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ESMAP
Energy Sector Management Assistance Program

SMART ENERGY INFRASTRUCTURE STUDY TOUR

October 30 – November 6, 2024

Republic of Korea

Contents

Overview

The Smart Energy Infrastructure Study Tour in the Republic of Korea is organized by the World Bank's Energy Sector Management Assistance Program (ESMAP).

The global energy landscape is amid a profound transformation, driven by the pressing need to not only meet the ever-increasing demand for electricity but also to improve energy efficiency, enhance energy reliability and security, and work towards achieving sustainability goals, including Sustainable Development Goal 7 (SDG 7). This transition is particularly pertinent in emerging and developing economies, where the demand for affordable, reliable, and clean electrical power systems is growing rapidly.

The advent of advanced digital technologies, along with substantial reductions in the cost of distributed energy sources, has paved the way for the integration of Smart Grid technologies as a critical element of the ongoing energy transition. Smart Grid represents a holistic approach to modernizing the electricity system, harnessing advanced technologies and data-driven solutions to optimize energy production, transmission, and consumption. For many emerging and developing countries, the transition to Smart Grid technologies presents a unique opportunity to leapfrog traditional energy infrastructure development and adopt state-of-the-art systems. Embracing Smart Grid not only enhances energy access and operational efficiency but also addresses the urgent need to curtail greenhouse gas emissions and adapt to the challenges of changing climatic conditions. The Republic of Korea is renowned for its world-class demonstration facilities that showcase cutting-edge technologies.

ESMAP's Foundations for Decarbonized Energy Systems program supports strengthening of power sector fundamentals in client countries around the world. Under its Modernized Energy Systems theme, the program supports client countries and their utilities in rethinking and implementing changes to their operations and business model, capitalizing on digital and decentralized technologies and leveraging the value of data. It is within the framework of the program that this study tour has been organized.

The primary objective of the study tour is to facilitate a hands-on understanding of Smart Grid technologies, insights from implementation, and business models for deployment, with a particular focus on their relevance to the energy transition, for electric utilities from World Bank client countries. The study tour will highlight specific insights from technology deployment, pertinent policies, and exemplary practices observed in Korea. The study tour aims to achieve the following specific goals:

1. Participants will gain firsthand exposure to advanced Smart Grid technologies, infrastructure, and operational models, including expert discussions, facility visits, and access to cutting-edge research and development initiatives.
2. Participants will learn strategies and practices of private sector distributed energy service providers and their operating models.
3. Participants will explore Korea's policy and regulatory frameworks supporting Smart Grid deployment and energy transition.
4. The tour will provide a platform to further collaboration between participants and relevant Korean institutions, as well as among participants, promoting potential partnerships and joint initiatives in the Smart Grid and energy transition domain.

Agenda

TIME	SESSION	VENUE
Day 1 | Wednesday, October 30, 2024 | Seoul		
	Morning: Presentation and Discussion Sessions	
08:30	Pick up at Four Points	
09:00-09:15	**Welcome and Introductions** Kabir Malik, Senior Energy Economist, ESMAP/World Bank	4th floor, Mid-Century Ball Room, Le Méridien Seoul Myeongdong
09:15-09:55	**Smart Grid in South Korea** Prof. Seung Il Moon, Korea Institute of Energy Technology *The session will introduce Korea's power system, covering the history of the Korea Electric Power Corporation (KEPCO) and the current state of the power system. In relation to Korea's smart grid policy, it will outline Korea's carbon neutrality goals for 2050, highlighting how these plans integrate with smart grid initiatives and specific components. Real-world applications of Korea's smart grid, such as smart campuses, microgrids, energy self-sufficient islands, and Battery Energy Storage Systems (BESS), will also be discussed.*	
09:55-10:35	**Smart Grid Vision and Strategy** Dr. Kum Jung Lee, Korean Energy Technology Evaluation and Planning *This session will present Korea's long-term smart grid strategy, outlining a vision for a sustainable, resilient energy system aligned with national energy policies and carbon neutrality goals. Key topics will include policy and technology roadmaps, the roles of government, and major milestones in technology integration. Additionally, the session will explore R&D efforts in AI, IoT, energy storage, DC grids, and demand response, with a focus on partnerships that drive innovation. It will also showcase demonstration projects and introduce key industry players, illustrating successful implementations and their impact on the power grid.*	
10:35-10:50	Coffee Break	
10:50-11:30	**Role of Smart Grid in Renewable Integration and Climate Resilience: Overview of South Korea's Renewables and Grid** Dr. Seong Soo Cho, KEPCO Research Institute *This session will explore the role of smart grids in integrating renewable energy and enhancing climate resilience. Key topics will include the implementation of Advanced Distribution Management Systems (ADMS), and Distributed Energy Resource Management Systems (DERMS) that improve grid management and asset maintenance. The session will provide an overview of future energy prospects, Korea's renewable energy policies, and the current status of grid integration. It will address stability issues in the power grid caused by the increased integration of renewable energy, including challenges related to supply-demand balance, voltage quality, and delays in renewable energy grid connections. Additionally, the session will discuss various technological solutions currently addressing these power grid challenges, including case studies on distribution system voltage problems and prospects for future power grid operation systems.*	

11:30-12:30	**Panel Discussion: Smart Grid Implementation** Moderated by Chong Suk Song, Energy Specialist, World Bank *Prof. Moon, Dr. Lee, Dr. Cho, and Dr. Kwon will discuss the key factors that contribute to the successful deployment of smart grids, considering the unique challenges and constraints faced by developing and emerging economies.*	
12:30-13:55	Lunch (Presentation by Encored on tech demo)	
	Afternoon: Site Visits	
14:00-15:15	Transfer (Bus)	Indoor Substation: KAMCO Yangjae Tower, Gangnam-gu GridWiz: Seongnam
14:45-15:30	**KEPCO Indoor Digital Substation Center,** Mr. Jung Hoon Yang, KEPCO **(Group 1)**	
15:15-16:00	**GridWiz,** RaYeon Park, GridWiz **(Group 2)**	
15:30-16:30	Transfer (Bus)	
16:15-17:00	GridWiz (Group 1)	
16:45-17:30	**KEPCO Indoor Digital Substation Center (Group 2)**	
17:00-18:30	Transfer to Moxy and Four Points (Bus)	
Day 2 | Thursday, October 31, 2024 | Seoul		
	Morning: Presentation and Discussion Sessions	
08:30	Pick up at Four Points	
09:00-9:45	**Big Data Analytics and Artificial Intelligence in KEPCO** Dr. Chang Hwan Sung, KEPCO Institution *This session will explore the transformative potential of big data and artificial intelligence in the operations of utilities, showcasing how these technologies have enhanced efficiency and decision-making processes in KEPCO.*	4th floor, Mid-Century Ball Room, Le Méridien Seoul Myeongdong
09:45-10:30	**Korean Energy Agencies** • KEPCO Academy (15 mins) • K-Water (15 mins) • Korea Electric Power Data Network (KDN) (15 mins) *In this session speakers from some key Korean public sector agencies in the energy sector will introduce the mandate and work of their agencies.*	
10:30-10:45	Coffee Break	
10:45-11:25	**Role of Smart Grid in Integration of Distributed Energy Resources** Mr. Jong Woong Choe, ENCORED *ENCORED is an energy IT company that has developed the iDERMS Virtual Power Plant (VPP). From a service provider's perspective, ENCORED will share insights on how utilities can effectively manage the increasing integration of diverse energy sources at the distribution level and implement VPP solutions.*	
11:25-12:00	**Role of Smart Grid in the Age of Electric Vehicles (EVs)** Dr. Ra Yeon Park, GridWiz *GridWiz is a clean-tech company pioneering Vehicle-to-Grid (V2G) charging technology. This session will showcase how GridWiz is leading the way in*	

