

APPLICATIONS OF HIGH CAPACITY POWER ELECTRONIC TECHNOLOGIES (FACTS AND HVDC) FOR GREEN ENERGY RESOURCE INTEGRATION AND MANAGEMENT

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Abstract

The rate of growth in U.S. electrical demand necessitates the development of new generation resources and the expansion of electrical infrastructure. With respect to this growing demand and the current trends of energy policy development, corporations, private investors, and policy-makers continue to advance the development and integration of green and renewable energy generation, including nuclear, wind, and solar power. The integration of novel and existing generation sources within the U.S. electric grid presents new requirements and challenges for large scale resource management and interconnection. The sheer magnitude of new generation being added to the grid, as well as the diversity of generation sources, will drive expansion and investment within the transmission and distribution (T&D) infrastructure sector and in enabling technology developments. In this address, descriptions and solutions will be presented for many of the foreseeable scenarios that will emerge from the T&D perspective regarding integrated generation management (IGM). By analyzing several primary classes of transmission technology – conventional AC transmission, high voltage DC transmission (HVDC), and FACTS compensation techniques as applied to both AC and DC transmission – the work presents future applications, advantages, and development requirements for power electronics and control technologies in a diversified generation environment and with respect to power system dynamic performance.

Speaker's Biographical Sketch

Dr. Reed received his BS in Electrical Engineering from Gannon University; his MEng in Electric Power Engineering, Troy NY; and his PhD in Electrical Engineering from the University of Pittsburgh. He is the Director of the Power and Energy Initiative in the Swanson School of Engineering and Associate Professor in the Electrical and Computer Engineering Department at the University of Pittsburgh. He also serves as the IEEE PES Vice President of Membership & Image. He has over 23 years of electric power industry experience, including utility, manufacturing, and consulting at Consolidated Edison Co. of NY, Mitsubishi Electric, and KEMA Inc. As the director of the Power & Energy Initiative at Pitt, Dr. Reed provides the vision and leadership of the Swanson School's multidisciplinary activities for the initiative's educational, research, and outreach components. He works closely with industry partners, federal and state agencies, foundations, and other constituents in collaboration with the Swanson School's faculty and staff and the university's Center for Energy on various funding and research oriented efforts. Dr. Reed also teaches courses in the fields of power and energy engineering within the Electrical & Computer Engineering Department. His research interests include power transmission & distribution and energy systems; smart grid technologies; power electronics and control technologies and applications; energy storage technologies; and power generation and renewable energy resources.

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