though some products have achieved good results, Delta's allocation of resources in key countries is incomplete due to the varying degrees of development and product demand in SEA countries, and it will face more challenges in the future. Chang adds, the responsibility of management is to assist in the "allocation of necessary resources and manpower on sales platform". The localization of sales platforms should be implemented as soon as possible, and more regional heads with new thinking must be cultivated for a better response to customers. SEA will be divided into different areas similar to practices of Delta Greentech. After 2020 India will be the focus for in-depth business promotion.



Group photo of Mr. Shenyen Hsieh (fifth from left), President of SEA, Mr. Jackie Chang (fourth from left), Vice President of SEA, senior executives from DET (three on the left), and Nissan representatives during the MOU signing ceremony



Vice President Chang received the Frost & Sullivan 2019 Best Practices Awards on behalf of Delta in Malaysia. In the category of electric vehicle (EV) charging, Delta was also honored with the award of "the Best Corporation for EV Charging in Thailand"

"In terms of regional complexity and importance, business units have previously focused on China, the United States, Europe and SEA in that order. Before I took this position, people remarked jokingly that the pace in SEA would be slower." With amusement, Chang continued, "But after actual contact, the trade issue between China and the United States has strengthened the strategic importance of the SEA. At a recent strategy meeting, we defined three key countries for the SEA: India, Thailand and Singapore. Thailand has a sound financial system and infrastructure, and can be regarded as a central hub for developing the neighboring countries of Indochina, such as Myanmar, Vietnam and Laos. Singapore is a highly developed country, and actual performance in this country helps promote business in Indonesia, Malaysia, Australia and New Zealand and the Philippines. Using these three key countries as a beachhead to support neighboring countries will be an important development strategy. Vietnam, Indonesia and the Philippines will be our next focus for development after the three key countries and will allocate resources to possible manufacturing transfer targets in the future."

In view of the three major business areas, Delta's infrastructure and automation business already have a certain base in SEA, and Chang is quite optimistic about the power supply and components business. Although there are not many key accounts, service-oriented businesses and start-up companies are rising, such as food delivery services, FinTech, medical care and the machinery industry. Businesses in these areas will have good opportunities in the future.



Industry Transformation India's domestic market is huge

According to a forecast by the International Monetary Fund (IMF), India's economic growth is expected to reach winning 7.4% in 2019. Chang shares his plans for India. "Under the management of the former General Manager, Dalip, India's business is very impressive, and we will pay more attention to India in the future." Chang set the tone for India's important strategic position.

Although the United States announced the termination of 2000 items for zero-tariff treatment of India's exports to the United States from June 5, the tariffs are still lower than those of other countries. Because of its large domestic market, India may be a suitable manufacturing place in the future. Due to serious pollution in India and active environmental governance, the National Electric Mobility Mission Plan announced it is planning for six to seven million electric vehicles on the road in 2020, with 30% e-mobility to be reached in 2030. After the overwhelming re-election of Indian Prime Minister Modi, in addition to the continuation of e-mobility as one of India's national development priorities, there will also be considerable business opportunities in water resources, electricity, building automation, pollution treatment and infrastructure projects, which is the direction of Delta's focus.

"India's large domestic market supports a high demand for communications power supply, and the government is actively building renewable energy. It predicts that communication power, solar and wind power generation will continue to grow after the 5G take-off in 2020. In response to the increase in manufacturing, coupled with the government's promotion of "Made in India" and intelligent cities, the sectors with good growth momentum will include industrial automation, factory automation, data centers, intelligent cities, security monitoring and building automation. India accounts for 13 of the top 15 cities with air pollution in the world. There will be great business opportunities for related industries under the government's reform plans. Since India's infrastructure is not yet complete, businesses related to power quality and railway electrification are also targets for active promotion." Chang then summed up Delta's direction for strategic development in India.



Strive for Perfection Doing the utmost to contribute

When Chang joined Delta in 1992, the international trade business of the company was just unfolding. He majored in a foreign language and started from inside sales. At that time with his ability to study actively and negotiate with customers, he was highly valued by the General Manager of EMEA. He was invited to go to the United Kingdom to help start foreign business. To date, his accumulated management abilities have led EMEA to have significant growth in the branded business.

Chang comments on his work attitude over the years:

- Attitude determines height and breadth.
- Don't think of work as work alone, but as managing the business of your own company.

With Delta's increasingly large organization and complex products, Chang believes that employees with a positive learning attitude will have a bigger role. He gave an example, with Delta's product diversification of, apparently irrelevant products can produce a comprehensive effect on sales after integration. "Take video products as an example, which can be used in shopping centers and digital advertising boards. However, if video products are used as the medium for information transmission, they can become a stepping stone for promoting intelligent city solutions to customers."



Vice President Chang took photos with the participating professors during certificate granting ceremony at the Delta Academy of Industrial Automation

"Be glad to do it and be willing to take it on. This is my favorite saying." Starting from the grassroots, Chang still works hard every day. "Life is a learning process. Many people like to compare and take a passive attitude in the workplace, but for positive people, it is adapting to the situation and learning quickly. Every job has many opportunities and many hopes." says Chang, encouraging all his colleagues as the interview ends.



Delta helps TFT-LCD manufacturers implement the BCS on factory production lines

Delta Block Control Solution BCS for smart factories

Text by IABG

Smart manufacturing is the market trend for international manufacturing industries. Whether it is Industry 4.0 in Germany, AMP in the USA, PRISM in Japan or the smart machine policies in Taiwan, they are all focused on IT (Information Technology) and OT (Operational Technology) integration. On-site information visualization and application of different systems extend the value of production data.





Is it smart to upload large quantities of data to the MES directly?

Among all the set-up processes of smart manufacturing, machine-to-machine connection within the systems is the first step. Machine-to-machine connection is to transmit the operation status of production equipment to the upper MES (Manufacturing Execution System) platform for managers to monitor the real-time on-site production data. It is collected in a database for storage, computing and analysis. Delta points out that due to the huge amount of equipment in a production line and large quantities of data, the efficiency of the whole system will slow down if it is uploaded directly to the MES without integration.



Low efficiency with the existing structure

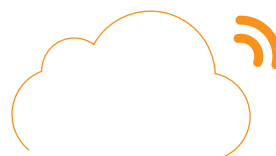
The operation method of the existing production system is to generate real-time information while the production equipment is operating. The data is uploaded to the upper MES via communication protocols. In the automation era, the function of an MES is to monitor the operation status and efficiency of each section in the production line. The on-site managers are able to see the information instantly and adjust the production line to achieve the estimated productivity. In the smart manufacturing era, the manufacturers expect the production line to continue the automation work, and enable visualized management and information transmission functions. Equipment data can transmit to each other and the upper cloud platform. However, achieving this smart manufacturing goal based on the existing structure is still very challenging.

First, there is a huge volume of data from the manufacturing equipment. If it is delivered to an MES without processing, the MES is overloaded and the efficiency of the whole system decreases. Second, the equipment from different machine makers uses different communication protocols. Unifying the various "languages" of the different equipment makes the structure extremely complicated. Even though all of the setup is complete, the existing structure is not flexible to meet an instant changeover and possible future production line extension demands.



BCS - smart and flexible equipment management

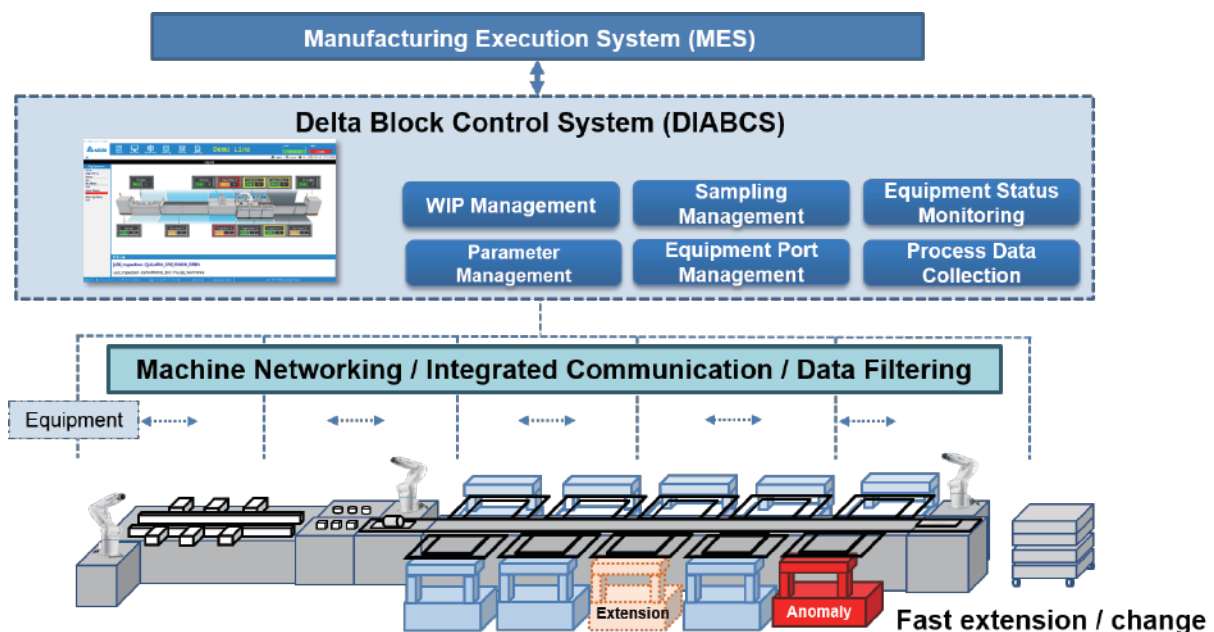
However, there are solutions for the pain points above. Delta indicates that the Block Control System BCS is not only for smart manufacturing, but is a well-developed solution that has long been deployed in the TFT-LCD industry to solve these issues. After slight adjustment by a professional service provider, this solution can be applied in most manufacturing industries to achieve smart manufacturing.