	innovative energy solutions by integrating a diverse range of Distributed Energy Resources (DERs), including industrial demand loads, energy storage systems, and electric vehicle (EV) batteries. This integration maximizes economic benefits for customers while enhancing grid stability. A key highlight will be the introduction of Asia's first EV-to-Grid (V2G) service, powered by GridWiz's advanced bidirectional chargers and cutting-edge platform.	
12:00-13:00	Lunch	
	Afternoon: Site Visits	
13:00-14:00	Transfer (Bus)	National Biodiversity Center World Cup Park
14:00-14:45	**Smart Energy Systems at the National Biodiversity Center,** Dr. Jungmin Lee, Hyosung **(Group 1)**	
	Hydrogen Fuel Cell Power Plant and BESS at World Cup Park (Group 2)	
14:45-15:45	Transfer (Bus)	
15:45-16:30	**Hydrogen Fuel Cell Power Plant and BESS at World Cup Park (Group 1)**	
	Smart Energy Systems at the National Biodiversity Center, Dr. Jungmin Lee, Hyosung **(Group 2)**	
16:30-17:45	Transfer to Moxy and Four Points (Bus)	
Day 3 | Friday, November 1, 2024 | Seoul		
	Morning: Presentation and Discussion Sessions	
08:30	Pick up at Four Points	
09:00-09:40	**Demonstration Trends of Smart Grid Business Model in Korea** Mr. Changhoon Lee, Korea Smart Grid Institute *This session will describe a couple of implementation examples of smart grid implementation and associated business models. It will discuss an example of smart grid deployment for consumer-centered energy communities. Key topics will include the Smart Grid Big Data System, implementation of ToU and new energy service delivery models, urban micro-grids, virtual power plants. The presentation will also highlight future prospects for smart grid use cases/technologies.*	4th floor, Mid-Century Ball Room, Le Méridien Seoul Myeongdong
09:40-10:30	**Korea's Energy Innovation Companies** Mr. Sangyeon An, Kevin Lab (http://kevinlab.com/index_en.php) Mr. Nhokug Park, AtoM (https://www.a2m.co.kr/kor) Dr. Seungcheol Lee, StandardEnergy (http://www.tidekorea.com/kr/) *This session will feature speakers from innovative energy companies in Korea and showcase some of the leading smart grid technologies and solutions.*	
10:30-10:45	Coffee Break	
10:45-11:30	**Panel Discussion**	
11:40-13:00	Lunch	
	Afternoon: Site Visits	
13:00-14:00	Transfer (Bus)	

14:00-14:45	**Hydrogen Storage Station (including BESS and EV charging station) (Group 1 & 2)**	Yangjae dong, Seoul
14:45-15:30	Transfer to Moxy and Four Points (Bus)	
18:00-20:00	**Networking Reception**	Lotte Hotel Seoul
Day 4 | Saturday, November 2, 2024 | Seoul		
	Rest Day	
Day 5 | Sunday, November 3, 2024 | Seoul & Jeju		
10:40	Pick up at Four Points	
11:00	Pick up at Moxy	
13:50-15:00	Flight from Seoul/Gimpo to Jeju	
15:30-16:30	Transfer to Kensington Resort and Lotte Hotel (Bus)	
Day 6 | Monday, November 4, 2024 | Jeju		
	Morning: 13th Korea Green Innovation Days Plenary Sessions *For event details, including the agenda, please visit https://events.wbgkggtf.org/*	
08:30-09:00	Registration and Networking	Halla Hall, The Shilla Jeju Hotel
09:00-09:40	**Opening Ceremony**	
09:40-10:10	**Green Growth Talks: Pathways to Green Growth**	
10:10-10:20	**Guerilla Interviews 1: Capturing Voices of Impact**	
10:20-10:35	**Towards a Livable Planet: KGGTF's Path and Promise**	
10:35-10:55	Coffee Break	
10:55-12:00	**Showcasing KGGTF Impacts: Collaborative Contributions to Zero Carbon**	
12:00-13:00	Lunch	
	Afternoon: Site Visits	
13:00-14:00	Transfer (Bus)	
14:00-15:00	**Tamra Offshore Wind Farm (Group 1 & 2)**	19, Dumo 11-gil, Hangyeong-myeon
15:00-16:00	Transfer (Bus)	
16:00-17:00	**Korea Power Exchange Total Operation Center (Group 1) / KEPCO Jeju Renewable Energy Control Center (Group 2)**	81 Oranam-ro 243 Wolsannam-gil
17:00-17:30	Transfer (Bus)	
17:30-18:30	**KEPCO Jeju Renewable Energy Control Center (Group 1)**	
18:30-19:30	Transfer to Kensington Resort and Lotte Hotel (Bus)	
Day 7 | Tuesday, November 5, 2024 | Jeju		
	Morning: 13th Korea Green Innovation Days Technical Breakout Sessions on Energy	

09:00-09:15	**Opening and Welcome Remarks**	Room B (Halla Hall 1), The Shilla Jeju Hotel
09:15-10:00	**Action Plan and Vision for Jeju Energy Transition** • Energy Transition for Carbon-Neutral Jeju by 2035: Yoon Sung Ko, Director of Future Growth Division • Energy Innovation for the Future: Jeju's Challenges, Achievements, and Tasks: Yong Hyuk Moon, Director of Energy Industry Division • Commitment to Change: Pioneering Efforts in the Green Energy Transition: Hanna Kang, Researcher, NIGT	
10:00-10:20	**CFI (Carbon-Free Island) Demonstration Experience in Jeju** Prof. Hyung Seok Yoon, Jeju National University, Former Director of Jeju Province	
10:20-10:40	**National Smart Grid Demonstration Experience in Korea** Prof. Woo Hyun Hwang, Seoul National University of Science and Technology, Former President of Jeju Energy Cooperation and Director of KEPCO Smart Grid Division	
10:40-10:50	Q&A	
10:50-11:00	Break	
11:00-11:55	**Country Experiences** • Ukraine: Energy Storage and Ancillary Services Market Development Support in Ukraine • Mongolia: Battery Energy Storage Assessment in Mongolia • South Africa: Smart Grid Roadmap for the City of Cape Town • Türkiye: Smart Grid state of play and perspectives in Türkiye	
11:55-12:00	**Closing Remarks**	
12:00-13:00	Lunch	
	Afternoon: Site Visits	
13:00-14:00	Transfer (Bus)	
14:00-15:00	**Jeju EV Battery Industrialization Center**	241, Cheomdan-ro
15:00-15:45	Transfer (Bus)	
15:45-16:45	**CFI (Carbon-Free Island) Energy Future Exhibition**	712-3 Haemajihaean-ro, Gujwa-eup
16:45-18:30	Transfer to Kensington Resort and Lotte Hotel (Bus)	
Day 8 | Wednesday, November 6, 2024 | Jeju		
	Morning: Site Visits	
09:00-10:00	Transfer (Bus)	
10:00-11:00	**Jeju Geumak BESS Substation by KEPCO**	757 Geumak-ri, Hallim-eup
11:00-12:00	Transfer to Kensington Resort and Lotte Hotel (Bus)	

Speakers

Seung Il Moon

Distinguished Professor, Grid Modernization Energy AI Next Generation Power Grid
Korea Institute of Energy Technology (KENTECH)

Professor Seung-Il Moon is a former faculty member of the Department of Electrical and Computer Engineering at Seoul National University, specializing in power systems. He earned his bachelor's degree in electrical engineering from Seoul National University and then completed his master's and doctoral degrees in electrical engineering at Ohio State University, USA. His main research areas include flexible transmission systems, control and stability of power systems, and power system modeling

Currently, Professor Moon serves as the director of the Next-Generation Grid Research Institute at the Korea Institute of Energy Technology (KENTECH). He has contributed significantly to the advancement of energy-related industries and the promotion of distributed energy. He emphasizes the importance of the Distributed Energy Promotion Act, which he believes can enhance Korea's energy self-sufficiency.

Kum Jung Lee

Program Director for Smart Grid
Korea Institute of Energy Technology Evaluation & Planning (KETEP)

Since 2018, Kum-Jung Lee has been serving as a Program Director (PD) for Smart Grids at the Korea Institute of Energy Technology Evaluation and Planning (KETEP). In this role, she plans government-supported R&D programs for technologies that are strategically important to the smart grid sector, aiming to accelerate commercialization through technology development and demonstration. Key R&D areas include DC power grids such as HVDC (High Voltage Direct Current) and LVDC (Low Voltage Direct Current), high-efficiency power conversion and control technologies for integrating distributed energy sources like solar and wind into the power grid, as well as technologies for grid stabilization using ESS (Energy Storage Systems) and EV (Electric Vehicle) batteries.

In the private sector, she spent ten years at Hyosung Corporation's Heavy Industry Performance Group (PG) and Strategic Headquarters. During this time, she was responsible for business planning, strategy development, and the execution of new business initiatives for key power equipment, including transformers, circuit breakers, and high-voltage inverters in the transmission and distribution networks. Drawing on her experience in both the public and private sectors, she actively promotes collaboration among industry, academia, and research institutions to drive technological advancement and industrial growth in the smart grid field, considering both policy and industry perspectives.

Seong Soo Cho

Chief Researcher, Power Distribution Laboratory
KEPCO Research Institute

Dr. Cho joined Korea Electric Power Corporation (KEPCO), a public corporation specialized in constructing and operating the power system in Korea, in 1993. He has been working at the KEPCO Research Institute for 28 years, researching technologies to integrate renewable energy into the power system. In 2009, during the smart grid demonstration project in Jeju Island, South Korea, he conducted demonstration research in the smart renewable field in collaboration with the headquarters. At that time, he worked with major domestic companies to utilize ESS systems for the stable integration of renewable energy into the grid.

