BTBU-ECOSF JOINT TRAINING CENTER ON SCIENTIFIC, TECHNOLOGICAL & ECONOMIC COOPERATION UNDER THE BELT AND ROAD INITIATIVE

5TH JOINT TRAINING PROGRAM

Pathways for Industrial Decarbonization in the Belt and Road Countries

Accelerating transition to low-carbon and climate-resilient development

JUNE 8 AND 9, 2022

中国科协“一带一路”国际科技组织合作平台建设项目

China Association for Science and Technology (CAST) Program of International Collaboration Platform for Science and Technology Organizations in Belt and Road Countries

北京工商大学——经济合作组织会科学基金会
“一带一路”科技与经济合作联合培训中心

About the BTBU-ECOSF Joint Training Center

The Belt and Road Initiative (BRI) is a massive global initiative aimed at connecting international trading partners in the east and the west. The BRI offers a tremendous potential to spur a new era of trade, economic and industrial growth for the countries in the Asia and beyond. In order to maximize the benefits of BRI, the participating countries require to develop adequate technological workforce and engage in an alliance for promotion of cross-border cooperation in the Science, Technology, and Innovation (STI) sectors.

Appreciating this need for skill development and capacity building in key economic sectors, the Beijing Technological and Business University (BTBU) and the Economic Cooperation Organization Science Foundation (ECOSF) collaborated and launched the BTBU-ECOSF Joint Training Center on Scientific, Technological and Economic Cooperation under Belt and Road Initiative in September 2020. The Center has won the financial support of China Association for Science and Technology (CAST) Program of International Collaboration Platform for Science and Technology Organizations in Belt and Road Countries.

BTBU is renowned as a one of the leading high-level research universities in Beijing. Having long been committed to promoting substantive exchanges and exchanges with overseas first-class universities and academic institutions, BTBU has achieved meaningful results in international exchanges and cooperation, personnel training, academic research, etc.

ECOSF is the specialized agency of the Economic Cooperation Organization (ECO), an intergovernmental organization for scientific and technological cooperation, with its 10-member states (Afghanistan, Azerbaijan, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan, Uzbekistan). ECOSF has an extensive exchange and cooperation network with international scientific and technological organizations in Asia-Pacific, Africa, Europe, and other regions, as well as other international organizations.

BTBU-ECOSF Joint Training Center aims to promote the sustainable economic and social development of BRI countries through training in the fields of technology application, industrial economics, S&T standards, and science communication.

Background

BTBU-ECOSF Joint Training Center with support of China Association for Science and Technology (CAST) organized the 5th joint Training Program on "Science, Technology, and Innovation (STI) Policy and Tools for Sustainable Development in the Belt and Road Countries" on June 8 and 9, 2022. The training was held virtually through Zoom and attracted participation of over 100 participants from 20 countries, particularly from the ECO Member Countries. Engr. Khalil Raza Scientific Officer and Dr. Di Yuna, Director EU-ECOSF Joint Training Center moderated the training session and generated a meaningful dialogue on the subject. A number of industrial experts, business leaders and research scholars from China, and Pakistan participated as resource persons.

Climate Change is the biggest risk to mankind and one of the greatest global challenges of the 21st century, which needs to be addressed through international cooperation in the context of sustainable development. China has emerged as global climate leader with its announcement in 2020 that the nation would aim to achieve "carbon neutrality" by 2060. China already leads the world in the clean energy technologies, and it is by far the largest investor, producer and consumer of renewable energy.

Most of the world's focus has rightly been on today's major emitting countries when it comes to fighting the battle with climate change. From a forward-looking perspective, however, the biggest climate risk and opportunity lies in our ability to support a low carbon development pathway for the Belt and Road Countries that have signed up to China's Belt and Road Initiative ('BRI'). Hence, BTBU-ECOSF Joint Training Center made an attempt to bring China's extensive expertise and best practices in low carbon development to other Belt and Road (B&R) countries to host its 5th training program entitled on "Pathways for Industrial Decarbonization for the Belt and Road Countries" on June 8-9, 2022.