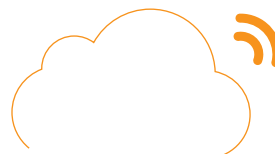


The BCS is positioned between the M2M and the MES in the overall manufacturing system. It vertically connects the information flow between equipment and the upper MES. The BCS designs the operation processes of production equipment and connects the MES with a unified communication protocol to allow the MES to focus on managing the whole production line. Delta says that since the BCS has been applied in the TFT-LCD industry for many years, it can generate smart functions to meet the corresponding requirements for panel manufacturing. The glass base panel is getting larger and thinner, so the delivering of WIP on a production line has to be as smooth and stable as possible. For manufacturers with high quality standards, the BCS is able to enhance production efficiency and quality.

In addition, the BCS is also equipped with flexibility and edge-computing for smart manufacturing. The TFT-LCD is used in a variety of applications, so it is cut in different sizes. Continuous mixed-line production is common on production lines. The BCS is extendable based on management demands. Edge-computing is also an important function in smart manufacturing systems. After the equipment data is collected, the BCS filters the data for computing and provides the processed data to the upper MES for further analysis. What's more, the BCS executes management functions instantly based on MES commands for flexibility. It shares the load of the MES to elevate the overall efficiency.



System structure of the Delta Block Control System DIABCS





Delta as a pioneer in the market for BCS solutions

Although the BCS is functional and beneficial for smart manufacturing, it is not easy to implement in a manufacturing system. Delta indicates that the structure of an automated manufacturing system is complicated involving a variety of equipment and processes. To add new functions or machines might impact the whole system. To overcome the two major challenges of quickly implementing the system and meeting functional demands, the assistance of an experienced service provider is required.

Delta has helped more than 100 domestic and international TFT-LCD manufacturers implement the BCS on more than 5,000 factory production lines. It is the top service provider in Taiwan in terms of quantity and experience. Offering complete industrial automation solutions is another advantage of Delta. The DIABCS provides an all-in-one solution, from customer VOC, specification design, system implementation to after-service.

The LCD industry is labor-intensive with advanced and complex production processes. With its larger and thinner glass base panels, damage easily occurs with any minor failure. Chosen to partner with a leading LCD manufacturer, Delta assisted the customer design an automated production line, and implemented Delta's Block Control System DIABCS for smarter and more efficient production process management.

In the system, Delta not only connects the equipment to monitor real-time operation status and collect data, but it also utilizes the new AIoT concept-edge computing with DIABCS.

In the past, the M2M system structure required two-way communication between the equipment and upper management platform, causing an overloaded MES and a decrease in efficiency. The DIABCS is equipped with an edge computing function to first integrate and filter the data collected by the end equipment, and process or transmit the information based on requests.

This provides two major advantages to customers. First, the data needed to be processed instantly can be done in the end system without back and forth transmission. Second, the data received by the MES is pre-processed for faster and more efficient operation.

In addition, the DIABCS features block control for the automated production lines of the TFT-LCD industry. Categorized by types of equipment, it gathers processes with similar types, and uses logic control for production line conveyance. It can control the simultaneous production of different products in different blocks on the same production line. Unlike traditional production lines that produce one type of product at a time, the DIABCS maximizes equipment uptime to create the most profit with limited equipment.





IoT SMART SOLUTIONS

Delta mentions that seven years has passed since Germany started to promote Industry 4.0. However, smart manufacturing is still a new and unknown topic for most manufacturers. Currently, starting from M2M is recommended, but the equipment IoT structure in the market is still chaotic. To meet the urgent demands of industry transformation, the BCS is suitable for application in CCL, PCB or PCBA manufacturing and other industries. With the integration of the BCS, manufacturers are able to stabilize the first layer structure to gain the most benefits of a smart system. Based on this, they can build a complete smart manufacturing system step-by-step.



Delta has helped more than 100 TFT-LCD manufacturers implement the BCS on more than 5,000 factory production lines. Offering a complete industrial automation solution is another advantage of the Delta Block Control System DIABCS





Delta luminaires shine over the Taipei Nangang Exhibition Hall

Text by BABG

The Taipei Nangang Exhibition Center Hall 1 is the largest international indoor exhibition venue in Taiwan. The lighting on the 1st and 4th floors of the Hall were replaced with 560 260W LED High Bay luminaires in 2018 and 2019. At 10 meters high on the first floor and 20 meters high on the fourth floor, replacing such a large number of High Bay luminaires in the biggest international exhibition hall in Taiwan was a rare case.

Tsai Yung-Hsiang, Sales Manager in charge of the Taipei Nangang Exhibition Center Hall 1, says that after the field installment comparison, Delta stood out for its outstanding luminous efficiency and output. Delta's product can support global voltages (120 ~277 Vac & 347~480 Vac) and have a wide range of lumen output (13000lm~41000lm). In terms of power-efficiency, the replacement of 1000-watt luminaires by 260-watt LED High Bay luminaires can save 70.70% of the annual venue's electricity bill based on 2,300 hours of lightings per year, while the average illumination had increased by 82.82%. The product is both environmentally-friendly and highly energy efficient.



Delta's High Bay luminaires provide the Taipei Nangang Exhibition Center's Hall 1 excellent illumination and outstanding energy efficiency



Excellent universities from China, Taiwan, India, Thailand, Vietnam and the Netherlands in the 6th Delta Advanced Automation Design Contest

Text by IABG

The 6th Delta Advanced Automation Design Contest (Delta Cup) has just been held at Delta's Wujiang Plant in Jiangsu, China, from July 24-28. Sun Yat-sen University, Fontys University and Shanghai Jiao Tong University won the Grand Prize among a total of 79 teams in the final contest.

This year, the CTO Special Prize is awarded to Professor Bai-yu Tseng. The team led by Professor Tseng from the Taipei University of Technology won the First Prize. Please go to below website for detailed information: <http://www.delta-china.com.cn/event/deltacup/2019/winnerslist.asp>



"Seeking Smart IoT Talents" - The 6th Delta Advanced Automation Design Contest in Wujiang, China



Yancey Hai, the Chairman of Delta Electronics attends the contest and indicates that talent is the key accelerator of smart manufacturing development. Delta Cup is a great opportunity to discover and cultivate more talents for industrial automation



Mr. Andy Liu, the General Manager of Delta's Industrial Automation Business Group (Sixth from the right, front row) awarded the Grand Prize to the winners

Yancey Hai, Chairman of Delta Electronics attended this year's contest. He said at the opening ceremony, "Combining Delta's advanced smart manufacturing concepts and technology with cooperation between governmental organizations, corporations, and universities, we hope to cultivate and find more talent. From previous experience, this contest is a great platform for students to understand the trends of smart manufacturing with real practices." Min Wu, the Committee Member of the National Steering Committee for Undergraduate Teaching of Automation Specialties indicated that for six consecutive years, the Delta Advanced Automation Design Contest has been closely tied with industry trends as an excellent platform for students to apply theory in real, innovative, and creative applications."

This year, more foreign universities participated enthusiastically, including 3 Thai university teams, 3 Indian university teams, 2 Vietnamese University teams, 1 Dutch university team and 8 Taiwanese teams entered the finals successfully. The team from the Netherlands made its debut at the Delta Cup.

Project highlights of Grand Prize Winners included:

- Sun Yat-sen University "Team Chen-Yu Wen 2.0" (Taiwan) which built a Reinforcement Learning Robotic Arm with speech recognition and object detection system
- Fontys University of Applied Sciences "Team Fontys Smart Wrist" (the Netherlands) which applied two wedge shaped disks mounted on bearings for independent rotation control
- Shanghai Jiao Tong University "Team Jiao Chi" (China) which presented a Self-organizing Flexible Production Comprehensive Optimization System under an intelligent manufacturing scheme

The world's first 8K environmental documentary "Water with Life in Taiwan" was shown to all participants at the award ceremony. The documentary raises the awareness of participants to the impact of global warming and human activities on water and the related environment, and spotlights our precious water resources.



Top mining company selects Delta to build its data center infrastructure

Text by EMEA

Delta has been selected by a leading mining company to build its data centers in Russia. In this project, Delta offers integrated data center solutions from UPS (uninterrupted power supply), precision cooling, power distribution systems to environmental monitoring systems in four data center sites with a total of 365 kW power capacity. With Delta's industry experiences, we guarantee reliable data center operations with best practice.

The scope of this project includes two modernized data centers and two newly-built data centers respectively located in Siberia and Western Russia. With more than 30 units of 42U cabinets, the total power capacity of the two modernized data centers is up to 275kW, which is as twice as before. The two newly built data centers, which comprise about 20 cabinets, support up to 90kW power capacity, and can still be expanded with additional racks, if necessary.

"The design of the facilities primarily focused on fault tolerance and safety. All computer rooms are equipped with UPS, precision cooling, and automated remote monitoring, control, and dispatch systems. In addition, access control and fire suppression systems have been installed in the data centers. Service personnel can obtain real-time information on the status of all engineering subsystems," noted by Dmitry Gulyayev, Head of The Data Center Infrastructure Department at Delta Electronics Russia.



