

# **Role of the Smart Grid in Facilitating the Integration of Renewables**

Saifur Rahman, PhD  
Joseph Loring Professor & Director  
Advanced Research Institute  
Virginia Tech, USA  
President, IEEE Power & Energy Society 2018 and 2019

With the focus on environmental sustainability and energy security, power system planners are looking at renewable energy as supplements and alternatives. But such generation sources have their own challenges - primarily intermittency. It is expected that the smart grid – due to its inherent communication, sensing and control capabilities – will have the ability to manage the load, storage and generation assets (including renewables) in the power grid to enable a large-scale integration of distributed generation. In a smart grid, information about the state of the grid and its components can be exchanged quickly over long distances and complex networks. It will therefore be possible to have the integration of sustainable energy sources, such as wind, solar, off-shore electricity, etc. for smoother system operation. But in order for this to be possible, the electric utility will have to evolve, and change their ways of operation to become an intelligent provider of these services. This lecture introduces the operational characteristics of renewable energy sources, and various aspects of the smart grid - technology, standards and regulations. It also addresses the interplay among distributed generation, storage and conventional generation to provide an efficient operational strategy in the context of the smart grid.

Keynote Speech, CPEEE  
Shiga, Japan, 25-27 Feb 2022