

IEEE PES Foothill Section Seminar Working Group on Data-Driven Modeling, Monitoring, and Control in Power Distribution Systems

Tuesday, Jan. 16th | 2:00 PM – 3:00 PM (PST)

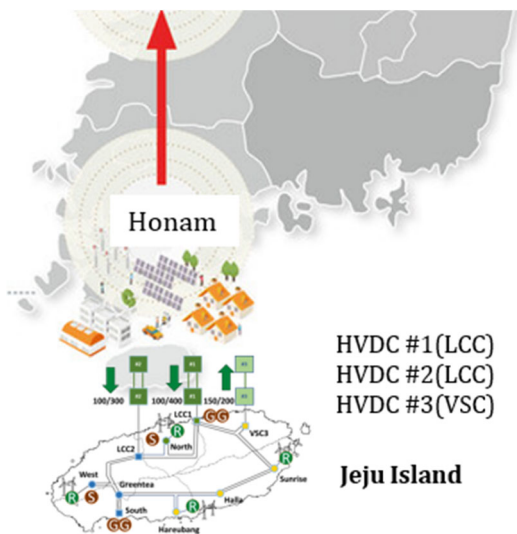
5:00 PM – 6:00 PM (EST)

Zoom Meeting Link:

Meeting ID: 9996024625

Modeling and Analysis of Renewable-Rich Power Grids: Navigating IBR Challenges

Abstract:



This webinar highlights the emerging challenges in modeling and analyzing the electric power system due to the widespread growth of variable renewable energy (VRE), particularly in the form of distributed energy resources (DERs) that are displacing traditional large power plants. Understanding the dynamic behavior of the power system should be critical to addressing the potential stability concerns, refining the grid requirements, and developing effective and reliable measures, among many alternatives. However, conventional methodologies for resource integration and network expansion studies, as well as application-

specific electromagnetic transient (EMT) studies, need improvements. This talk thus presents recent academic and industrial efforts to advance the existing approaches, especially by incorporating the variability of VRE, and EMT dynamics of IBRs, focusing on Jeju island and Honam province power grids of Korea.

Jeju Special Self-Governing Province of South Korea declared its vision to become an island with net zero emissions by 2030, initiating a project dubbed “Carbon Free Island Jeju 2030” , or CFI 2030. This talk investigates the challenges of grid operation with high levels of inverter-based resources (IBR) and demonstrates how the grid forming technologies help the Jeju power grid operate with 100% generation from IBR, i.e., without any synchronous generation, and achieve carbon neutrality. It is interesting to note that the Jeju power grid is connected to the mainland power grid (Honam province) through two HVDC lines, two line commutated converter types (heavily depending on the grid strength), and one VSC type (to be commissioned in early 2025). More than 40% of renewables have been deployed in the Honam area, which makes the grid weaker and more vulnerable to various operational concerns. This webinar selects some crucial concerns raised in grid operations, discusses lessons learned through comprehensive studies, and proposes ways to handle them.



Kyeon Hur

Professor Kyeon Hur (Senior Member, IEEE) is an accomplished professional with extensive expertise spanning academia, research, and industry. Prof. Hur received the B.S. and M.S. degrees in electrical engineering from Yonsei University, Seoul, South Korea, in 1996 and 1998, respectively. Later, he earned his Ph.D. degree in electrical and computer engineering from The University of Texas at Austin, Austin, TX, USA, in 2007.

Prof. Hur’s career began as a Research and Development Engineer with Samsung Electronics, South Korea, from 1998 to 2003, where he designed control algorithms and power electronic circuits for AC drives. After completing his Ph.D. dissertation, he joined the Electric Reliability Council of Texas (ERCOT), Taylor, TX, USA, as a Grid Operations Engineer from 2007 to 2008. Subsequently, he worked with the Electric Power Research Institute (EPRI), Palo Alto, CA, USA, managing research projects in grid operations and planning from 2008 to 2010.

Since March 2010, Prof. Hur has served as a Professor at Yonsei University in Seoul, Korea, where he leads the Smart-Grid Research Group. His current research interests include dynamic performance modeling, analysis, and control of power grids with high levels of stochastic and power electronic interfaced renewable energy resources, HVDC/FACTS, and data-driven approaches in grid operations and planning.

Prof. Hur is the secretary of the IEEE Seoul Section. He has joined the tutorial program on HVDC planning as a lecturer in the IEEE PES GM and was awarded an IEEE PES Technical Committee Working Group Recognition Award for Technical Report: Studies for Planning HVDC, 2022. Prof. Hur serves as a commissioner of the electricity regulatory commissions of Korea (KOREC) and an advisory professor at Hyosung Power Performance Unit.