Delta offers integrated data center solutions to a leading mining company's four data center sites with a total of 365kW power capacity



Delta's Ultron HPH series online UPS are installed to protect IT equipment and precision cooling systems in the data centers

Ultron HPH UPS protects both IT equipment and precision cooling

To ensure continuous power supply to the facilities, the Ultron HPH 40/80/100/120kVA online UPS are installed to protect IT equipment and precision cooling facilities. The Ultron HPH series combines maximum available power, unsurpassed energy efficiency, and superior power performance with a significant advantage: TCO savings. In order to reduce capital costs for the construction of the data centers and operating costs, UPS without battery cabinets are used to in the facility equipment, so the microclimate control system would switch to idle during blackouts and stays that way until the diesel generator units kick in. IT equipment is connected to UPS with battery cabinets, which ensures the continuity of operation needed for the diesel generator units to kick into action. This data center project, the Ultron HPH series has been widely adopted in manufacturing and telecommunication industries.

Cooling system supports N+1 redundancy for resilient air conditioning

Delta offers both RoomCool and RowCool of 35 kW cooling capacity with hot and cold aisle containment solutions to these four data center site. Delta's data center cooling system offers a rapid and precise means of adjusting the level of moisture within the air, and keeping humidity levels within the ideal range required by the data center equipment.

Space-saving rack power distribution unit is ideal of high power density application

As part of the integrated data center infrastructure solution, over 90 pcs of rack power distribution units (rPDU) are supplied to the four data centers. The space-saving rPDUs not only provide an optimal distribution of power within the rack, but also the ability to monitor the power distribution network parameters. Automatic circuit breakers for outgoing lines and LED current and overload indicators ensure the safety of the power distribution system.



Commemorations of the steadfast character of Mr. Li Kwoh-ting

Text by DEF



A number of VIP guests participated in the lecture for Mr. Li's 110th birthday, commemorating advisor Li's steadfast character. Starting from the front left: Mr. Chen Liang-gee, Mr. Stan Shih, Mr. Bruce Cheng, Mr. Matthew Miao, and Mr. Morris Chang, founder of TSMC. Third from the left on the second row is Ms. Shan-Shan Guo, Delta's Chief Brand Officer

Coinciding with the 110th birthday of Mr. Li Kwoh-ting, the "Godfather of Technology" in Taiwan, the Delta Electronic Foundation and the K.T. Li Foundation for Development of Science and Technology jointly hosted the memorial lecture for Mr. Li's 110th birthday on June 5th. The prominent pioneering figures from Taiwan's technology industry, government, and academia were invited, such as Chen Liang-gee, Minister of Science and Technology, Matthew Miao, Chairman of MITAC-SYNNEX Group, Mr. Stan Shih, founder of Acer, and Mr. Morris Chang, founder of TSMC, to jointly commemorate the feats of advisor Li in pushing for the development of the technology in Taiwan.

Mr. Bruce Cheng, founder of Delta Group and Chairman of the Delta Electronics Foundation, recalled his days as an entrepreneur. At that time, Delta faced the issue of taxation while cooperating with a US-based precision electronics corporation (TRW). Mr. Li coordinated with the customs to solve the problem in the company and adjusted the tax exemption method in less than one year. It is precisely because of the dedication of advisor Li and the other predecessors that young people had the opportunity to be educated, employed, and provided with a good entrepreneurial environment that contributed to today's Delta.

Keeping in mind that advisor Li once said that "technological development is the driving force behind economic development," Delta has invested a lot of efforts internally to offer a favorable environment for engineers to research and develop. At the lecture and the follow-on meeting, "Water with Life in Taiwan" campus tour, Delta presented the attending guests with the world's best 8K projectors. Through this ultra-high-quality 8K projector, the attending VIPs were all amazed by this new work in visual revolution.

Finally, the founder Mr. Bruce Cheng encouraged young people to understand the vision of Mr. Li, the presidential advisor, not forgetting to remind everyone that they should be grateful of the predecessors' efforts and continue to strive for Taiwan's technological development and environmental sustainability.

2019 "Delta New Power Electronics Technology Seminar" held successfully

Text by DGC

Organized by Delta Group and supported by Zhejiang University, "2019 Delta New Power Electronics Technology Seminar" was held from May 23rd to 25th in Jiangsu Wujiang Tongli Lakeview Hotel. During the seminar, a list of 12 scientific research project gainers sponsored and approved by "Delta Power Electronics Science and Education Development Plan" was released. Professor Cai Xu from Shanghai Jiaotong University was awarded the honorary title "Delta Greentech Scholars", and professor Wang Fei from Shanghai University and associate professor Liang Lin from Huazhong University of Science and Technology won "Delta Greentech Young Scholar Award".

As Delta founder Mr. Bruce Cheng stressed, based on the core technology of power electronics, Delta continued to invest on innovation of products, improve the efficiency of energy conversion and carbon reduction. From 2010 to 2018, Delta's products helped save 28.1 billion KWH, about reduction of 15.06 million tons of carbon emission. As Delta President and CEO Mr. Simon Zhang shared, there are four development directions in the future: high voltage megawatt (MEGA Watt), megahertz (MEGA Hz) modularization and micromation, power electronics technology based on new device carborundum (SiC) and gallium nitride (GaN), and digital control of power electronic system. For business development in power electronics fields, the focus is on transportation and IoT industry, intelligent manufacturing and intelligent micro-grid. During the seminar, the guests enjoyed 8K environment documentary "Water with Life in Taiwan" funded by Delta, which was intended to arouse attention to global warming and water resources.



Photo of Mr. Bruce Cheng (right) with Professor Cai Xu (middle) and Professor Fred Lee (left)



"2019 Nationwide Itinerant Exhibition Vehicle of Delta's automation solution" starts off

Text by DGC

The nationwide itinerant exhibition vehicle of Delta's automation solutions in 2019 with the theme of "intelligent manufacturing & intelligent control" officially started off from Wenzhou, Zhejiang Province on June 1, 2019. It sets out from East China, and will cover 40 major cities in China for six months. Users in manufacturing enterprises across the country will be presented with Delta's comprehensive solutions in intelligent precision machining, intelligent production control, high-speed intelligent driving, intelligent warehousing, visual management of production lines, remote operation, maintenance and monitoring of equipment, as well as industrial automation products such as vertical multi-joint robots, screw locking robots and high-speed frequency converters; also solutions in building management and control, intelligent lighting and intelligent building with safety protection.

"In the era of intelligent manufacturing, industrial users are in urgent needs of upgrading. They also put forward higher requirements for automation and intelligent manufacturing. In response to the overall development trend of the manufacturing industry, Delta focuses on the development of intelligent manufacturing. Automation and intelligent solutions are gradually introduced to production equipment, process and the whole factory; high-quality industrial automation products and industrial solutions are provided synchronously, and relevant intelligent upgrading of equipment and manufacturing is explained to customers." Zhang Shaokun, Director of Shanghai & Hangzhou Region of Delta Greentech Electromechanical Department, expressed "The nationwide itinerant exhibition of Delta overall automation solutions is one of Delta's classic activities in the field of automation, which is widely welcomed by users in the industry. The exhibition vehicle integrates Delta's flagship products and solutions in the field of automation and extends the concept of intelligent manufacturing. Delta's advanced concepts in intelligent manufacturing and energy-saving are explained to general customers in the industrial field at short range through a variety of intelligent manufacturing platforms and solutions." Zhang Shaokun also introduced Delta specially holds the activity of "Delta Smart Green City Solution Day", in which Delta's achievements in intelligent manufacturing are shared, and improvement of production efficiency and visual monitoring and optimization of the factory energy use are explained to promote enterprises to enhance their competitiveness.



The nationwide itinerant exhibition vehicle 2019 of Delta's automation solutions with the theme of "intelligent manufacturing & intelligent control" officially starts off from Wenzhou, Zhejiang Province

Intelligent campus chooses Delta Micromodule Data Center to build core computer room

Text by DGC

Delta has recently joined hands with a university in Hunan to create a highly integrated and extensible Data Center Infrastructure Solution for the core computer room of its intelligent campus. Movable-series micromodules include: DPH-series modular UPS, precision air conditioner and DCIM data center infrastructure management system. The new computer room meets the B-level power supply architecture specification.

DPH-series modular UPS, in addition to its consistent high reliability, excellent performance and excellent overall efficiency, has (N+X) fault-tolerant design, which can achieve automatic redundancy of power module through built-in control mechanism. Distributed control logic enables the system to automatically synchronize and switch to the backup module in case of a power module failure, ensuring the continuous operation of UPS. The hot swapping function of the key parts and modules can improve the maintainability of UPS system, thereby reducing MTTR (average recovery time) close to zero, ensuring the longest normal operation time and optimal availability of the data center.

DCIM data center infrastructure management system adopted in the micromodules can provide a comprehensive unified view of the combination of IT infrastructure (virtual machine, server, rack, etc.) and facility environment (power, refrigeration system, environment, etc.) that the data center operation is dependent on. It integrates hardware with software to manage the key operations of the data center. More information can be provided to computer room managers to assist in planning and forecasting future data center needs, including environment monitoring, power system, refrigeration system, security system, asset management, report management, data analysis and IT integration.



Movable-series Micromodule Data Center Solution



Delta assists the weather bureau in building the laser DLP display system

Text by DGC

Recently, a laser DLP display system of Delta has been installed in disaster prevention center of the provincial weather bureau in North China. A set of 2*12 70" large laser DLP screen splicing system provides comprehensive information display with high brightness, high definition and high intelligent control. It undertakes the role of the provincial weather forecast and the emergency command platform for decision-making on disaster prevention and reduction.

To enhance the pertinence of weather forecast services, weather forecast services have become increasingly refined, and the demand of meteorological departments for large screen display with high resolution has been increasing day by day. To improve the warning and emergency mechanism of meteorological disasters and to minimize losses caused by disasters, meteorological departments have increased the construction of "weather disaster warning platform" in recent years.

