THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

西安交通大學 XI'AN JIAOTONG UNIVERSITY

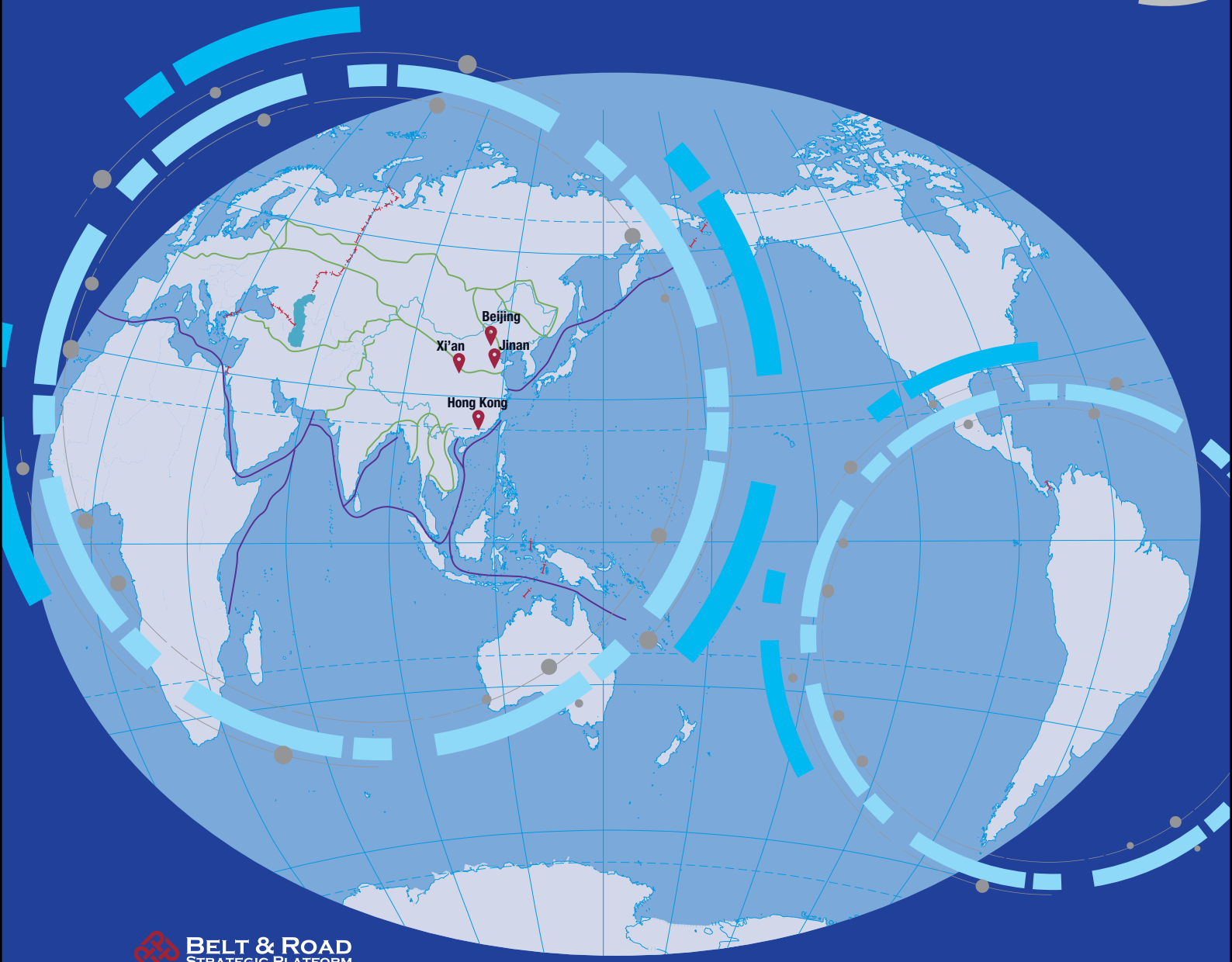
国家电网有限公司 STATE GRID CORPORATION OF CHINA