Recently, due to the government's emphasis on energy transition policies and the 2050 carbon neutrality policy, there has been a significant increase in applications for connecting renewable energy to the power system. This has led to social issues such as a shortage of connection facilities and increased construction costs for connection facilities. Dr. Cho is dedicated to developing technologies to mitigate these problems. In particular, he is focusing on developing voltage control technology using reactive power to address voltage quality degradation and overload issues in the distribution system caused by the increased connection of renewable energy sources. He is also working on developing flexible interconnection technology to appropriately control the generation output of renewable energy, prevent overload of power facilities, and maximize the total amount of renewable energy that the power system can accommodate.

Youngjin Kwon, Ph.D.

Chief Researcher/Team Leader of Power System R&D Team
Hyosung Heavy Industry R&D Center (KR)

Dr. Kwon has worked at Hyosung Heavy Industry R&D Center for 15 years and is in charge of the power system research team leader. His main research areas are power system modeling and analysis, engineering, signal processing and HILS. Dr. Kwon is researching and developing technologies in the fields of fault analysis, insulation coordination, harmonic analysis, facility rating analysis, grid code compliance study, power quality analysis, and resonance analysis in Hyosung Heavy Industry's' existing business areas of circuit breakers and transformers and new business areas of HVDC, STATCOM, and ESS.

His research and development products related to smart grids are the development of IED (Intelligent Electronic IED) and MU (Mersing Unit) for digital substations, CSD (Controlled Switching Device) for GIS, and Control Platforms for the microgrid for ESS.

His representative projects are Power system analysis and engineering of island microgrids, Power system analysis and engineering of 200MW HVDC in Yangju substation, and a lot of ESS projects for the Frequency Regulation/Grid Stabilization in domestic and South African ESS projects.

Dr. Kwon's recent research topics are solving various power system-related problems caused by increasing of DER (Distributed Energy Resource) and IBR (Inverter Based Resource). He is focusing on the research of enhanced analysis method and mitigation technology for harmonic resonance, control interaction between power electronic based devices, also development of grid forming algorithm for ESS and STATCOM, and real-time HILS (Hardware in the Loop) technology.

Jong Woong 'John' Choe, Ph.D.

CEO (Founder)
Encored Inc. (US) & Encored Technologies Inc. (KR)

Jong Woong 'John' Choe is the CEO at Encored. In 2013, Encored was founded by him in Silicon Valley in the U.S., and it has grown into corporations in Japan and Korea.

Prior to founding Encored in 2013, Choe was a Vice President at LG Instrument & Machinery from 1982 to 2003. In 2004, he became CTO as well as a Vice President of R&D and Business in LS Industrial Systems. Since 2005, Choe has been working as an IEC (International Electrotechnical Commission) international expert. In 2012, Choe was a President of R&D and Business in LS Industrial Systems and became CEO of LS Industrial Systems finally. Choe was honored in 2016, with Smart Grids as national merit from a Minister of Trade, Industry, and Energy. Currently, he is also a chair professor at Tech University of Korea in Energy & Electric Engineering.

Choe has a B.A. in Mechanical Engineering from Pusan National University. He has M.A. and Doctorate in Computer Science from Chungnam National University.

Ra Yeon Park

Board Director, Strategic Planning Office
GridWiz

Rayeon Park is a strategic planning lead at GridWiz. She leads a strategy team with a strict focus on delivering integrated platforms to optimize fleets of distributed energy resources as virtual power plants. The areas for the team include demand response, energy storage, rooftop solar, and EV charging solutions. Prior to joining GridWiz, she was a senior manager at KPMG CC&S (Climate Change & Sustainability). She received a B.A. in architecture from UC Berkeley and an MBA from KAIST.

Dr. Chang Hwan Sung

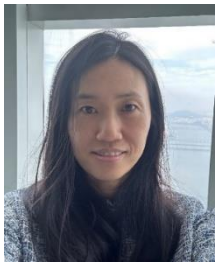
General Manager
KEPCO Institution

Sung Chang Hwan received a bachelor's degree in electronics engineering from Korean University and Master degree of Business Administration from University of South Carolina. During undergraduate, he was devotionally interested in programming languages, made a lot of software programs and some of them were commercially distributed. He entered KEPCO, a Korean government owned utility company and has been working over 22 years as an engineer.

He has planned a lot of ICT projects and many of them were applied to the industry field successfully. The biggest achievements are the designing of KEPCO's first IDC (Information Data Center) facility, planning and execution of next-generation SCADA project with 81 control centers and implementation of cloud computing. He acquired 5 ICT-related professional licenses from Korea and global including ATD license (IDC Center Design Expert) and ITIL license (IT Governance Expert). He designed xGrids architecture which merged SCADA, power network analysis, other electric control systems and

intelligent application into a brand-new platform. As of 2018, Korean government formalized xGrids as a national smart grid platform. He also won a lot of prizes such as KEPCO Man Awards, Creativity Awards, Ministry of Industry Awards etc. In addition, KEPCO was selected as CIO100 Awardee in 2016 thanks to SCADA project.

Nowadays, he is interested in the analysis of power network, big data, AI and Blockchain technologies for deployment onto the field. He is enjoying the exchange of insights with people. He wants to make Korean intelligent power grids platform (xGrids) as the world-leading best practice in power grid management.



Gihye Shin

Senior Manager
Human Resources Development Institute, K-water

Dr. Gihye Shin has been working at K-water as a water resources and environmental engineer since 2004. Over the years at K-water, Dr. Shin has engaged in wide range of water projects, spanning various infra types and technical areas from field operations to strategic planning. Her specific areas of expertise include: global technical assistance/ knowledge exchange services, studies and planning of water quality improvement solutions for river basins and cities; and environmental planning and safeguards in domestic/oversea water infrastructure projects. She holds a PhD in civil engineering from the University of Texas at Austin, USA, where her dissertation focused on “A subgrid approach for shallow hydrodynamic modelling.”

Chang Hoon Lee

Executive Director
Korea Smart Grid Institute

Mr. Lee has been working for Korea Smart Grid Institute, a non-profit and non-governmental organization that aims to provide public services related to the energy industry. He received Ph.D degree in public law at Sung Kyun Kwan University, Seoul. He has been doing professional work to support the Korean government’s policymaking for smart grid development from 2015 to the present.

Recently, he has mainly been working on projects related to artificial intelligence development using large amounts of energy data collected through smart grid infrastructure and has also been actively pursuing projects to support SMEs’ overseas expansion in response to changes in the global carbon-neutral market.

As a member of the ISGAN Secretariat, an international organization for smart grids, he focuses on discovering projects that can spread smart grid experiences to major countries in Asia and demonstrate new technologies and business models locally.

Sang Yeon An

Team leader of Global Business Team
KevinLAB Inc.

Mr. An possesses extensive experience in global business and Sales more than 10 years. Started out from entrepreneurship in Singapore, he now has led the global business team in KevinLAB Inc. for 3 years.

His global energy management market experience reaches out to Serbia, Malaysia, Indonesia, and UK. In the year 2021, he was in charge of communications during ODA project in Serbia, which was completed with grade A. Mr.An is also the lead personnel in Green Building projects currently conducting in Indonesia. His role is to manage the project via collaborations with Indonesia's national pension services (for public official), EPC company, and KevinLAB. Furthermore, he is the main communications officer between KevinLAB's Malaysian branch and headquarters. He has numerous experiences in collaborating with public companies internationally, as well has Korean companies. The recently growing attention to energy sustainability has led the corporates to emphasize the sustainability of their business management, especially in regard to energy; It is his company KevinLAB's role to ensure the energy dynamic of any building becomes sustainable and displayed in simplicity via energy management system. Mr.An's role in KevinLAB is to introduce these systems to companies who need them and communicate with clients to confirm KevinLAB provides what is adequate for the situation of their clients. As a member of the ISGAN Secretariat, an international organization for smart grids, he focuses on discovering projects that can spread smart grid experiences to major countries in Asia and demonstrate new technologies and business models locally.

Nhokug Park

Assistant Manager, Business Research Strategy Office
AtwoM

Mr.Park is in charge of planning, managing, and establishing strategies for projects utilizing renewable energy in AtwoM's strategic planning team. Currently, reflecting the country's carbon neutrality trend, he is carrying out numerous projects such as carbon emission management and trading, RE100, and wind turbine O&M. Korea is a country that has established itself as an IT powerhouse, having risen two levels from the previous year (8th) to 6th place in the 2023 World Digital Competitiveness Ranking announced by IMD(International Institute for Management Development, Swiss). Based on the excellent domestic IT infrastructure and human resources, AtwoM has achieved continuous growth and technological innovation since its establishment in August 1999. In 2016, AtwoM Vietnam Branch was established, and a cooperative system with the Vietnamese government and industry-academia cooperation with Ho Chi Minh City National University were established to lay the foundation for global business. Since then, as the demand for renewable energy resources has increased, a wind turbine O&M platform utilizing ICT technology has been developed, and successful verification experience has been gained. Recently, an energy market platform for carbon emissions trading has been developed to support companies in achieving cost-effective carbon neutrality.