According to the special requirements of the weather bureau, Delta has built a set of 2×12 single-screen 70-inch laser DLP large screen splicing system, which adopts the fourth-generation light source (laser) DLP display unit to provide LED light source with ultra-high brightness, high contrast and high uniformity. It also exceeds the ultra-wide color gamut range of Rec. 709 (ITU HDTV color standard), provides real color performance, and achieves high display resolution, so the display of cloud chart is richer and more delicate. With a wider range of brightness control and constant color temperature, it can better ensure the brightness and color uniformity of the whole screen. The life of the light source can reach 60,000 to 80,000 hours, saving a lot of maintenance costs in the later period.

After the establishment of this laser DLP large-screen display system, the weather bureau can watch and monitor various relevant information in real time, including cloud chart, GIS electronic map, real-time video monitoring signal, management information system data, history data image and other information from signal sources like computer, television, projector, DVD and computer network and so on. Judgment can be made and instructions can be issued in time, and the purpose of real-time warning and decision-making can be realized.



Delta laser DLP display system



Delta power system efficient solution unveils in the Shanghai International Exhibition

Text by DGC



Delta power system efficient solutions assist industries to realize intelligent manufacturing

In complying with the intelligent upgrading demand in the water treatment, pharmacy and other fluid industries, from June 3rd to 5th, Delta introduced the new frequency converter ME300 series, fan and water pump special frequency converter CP2000 series, and intelligent water-related affairs and intelligent pump valve solutions etc. at the 8th Shanghai International Exhibition for Valves, Pumps & Pipes in 2019, to assist pump pipe valve industry in connecting with intelligence manufacturing.

Shi Wenxiang, product director of Industrial Automation BD of Delta Green Tech, said: "As a traditional industry, pump pipe valve is widely used in water treatment, chemical industry, environmental protection, pharmacy and other fluid related industries, for which continuous innovation is a must. For a long time, Delta has been creating power system high efficiency solutions with frequency converter products as a core, which has helped many enterprises complete the upgrading task of connecting with the intelligent manufacturing age". The exhibition mainly displayed backpack type pump controller solutions, ME300 pump control solutions, intelligent

water pump solutions, intelligent pump house solutions, fan and pump special frequency converter CP2000 series, exquisite vector control frequency converter ME300 series and synchronous reluctance motor, which can effectively assist to upgrade fluid industries.

Delta Controls releases O3 Zone Control System

Text by DGC

On June 14, Delta Controls, the subsidiary of Delta, held the O3 new product release meeting - building in future - in Beijing, which officially launched the new zone control system - O3. O3 is a zone control system developed on the basis of BACnet communication protocols, which can expand module integration Modbus, DALI, EnOcean, KNX and various other protocols with I/O. Without additional infrastructure costs, subsystems of different buildings can be directly added to the existing system, and can be integrated into a platform for management. Combining with the new O3 - HUB sensor, air conditioning, entrance guard, lighting, curtains, projection equipment and several other systems can be controlled centrally, which meets the future demand of users in the building field. O3 can have integration with digital camera security and protection system of VIVOTEK, the subsidiary of Delta, which makes it one of the competitive zone control systems on the market.

According to Chen Yili, President of Greater China of Delta Controls, device data sharing had become more and more important under the trend of IOT. Through collection and analysis of big data, sharing information enables real-time collaborative operation of air conditioning, lighting and security system, and is able to further predict system maintenance and operation and promote the user experience in the building. Imagine that when the user enters the room with a card or through mobile phone Bluetooth identification, the lighting lights up automatically, the air is kept fresh constantly, and depending on different behavior patterns of users, the situation mode will be changed through self-learning, which can enhance the user experience satisfaction.

O3 series multiple sensors not only sense the light, heat, humidity, carbon dioxide, voice and others in the environment, but also have the ability of calculation and producing sound. Matched with the flashing aperture ring that will change with the situation, it will interact with users, accurately judge the user behavior, and automatically adjust the equipment inside the space.



O3 - HUB multiple sensors

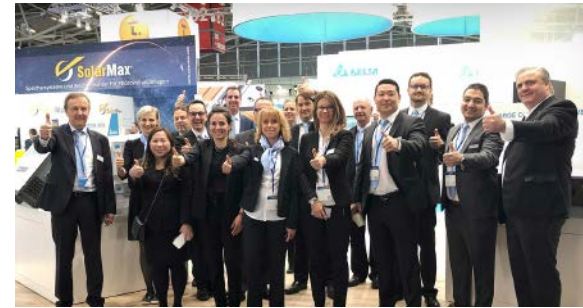


Delta's solutions showcase at Intersolar 2019

Text by EMEA

More than 50,000 visitors from 160 countries visited the world's leading exhibition for the solar industry in Munich from May 15-17 where Delta unveiled its new innovative green energy solutions. The theme of the stand was Solar Energy Solutions for a Sustainable Future.

Delta unveiled two new commercial string inverters prominently displayed to our visitors; a 140kVA string inverter with 1500 Vdc and 99.2% peak efficiency for optimum yield in megawatt-scale solar plants and a compact 70kVA string inverter with 6 MPP Trackers that is a good choice for large commercial rooftop PV systems. Both of the new inverters impressed with high-power output and high efficiency in a compact chassis. A lot of installers found the all-in-one design of the two new inverters with built-in AC and DC surge protection and individual string monitoring to be a winning feature that set these units apart from other competitors.



Delta's wide range of energy-efficient solutions featured at Intersolar 2019

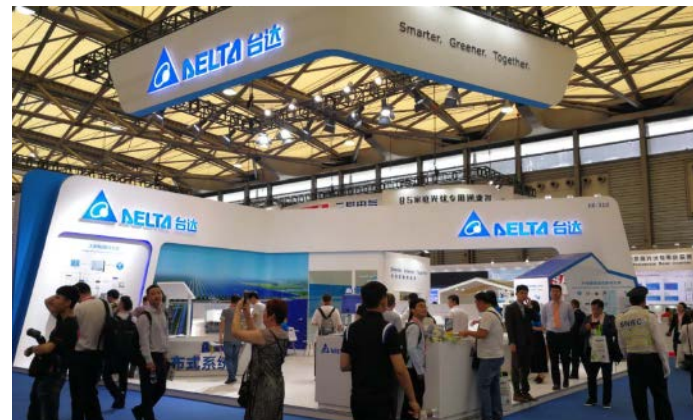
A new My Delta Cloud Monitoring System was also presented, something many customers see as a nice value added to our string inverters. An appealing part of the new monitoring is the complementary App for iOS and Android smartphones that give the PV plant owner easy access to check their system anywhere they have an internet connection and configure email alerts to quickly get notified of issues with the grid or PV system.

Energy storage was also a big topic at the Intersolar show and for those visitors seeking storage, Delta demonstrated a residential DC coupled energy storage system with 6kWh Li-ion battery capacity as well as an AC-coupled commercial energy storage system with 68kWh Li-ion battery capacity. Smart city solutions were also highlighted on a 65" touchscreen software application that allowed the visitor to explore a 3D city landscape equipped with a broad range of Delta's highly energy efficient power solutions, including various PV plant installations.

Delta's new products are exhibited at SNEC PV POWER EXPO

Text by DGC

With the theme of "New Change & New Journey", Delta exhibited a new generation of products at SNEC (2019) International Photovoltaic Power Generation and Smart Energy Exhibition (SNEC PV POWER EXPO) from June 4 to June 6. Key exhibited items are large power plant solution with DC1500V-M125HV and M88H string inverter matched with SUB-1G+DC1 monitoring, which facilitates the access of the inverter data to the third-party monitoring or Delta's intelligent cloud monitoring system; M70A, M30A and M50A string inverter of distributed system suitable for roofs of large factories, shopping malls, parking lots, etc.; photovoltaic energy storage system for household use with Delta's E-Series energy storage inverter as the core, combining IOT and cloud technology, integrating efficient energy management system (EMS), and matched with intelligent electric meter, fast shutdown device and automatic changeover switch; low-power household system solution with H3 and H5A string inverter as the core; household energy storage system solution with electric energy conversion through E5 energy storage inverter, combining intelligent electric meter and intelligent monitoring panel, and matched with efficient management system. In addition, the new intelligent cloud monitoring system (My Delta Solar APP) equipped with photovoltaic inverter can support real-time warning and realize 7x24-hour remote monitoring, so that users can know the status of the power station in real time.



SNEC PV POWER EXPO



Delta debuts new projectors and display solutions at IFC 2019

Text by DGC

At InfoComm China 2019 held in Beijing, Delta, Vivitek, a brand of Delta, and Delta associated company - Digital Projection International Ltd., jointly featuring innovative Pro-AV and integrated experience display solutions including INSIGHT Laser 8K Projector, 4K Ultra-Short Throw Laser Projector with high brightness, 4K Laser DLP and DVCS3 Distributed Image Display Control System.

Highlights include:

- Vivitek light-shadow interactive wall: superimposed projection using two 4K projectors DK10000Z of 10,000 lumen to create the visual effect of people-shadow interaction
- Vivitek DU9800Z engineering projector featuring 300-inch large screen projection with 1920×1200 resolution
- Vivitek launched new UHD ultra-short throw laser projector with 4500-lumen
- Digital Projection 8K projector application solution: Hemispherical application with 7 m-diameter and 4K*4K resolution projected on a 10m-wide stand; INSIGHT Dual Laser 4K 40,000-lumen model, exhibited for the first time
- Delta 4K laser DLP splicing display screen matched with DVCS3 distributed image control system; "intelligent control platform" integrating intelligent building, dynamic environment monitoring and industrial automation; Delta P1.2mm small spacing LED - the best choice for control room and commercial display



Delta's projectors and video solutions showcased at IFC 2019

2019 Delta Environmental Scholarship Awards sends talents abroad

Text by DEF

The solution to environmental issues requires experts from various fields! Delta has partnered with the Netherlands Trade and Investment Office and British Office Taipei individually since 2005 to sponsor students in overseas graduate studies. This year's Delta Environmental Scholarship Awards Ceremony was held on July 12. Five master's students and two professors were awarded with the scholarship and will be heading to the Netherlands, UK, and US for long-term studies or short-term research programs. Their majors cover energy, urban planning, corporate sustainability, sustainable policies, marine law, circular economy, and other fields.

