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The Hongkong Electric Co., Ltd.

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HK Electric Enhances Power System Resilience Against Abnormalities with Innovative Technologies

HK Electric is committed to the development and application of innovative technologies to enhance its overall operational performance and ensure world class power supply reliability. The Company organised today (12 October 2023) a seminar entitled "Innovating Beyond Boundaries" to further promote the culture of innovation and enhance its service through experience sharing and views exchange with industry players.

Representatives from HK Electric introduced to the participants various self-developed projects, including remote monitoring systems for power network health which help reduce substantially the occurrence of high-voltage (HV) cable abnormalities by 40%.

Mr. Frank Chan, Hong Kong Deputy to the National People's Congress and former Secretary for Transport and Housing, and Mr. Charleston Sin, Professor of Practice of the Hong Kong Polytechnic University delivered the keynote speeches. Around 300 practitioners from various sectors, including utilities, construction, property telecommunication, logistics, computer technology and academia joined the event in person or online.

"Though HK Electric is well known globally for its world-class reliability of power supply, we continue to work hard and are never complacent with this. We have been reviewing our daily operations, driving colleagues to adopt new technologies and work out innovative solutions. Our ultimate aim is to enhance our efficiency and productivity further in daily operations and ensure a stable and reliable power supply for our customers," HK Electric's Managing Director, Mr. Francis C.Y. Cheng said during the opening ceremony.

Mr. Cheng said that HK Electric formalised its innovation journey by establishing a dedicated committee in 2018. Chaired by the Managing Director, the Innovation Steering Committee drives the integration of innovative culture into employees' daily work and organises competitions to enhance employees' motivation and engagement, as well as to acknowledge their contributions to innovation. The Company also set up the "Inno Hub", an online community platform where ideas can be shared and collaboration undertaken within and across business units, nurturing a strong and robust innovation culture.

Over the past five years, different divisions and departments have developed cross-discipline cooperation and launched more than 200 projects applying market technologies or improving operational efficiency through digital transformation, among which three patents have been obtained, including the “Smart Circuit Breaker Monitoring and Analytic System”.

Taking the example of strengthening the stability of HK Electric’s transmission and distribution network, the company has more than 4,000 substations across its supply territory with a total cable length of around 7,000 km, which is about the flight distance from Hong Kong to Melbourne. The huge power network provides a stable electricity supply to customer installations, so any abnormality should be avoided. HK Electric has therefore over the years made references to new market technologies, used cost-effective methods, be it self-developed or collaborative, to remotely monitor the power network health and take preventive measures against abnormalities.

The transmission and distribution network could be compared to the human circulatory system with power cables as the blood vessels responsible for the important function of energy delivery and distribution. Just as the health of the blood vessels would deteriorate with age, so would the power cables. To keep our network “healthy”, comprehensive and frequent “body checks” are necessary. In collaboration with the Centre for Advances in Reliability and Safety Limited (CAiRS) initiated by The Hong Kong Polytechnic University, HK Electric has developed an AI-based “Cable Health Condition Monitoring System”. The built-in AI models conduct cable health diagnosis by analysing operational data of underground cables, helping engineers formulate solutions prior to any possible issues.

Apart from routine maintenance, immediate response to cable damage is equally important in safeguarding the well-being of the whole network. The circuit breakers will operate immediately whenever there is malfunction or fault in the cable to isolate the fault from further affecting the entire network. To ensure this last line of defence is working effectively, a “Smart Circuit Breaker Monitoring and Analytic System” has been developed. By analysing waveform of the trip coil current of the circuit breakers, it could identify abnormalities and early symptoms of circuit breaker failure, so that maintenance can be carried out at an early stage.

The “Artificial Intelligent (AI) Video Surveillance for Substation Monitoring System” is another transformative technology applied to safeguard our power supply. With the use of thermal cameras and AI analytic model to continuously monitor temperature changes in substations and detect hot spots caused by failures of switchgears and water leakage, engineers on duty will be alerted immediately when there are unusual events so that intervention could be made as early as possible.