港燈 HK Electric 130 推動永續未來 Powering for Sustainability

BELT AND ROAD ADVANCED PROFESSIONAL DEVELOPMENT PROGRAMME IN POWER AND ENERGY 2023

THEME: BUILDING AN INNOVATIVE AND DIGITAL POWER GRID FOR SHARED FUTURE OF MANKIND

(PHYSICAL MODE)



BELT & ROAD STRATEGIC PLATFORM

一帶一路 策略平台

12 August - 23 August 2023

To facilitate communication and foster long-term collaboration in electric power industry among the Belt and Road countries and regions, a professional workshop is co-organised by The Hong Kong Polytechnic University (PolyU), Xi'an Jiaotong University (XJTU), State Grid of China Technology College, and The Hongkong Electric Company, Limited (HK Electric). Co-ordinated by XJTU-PolyU Silk Road International School of Engineering – a collaboration between XJTU and PolyU for talent nurturing and research collaboration in the Belt and Road countries and regions, the workshop provides a platform for connection and technology exchange among senior executives and researchers of enterprises, government units and higher education institutions. It is the first of its kind workshop in both Mainland China and Hong Kong with cross-regional, multi-cultural, systematic and innovative elements incorporated.

12-16 August 2023

Jinan
State Grid of China Technology College

16-19 August 2023

Xi'an
Xi'an Jiaotong University

19-21 August 2023

Hong Kong
The Hongkong Electric Company, Limited

21-23 August 2023

Hong Kong
The Hong Kong Polytechnic University

THEME: BUILDING AN INNOVATIVE AND DIGITAL POWER GRID FOR SHARED FUTURE OF MANKIND

Date	Time (UTC+8h)	Items	Items (Info)
STATE GRID OF CHINA TECHNOLOGY COLLEGE (JINAN)			
12/8/2023 (Saturday)	AM/PM	Transportation	Arrival in Jinan
			Coach transfer to Hotel
13/8/2023 (Sunday)	AM/PM	Activity	**VISIT AND ON-SITE EXCHANGE - QUFU CITY**
14/8/2023 (Monday)	AM	Activity	**OPENING CEREMONY**
		Activity	**VISIT PRACTICAL TRAINING FACILITIES**
		Lecture	**TOPIC: BUILDING A POWER SYSTEM BASED ON NEW ENERGY** Speaker: Ms. ZHOU Guiping, *Professor, Training Dept. of Power Grid Construction, State Grid of China Technology College* Abstract: This lecture introduces the essential role that a power system based on new energy is playing when promoting carbon emission reduction and neutrality, and the characteristics of power system based on new energy and zero-carbon technology for power grid will be shared from the viewpoint of State Grid Corporation of China(SGCC).
	PM	Lecture	**TOPIC: CONSTRUCTION OF A DIGITAL POWER GRID** Speaker: TBC Abstract: Digital power grid is a crucial part in digital transformation for a TSO or the power systems. The lecture introduces the endeavor in digital power grid SGCC has made to create new competitive strengths while embracing the digital economy, including smart operation, equipment lean management, ecological high -quality services and business efficiency compliance. Application of the digital power grid such as smart grid is also introduced.
15/8/2023 (Tuesday)	AM	Lecture	**TOPIC: INTEGRATION OF LARGE-SCALE CLEAN ENERGY** Speaker: TBC Abstract: This lecture introduces the integration situation and core technology of large-scale clean energy, the unified dispatching mechanism implemented in China,and rapidly respond to multi-level dispatching and coordinating the accommodation of clean energy sources in China, which enables SGCC to integrate the largest amount of renewables with the strongest power transmission capacity in the world.