During the ceremony, Delta Foundation Chairperson Bruce Cheng personally encouraged the winners to utilize their studies and find solutions to climate change. For the past ten years, the Delta Environmental Scholarship has issued scholarships in support to over a hundred master's and PhD graduates, who have returned to Taiwan to continue to work in the industry, government, academia, and NGOs, and develop the low-carbon sustainability work. We hope the winners the best in their studies and that they will contribute their efforts to a low-carbon future in Taiwan.

★ More about the Delta Environmental Scholarship:

The registration period of the Delta/Chevening Environmental Scholarship is from August to November each year. For more details please go to <http://www.delta-foundation.org.tw/Project/15>

The registration period of the Delta/Netherlands Environmental Scholarship is from February to April each year. For more details please go to <http://www.delta-foundation.org.tw/Project/16>



DEF Chairperson Bruce Cheng attends 2019 Delta Environmental Scholarship Awards Ceremony to encourage and commend the students



A speech by the NCU-DELTA Young Astronomer Lectureship Award Winner 2019

Text by DEF



Mr. Bruce Cheng, Founder of Delta Group, presented the award of "DELTA Young Astronomer" to Mr. Chao-Lin Kuo, Professor of Stanford University

Mr. Chao-Lin Kuo, Professor of Stanford University, who devotes himself to the "Big Bang" theory and who has almost confirmed the theory of "cosmic expansion", has won the laurel of "DELTA Young Astronomer". On June 11, Mr. Kuo received the award presented by Mr. Bruce Cheng, founder and honorary chairman of Delta Group, and made a speech with the theme of "Big Bang and You" at the Sunshine Conference Hall of Delta Sunshine Building. Nearly 100 Delta colleagues listened to his speech.

The research team of Harvard Smithsonian Center for Astrophysics in which Mr. Kuo is a member published a paper in 2014. The evidence of the early Big Bang - "Primordial Gravitational Wave" was found by making use of data from the Antarctic observatory; thus Kuo immediately became a well-known physicist in Taiwan. However, the same team published a paper in 2015 to argue that existing data still do not rule out the effect of interstellar dust and they will continue to look for other evidence. Kuo is now working with the astrophysics team of Taiwan University to set up another northern hemisphere observation base next to the Tibetan Plateau Shiquanhe Observatory, which is also an astronomical observation base established with the assistance of Mr. Bruce Cheng. It has become an important astronomical observation base in the world.

Mr. Kuo is the 12th astronomer winning the honor of "DELTA Young Astronomer". Mr. Wing Huen Ip, academican of Academia Sinica, who is in charge of the award selection, points out that these scholars are all Stars of Tomorrow in the field of astrophysics. He is confident that someone from the current winners will have a great opportunity of winning the Nobel Prize in Physics in a few years, which shows the particularity of the award in the field of global astrophysics.

Delta wins "Top Graduate Employers"

Text by DGC

The award ceremony of favored employers by university students of 2019 was held on 12th July in Shanghai. Delta group was awarded "Top Graduate Employer". "Top Graduate Employers" was jointly sponsored by 51job.com and yingjiesheng.com. Delta stood out among 230 candidate enterprises and received the honor.

Delta's Global Talent Development Division Head Mr. Chen Zheyang as a representative attended the ceremony and accepted the award. He emphasized that Delta consistently adheres to the business mission of "To provide innovative, clean, and energy-efficient solutions for a better tomorrow.", actively practices corporate social responsibilities, and invests on employee recruitment as well as talent development and cultivation on a long-term basis. For graduates, the campus recruitment in China offers over 300 positions every August. "Delta Enterprise College" inside the company provides training courses. After entering the company, a customized "Management Associate Training Plan" will be made and tutorial system will be implemented one to one to help fast development of management associates.

Since 2000, Delta has set up "Delta Power Electronics Science and Education Development Program" and "Delta Greentech Scholar Program" to fund scientific research projects and provide scholarship. Since 2006, Delta has consistently sponsored "Delta Cup-International Solar Building Design Competition" to promote the application of clean energies including solar energy in building and daily life. Since 2014, Delta has jointly hosted "Delta Advanced Automation Design Contest" with the Teaching Advisory Committee on Automation Majors in Higher Education under the Ministry of Education to promote overall improvement of automation practice level of university students.



Delta's Global Talent Development Division Head Mr. Chen Zheyang as a representative attended the award ceremony and accepted the award



Delta UPS wins the "Top 10 Enterprise Brand" and "Technological Innovation" Awards for seven consecutive years

Text by DGC



Delta UPS wins the awards of "Top 10 Enterprise Brand" and "Technology Innovation"

"Intelligent Energy Green Cloud Computing Development Forum and 15th UPS Power Supply System and User Satisfaction Survey Result Announcement Meeting in 2019" cosponsored by management committee of Beijing Zhongguancun Yanqing Park, Zhongguancun energy Internet industry technology alliance and "UPS Application" magazine was held in Beijing on June 11-12, 2019. With world-renowned brand value and technical advantages, Delta has been on the list for seven consecutive years. This year it was also honored to win the awards of "Top 10 Enterprise Brands" and "Technology Innovation" of 2019.

According to the committee, Delta provides leading UPS, micro data center and other solutions. At the same time, it advocates energy-saving and green ideas, and continuously introduces solutions conforming to the trend of the times, such as Modulon DPH 500kVA series UPS, which features for new technology and meets the demands in line with the application trend of the time, designed for ultra-large-scale IDC. The awards also reflect the recognition and affirmation of Delta products and technology by the industry users.

Delta Electronics Thailand selected for Thaipat Institute's ESG100 Universe for fifth consecutive year

Text by DET

Delta Electronics Thailand is one of 100 best-performing public listed companies in the Thaipat Institute's ESG100 Universe for the 5th consecutive year. Delta is one of six companies in the technology sector among eight industry groups in ESG100 2019. It's an indicator of Delta's effective sustainable development strategy and excellent value-add for investors.

Thaipat Institute's ESG Rating Unit compiles the ESG100 list based on the guiding principles of the Global Initiative for Sustainability Ratings (GISR). The ESG100 2019 list assessed 771 securities based on over 14,278 publicly available data points from six data sources. Since the ESG100 launched in 2015, Delta was in every one of Thaipat Institute's annual lists for most outstanding ESG performers on the Thai stock market.



ESG100 Universe



Delta Electronics Thailand Named 2019 Thailand Electric Vehicle Charging Company of the Year at Frost & Sullivan's Asia Pacific Best Practices Award

Text by DET



Mr. Jackie Chang (center right), Delta Vice President of SEA and India Region, receiving award on behalf of Delta

Delta Electronics Thailand among best-in-class companies in Asia for market performance, innovation and business development strategy. DET received the 2019 Thailand Electric Vehicle Charging Company of the Year Award by Frost & Sullivan at the Asia-Pacific Best Practices Awards. Delta joined Asia-Pacific's leading companies honored at Frost & Sullivan's annual event held at Hilton Kuala Lumpur, Malaysia.

The award recognizes Delta's best practices, strong performance and meaningful contributions of stakeholders towards a sustainable future. Frost & Sullivan's analysts identified Delta as a recipient based on their in-depth research. Delta was then evaluated on a variety of actual market performance indicators which include revenue growth; market share and growth in market share; leadership in product innovation; marketing strategy and business development strategy.

For the 2019 Company of the Year Award, Frost & Sullivan evaluated Delta according to the following key benchmarking criteria:

- Addressing Unmet Needs
- Customer Service Experience
- Implementation of Best Practices
- Price/Performance Value
- Brand Equity
- Financial Performance

Mr. Shivaji Das, Partner and Asia-Pacific Managing Director at Frost & Sullivan, congratulated Delta and all recipients on the occasion, "Frost & Sullivan hopes that the recognition will serve as a source of encouragement and inspiration for the award recipients, allowing them to continue to excel in their respective industries," he said.



Delta Breez Ventilation Fans wins 2019 Dealer Design Award for the second consecutive year

Text by Indoor Air Quality Division

Delta, a global leading provider of power and thermal management solutions, its ventilation fan Breez Signature SIG80-110ELED was awarded the 2019 ACHR Dealer Design "Silver Awards", which selected the best HVACR product that has been introduced over the last year. This is the second consecutive year the ACHR News has awarded Delta. The winners were chosen by a panel of independent HVACR contractor judges out of 98 product applications in the Ventilation Products category.

The judges rated the products on ease of installation, use, maintenance, application and repair, reliability and design excellence. The award-winning product not only recognized Delta Breez fans for high quality, but accredited for Delta's service capabilities.



SIG80-110ELED

Delta Breez Ventilation Fans wins 2019 Dealer Design Award



DRC Tech Centers are located in Ruyi Kuang Building in Taipei

PEOPLE

Advanced technology for innovation enhancement DRC Tech Centers

Text by DRC Tech Centers

Artificial Intelligence Center of Excellence (AICoE)



Vicky Chen / Data Scientist at AICoE

With the rise of industrial automation and intelligent manufacturing, big data analysis has become one of the important key factors to the competitiveness of enterprises. To assist various business units in introducing AI technology and achieving intelligent manufacturing transformation, Delta established the Artificial Intelligence Center of Excellence (AICoE) in October 2018.