The purpose of this training program was to accelerate to low-carbon and climate-resilient development with special focus on key industrial sectors. It is important to note that this was the second training session dedicated to low carbon development for BRI, previously we held the similar training session on low carbon development last year in June 2021.

In this backdrop, this training program sought to understand and learn about viable options for low carbon transition, best practices, success stories, and barriers on implementation of policies and programmes promoting low carbon development, and match the potential cooperation among BRI counties in clean energy, charging station and new energy vehicles.

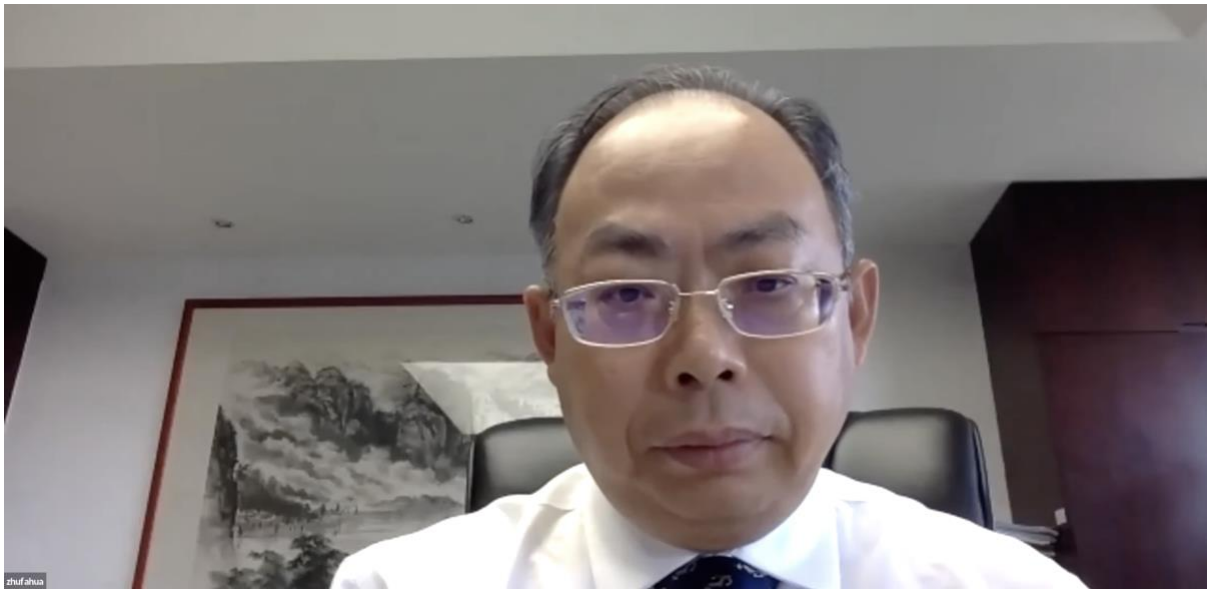
Prof. Dr. Manzoor Hussain Soomro, President ECOSF in his welcome remarks emphasized that Science, Engineering, Technology, and Innovation (SETI) play a critical role in providing policy instruments that are essential to develop strong base of countries. Prof. Soomro underlined that it is important to deliberate on the adequate framework and strategies to develop the STI policies as a powerful governing tool which can reshape and alter the course of direction towards a high economic growth trajectory for the Belt and Road countries.

Prof. Soomro underscored that BRI of China commits to foster the industrial development with strong technical cooperation in many fields, including sustainable energy, infrastructure development, emerging technologies, and smart cities or transport etc. To achieve these massive goals, it requires a robust commitment to support science and engineering, including the capacity building and human resource development, Prof. Soomro remarked.

Prof. Soomro said that we are very well aware of that the impacts of climate change that are occurring with increasing severity and frequency. All nations are vulnerable, but generally, developing countries are even more vulnerable and less resilient with limited resources for both mitigation and adaptation. This situation calls for the urgent need for us to make more investments in technologies and processes to promote climate-smart solutions for our planet.