Seungcheol Lee

Chief Strategy Officer
Standard Energy Inc.

Dr. Seungcheol Lee is a Chief Strategy Officer of Standard Energy Inc., a company manufacturing Vanadium Ion Battery and Energy Storage System. Vanadium Ion Battery ESS which is developed by Standard Energy Inc. is very long lasting, non-flammable, high-powerful and the suitable system for AI computing, super-fast EV charging station, power supply stabilization, and renewable energy storage. Standard Energy, founded in 2013, is one of the fastest growing companies in ESS industries.

Previously, he was the Vice Chairman and CEO of the Federation of Korean Industries. He was a board member of many public institutions such as the Korea National Pension, Korea Consumer Agency. He served and advised various Ministries of the Government, National Assembly, Board of Audit and Inspection, The Bank of Korea, and Court. He received Presidential Commendation twice for the above services. He has a BA from Korea University, an MA and Ph.D. from the Department of Economics of Ohio State University.

Woo Hyun Hwang

Professor
Seoul National University of Science and Technology

Professor Hwang currently lectures on Smart Grid and Microgrid Engineering to Master's and Doctoral students in the Department of Electrical and Information Engineering and the Department of Data Science at Seoul National University of Science and Technology (SeoulTech).

He also serves as an expert member of the Renewable Energy Division of the Presidential Commission on Carbon Neutrality and Green Growth. His research focuses on strategies to achieve global carbon neutrality. He has over 35 years of experience in the power industry, including policy development, research, project promotion, and evaluation, with particular expertise in smart grid projects, microgrids, e-mobility distribution, and EV charging infrastructure across academia, private, and public sectors.

Hyung Seok Yoon

Industry-Academia Cooperation Professor, Department of Electrical Energy Engineering, Jeju National University

Mr.Yoon is currently serving as an industry-academia cooperation professor at Jeju National University in the Department of Electrical and Energy Engineering. Previously, he worked as the Director-General of the Future Strategy Division (2020-2022) in the Jeju local government and as a Policy Research Fellow (2014-2020) in the Jeju local council, where he planned and implemented various policies for innovative energy transition models and the development of regional strategic industries focused on carbon neutrality and digital convergence. He played a key role in developing and implementing the Carbon Free Island 2030 policy in Jeju, significantly contributing to the expansion of renewable energy sources, including wind and solar

power. Additionally, he has advanced several pioneering future energy projects, such as the microgrid demonstration model in Gapado, R&D planning for P2G, P2H, and V2G using sector coupling technology, and the establishment of a resource circulation economy model based on electric vehicle battery reuse. These initiatives have driven substantial changes in the energy transition industrial ecosystem.

Building on these experiences, Professor Yoon is actively pursuing research and collaborative projects aimed at the sustainable development of the energy transition industry.

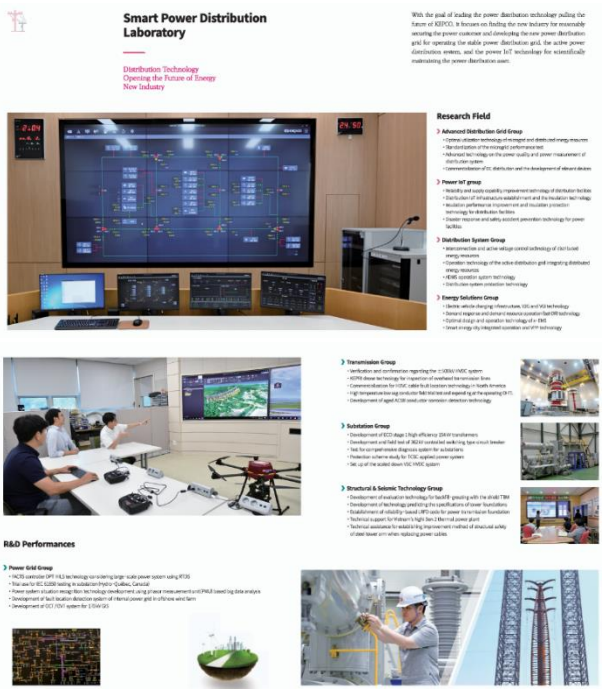
Site Visits

Day 1 | Wednesday, October 30, 2024 | Seoul

KEPCO Indoor Digital Substation Center

KEPCO Seoul Office – Smart Grid & Renewable Energy Exhibition

Korea Electric Power Corporation (KEPCO) is a leading energy provider in Korea, driving innovation in smart grid technologies and renewable energy solutions. At their Seoul facility, they integrate advanced systems to meet the evolving demands of sustainable energy management.



Smart Grid Initiatives: KEPCO focuses on building an intelligent energy infrastructure through various projects.

- Advanced Metering Infrastructure (AMI): Real-time monitoring for efficient energy usage.
- Smart Distribution Systems: Enhancing reliability while integrating renewable energy sources.
- Energy Management Systems (EMS): Optimizing energy flow through data analysis and automation.

Renewable Energy Focus: KEPCO is committed to expanding renewable energy deployment to meet global sustainability goals.

- Solar and Wind Integration: Advanced grid technologies balance renewable variability, ensuring stable energy delivery.
- Energy Storage Systems (ESS): These systems store excess energy and release it during peak demand, maintaining a consistent power supply.
- Hydrogen Energy Development: Pioneering efforts in hydrogen energy provide a promising pathway to a cleaner, more sustainable future.

Training & Knowledge Exchange: KEPCO's Seoul center serves as a hub for knowledge sharing, especially with officials from developing nations.

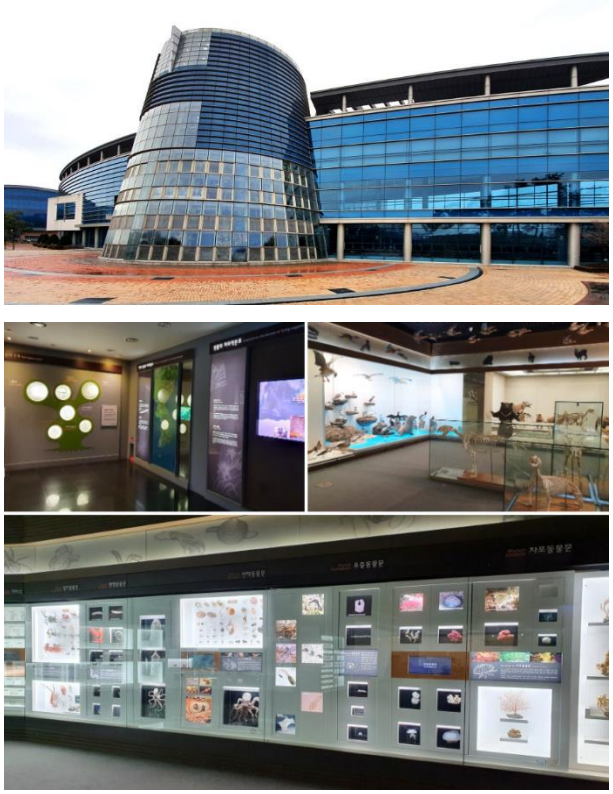
- Best practices for deploying smart grids in diverse environments.
- Strategies for integrating renewable energy into existing power networks.
- Advanced technologies for energy management and system optimization.

GridWiz

GridWiz is a smart energy solution provider committed to optimizing energy use and ensuring efficient power management. Our innovative technologies enhance the intelligence, sustainability, and responsiveness of energy grids to meet modern demands.

Core solutions:

- Smart Grid Technology: Improving the efficiency and reliability of power grids through advanced monitoring and control systems.
- Energy Management Systems (EMS): Utilizing real-time data analytics and automation to optimize energy consumption.
- Renewable Energy Integration: Facilitating the incorporation of solar, wind, and other renewable sources into existing power systems.



Cutting-edge solutions:

- Demand Response: Assisting businesses and communities in managing energy demand during peak times.
- Energy Storage Solutions: Providing scalable storage technologies to stabilize power supply and manage excess renewable energy.
- IoT-based Monitoring: Employing IoT devices for precise, real-time monitoring of energy systems.

For more details, visit https://www.GridWiz.com/en/

Day 2 | Thursday, October 31, 2024 | Seoul

Smart Energy Systems at the National Biodiversity Center

National Biodiversity Center is dedicated to the conservation and study of Korea's rich biodiversity. It combines advanced energy solutions with environmental research, creating a unique environment where ecological preservation meets technological innovation.