PEOPLE & PRODUCT

AICoE is committed to developing machine learning and in-depth learning technologies, with the goal of rapidly introducing AI into Delta's internal production and operation processes, products and solutions, and creating multi-intelligent value-added services. Initially, through project cooperation, AI value-added services were jointly explored with Delta's internal partners and problems were solved by combining Cornerstone and KnEW platform tools. With the gradual increase of a large amount of AI demands, complete digital courses start to be provided to cultivate AI talents and assist the internal establishment of AI teams, so as to gradually expand the application of AI.

In the process aspect, the data analysis technology is used to assist in the process quality diagnosis, which includes early detection of anomalies from the data and identification of anomaly causes. In addition, an intelligent parameter recommendation system is developed to assist in the process parameter adjustment to ensure the stability of the production process and high yield of products. In terms of equipment, AI is used to establish equipment anomaly detection mechanism and residual life estimation for equipment, so as to reduce the risk of equipment shutdown. In terms of logistics, simulation and optimization technology are combined, and the establishment of the intelligent logistics response strategy is envisaged in advance in the complex and dynamic production environment, such as AGV task dispatch strategy and path planning.

Delta has many years of experience in the application of AI technology in intelligent manufacturing, and AICoE will also create more intelligent value-added services and accelerate the transformation of intelligent manufacturing by adopting open and collaborative approaches in the future.



Group photo of DRC, AICoE and A&O team colleagues. A&O specializes in prospective analysis technology, while AICoE solves practical problems by integrating and applying technical modules. Many projects are often completed by the two teams jointly

I joined Delta Research Center in February 2017 to serve as a data scientist, and before that, I worked as a quality control engineer in a semiconductor company in Taiwan. In the past few years at Delta, I have applied data science to the field of quality optimization based on the experience I gained from my previous job.

"Data Scientist" was named the "Sexiest Job of the 21st Century" by Harvard Business Review. There must be a lot of curiosities and imaginations about it. Some people think that big data can do anything, while others think that "big data" is just a slogan. I would like to share with you about my work from the perspective of being a data scientist, and let you know more about "data scientist".



PEOPLE & PRODUCT

Data science is a discipline that uses data to learn knowledge, and data scientists use analysis tools to find the value from data and produce insights, in order to assist experts to expand the field of knowledge from data driving, work improvement, operation flow efficiency, or to find out some previously unknown rules from data. However, a successful data analysis product is often not completed by one data scientist alone. It also requires the mutual cooperation between industry experts, data engineers, software engineers and project managers. These roles are different, but they must be indispensable and intersected to each other.

So, what do data scientists do at ordinary times? Their main core work is to build models, including selecting suitable algorithms, integrating multiple algorithms, designing appropriate analysis processes, evaluating models, adjusting model parameters, interpreting and verifying the results of the analysis. However, it is often data understanding, collation and reorganization that consume the most time in a project, because good quality data are the key to analysis, and it is impossible to draw correct conclusions from wrong data. We often encounter such a thing that customers think their data are very complete and sufficient, but actually they are not, or customers and data engineers do not know what data scientists need, and they spend a lot of costs to clarify and communicate back and forth, so Delta Research Center has developed the tool of "Data Readiness for Effective Analytics (DREA)", which allows customers and consultants to objectively and quickly assess and diagnose the data status in order to accelerate the development cycle.

With good technology and data, will valuable results be obtained? In fact, the answer is not absolute; good questions are also needed. What we often hear is "We have a lot of data, and you see what can be done". We often cannot just deal with the data, but explore and think about possible applications as well. Therefore, in addition to studying new analytical methods, we also need to sharpen our sensitivity to technological trends and market demands. This may not be the responsibility of a data scientist, but it is what we expect of ourselves as a "problem-solving data scientist".

Finally, I would like to say that for a successful project, there must be support of the organization. Having worked in Delta for these years, I have also deeply experienced that Delta spares no efforts to promote AI technology. Internal and external customers also have a correct understanding and expectation of AI technology. I sincerely thank the colleagues whom I have cooperated with in the projects, I expect that I can continue to grow with everyone together in the years to come.



After work, partners (the third from the left is the author of this article) are keen to participate in various activities



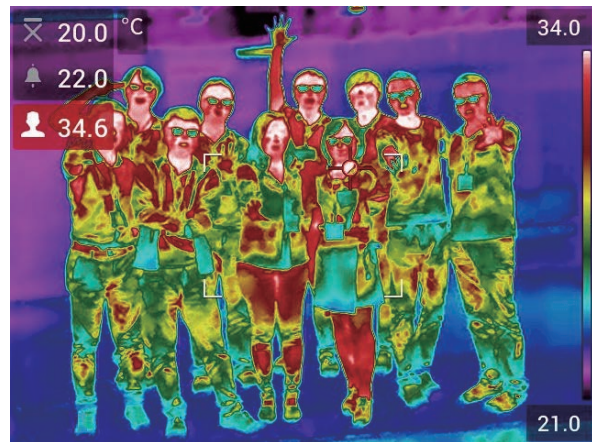
Advanced Green Photonics Center (AGPC)



Dr. Hungwen Chen / Director of Advanced Green Photonics Center, DRC

I am honored to join Delta Research Center (DRC) in 2016 to develop prospective technology in this open and innovative environment. In view of increasingly sophisticated products in the future, precise measurement and processing will be required in the manufacturing. This job can integrate the knowledge of physics, optics, laser and artificial intelligence I learned in the past with Delta technology and DRC solutions to carry out highly interdisciplinary system integration.

When I first joined Delta and visited the assembly and production line of PCB electronic components, I got lots of feedback from factories on many problems regarding special-shaped plug-in station and soldering station. For example, the special-shaped plug-in station is affected by hole positioning accuracy and inaccurate shooting of component pin images. At present, most of the plug-ins are manual plug-ins. In terms of the soldering station, problems exist in wave welding process and soldering iron welding process, such as large energy consumption and heat affected zone, big component space, cleaning and maintenance and replacement of soldering bits. Later, it is further found that these are not only factory problems, but the same problems are also encountered in special-shaped plug-in machines and soldering machines in the market. For us, these are both challenges and good opportunities to solve problems.



AGPC team in a radiant energy image invisible to the human eye. Team members: Hungwen Chen, Andy Chou, Albert Sun, Eva Wu, YuCheng Su, Yi.Jiun Shen, RenFeng Ding, Brian Huang, YuRu Huang, and YuTa Chen (right to left)

Why have production lines had these pain points? After in-depth thinking, it is found that the possible reason is that the professional background of the personnel is relatively identical and that the thinking mode is similar. If there are professional knowledge in different fields and different angles of thinking, then existing framework can be broken, and new creative ideas can be created through the cross-field cooperation.

In view of this, we have established Advanced Green Photonics Center (AGPC). Our team has talents from various specialties, such as laser optics, materials, micro electro-mechanical systems, industrial control, optoelectronic semiconductor and artificial intelligence. Our goal is to use interdisciplinary knowledge like laser and optics to develop intelligent manufacturing solutions so as to solve pain points for production lines, and to collect important information that cannot be collected from past production lines by using the newly developed technology, further helping industrial upgrading and reform.



Currently, AGPC includes three major optical platforms:

High-Precision Laser Detection Platform: The purpose is to develop innovative laser imaging system for precise inspection and production. For example, for P-POP (Precise Picked-Up Object Positioning) project, through accurate pin distribution imaging, we can correct position error, successfully achieve special-shaped plug-in automation, and ensure the quality of production.

Precision Laser Machining Platform: Through precise laser control, automatic production of industrial products with excellent quality can be achieved. For example, in the laser soldering project to solve pain points in the traditional soldering iron welding and wave welding, laser soldering machines are developed, including laser optical path system, energy feedback control system, tin supply system, image positioning system, displacement transmission system and so on. This project has been applied to the soldering stations in factories, which greatly reduces maintenance costs and improves the yield rate.

Artificial Intelligence Image and Lighting Platform: Light source, image technology, machine learning and numerical analysis methods are used to optimize and solve problems of automatic positioning and detection. In the PIE (PCB Image Enhancement) project, through the improvement of the resolution of original images, brightness distribution is corrected, when it is used in PCB hole center positioning. Without changing too many existing processes, we improve the positioning accuracy and reduce the technical threshold required for line change, reducing the error to about one-fifth of the original.

It is over 3 years now since AGPC was established, besides solving pain points of production lines, in terms of innovative breakthrough patent application, so far, 1 patent has been successfully approved, 18 patents are under review, and 3 patents are in writing. In the future, we will continue to develop new technology, and cooperate with Delta teams to help industrial upgrading and reform, to popularize technology and to realize interdisciplinary intelligent manufacturing.



The AGPC group photo visible to the human eye at CIIF (China International Industry Fair) 2018 in Shanghai. Team members: RenFeng Ding, HungWen Chen, Eva Wu, Yi.Jiun Shen, YuCheng Su, YuRu Huang, and Andy Chou (right to left)



Delta newest PMC series

PRODUCT

Delta newest 12V and 48V 600W PMC series

Text by DET

Delta Electronics is extending the popular 600W PMC series of panel mount power supply with output voltage 12V and 48V, namely, PMC-12V600W1BA and PMC-48V600W1BA. The products come with universal AC input at 85Vac to 264Vac and have built-in active PFC circuit. Both models also have feature Power Boost of 200% (peak load 12V 100A, 48V 25A) for 3 seconds, included the built-in fan speed control and fan lock protection.