President ECOSF further said that it is very timely to discuss low carbon industrial development, as aggressive adoption of such technologies will be an essential prerequisite for the Belt and Road region to collectively move closer to the more ambitious target to reducing the GHG emissions and containing the increase in temperature.

Policies and practices for low-carbon transition in the **Coal Power** Industry.



ZHU Fahua, Deputy General Manager, Science and Technology Research Institute Co., China Energy Investment Corporation (China Energy) delivered his lecture on the ***Policies and practices for low-carbon transition in the Coal Power Industry.***

Mr. Fahua outlined that China has adoptend an stringent focus on reducing the total amount of fossil energy, focus on improving utilization efficiency, implement renewable energy alternative actions, and deepen the power system innovation. He underlined that the importance of coal power in maintaining the security of the national power supply and the stability of the grid is irreplaceable for China at present. Hence, the low-carbon transition must

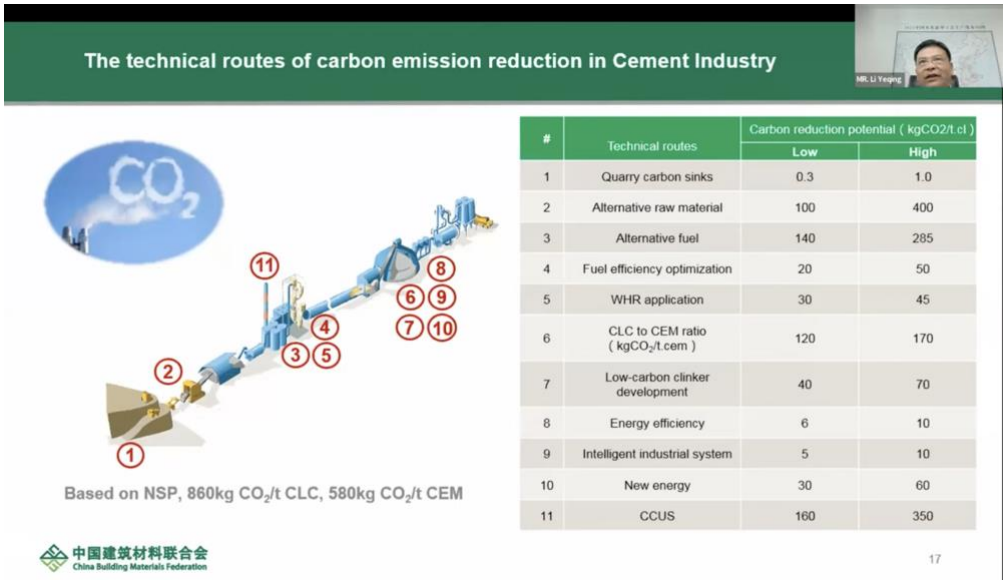
be coordinated with supplies guaranteed, making a large-scale expansion of renewables possible, while avoiding emissions cuts or indiscriminate cutting back on power consumption.

Mr. Fahua underlined that the 14th Five Year Plan (FYP) period (2021–2025) as an important policy directive for laying a foundation on which China can achieve its dual carbon targets, of peaking before 2030 and neutrality before 2060.

To achieve the goal of carbon neutrality, the low-carbon transition paths of coal power for each province are extremely critical in the context of China's emission trading scheme (ETS). He further highlighted importance of energy security and the role of coal and coal power in ensuring it: coal is to provide stronger energy guarantees, coal power will have a "supportive" role, and the "clean and efficient use of coal" is to be encouraged. He said that FYP provides clear roadmap on China's efforts to decarbonize its energy system and it outlines systematic instructions for a "green and low-carbon energy transition" – a key step for China to peak carbon emissions before 2030 and achieve carbon neutrality before 2060. Mr. Zhu Fahua concluded that fossil fuels should only be replaced when renewable energy supplies become reliable.

Policies and practices for low-carbon transition in the **cement industry**.

LI Yeqing, Executive Vice President, China Building Materials Federation (CBMF) presented his insights on the ***Policies and practices for low-carbon transition in the cement industry***.