- Smart Grid Integration: Utilizes smart grid technologies to optimize energy consumption across research facilities, enabling real-time monitoring and efficient management of renewable energy sources.
- Renewable Energy Utilization: Solar panels and other renewable sources power a significant portion of operations, reducing carbon footprints and promoting a sustainable research environment.
- Energy Management Systems (EMS): Advanced EMS platforms efficiently balance energy demand and supply, ensuring stable power for critical biodiversity research while minimizing costs.
- Innovation in Sustainability: Showcases how smart grid technologies and renewable energy can support environmental conservation, providing valuable insights for developing nations looking to enhance their energy infrastructures.
- Cutting-Edge Research Facilities: Equipped with state-of-the-art technology, the center acts as a living laboratory for sustainable energy practices.

- Knowledge Exchange Hub: Welcomes government officials and energy experts from developing countries to learn best practices in integrating smart grids with renewable energy solutions for ecological preservation.

Hydrogen Fuel Cell Power Plant (20MW) and BESS, World Cup Park

World Cup Park serves as a key site for demonstrating advanced energy technologies, focusing on hydrogen fuel cells and Battery Energy Storage Systems (BESS). This facility embodies Korea's commitment to achieving carbon neutrality and developing sustainable energy solutions. As a demonstration site, it illustrates how smart grid technologies and renewable energy can collaborate to create a more efficient and resilient power system.

Key technologies:

- Hydrogen Fuel Cells: The park utilizes hydrogen fuel cell systems to generate clean electricity. Hydrogen, produced through electrolysis or derived from renewable sources, is used in fuel cells to generate electricity, emitting only water vapor as a byproduct. This technology provides a sustainable alternative to fossil fuels and is essential for balancing energy supply in regions aiming to reduce carbon footprints.
- Battery Energy Storage Systems (BESS): The integration of BESS allows for efficient storage and discharge of electricity, stabilizing the grid and ensuring a reliable power supply even when renewable sources fluctuate. BESS is crucial for managing peak loads, enhancing renewable energy efficiency, and providing backup power during outages.

Smart Grid Integration: The synergy between hydrogen fuel cells, BESS, and smart grid technology at World Cup Park showcases the future of energy management.

- Real-Time Energy Monitoring: Advanced data analytics enable real-time monitoring and management of energy systems, optimizing energy flow and balancing demand with available renewable sources.
- Renewable Energy Integration: Solar panels and other renewable sources are connected to the grid through smart technologies, demonstrating the increasing sustainability and adaptability of Korea's energy systems.

- Demand Response Capabilities: The facility adjusts energy usage based on demand, enhancing grid balance, improving energy consumption efficiency, and reducing strain during peak hours.

Day 3 | Friday, November 1, 2024 | Seoul

Hydrogen + BESS + EV Charging Station

In November 2018, amid significant public interest, Seoul introduced its first hydrogen bus, which began operating on Route 405, connecting Yangjae and City Hall. This bus successfully completed a one-year pilot

program to assess the viability of hydrogen-powered vehicles. The Yangjae Hydrogen Station, Seoul's first hydrogen charging facility, was established in 2010 for research but faced operational issues due to aging infrastructure and was closed in 2019.

To support the growing hydrogen vehicle fleet, Seoul expanded access to hydrogen charging at the Sangam and Yangjae stations to a total of 85 vehicles, with a capacity to support up to 300 vehicles per charging cycle. The world's first hydrogen charging station was also installed at the National Assembly, with additional stations established in Gangdong and Sangil, alongside the launch of 10 hydrogen taxis.

On March 1, 2021, the Yangjae Hydrogen Station reopened with a daily hydrogen storage capacity of 350 kg, allowing it to charge up to 60 vehicles. The station can charge five vehicles per hour, totaling up to 70 vehicles daily. Additionally, it features four rapid chargers for electric vehicles, solidifying its role as a comprehensive hub for zero-emission vehicles (hydrogen and electric).

The Yangjae Green Car Station operates at a charging pressure of 700 bar, with a cost of 8,800 KRW per kg, functioning on a 100% reservation basis.

Day 6 | Monday, November 4, 2024 | Jeju

Tamra Offshore Wind Farm

South Korea's first commercial offshore wind farm, operational since 2017, has a total capacity of 30 MW generated by 10 turbines. It plays a crucial role in advancing the country's renewable energy goals, providing clean, sustainable power to approximately 24,000 households annually.

Integration with Smart Grid Technology: The Tamra Offshore Wind Farm is closely integrated with advanced smart grid technologies that optimize the management and distribution of its generated electricity.

- Real-Time Power Management: The smart grid system allows for real-time monitoring and adjustment of power output, ensuring grid stability and efficiency despite the variability of wind power.
- BESS Integration: The wind farm includes a BESS to store excess power generated during peak production times, releasing it when needed to ensure a stable energy supply and mitigate fluctuations in wind energy.

Contribution to Renewable Energy Development: The Tamra Offshore Wind Farm is pivotal in helping Jeju Island achieve its carbon neutrality goals, with several notable contributions:

- Clean Energy Production: It generates approximately 180 GWh of electricity annually, enough to power around 60,000 households, significantly reducing reliance on fossil fuels and cutting greenhouse gas emissions.
- Boosting the Local Economy: The project collaborates with local communities for its operation, fostering the growth of the renewable energy industry in the Jeju region and supporting the training and development of skilled professionals in the maintenance and management of offshore wind facilities.

For more details, visit https://www.jejutp.or.kr/

KPX TOC HVDC Technology and HVDC Converting Station

Korea Power Exchange (KPX) Transmission Operation Center (TOC) and HVDC (High Voltage Direct Current) Converting Station serve as a critical hub for energy management and transmission. This facility is essential for integrating renewable energy sources, such as wind and solar, into the power grid while ensuring stable electricity transmission between Jeju Island and the Korean mainland.

- Efficient Power Transmission: The HVDC technology deployed at this facility enables the efficient transmission of large amounts of electricity over long distances with minimal energy loss. This is crucial for connecting Jeju Island's renewable energy output to the mainland power grid.
- Grid Stability and Flexibility: HVDC systems enhance grid stability by managing voltage and frequency variations, effectively balancing the fluctuating power output from renewable sources like wind and solar.
- Seamless Renewable Integration: The HVDC Converting Station facilitates the seamless integration of renewable energy generated on Jeju Island into the national grid, supporting Korea's goals for a sustainable and carbon-neutral energy future.

The KPX TOC utilizes advanced smart grid technologies to optimize energy flow, enhance grid reliability, and support renewable energy integration.

- Real-Time Monitoring and Control: The Transmission Operation Center enables precise monitoring and control of energy transmission, utilizing real-time data to adjust power flow according to demand and production levels. This ensures efficient energy distribution and minimizes the impact of fluctuations in renewable energy generation.
- Advanced Energy Management Systems (EMS): The EMS at KPX TOC coordinates the flow of electricity, allowing for optimal use of energy resources. It ensures a balance between supply and demand, even when renewable energy output varies due to changing weather conditions.

- Demand Response Programs: KPX implements demand response strategies to manage peak loads and balance energy consumption, ensuring a stable power supply while maximizing the use of renewable energy sources.

For more details, visit https://new.kpx.or.kr/

KEPCO Jeju Renewable Energy Control Center

KEPCO Jeju Renewable Energy Control Center is a state-of-the-art facility dedicated to the management and optimization of renewable energy generation on Jeju Island. As a key part of Korea Electric Power Corporation's (KEPCO) efforts to lead the renewable energy transition, this center integrates advanced smart grid technologies with renewable sources like wind and solar to ensure a stable and efficient power supply.

A Hub for Learning and Innovation: The center serves as a critical hub for controlling and monitoring the island's renewable energy assets, making it an ideal destination for energy officials from developing countries who wish to learn about the latest advancements in smart grid and renewable energy management.

Key Learning Opportunities: Visitors to the KEPCO Jeju Renewable Energy Control Center will gain valuable insights into the practical application of advanced energy technologies and renewable energy integration.

- Renewable Energy Control and Optimization: Understand how to manage and optimize the output from wind farms, solar power plants, and other renewable sources, focusing on maintaining grid stability.
- Advanced Smart Grid Technology: Explore the real-world application of smart grid systems that enable seamless integration of renewable energy into existing grids, providing lessons applicable to other regions.
- Strategies for Carbon Reduction: Learn about successful strategies for achieving carbon neutrality through large-scale renewable energy deployment, offering a blueprint for sustainable energy transitions.

For more information, visit https://home.kepco.co.kr/kepco/EN/main.do

Day 7 | Tuesday, November 5, 2024 | Jeju

Jeju EV Battery Industrialization Center

Located within the Jeju Technopark, the Jeju Electric Vehicle (EV) Battery Recycling Industry Center is at the forefront of South Korea's efforts to build a sustainable, circular economy surrounding electric vehicle batteries. This state-of-the-art facility focuses on the collection, testing, and repurposing of used EV batteries, addressing the challenges of battery disposal while creating new opportunities for resource recovery and renewable energy storage.