The products are certified with IEC/EN/UL 62368-1 approval that will replace IEC/EN/UL 60950-1 for ITE which expires on December 20, 2020. EMI according to EN 55011 (Industrial, scientific and medical (ISM) radio-frequency equipment) and EMS according to EN 61000-6-2 (Immunity for industrial environments).

Highlights & Features:

- ▶ Universal AC input range
- ▶ Built-in active PFC and high efficiency
- ▶ Power Boost of 200% for 3 seconds and 150% for 5 seconds
- ▶ SEMI F47 compliance at 120Vac
- ▶ Meet Surge Immunity IEC 61000-4-5, Level 4 (CM: 4kV, DM: 2kV)
- ▶ Built-in fan speed control and fan lock protection
- ▶ Wide operating temperature range -20°C to 70°C
- ▶ Overvoltage / Overcurrent / Over Temperature / Short Circuit Protections



Resilient Cities 2019: 10th Global Forum on urban resilience and adaptation organized by ICLEI
(Source: Icleiglobal)

Come to the annual conference of ICLEI Resilient City for solutions on flood and heat wave

Text by Yvonne Chan / Senior Program Coordinator at DEF

At the end of June, deadly heat waves enveloped Europe for nearly a week, setting new temperature records in June in many countries. Some meteorologists described the whole week as hell. Just in time of this very oppressive summer heat, Local Governments for Sustainability (ICLEI), an international organization that promotes the sustainable development of cities on the long-term basis, organized Resilient Cities 2019: 10th Global Forum on Urban Resilience and Adaptation in Bonn, Germany. City representatives, scholars and industry delegates from countries all over the world gathered here to discuss how to build cities in extreme weather. Compared with the 37 °C high temperature outside the window, the conference fitted the situation.



Urban resilience is built in nature

According to data of United Nations Human Settlements Programme (UN-HABITAT), up to 60% of major international cities are at risk of wind disasters, floods and tsunamis. By 2050, 70% of the world's population will live in cities. With development of less resilience, the impact of natural disasters on metropolitan areas is worrisome.

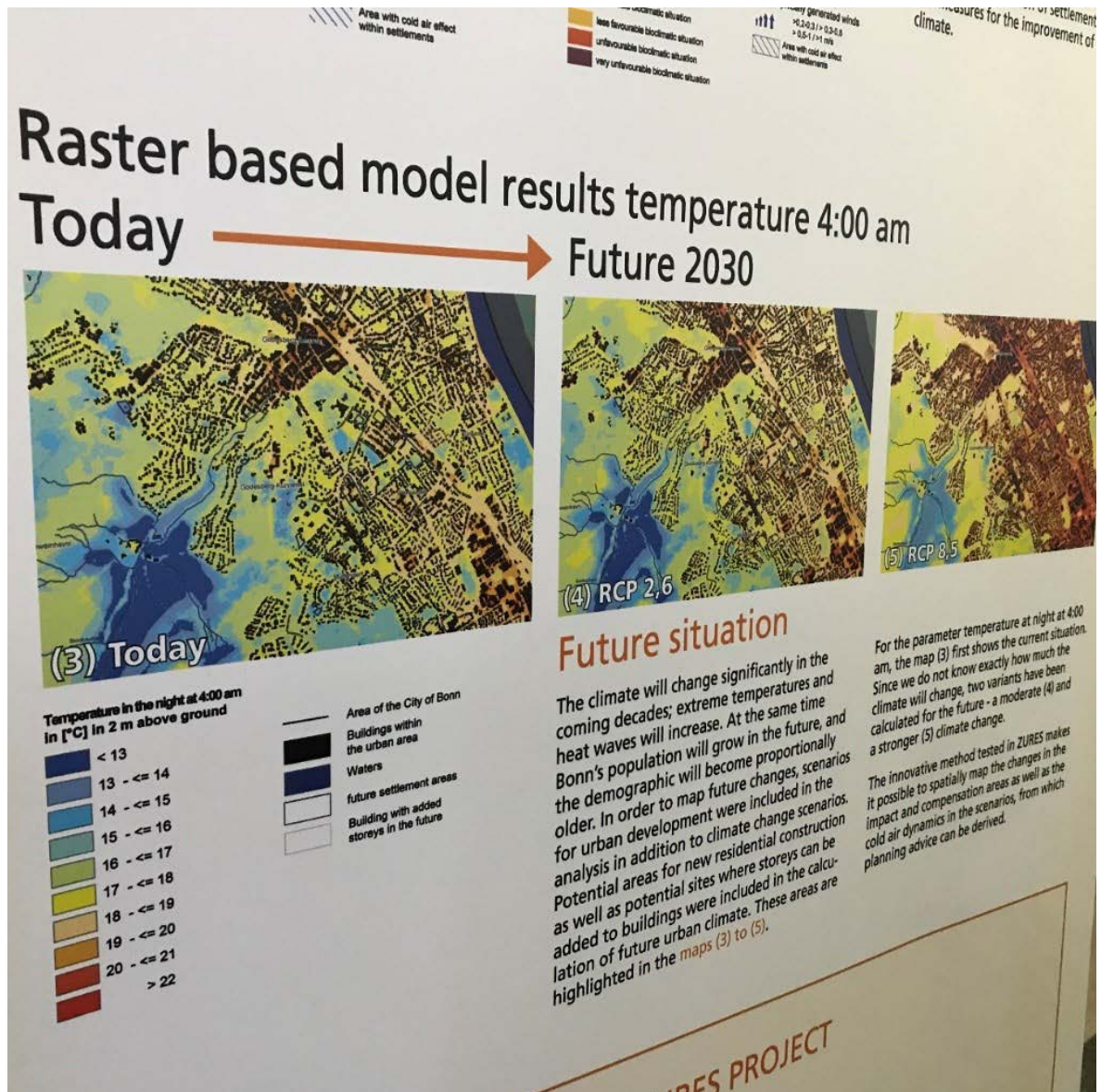
Therefore, the resilient cities conference introduced a new concept: Nature-Based Solution (NbS). A key solution listed in the World Water Development Report in 2018 to cope with challenges faced by the society, mainly by the way of restoration of nature or improving ecosystems. For example, building green roofs, planting greens on walls in metropolitan areas, creating urban food forests, marking out multifunctional artificial wetlands and those by making use of various green and natural facilities to mitigate consequences of urban disasters are all within the scope of NbS.

What is beyond imagination is that the benefits of NbS not only make the environment better, but also consider both social and economic levels. A project funded by the European Commission to promote NbS –NATURVATION– Presented a number of successful cases at the conference. One of which is the Project of "Food for Good" in Utrecht, the Netherlands. The project uses about 0.7 hectare of land in the city, to grow vegetables and fruits to cure the ecological environment and regularly supply to local disadvantaged groups (i.e. elderly, refugees and mobility-impaired persons). In the process, the interaction and participation of local residents have increased, so that vulnerable groups will not go hungry. A single prescription solves environmental, economic and social problems at once.

For prevention of heat injury, technology is the key

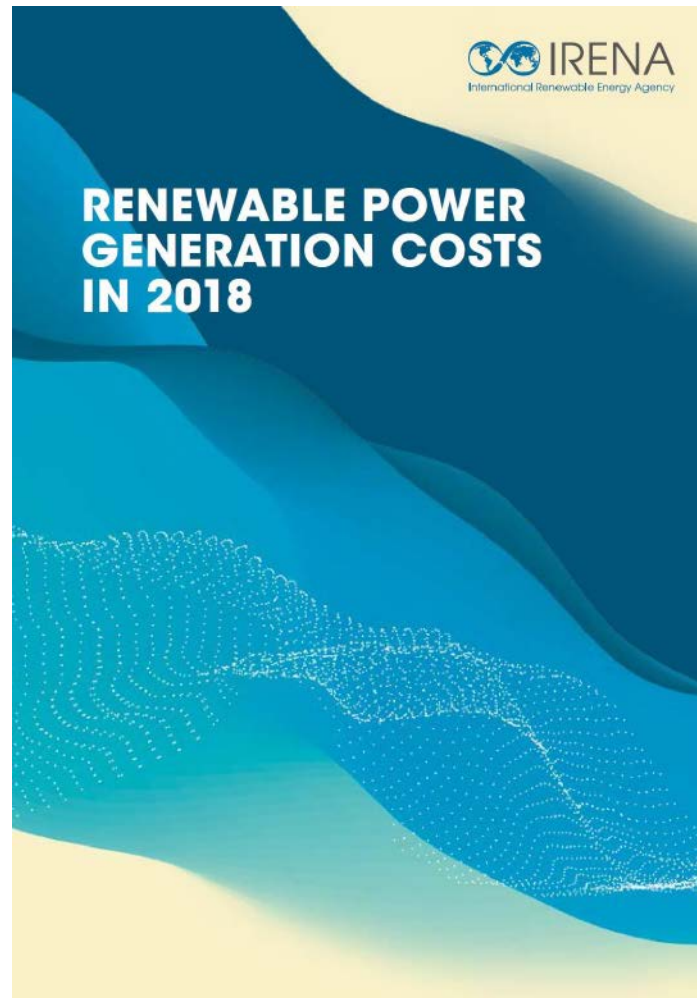
In addition to NbS, the conference also invites a private company to introduce an APP software – Extrema – to cope with heat waves. Through the ICT-based solution, this APP lets citizens see in real time the temperature in their area and shows nearby summer shelter spots, so that they can escape from the "heat threat" in the shortest time and in the most efficient way. This APP is said to be the most frequently downloaded software in the past two years. It can detect many European big cities, including Rotterdam, Paris, Milan, Lisbon, Athens and Palma.