		Lecture	**TOPIC: UHC AC AND DC TRANSMISSION TECHNOLOGY** Speaker: TBC Abstract: This lecture introduces the principle, application, apparatus, and advantages of UHV DC/AC transmission technology in the context of building up a power system and the changes brought by UHV transmission technology.
	PM	Activity	**TECHNICAL VISIT - ELECTRIC EQUIPMENT AND NEW TECHNOLOGIES INTRODUCTION**
16/8/2023 (Wednesday)	AM	Lecture	**TOPIC: UHV LIVE WORK** Speaker: TBC Abstract: Live line works are widely used in maintenance jobs of UHV AC/DC lines in SGCC with several advantages not only in saving back-up capacity but economy while the line is still in charge. This lecture shows preparation especially protection work, operation procedures and operation items, the prospect of live work is also introduced here.
		Activity	**SHARING SESSION**
	PM	Transportation	Departing for Xi'an
XI'AN JIAOTONG UNIVERSITY (XI'AN)			
16/8/2023	Evening	Transportation	Coach transfer to Hotel
17/8/2023 (Thursday)	AM		**WELCOME BRIEFING**
		Lecture	**TOPIC: ELECTROMAGNETIC RESILIENCE ENHANCEMENT OF CRITICAL NATIONAL INFRASTRUCTURE** Speaker: Prof. XIE Yanzhao, *Professor with School of Electrical Engineering, Xi'an Jiaotong University* Abstract: This talk will introduce the recent progress of resilience enhancement measures for critical infrastructure against the extreme electromagnetic events, e.g., geomagnetic disturbance (GMD) and intentional electromagnetic interference (IEMI), etc. Firstly, this talk will present a triangular pyramid model which aims for evaluation of electromagnetic security of critical infrastructure and discuss the significance of electromagnetic resilience. Then, the characteristics of typical extreme electromagnetic environments, such as GMD and IEMI, will be analyzed. The electromagnetic effect mechanism and susceptibility evaluation theory for critical infrastructure will be introduced. As a typical example, the impact of GMD on the power grid is analyzed. The 100-year and 10,000-year extreme GMD scenarios have been established, and the impact on critical equipment such as transformer are evaluated, including the hot-spot heating, reactive power loss and harmonics, etc. Afterwards, in view of variety of waveform characteristics, a combined worst-case and statistical analysis is proposed for complex power system for assessing the maximal field induced terminal load voltage. Accordingly, analytical solutions to overvoltage peak upper bound and its statistics have been formulated, which quantitively interprets the effect of individual segment orientations, length, impedance, etc. The approach offers useful uncertainty quantification tool for assessing the impacts due to external extreme electromagnetic events. Finally, taking into account the priority of critical infrastructure, a comprehensive electromagnetic resilience enhancement strategy can be developed by integrating the prevention, protection and recovery techniques.