- Battery Collection and Testing: The center systematically collects used EV batteries and conducts rigorous testing to evaluate their remaining capacity and safety. This ensures that only suitable batteries are selected for repurposing or recycling, maximizing the value extracted from each battery.
- Battery Reuse and Repurposing: Batteries with remaining usable life are repurposed for secondary applications, such as energy storage systems (ESS) and renewable energy support. By giving a second life to EV batteries, the center helps reduce the environmental impact of battery production and disposal.
- Battery Dismantling and Material Recovery: For batteries that can no longer be reused, the center employs advanced dismantling technologies to extract valuable materials like lithium, cobalt, and nickel. These recovered materials are then supplied back to the battery manufacturing industry, contributing to a circular economy and reducing dependence on raw material extraction.

The Jeju EV Battery Recycling Industry Center offers a unique opportunity for energy officials from developing countries to gain hands-on experience with the latest practices in EV battery recycling and resource recovery.

- Battery Testing and Repurposing Processes: Understand the technical aspects of assessing used EV batteries for secondary applications and explore how batteries can be adapted for use in renewable energy storage.
- Recycling Technologies and Material Recovery: Learn about advanced dismantling techniques for recovering critical materials from end-of-life batteries, gaining insights into building a circular economy in the battery industry.
- Strategies for Sustainable Waste Management: Explore the regulatory frameworks, market mechanisms, and best practices that enable sustainable waste management for EV batteries, providing a model that can be adapted to other regions.

For more information, visit https://battery.jejutp.or.kr/

Carbon-Free Island Energy Future Exhibition

CFI (Carbon-Free Island) Energy Future Exhibition serves as a central hub for showcasing Jeju Island's ambitious journey toward becoming a carbon-free island. This exhibition offers a unique opportunity for international visitors, including energy officials from developing countries, to learn about cutting-edge renewable energy solutions and smart grid technologies being implemented on Jeju Island.

- Vision of a Carbon-Free Island: The exhibition highlights Jeju's strategic roadmap for achieving carbon neutrality by 2030. Visitors can explore the island's goals and milestones, including its transition from fossil fuels to renewable energy sources such as wind, solar, and geothermal power.
- Interactive Renewable Energy Displays: The exhibition features interactive displays that demonstrate the deployment of various renewable energy technologies across Jeju. These displays include models of wind turbines, solar panels, and energy storage systems (ESS), providing a hands-on understanding of how clean energy is generated and managed.

- Smart Grid Integration: Attendees can learn about the smart grid systems that enable Jeju to efficiently integrate renewable energy into its power grid. The exhibition explains how smart grids monitor and balance energy production and consumption in real time, ensuring a stable and reliable energy supply despite the variability of renewable sources.

The CFI Energy Future Exhibition provides an invaluable learning environment for energy officials from developing countries. Through guided tours and interactive sessions, visitors can gain a deep understanding of the strategies and technologies driving Jeju's carbon-neutral transformation.

- Strategies for Achieving Carbon Neutrality: Understand the policy frameworks, regulatory support, and community initiatives that enable large-scale renewable energy deployment on Jeju Island.
- Renewable Energy Integration: Explore how Jeju's smart grid system manages the challenges of integrating wind, solar, and other renewable sources into the power grid, offering valuable insights that can be adapted to other regions.
- Sustainable Tourism Practices: Learn about Jeju's efforts to promote green tourism and eco-friendly practices, creating a sustainable model that supports both environmental preservation and economic growth.

For more information, visit https://www.jejuenergy.or.kr/

Day 8 | Wednesday, November 6, 2024 | Jeju

Jeju Geumak BESS Substation by KEPCO

Korea Electric Power Corporation (KEPCO) Jeju Headquarters is undertaking the Geumak Substation ESS (Energy Storage System) Construction Project in the Geumak-ri area of Hallim-eup, Jeju City, Jeju Special Self-Governing Province. This project aims to stabilize the power grid, addressing the challenges posed by the increased production of variable renewable energy sources. With a capacity of 50 MW, the ESS stores electricity in batteries and supplies it during temporary shortages, playing a critical role in balancing energy supply and demand.

- Power Grid Stabilization: The ESS effectively manages the variability of renewable energy sources, such as wind and solar power, which can fluctuate due to weather conditions. By storing electricity when renewable generation is high and releasing it during low production periods, the ESS ensures a stable power supply.
- Peak Demand Management: The ESS assists in managing peak demand by discharging stored energy during periods of high electricity consumption. This prevents overloading of the power grid and enables more efficient and stable energy distribution.

- Supporting Green Energy Transition: The Geumak Substation ESS supports Jeju's goal of becoming a "Carbon-Free Island by 2030," facilitating the efficient use of renewable energy sources and reducing reliance on fossil fuels.

The Geumak Substation ESS facility offers a unique opportunity for energy officials from developing countries to experience firsthand Jeju's approach to smart grids and renewable energy integration.

- ESS Operation and Management: Gain insights into how the ESS manages battery systems, stores energy, and discharges it to meet power demand, with on-site demonstrations.
- Understanding Smart Grid Technology: Learn about the real-time monitoring of the power grid and how balance is maintained between renewable and conventional energy sources using advanced smart grid technologies.
- Strategies for Grid Stability: Discover various technical approaches for managing the variability of renewable energy and explore real-world examples from KEPCO that can be applied to energy policies in different regions.

For more information, visit https://www.kepco.co.kr/

Participants and World Bank Teams

NAME	COUNTRY	ORGANIZATION	TITLE
Participants			
Arsen Harutyunyan	Armenia	High Voltage Electric Networks	Relay Protection, Automation, and High Voltage Testing Department Head
Hamlet Zakaryan	Armenia	Electro Power System Operator (TSO)	Engineer
Ousseni Congo	Burkina Faso	Société Nationale d'Électricité du Burkina Faso (SONABEL)	Electrical Engineer in Industrial Engineering
Wend Panga Roger Ouedraogo	Burkina Faso	Société Nationale d'Électricité du Burkina Faso (SONABEL)	Director of Transport and Energy Flow
Patrick Ebana Babala	Cameroon	Société Nationale de Transport de l'Électricité (SONATREL)	Deputy Director, Real Time Dispatch of Energy
Carlos Xavier Lozada Caguano	Ecuador	Operador Nacional de Electricidad (CENACE)	National Research and Development Analyst
Edna Julisa Naranjo Salas	Ecuador	Corporación Eléctrica del Ecuador (CELEC)	Technical Specialist
Oley Jallow	The Gambia	Gambia National Water & Electric Company (NAWEC)	Senior Electrical Engineer
Salifu Gindeh	The Gambia	Gambia National Water & Electric Company (NAWEC)	Plant Manager
David Syengo	Kenya	Kenya Power and Lighting Company (KPLC)	Head, Transformation Coordination Unit
Kennedy Owino	Kenya	Kenya Power and Lighting Company (KPLC)	General Manager, Infrastructure Development
Tom Fred Ishugah	Kenya	Rural Electrification and Renewable Energy Corporation (REREC)	General Manager, Renewable Energy Research and Development
Chimidlkham Dashdondog	Mongolia	Ministry of Energy, Mongolia	Senior Expert, Public Administration Department
Enkhtuya Gombosuren	Mongolia	Energy Regulatory Commission of Mongolia	Specialist
Gansukh Myagmar	Mongolia	Ministry of Energy, Mongolia	Senior Expert, Energy Policy Implementation and Coordination Department
Gantamir Ganbat	Mongolia	National Dispatching Center	Engineer, Relay Protection and Automation Department
Cheikh Ahmadou Bamba Kane	Senegal	Societe Nationale d'electricite du Senegal (SENELEC)	Head of Commercial Practice and Innovations Department
Ibrahima Khalil Diop	Senegal	Societe Nationale d'electricite du Senegal (SENELEC)	Head of Remote Control, Distribution
Gerhard Brown	South Africa	City of Cape Town	Principal Professional Officer
Lucky Ngonyama	South Africa	City Power (City of Johannesburg)	Senior Engineer
Naim Saidmirov	Tajikistan	OJSC "Shabakahoi Taqsimoti Barq"	Advisor to CEO
Temur Tabarzoda	Tajikistan	OJSC "Shabakahoi Taqsimoti Barq"	Head of the Kulob Branch
Ahmet Cem Atici	Türkiye	Turkish Electricity Transmission Corporation (TEİAŞ)	Assistant Manager, Communications and Information Systems Department
Esen Tayfur	Türkiye	Turkish Electricity Transmission Corporation (TEİAŞ)	Chief Engineer, Planning and Investment Management Department
Serhii Fursiak	Ukraine	NPC Ukrenergo	Lead Engineer
Taras Vasyliv	Ukraine	NPC Ukrenergo	Head of Dispatching Control Systems Department
Akmal Sultonov	Uzbekistan	National Electric Grid of Uzbekistan	Head of the Department of Grid Operation
Avaz Zufarov	Uzbekistan	Uzbekistan National Dispatch Center	Chief Dispatcher
Jauinger Shamuratov	Uzbekistan	Regional Electrical Power Networks JSC (REPN)	Chief Specialist, Project Implementation Group
Shokhrukh Rakhmanov	Uzbekistan	Regional Electrical Power Networks JSC (REPN)	Director, Center for Training and Advanced Training of Personnel
Uygun Irgashev	Uzbekistan	NEGO Uzbekistan	Head of Department for Implementation of Investment Projects
Natasia Omoukova			Russian-English-Korean Interpreter
World Bank			
Kabir Malik		WB ESMAP	Sr. Energy Economist
Anders Pedersen		WB ESMAP	Sr. Energy Specialist
Yae Jun Kim		WB ESMAP	Energy Specialist
Naoki Fujioka		WB ESMAP	Jr. Professional Officer
Marie-Gisele Morrisson		WB ESMAP	Sr. Program Assistant
Yu Tack Kim		WB ESMAP	Sr. Energy Consultant
Chong Suk Song		WB ESMAP/LAC	Energy Specialist
Andile Precious Dube		WB AFE	Energy Consultant