In addition, the Research Team of the University of Stuttgart presents another solution, they have prepared a "vulnerability" and "risk" assessment map for the city of Bonn. Through the urban population density map, which overlaps the current and the future density, the forecast of temperature increase in different areas, and elderly residence and poor population distribution areas. The team finds the most vulnerable and risky areas in the city after the temperature rises sharply in 2030, which will help the planning of residential areas and elderly communities later on, or know which areas the city government should give priority to when the extremely deadly heat wave comes again.



Vulnerability and risk assessment map prepared by the University of Stuttgart for Bonn

In retrospect of the construction of domestic urban resilience, "Sponge City" is highly praised by some counties and cities at present is a part of NbS. However, as mentioned above, it is not just as simple as pure disaster prevention function and climate change adaptation, the balanced requirements between the environment, society and economy (Triple Bottom Line) need to be taken into account. Therefore, in addition to using green space to control water, cities in Taiwan might as well think about urban food forests, green roofs, plant-growing walls, or creating a "vulnerability" assessment map that can enhance the city's disaster prevention system and social and economic welfare.



Front cover of IRENA Renewable Power Generation Costs

Will green power generation costs be cheaper than coal-burning? IRENA's report arouses shocks

Text by Tino Wang / Climate and Energy Project Officer of DEF

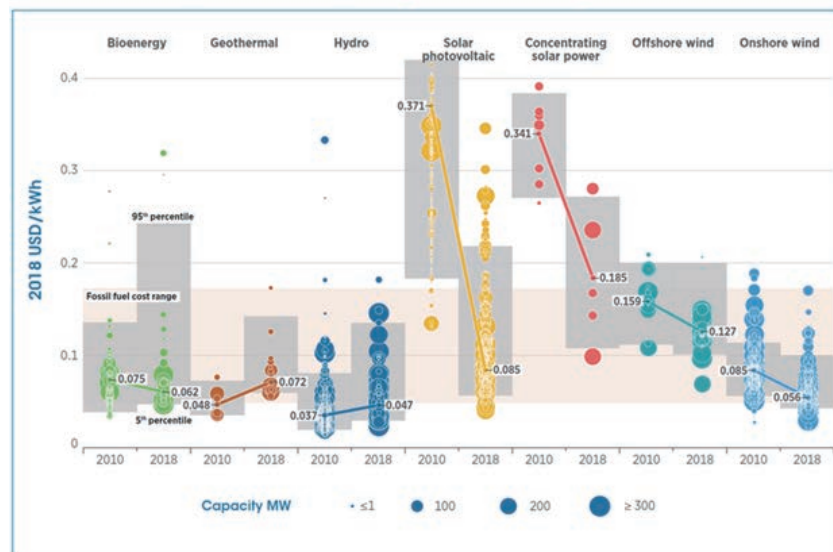
In recent years, there has been a widely held debate on energy issues in Taiwan. Some people argue that coal burning should be replaced by other energy sources as soon as possible as it causes air pollution, while some people think that the cost of renewable energy is still high, and it should not be promoted vigorously. However, according to the International Renewable Energy Agency (IRENA), in many parts of the world, renewables are a cheap option for new power generation. The report even predicts that, in 2020 (i.e. next year), new solar PV and onshore wind are expected to cost less than the marginal operating cost of existing coal-fired power plants.



The rapid decline in renewable energy costs has threatened the survival of coal-fired power plants

This trend is mainly related to the rapid development of technology. In 2018, the weighted-average cost of electricity from all commercially available renewable power plants falls in the fossil fuel cost range. The rapid decline of green energy costs in recent years has put the operation of traditional power plants in many developed countries at risk. For example, coal power generation in the United States has fallen by more than 40% since 2007, while coal power generation in the UK still accounted for 40% of total power generation in 2013, but it fell sharply to 6% last year, and the UK has gone one week without using any coal power in this year. On the whole, the percentage of green power generation has jumped from 12% to 28%.

Global LCOE of utility-scale renewable power generation technologies, 2010-2018



The global average cost of commercial green power plants has fallen rapidly in recent years, and the orange color is the fossil fuel cost range
(Source: IRENA Renewable Power Generation Costs)

It can be seen from the Figure that in 2018 alone, the cost of the global solar PV and onshore wind power fell by 13% compared with the previous year; biomass energy fell by 14%, hydropower fell by 11%, and geothermal and offshore wind power fell by 1%. Most notably, several concentrated solar power (CSP) plants around the world were put into operation successively at the end of last year, and the cost of CSP fell by as much as 26% last year! The reasons for the decline in costs can be attributed to the fact that solar thermoelectricity can be accompanied by installed energy storage facilities to store thermal energy, so it is not affected by no sunlight at night, and the number of hours in power generation can still be increased.

Of course, with the development of technology year by year, costs of solar PV and onshore wind power facilities also reduce, and the capacity factor (which can be understood as the proportion of annual power generation) rises, so that levelized cost of electricity (LCOE) in the whole life cycle drops sharply. According to the estimate of IRENA, the cost of solar PV and onshore wind power will continue to fall steadily in the future; the cost of solar PV power will fall by 13%, to US\$ 0.048 (about NT\$ 1.44) / kwh in 2020, and that of onshore wind power will fall by 8%, to US\$ 0.045 (about NT\$ 1.35) / kwh.



Global electricity costs in 2018

	GLOBAL WEIGHTED-AVERAGE COST OF ELECTRICITY (USD/KWH) 2018	COST OF ELECTRICITY: 5TH AND 95TH PERCENTILES (USD/KWH) 2018	CHANGE IN THE COST OF ELECTRICITY 2017-2018
Bioenergy	0.062	0.048-0.243	-14%
Geothermal	0.072	0.060-0.143	-1%
Hydro	0.047	0.030-0.136	-11%
Solar photovoltaics	0.085	0.058-0.219	-13%
Concentrating solar power	0.185	0.109-0.272	-26%
Offshore wind	0.127	0.102-0.198	-1%
Onshore wind	0.056	0.044-0.100	-13%

Costs of various kinds of green power plants fell in 2018
(Source: IRENA Renewable Power Generation Costs)

Small hydropower and geothermal power also have potentials for development in Taiwan

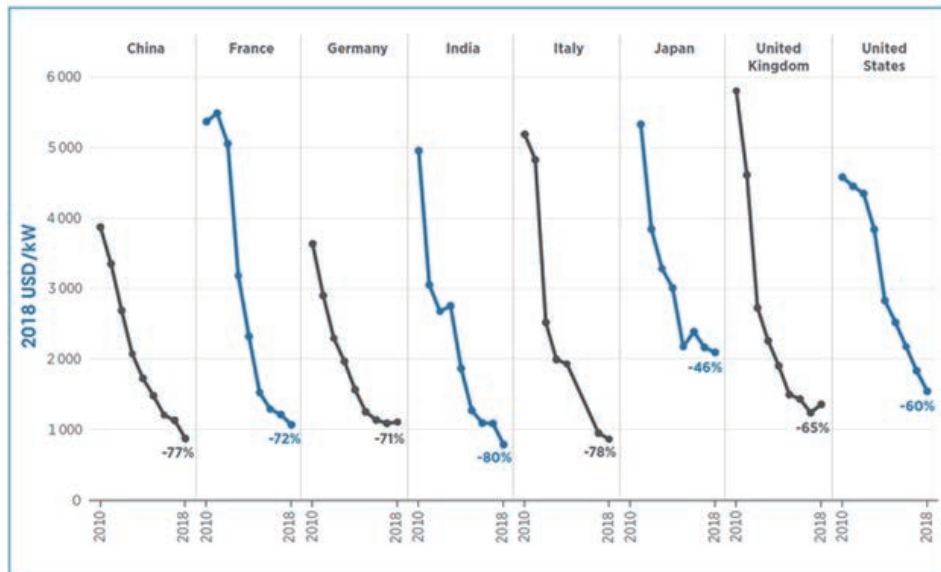
Of course, the low price has driven the rapid development of wind power and PV power. The global installed solar PV capacity reached 60GW, accounting for about 55% of the total renewable energy, while installed onshore wind power capacity reached 45GW, and hydropower capacity reached 21GW last year. In addition to the relatively mature hydropower, wind power and PV power, other renewable energy sources also have considerable potentials for development. In recent years, due to the risk that large hydropower plants may affect the ecological environment, it is difficult for many countries to find appropriate sites for construction. On the contrary, small hydropower generation is a better solution, because there is less need for large-scale construction, which gradually arouses people's interest. In recent years, the small hydropower capacity factor of various countries has reached about 46%~67%, which is similar to the factor of 34%~62% of large hydropower generation. This shows that even small hydropower plants may not generate less power than large hydropower plants when there is plenty of water. Taiwan has high mountains and swift torrents, and the drop height of rivers is big, so the development of small hydropower may be a solution that gives consideration to both ecological and local energy needs.

In terms of geothermal power generation, the global LCOE mostly falls in the low standard of fossil fuel cost, and the capacity factor mostly falls in the high-grade range of 80%-90%. It can be said that the year-round renewable energy power generation has great potential and low cost. Taiwan, rich in geothermal resources, may be able to develop in this direction, making geothermal power generation the third foot of green energy power generation in addition to wind and PV power generation.



Since the cost of building new power plants for renewable energy is getting lower and lower, countries should develop renewable energy vigorously, whether from the point of view of economy or carbon reduction. The supporting intelligent power grid, power grid management and energy storage facilities are also becoming more and more important. The report points out that in the future, not only will the cost of power generation be taken into account, but also the cost of the overall system as well gradually. The combination of power generation from various green energy will be the blueprint for the global energy ratios in the future.

Utility-scale solar PV total installed cost trends in selected countries, 2010-2018



The costs of solar power plants in various countries decline significantly
(Source: IRENA Renewable Power Generation Costs)

【Reference】IRENA-Renewable Power Generation Costs in 2018