#	Technical routes	Carbon reduction potential (kgCO2/t.cl)	
		Low	High
1	Quarry carbon sinks	0.3	1.0
2	Alternative raw material	100	400
3	Alternative fuel	140	285
4	Fuel efficiency optimization	20	50
5	WHR application	30	45
6	CLC to CEM ratio ($kgCO_2$/t.cem)	120	170
7	Low-carbon clinker development	40	70
8	Energy efficiency	6	10
9	Intelligent industrial system	5	10
10	New energy	30	60
11	CCUS	160	350

Mr. Yeqing said that the cement industry is regarded as one of the most energy-intensive sectors, which generates large amount of greenhouse gas and pollutant emissions. Therefore, the realization of green development of cement industry is of great significance for industrial decarbonization.

Globally, cement industry is under tremendous pressure to reduce the carbon emissions. Traditional cement industry has a very high carbon footprint. In the cement production, a large amount of limestone, coal and other nonrenewable resources are consumed, and greenhouse gases are produced, and other pollutants are emitted. Globally the cement the industry accounts for 7% of total CO2 emissions and whereas the coal consumption represents 5% of global CO2 emissions.

Mr. Li Yeqing highlighted that the National Development Reforms Commission (NDRC) issued Action Plan for Key Industries of Metallurgy and Building Materials to promote Energy Efficiency, push energy savings and carbon reduction (Year 2021-2025), which outlines main goals for industries including cement. It requires the capacity with advanced level of major industries including cement and data center must exceed 30% in 2025, by means of implementing energy saving and carbon reduction actions.

There are multiple potential ways to decarbonize the cement industry. This could be done using a combination of carbon capture and storage (CCS) and fuel and intermediate product substitutes. Besides, using alternative fuels in clinker production can reduce the use of fossil fuels, reduce emissions of CO_2 and other polluting gases, reduce the shortage of land caused by landfill, save investment in new waste disposal sites, and have great energy saving, emission reduction and economic and environmental benefits.

Alternative fuels such as Municipal Solid Waste, have a lower CO_2 emission factor than conventional fuels and can reduce the amount of CO_2 emitted by the disposal of these alternative fuels. In addition, the synergistic disposal of cement kilns can also reduce methane emissions from landfills. About 60% of the gas emitted from landfills is methane gas, which has 21 times the potential of CO_2.

Policies and practices for low-carbon transition in the **steel industry.**

GUO Zhancheng, Professor, State Key Laboratory of New Technologies of Iron and Steel Metallurgy, University of Science and Technology Beijing delivered his lecture on ***policies and practices for low-carbon transition in the steel industry***

Mr. Zhanchang said that steel industry occupies a place as one of the most important materials in modern life. Making steel is also highly carbon intensive. Making one metric ton of steel results in 1.8 metric tons of CO2 emissions, on average, and steel production accounts for about 8 percent of global CO2 emissions.

Steel is one of the core pillars of today's society and, as one of the most important engineering and construction materials, it is present in many aspects of our lives. However, the industry now needs to cope with pressure to reduce its carbon footprint from both environmental and economic perspectives.

Currently the steel industry is among the three biggest producers of carbon dioxide, with emissions being produced by a limited number of locations; steel plants are therefore a good candidate for decarbonization. While the industry must adapt to these new circumstances, it can also use them as a chance to safeguard its license to continue operating in the long term. Indeed, all Indeed, almost all Chinese steel producers are currently developing decarbonization strategies and running pilot plants to assess different production technologies.

Policies and practices for low-carbon transition in the **chemical industry**

ZHANG Hua, Secretary General, China National Chemical Energy Conservation (Emission Reduction) Center (CNCECC).