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Date	Time (UTC+8h)	Items	Items (Info)
17/8/2023 (Thursday)	PM	Activity	**TECHNICAL VISIT - STATE KEY LABORATORY OF ELECTRICAL INSULATION AND POWER EQUIPMENT**
		Lecture	**TOPIC: APPLICATION RESEARCHES AND EXPLORATION OF ARTIFICIAL INTELLIGENCE IN HIGH-RESILIENT POWER ENERGY SYSTEMS** Speaker: Prof. LI Gengfeng, *School of Electrical Engineering, Xi'an Jiaotong University* Abstract: High-resilient power systems can effectively prevent, resist extreme events and restore performance by flexibly regulating resilient resources, thereby ensuring safe and reliable power supply. Artificial intelligence can effectively improve the risk perception, prevention and resistance capabilities of the power system through data-driven methods, and improve the system's resilience level. This lecture focuses on the application research of artificial intelligence in high-resilient power systems, and discusses forward-looking technologies that may achieve major innovative breakthroughs.
18/8/2023 (Friday)	AM	Lecture	**TOPIC: RESILIENCE-CONSTRAINED PLANNING AND OPERATION OF HYDROGEN-ELECTRICAL SMART DISTRIBUTION NETWORKS** Speaker: Prof. CAO Xiaoyu, *Assistant Professor with the Systems Engineering Institute of Xi'an Jiaotong University, Xi'an, China.* Abstract: Recent breakthroughs of hydrogen energy technologies may revolutionarily change the physical structure and operational manner of power distribution systems. The formation of carbon-neutral energy distribution infrastructure based on Hydrogen-Electrical integration would bring new challenges as well as opportunities to the grid resiliency (i.e., the capability to prevent, resist, adapt to, and promptly recover from extreme disturbances). On the one hand, the hydrogen energy components are still with very high capital expenditures, so that many system reinforcement measures could be infeasible due to the budget restriction. On the other hand, the synergistic operation of power grids with other energy sectors and urban transport system can be leveraged to enhance system's preparedness and responsiveness to disastrous events. This talk would first mention the technical measures with cost-benefit analysis for resilience enhancement of hydrogen-electrical smart distribution networks. Then, some recent studies on resilience-oriented hydrogen-electrical planning and operation will be reported.
		Activity	**TECHNICAL VISIT - THE LABORATORY OF CYBER-PHYSICAL ENERGY SYSTEMS**
	PM	Activity	**XI'AN CULTURAL EXCHANGE ACTIVITIES - TERRA COTTA WARRIORS**
19/8/2023 (Saturday)	AM	Transportation	Departing to Hong Kong
THE HONGKONG ELECTRIC COMPANY, LIMITED (HONG KONG)			
19/8/2023 (Saturday)	PM	Transportation	Coach transfer to Hotel (Wong Chuk Hang)
20/8/2023 (Sunday)	AM	Lecture	**TOPIC: HOW WE COMBAT CLIMATE CHANGE IN METROPOLITAN CITY?** Speakers: Mr. Bill Ho, *General Manager (Corporate Development), The Hong, HK Electric* Mr. K.K. Leung, *Construction and Maintenance Engineer, HK Electric* Ms. Karen Li, *Distribution & Planning Engineer, HK Electric* Abstract: There is a pressing need for us to combat climate change for the betterment of the mankind. HK Electric, as a socially-responsible organisation, has taken a multi-pronged approach to combat climate change. This lecture provides an overview on how HK Electric implements different measures in our power grid to combat climate change in Hong Kong.
	PM	Activity	**TECHNICAL VISIT - CABLE TUNNEL OF HK ELECTRIC**
	PM	Activity	**TECHNICAL VISIT - LAMMA POWER STATION OF HK ELECTRIC**
	PM	Activity	**CULTURAL VISIT - VICTORIA HARBOUR**
21/8/2023 (Monday)	AM	Lecture	**TOPIC: DIGITAL POWER GRID IN METROPOLITAN CITY** Speakers: Mr. W.T. Yau, *Senior Distribution Planning Engineer, HK Electric* Mr. H.P. Mak, *Senior System Control Engineer, HK Electric* Abstract: This lecture introduces how HK Electric digitalises the power grid and the smart grid features through customised software applications in Energy Management System and Distribution Management System, aiming at improving reliability and quality of power supply to customers.
	AM	Activity	**TECHNICAL VISIT - SYSTEM CONTROL CENTRE OF HK ELECTRIC**
THE HONG KONG POLYTECHNIC UNIVERSITY (HONG KONG)			
21/8/2023 (Monday)	PM	Lecture	**TOPIC: CARBON ANALYTICS AND MANAGEMENT UNDERPINNING SMART GRIDS AND SUSTAINABLE DEVELOPMENT** Speaker: Prof. XU Zhao, *Professor, Department of Electrical and Electronic Engineering, The Hong Kong Polytechnic University* Abstract: To limit global warming to pre-industrial levels, global governments, industry and academia are making aggressive efforts to reduce carbon emissions. At present, the carbon dioxide (CO2) emissions of power and industrial companies are disclosed by themselves, where the self-reported information is not always reliable and accurate. Therefore, an authorized, independent and genderized carbon analysis and evaluation system is urgently needed to meter CO2 emissions and achieve carbon certificate for various companies. This talk is focused on the latest development of Artificial Intelligence (AI) and carbon satellite and their applications to CO2 emission measurements especially for electric power industries. Here, advanced AI techniques, carbon satellite monitoring and power company data are combined to quantify anthropogenic CO2 emissions. This carbon measurement is then used to evaluate the emission reduction performance and to build a comprehensive carbon certificate framework for each company. The well-established carbon certificate system can facilitate companies to reduce CO2 emissions and protect the environment, which also underpins the development of renewable energy resources (RES) in smart grids.
22/8/2023 (Tuesday)	AM	Activity	**TECHNICAL VISIT - MARSH ROAD ZONE SUBSTATION**
	PM	Activity	**ROUNDTABLE DISCUSSION AND SHARING** **GRADUATION CEREMONY**
23/8/2023 (Wednesday)	AM/PM	Transportation	Departure from Hong Kong