Leopold Sedogo	WB AFW	Sr. Energy Specialist
Barsha Pandey	WB EAP	Energy Specialist
Özge Ozden	WB ECA	Sr. Energy Specialist
Silvia Martinez Romero	WB ECA	Lead Energy Specialist
Laura Berman	WB LAC	Sr. Energy Specialist
Myoe Myint	WB EAP (Seoul Office)	Sr. Energy Specialist
Inchul Hwang	WB EAP (Seoul Office)	Sr. Energy Specialist
Wonbae Seo	WB EAP (Seoul Office)	Energy Consultant
Soyoun Jun	WB EAP (Seoul Office)	Program Assistant

Energy Sector Management Assistance Program (ESMAP)

The Energy Sector Management Assistance Program (ESMAP) is a partnership between the World Bank and over 20 partners to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the World Bank's country financing and policy dialogue in the energy sector. Through the World Bank, ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 (SDG7) to ensure access to affordable, reliable, sustainable, and modern energy for all. It helps to shape World Bank strategies and programs to achieve the World Bank Climate Change Action Plan targets. Learn more at: www.esmap.org.

Utilities for the Energy Transition under the broader Foundations for Decarbonized Energy Systems Program

The power sector landscape is undergoing a transformative change driven by increasingly urgent decarbonization goals, falling costs of digital technologies, and data storage and processing capabilities. Digital and data-driven transformation of utilities and smart grids are enabling greater operational efficiency, enhanced customer engagement, and new service delivery models. These technologies enable utilities and system operators to view, measure, and manage the demand and supply balance on the grid with greater speed and accuracy, the key to deep decarbonization efforts. This more flexible grid enables greater penetration of variable renewable energy production and improved efficiency across the supply chain. Associated new business models are also giving rise to new market players, especially those on the "grid edge" to deliver improved service quality and customer engagement through distributed energy resources.

The ESMAP Utilities for the Energy Transition program supports utilities in the journey to harness the opportunities to deploy digital and decentralized technologies, design and adopt new business models, leverage the value of data, build the capacity of sector practitioners, enhance regulatory frameworks and policy, and enable the emergence of new service providers in the energy sector. The program does this through a combination of technical assistance, knowledge work, peer-to-peer knowledge exchange, and partnerships.

Korea Green Growth Trust Fund (KGGTF) and Korea Green Innovation Days (KGID)

The study tour will take part in the 13th Korea Green Innovation Days (KGID), organized by the World Bank Korea Green Growth Trust Fund (KGGTF) in Jeju on November 4-5.

KGGTF, a partnership between the World Bank and the Republic of Korea, is crucial to the World Bank's vision of creating "a World Free of Poverty on a Livable Planet." Since its inception in 2012, KGGTF has been a technology-driven and implementation-focused trust fund, supporting partner countries in developing innovative and sustainable solutions, strategies, and investments geared towards Green, Resilient, and Inclusive Development (GRID). KGGTF has played a pivotal role in accelerating green growth and sustainable development through its robust support for a variety of programs, fully integrated within the World Bank's country lending and policy dialogue across seven green growth sectors: Agriculture & Food; Digital Development; Energy & Extractives; Environment, Natural Resources & Blue Economy; Transport; Urban Resilience & Land; and Water.

KGID is a flagship knowledge-sharing event on Green Growth organized and funded by KGGTF. Now in its 13th edition, KGID has a rich history of facilitating the exchange of practical examples and innovative approaches to achieving sustainable development. This esteemed event has been previously held in major international locations including Seoul, Washington DC, Dar es Salaam, and Cairo. This year, it will be hosted in Jeju, South Korea.

The theme for this year's KGID, "Green Growth for a Livable Planet," focuses on showcasing progress in green growth and exploring avenues for expansion. This theme embraces the World Bank's recognition of the intertwined relationship between economic growth and environmental sustainability, highlighting the need for policy shifts that ensure a livable planet for future generations. The event will highlight project impacts, real-life examples, and creative solutions from development practitioners, offering insights into innovative policies and technologies while fostering networking through pre-arranged bilateral meetings.

13th Korea Green Innovation Days (KGID JEJU 2024)

KGID JEJU 2024 is a three-day event scheduled for November 4-6, 2024, in Jeju, South Korea, in partnership with the Ministry of Economy and Finance (MOEF) and the Jeju Special Self-Governing Province (JSSGP) of the Republic of Korea.

KGID aims to bring together experts and practitioners from across the globe in green growth, climate change, and sustainable development. Serving as a valuable platform for learning about cutting-edge green growth solutions, exchanging practical knowledge, and fostering partnerships, KGID JEJU 2024 welcomes all KGGTF grant task teams, their clients, and partner institutions from Korea and around the world.

This year's event will facilitate the exchange of transformative green growth strategies and methodologies from KGGTF-funded programs globally. Jeju, a Carbon-Free Island (CFI), is actively implementing this vision, making it a representative and inspiring location for KGID. Participants will connect with various green growth agencies, public institutions, universities, and private sector entities from Korea and around the world.

South Korea's Power Sector-at-a-Glance

South Korea's energy portfolio includes nuclear power, coal, natural gas, and renewable energy sources. Nuclear power is a significant contributor, accounting for around 30% of generation. The country operates multiple nuclear reactors and plans further expansion, although there is a concurrent push to gradually reduce reliance on nuclear energy in favor of more sustainable options.

Coal remains a major source of electricity, contributing approximately 40% of the total generation. However, environmental concerns and international commitments to reduce carbon emissions are driving efforts to decrease coal dependency. Natural gas, primarily imported as liquefied natural gas (LNG), constitutes about 25% of the energy mix. Renewable energy sources such as solar, wind, and hydroelectric power are growing, yet they still represent a smaller portion of the energy mix, around 5-10%. The South Korean government has set ambitious targets to increase the share of renewables in the coming decades.

The electricity grid in South Korea is highly developed and reliable, managed by the Korea Electric Power Corporation (KEPCO). Known for its high efficiency and low outage rates, KEPCO oversees the generation, transmission, and distribution of electricity across the country. Government policies and regulations play a significant role in shaping the power sector, with initiatives aimed at ensuring energy security, economic efficiency, and environmental sustainability. The Renewable Energy 3020 Plan aims to increase the share of renewable energy to 20% by 2030, involving substantial investments in solar and wind power projects. The Green New Deal, announced in 2020, focuses on reducing carbon emissions and promoting green industries, including measures to phase out coal power plants and increase investments in renewable energy and energy efficiency. The Energy Transition Policy underscores the government's commitment to gradually shift from nuclear and coal to more sustainable energy sources, including decommissioning older nuclear reactors and boosting the share of renewables and natural gas.

In addition to its diverse energy mix, South Korea is at the forefront of digital initiatives. The country is investing heavily in smart grid technology. One of the flagship projects in this domain is the Jeju Smart Grid Demonstration Project. Located on Jeju Island, this project serves as a testbed for various smart grid technologies, including advanced metering infrastructure, demand response systems, and energy storage solutions. The project aims to create a more resilient and efficient grid, capable of accommodating a higher share of renewable energy. It also provides valuable insights into consumer behavior and energy usage patterns, helping to optimize energy management.

Plan Your Trip

1. Country and Cities

South Korea, officially known as the Republic of Korea, is a vibrant, technologically advanced country located in East Asia, on the southern part of the Korean Peninsula. South Korea is renowned for its rapid economic growth, innovation in technology, and rich cultural heritage. The country boasts a blend of traditional and modern elements, with ancient palaces and temples alongside towering skyscrapers and bustling cities. Known for its influential pop culture, South Korea has made a significant impact globally through K-pop, dramas, and film, while also being home to world-leading industries in electronics, automobiles, and fashion.