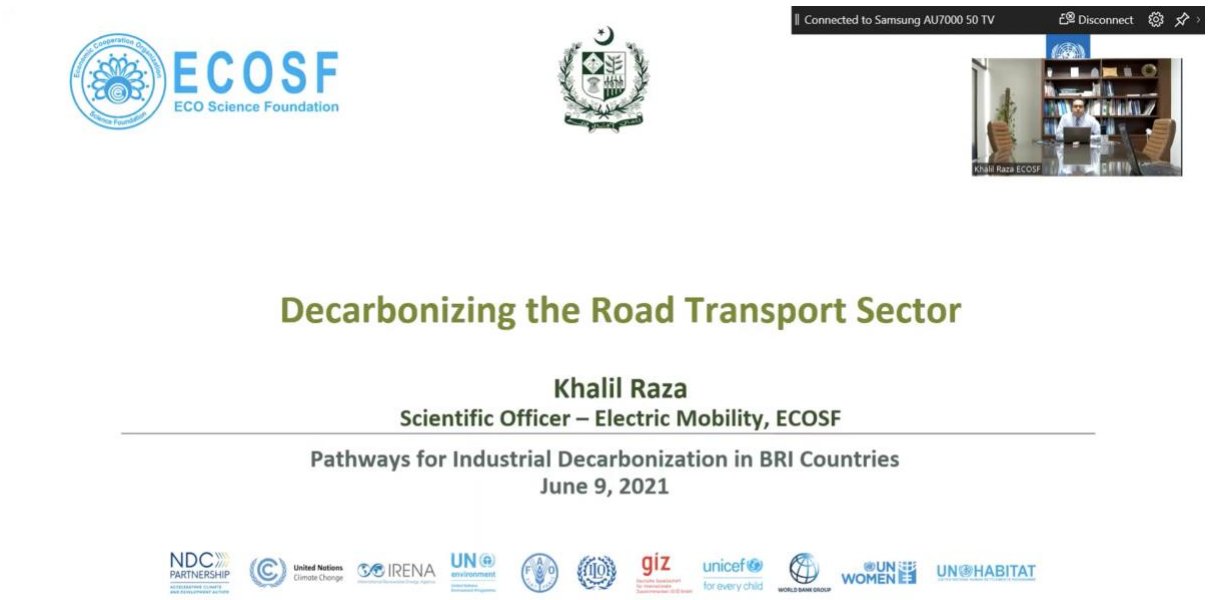
Ms. Hua underlined that the Chinese Government has put high emphasis on decarbonizing the major chemical industries to achieve the carbon neutrality targets. Hence, the state authorities are promoting the carbon peak of the petrochemical and chemical industry. This requires the optimizing the scale and layout of the production capacity and intensify the elimination of backward production capacity.

For emerging industries with large energy consumption, industrial associations and government institutions are supporting and guiding enterprises to apply green and low-carbon technologies to improve the energy efficiency. China launched an action plan which provides a strict energy efficiency target and highlights key areas in petrochemical and chemical industries to promote energy conservation and carbon reduction process by 2025.

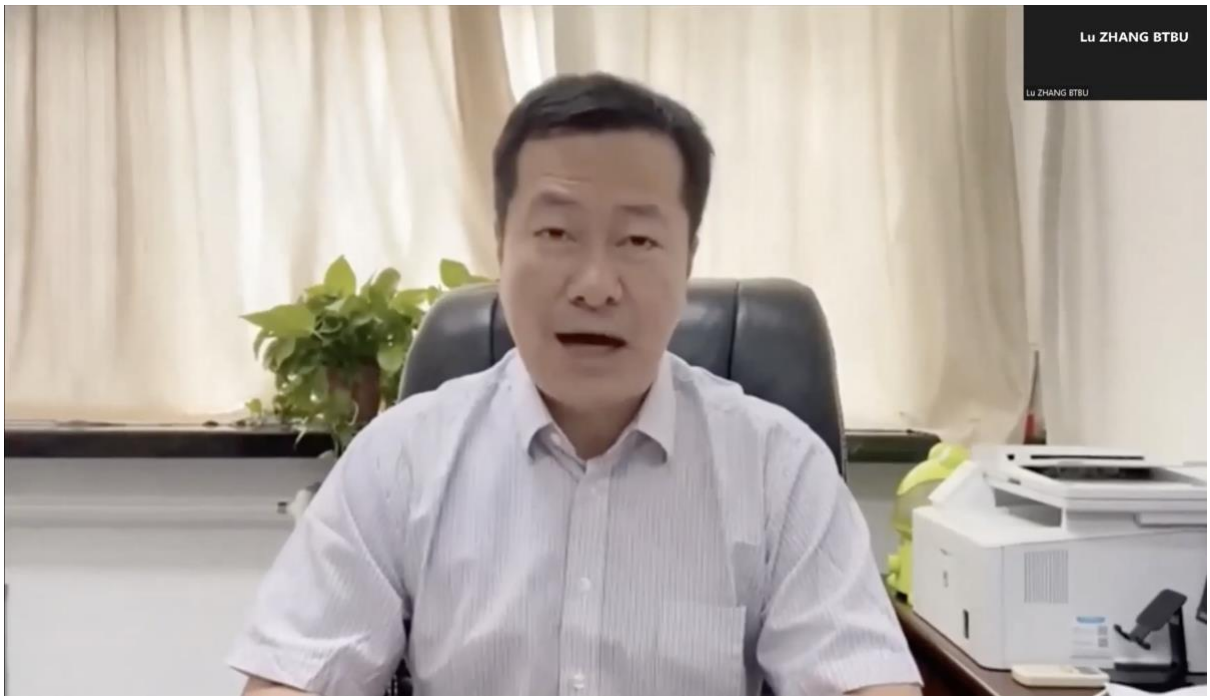
Case study: Low Carbon Transportation in BRI Countries