MEDIUM OF INSTRUCTION

English

SPEAKERS

Veteran academics and professionals of the co-organisers

TARGET PARTICIPANTS

- Senior executives, government officials, specialists, professors, researchers and scholars in the electricity industry/ research disciplines from the Belt and Road countries and regions.
- Participants are expected to have sufficient English proficiency for communication in the workshop.

CONTENTS

The workshop comprises lectures, seminars, exchange activities and field studies in Mainland China and Hong Kong. Please see tentative schedule for details.

FEES AND EXPENSES

No workshop participation fee will be charged except that participants should be responsible for the following –

- **Transportation**
  - While the co-organisers will arrange inter-city transportation and ground transportation for the participants within Mainland China and Hong Kong, participants are responsible for international flights at their own cost (i.e. from home country to Jinan and from Hong Kong to home country).
- **Local Accommodation**
  - Participants are responsible for their accommodation expenses in Jinan, Xi'an and Hong Kong during the whole period of the workshop. Estimated total cost would be around USD1,300.
  - Participants will be arranged to be resided at the same hotel in the above-mentioned cities for easy coordination. The co-organisers will help make reservation at the hotel for the participants who will settle the payment with the hotel directly.
- **Insurance**
  - Participants must arrange insurance at their own cost with sufficient coverage for the entire workshop period both in Mainland China and Hong Kong. He/she needs to present the insurance contract to the organiser.
- **Visa Application**
  - Participants have to obtain a visa before entry into Mainland China and Hong Kong respectively, with the exception of visa-free entry based on relevant agreements or regulations.

    About Visa to Mainland China

    http://cs.mfa.gov.cn/wgrlh/lhqz/lhqzjjs/

    About Visa to Hong Kong

    http://www.immd.gov.hk/eng/services/visas/visit_transit.html
  - Participants are required to apply for the visa at their own cost. The co-organisers will provide necessary assistance such as the issuing of supporting documents.

ATTENDANCE REQUIREMENTS

- Participants are required to attend **ALL** sessions of the entire workshop. A certificate of attendance will be awarded upon completion of the workshop.
- To promote interaction and to enhance mutual learning, participants are encouraged to present and share the situation and development relating to electric power industry of their home country in the workshop.

ENROLMENT BY INVITATION

Enrolment will be considered via nomination by the invited organisation/ institution only. Deadline is **21 June 2023**.

CO-ORGANISERS / ENQUIRIES

The Hong Kong Polytechnic University

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The Hongkong Electric Company, Limited

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GENERAL NOTES

- The co-organisers reserve the rights to cancel the workshop and to make any necessary changes to the schedules, contents and mode of delivery of the workshop offered.
- The co-organisers reserve the rights to make an enrolment offer taking into consideration the composition of the workshop participants.
- All the sessions will be recorded by the organisers. By joining the workshop, participants agree that the video, audio and photos recorded and retained will be used for related academic and promotion purposes.