Seoul, the capital of South Korea, is a dynamic metropolis where history and modernity coexist harmoniously. As one of the largest cities in the world, it is a hub of commerce, culture, and technology. The city is famous for its striking contrasts – ultra-modern skyscrapers, vast shopping districts, and cutting-edge technology alongside centuries-old palaces, serene temples, and traditional hanok villages. Landmarks such as Gyeongbokgung Palace, N Seoul Tower, and the Han River Park offer diverse experiences, from historical exploration to stunning city views. Seoul is also a city that never sleeps, with 24-hour cafes, nightlife, and the vibrant streets of districts like Myeongdong, Gangnam, and Hongdae bustling with locals and tourists alike.

Jeju Island, located off the southern coast of South Korea, is a popular vacation destination known for its natural beauty, volcanic landscapes, and serene atmosphere. As a UNESCO World Heritage site, Jeju is famous for its volcanic landmarks like Hallasan Mountain, the highest peak in South Korea, and the lava tubes of Manjanggul Cave. The island's pristine beaches, waterfalls, and scenic coastal trails make it an ideal spot for outdoor activities such as hiking, cycling, and water sports. Jeju's distinctive culture, shaped by its history of isolation from the mainland, is also reflected in its unique dialect, cuisine, and the traditional haenyeo (female divers) who collect shellfish by free diving. The island offers a peaceful retreat from city life, with luxury resorts, traditional guesthouses, and a slower pace of life that attracts visitors from across Korea and beyond.

2. Hotels

Seoul

Moxy Seoul, Myeongdong
38 Myeongdong 8na-gil, Jung-gu, Seoul
+82 2-2184-7000
Nearby metro stations:
- Myeongdong Station (Line 4, 5-minute walk)

Four Points By Sheraton Josun, Seoul Myeongdong
36 Samil-daero 10-gil, Jung-gu, Seoul
+82 2-6466-6000
Nearby metro stations:
- Euljiro 3-ga Station (Lines 2 & 3, a 3-minute walk)

- Euljiro 1-ga Station (Line 2, 7-minute walk)
- Myeongdong Station (Line 4, a 7-minute walk)

Jeju

Kensington Resort Jeju Jungmun
29-29 Jungmungwangwang-ro 72beon-gil, Seogwipo-si, Jeju-do
+82 64-738-9101

Lotte Hotel Jeju
35 Jungmungwangwang-ro 72beon-gil, Seogwipo-si, Jeju-do
+82 64-731-1000

If you encounter any issues during check-in, please contact Marie-Gisele Morrisson at +1 301 213 0625 (mobile and WhatsApp) or via email at ESMAP-SmartEnergy_Organizer@worldbankgroup.org.

Please note that teams/participants are responsible for making payments directly to the hotels at check-in/out, unless the country teams have informed the ESMAP team in advance of any inability to do so.

3. Meals

The following meals are included in the study tour and will be covered by ESMAP:

- Lunch: Oct 30, Oct 31, Nov 1, Nov 4, Nov 5
- Dinner (Networking Reception): Nov 1

Additionally, breakfast is included in the hotel rates if you are staying at ESMAP-arranged hotels.

4. Airport Pick-up/Drop-off

ESMAP has arranged the following scheduled airport transfers:

- October 29: Transfer from Incheon International Airport to the ESMAP-arranged hotels
- November 3: Airport transfers in Seoul (from ESMAP-arranged hotels to Gimpo International Airport) and in Jeju (from Jeju International Airport to ESMAP-arranged hotels)
- Afternoon of November 6: Transfer from ESMAP-arranged hotels to Jeju International Airport

Details of the airport pick-up upon arrival in Seoul on October 29 have been sent to participants separately. Information regarding airport transfers for November 3 and 6 will be shared closer to the dates.

If participants arrive or depart outside these shuttle windows, prefer to travel on their own schedule, or stay at accommodations other than those arranged by ESMAP, the country team will be responsible for organizing their airport transfers.

5. Local Transportation

Seoul

Seoul has one of the most efficient subway systems in the world, consisting of 23 lines covering the city and surrounding areas. The subway is safe, clean, and punctual. The bus system complements the subway, reaching areas not covered by the metro. There are different types of buses: blue (long-distance), green (local), yellow (circling downtown), and red (express to suburban areas).

Taxis are widely available and relatively inexpensive compared to other major cities. They are also convenient for late-night travel when public transport may not be operational. Regular taxis are usually orange or silver. You can also use apps like Uber and KakaoTaxi to book a ride easily.

For convenient travel on public transportation, consider getting a T-money card. This rechargeable card allows for easy travel on subways, buses, and even some taxis. This can be used even for small purchases in convenience stores. You can buy and top up these cards at convenience stores and subway stations.

Jeju

Jeju has a public bus system that connects major attractions and towns, but the frequency may be lower than in Seoul. Buses are numbered, and routes are clearly marked. You can use your T-Money card on public buses in Jeju as well.

Taxis are widely available and convenient for visiting attractions not easily accessible by public transport. They can be hailed on the street or booked via phone or apps.

6. Map Apps

Naver Map and **KakaoMap** are the most popular navigation apps in South Korea. Both are available in English, and they offer detailed maps, real-time transit information, and accurate directions. Download offline maps if you plan to be in areas with limited internet connectivity. Though Google Maps is also available, it may not be as comprehensive as local apps, especially for public transportation.

7. Weather and Dress Code

Seoul in late October/early November experiences mild, pleasant autumn weather. Daytime temperatures range from 13°C to 20°C (55°F to 68°F). Evenings can be cooler, with temperatures dropping to around 7°C to 10°C (45°F to 50°F), so light jackets or sweaters are recommended.

Jeju Island in early November remains relatively mild with temperatures ranging from 12°C to 18°C (54°F to 64°F). While it’s cooler than earlier in the fall, the island’s subtropical climate ensures comfortable weather. Occasional rain showers are possible, so it’s good to have a light rain jacket handy.

Participants are advised to wear business casual for the presentation and discussion sessions. Please bring comfortable walking shoes for site visits.

8. Language

In South Korea, the primary language is Korean, known as Hangul (한글). English is widely taught in schools, and many South Koreans, especially in urban areas, have a basic understanding of English, though fluency varies. English is commonly seen on signs, public transportation, and in the media.

The study tour will be primarily conducted in English, although some sessions and site visits may be conducted in Korean, with simultaneous interpretation provided in English.

9. Currency

The official currency is the South Korean Won (KRW). Banknotes come in denominations of 1,000, 5,000, 10,000, and 50,000 won, while coins are available in 1, 5, 10, 50, 100, and 500 won. It's advisable to exchange your currency at banks, authorized exchange offices, or at airports. Avoid exchanging at hotels as rates may not be as favorable.

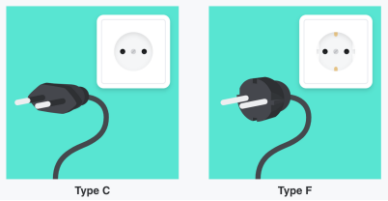
Cash is widely accepted and useful for small purchases, especially in markets, local restaurants, and some traditional shops. Keep some small bills and coins handy, as many places may not accept large notes.

Credit and debit cards are widely accepted in urban areas, including hotels, restaurants, and major retail stores. Visa and MasterCard are the most commonly accepted brands. Make sure to notify your bank before traveling to avoid any issues with international transactions.

Mobile payment apps like KakaoPay, Naver Pay, and Samsung Pay are popular in South Korea. They can be used at various retailers, restaurants, and even for public transportation. These apps often require a South Korean bank account, but international tourists can use some services by linking their foreign cards.

10. Electricity and Plug Types

In South Korea, the standard voltage is 220 volts with a frequency of 60 Hz. The country primarily uses Type C and Type F plug sockets.



11. Contacts during the Study Tour

Should you need any assistance from the ESMAP organizing team, please feel free to email ESMAP-SmartEnergy_Organizer@worldbankgroup.org or contact any team member listed below via call or WhatsApp.

Name	Mobile/Whatsapp	Language
Kabir Malik	+1 240 350 8140	English
Chong Suk Song	+1 202 848 5685	English, Korean
Yaejun Kim	+1 202 766 8066	English, Korean
Naoki Fujioka	+1 202 848 3499	English
Marie-Gisele Morrisson	+1 301 213 0625	English, French
Soyoun Jun	+1 202 352 1037	English, Korean

12. Emergency Numbers (Local Dialing)

Police: 112

Fire and Ambulance: 119

General Medical Assistance: 1339*

**The service includes English-speaking operators who can assist with finding appropriate medical facilities.*

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