Engr. Khalil Raza, Scientific Officer, Economic Cooperation Organization – Science Foundation (ECOSF)

Mr. Khalil Raza presented a policy framework to scale up electric mobility in Pakistan and other ECO Member Countries. Mr. Raza concluded in order for Pakistan to achieve its intended Electric Vehicles (EV) penetration targets, relevant stakeholders need to strengthen its policy intervention in four key areas; (a) robust strategy (b) financial incentives (c) plan for reducing the cost of lithium-ion batteries and (d) adequate supply of reliable charging network.



It is important to mention that the transport sector of Pakistan is based entirely on imported fuels that is causing a major threat to country's trade deficit. As of January 2022, the trade deficit of Pakistan surged to $24.79 billion in the first half due to 63% increase in year-on-year basis. In 2019, Pakistan had to spent over $13.3 billion dollars on import of oil, and this cost is expected to cross over $30.7 billion by 2025. In the backdrop of these challenges, a transition towards Electric Vehicles (EVs) can reduce Pakistan's dependency on the petroleum products & at the same time provide a decarbonization pathway that goes beyond just the power sector. In pursuant of this goal, Pakistan launched its first Electric Vehicles Policy in 2019 which aims to achieve 30% share in sale of EVs by 2030.



Prof. Liu Minhua Vice President, Beijing Technological and Business University (BTBU) gave his closing remarks towards the end of training workshop. Prof. Minhua concluded that transformative powers of Science, Technology and Innovation (STI) will be at the heart of industrial decarbonization in the Belt and Road region. Prof. Minhua paid her gratitude to the expert trainers from China and Pakistan for delivering important and resourceful training for the audience.

Prof. Minhua concluded that the successful transition towards low carbon development would heavily depend on fostering public-private partnerships that can accelerate deployment of technologies, promoting research and development, and human resource skills development. Hence the critical challenge for us is to enable delivery of our national development visions and goals – through low-carbon, climate-resilient or climate-compatible development plans and strategies, whereby the role of science and technology is overarching and gigantic.

He assured robust cooperation and collaboration will continue by the Joint Training Center to achieve the intended goals and promote emerging trends in industrial development and STI in the belt and road region.