These three systems together have made possible real-time monitoring of the health status of the transmission and distribution network. Due to external interferences and other factors, there were about 250 HV cable abnormalities on average each year, affecting the stability and reliability of our power supply. With the introduction of these new systems, the number of HV cable abnormalities has now dropped by 40% to around 150 incidents per year on average, demonstrating the effectiveness of these systems in improving our power supply reliability.

In the conference, speakers from HK Electric also shared how to enhance customer service through technology implementation, support the needy in society through collaboration with NGOs, access equipment and spare parts in a smarter and more efficient way, and promote a greener building process and energy use in construction sites. All these innovative ideas and solutions are reported in the company's Innovation Report 2023 , which has been uploaded to the corporate website ([InnovationReport_eng \(hkelectric.com\)](http://hkelectric.com)) for sharing and promoting knowledge transfer.

Photo Captions:



To enhance service quality, HK Electric organises an innovation conference entitled “Innovating Beyond Boundaries”, bringing together various industry players to share experience and views.



Mr. Francis C.Y. Cheng says HK Electric is committed to driving integration of innovative culture into employees' daily work. More than 200 digital transformation and technological projects have been launched over the past five years to improve operational efficiency, among which 3 patents have been obtained.



Mr. Frank Chan (4th from left, front row) and Dr Charleston Sin (2nd from left, front row) deliver keynote speeches with their insights on innovation. A number of guests also share their thoughts and experiences.



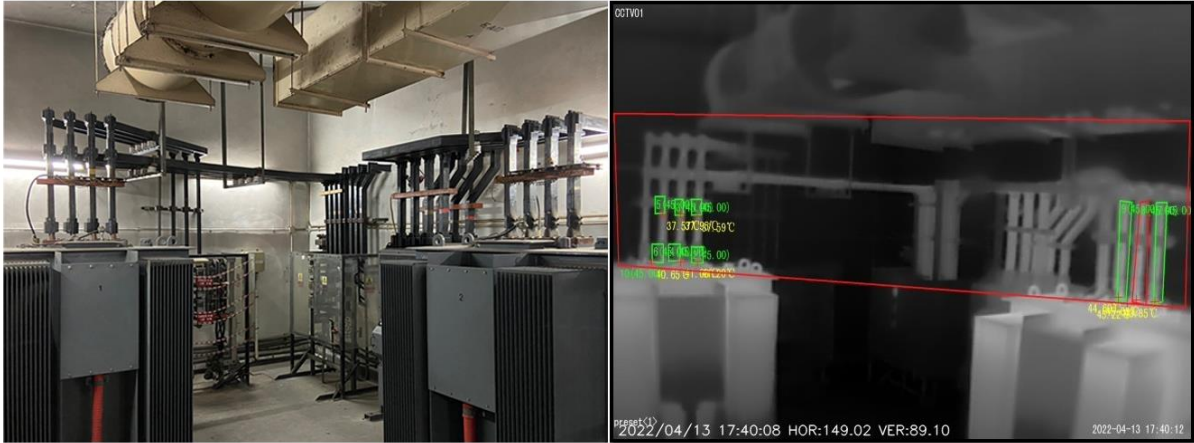
Transformative technologies have been applied to substations and other parts of the power network to monitor their health status and improve supply reliability.



A Smart Circuit Breaker Monitoring and Analytic System is invented to analyse the waveform of the trip coil current of the circuit breakers which help identify abnormalities and early symptoms of circuit breaker failure.



The AI-based Cable Health Condition Monitoring System conducts cable health diagnosis by analysing operational data of underground cables, helping engineers to formulate a repair solution.



The Artificial Intelligent (AI) Video Surveillance for Substation Monitoring System uses thermal cameras and AI analytic model to continuously monitor temperature changes in substations and detect hot spots caused by failures of switchgears and water leakage.