The recording of the entire training session is provided at the ECOSF's YouTube at https://www.youtube.com/watch?v=oHulRJPGA5c&list=PLxCR_mQcL6HbNpvOlWiWhe5boKHPEVg3U

Bionote of the Resource Persons/Experts

(I) **ZHU Fahua**, foreign academician of the Russian Academy of Natural Sciences; expert of the special government allowance of the State Council. Now Academician ZHU is the Deputy General Manager of Science and Technology Research Institute Co. in China Energy Investment Corporation (China Energy); Director of National Key Laboratory of Atmospheric Physical Simulation and Pollution Control; Doctoral supervisor of Nanjing Information Engineering University; Editor-in-chief of Power Science and Technology and Environmental Protection; Deputy editor-in-chief of China Electric Power. In 2019, under the leadership of Academician ZHU, China Guodian Environmental Protection Research Institute won the China Environment Award jointly established by the Environment and Resources Committee of the National People's Congress and the Population, and Capital and Environment Committee of the National Committee of the Chinese People's Political Consultative Conference. Academician ZHU has been interviewed by CCTV, Science and Technology Daily, China Environment News and China Electricity News for many times, and has been dedicated to ultra-low emission and carbon neutrality & emission peak.

(II) **LI Yeqing, Ph.D**., professor-level senior engineer. Dr.LI is currently the President & Party Secretary of Huaxin Cement Co., Ltd, Director of the Technology Center, Director of the Technology Research Institute; Executive VP of China Building Materials Federation (CBMF), Executive Director of the Expert Committee; President of Hubei Building Materials Federation; Deputy Director of the State Key Laboratory of Silicate Building Materials; Adjunct professor & doctoral supervisor of Wuhan University of Technology. Dr.LI has won 2 National Science and Technology Progress Awards, 1 National Management Innovation Achievement Award, 42 authorized invention patents, and 22 major scientific and technological achievements. Dr.LI has been awarded as the National Outstanding Engineer, the expert of State Council Government Special Allowance, and selected into the National Hundred Million Talents Project.

(III) **GUO Zhancheng**, Professor of State Key Laboratory of New Technologies of Iron and Steel Metallurgy, University of Science and Technology Beijing; Director of Metallurgical Reaction Engineering Branch of Chinese Society for Metals; Member of the Discipline Review Group of Metallurgical Engineering of the State Council; Member of the Expert Group of Atmospheric Special Program of the Key R&D Program of the Ministry of Science and Technology; Expert of the Industry Group of the UN Intergovernmental Framework for

Cooperation on Climate Change. Pro.GUO is mainly engaged in the research of physical chemistry of coal energy conversion process in metallurgical process, flue gas purification and solid waste treatment technology, low-carbon iron-making of fluidized iron ore powder, super gravity metallurgy, etc. Pro.GUO is committed to the R&D of new processes and technologies for energy saving and emission reduction in metallurgical process. Pro.GUO is responsible for 10 National Natural Science Foundation of China (NSFC) projects, including "Simulation of Clean Iron-making Process System for Sustainable Development"; 2 NSFC key projects, including "Key Technology Fundamentals of Fluidized Iron Ore Deoxidation"; 4 "863" projects, including "Catalytic Combustion Technology for Coal Powder Injection in Blast Furnace"; key R&D projects, including "System Optimization and Energy Saving Technology for Chemical and Metallurgical Process Industry". Pro.GUO has published more than 300 academic papers, 4 monographs such as "Fundamentals of New Technology of Iron and Steel Metallurgical Slag Dust Utilization", and more than 60 authorized patents for technical inventions. Pro.GUO was awarded by the National Outstanding Youth Fund in 2002, listed into Tier1/2 "Hundred, Thousand, Ten Thousand" Talent Project of Ministry of Human Resources and Social Security of the People's Republic of China in 2003, awarded the Billiton Gold Medal by the Institute of Minerals & Materials & Mining in 2006, granted a special allowance by the State Government in 2008, awarded the China Patent Excellence Award in 2015, awarded the Innovation Award for Scientific and Technological Achievements in Industry-University-Research Cooperation in 2016, awarded Honorary Professor by the University of Warwick (UK) in 2018, awarded the Spriggs Phase Equilibria Award by the American Ceramic Society (USA) in 2020, and awarded the Excellent Achievements in Scientific Research by the Ministry of Education (MOE) in 2020.

(IV) **ZHANG Hua**, Secretary General, China National Chemical Energy Conservation (Emission Reduction) Center (CNCECC); Head of Energy Conservation and Low Carbon of China Chemical Information Center; Expert in chemical industry of "National Carbon Market Help Platform". Ms. ZHANG, rich experience in petrochemical and chemical industry-related low carbon and energy saving, has led and participated in dozens of carbon neutrality & emission peak, and energy saving consulting projects in petrochemical and chemical industry. Ms. ZHANG is equipped with massive experience in greenhouse gas accounting for nearly 300 petrochemical and chemical enterprises; responsible for and participated in the revision of the supplementary data sheet on greenhouse gas emission accounting for the chemical industry issued by the Ministry of Ecology and Environment; responsible for and participated in the research of carbon emission baseline for 7 energy-consuming chemical products by the Development and Reform Commission; undertook the carbon emission benchmarking research project for the chemical industry in cooperation with Tsinghua University, EU Climate Division and US Environmental

Protection Association; responsible for and participated in the training of carbon verification agency personnel in Shandong Province, and the carbon emission training of Yanchang Petroleum Group and China Sinochem Group.

(V) **CUI Xu**, Deputy General Manager, New Energy and Power Department, China Power International Group Limited. CUI Xu, 10-year experience in such new energy generation as wind power and solar power. Mr. CUI has been mainly engaged in the market development of international new energy projects recently, and has organized national renewable energy planning for Africa, America, Southeast Asia and other regions respectively, and successfully developed new energy projects in Vietnam, Philippines, Kazakhstan, Argentina, Ethiopia, Kenya, etc; Mr. CUI has participated in the compilation of Chinese standards for wind power and solar power, which has promoted Chinese standards to apply in the global market.

(VI) **WEI Li**, VP of Environmental Technology Co., Deputy General Manager of BGE Environmental Restoration Co. Ms. WEI has been honored as Senior Engineer, National Environmental Protection Professional and Technical Young Talent, and Young Scientist of the Chinese Society of Environmental Science. Ms. WEI graduated from Zhejiang University in 2003 and joined BGE in 2011, mainly engaged in the implementation and management of oil and groundwater restoration projects, and technology and equipment development and application research. Ms. WEI has organized and implemented more than 150 restoration projects for contaminated soil and groundwater, generating revenue of more than 6 billion yuan; participated in the compilation of 17 industry standards and norms, and published more than 80 patents, papers and monographs; won the "Second Prize of National Science and Technology Progress", "Third Prize of Science and Technology Progress of Zhejiang Province ", "First Prize of Scientific and Technological Progress of China Construction Society", "Outstanding Youth Science and Technology Award of China Environmental Protection Federation", "Beijing 38th Red Flag Medal", "Beijing Municipal Haidian District 38th Red Flag Medal", "Beijing Haidian District Excellent CPC Member", etc.

(VII) **PENG Luhua**, Director of East Africa of Shenzhen LEMI, Founder of the former Light Up Global Project Laboratory of Shenzhen Quality Inspection Institute, consultant for Chinese language translation of IEC 62257-9-5 standard, and First Director of Lighting Laboratory of TUV SUD Certification Group in Germany.

(VIII) **Khalil Raza** is a sustainable energy professional with extensive experience in strategy management, project development and policy analysis, in the areas of science & technology, and clean energy. Currently, he serves as the Scientific Officer at the Economic Cooperation Organization Science Foundation (ECOSF). Mr. Raza plans, coordinates, and implements ECOSF's research programs, notably in the area of global environmental challenges with a particular focus on sustainable energy, water, and climate change. He also provides strategic and technical advisory to Member Countries of ECO in areas of Science, Technology and Innovation (STI) policy, energy roadmaps, and sustainable transportation. Mr. Raza is also working as an Energy Efficiency Consultant with the World Bank to help support Pakistan to increase energy and resource efficiency to decarbonize key heavy industrial sectors. Previously, Mr. Raza has worked with the UNDP, and Planning Commission on vital strategics programmes, including renewable energy, energy planning, electric mobility and Sustainable Energy for All (SE4ALL). Mr. Khalil is a recipient of the prestigious Fulbright Scholarship and holds Masters in Renewable and Clean Energy from Wright State University, Ohio USA.