Challenges of Renewable Energy Utilization for Power Generation:
Renewable-Energy-Based Microgrids and Microgrid-Based Smart Grid Systems

By

Hashem Nehrir, IEEE Life Fellow, Professor
Electrical & Computer Engineering Department
Montana State University
Bozeman, MT USA

Keynote Speech/Presentation Abstract for Energy 2020, Singapore, April 20, 21, 2020:

It is expected that demand for electricity will increase rapidly in the foreseeable future with population growth around the globe. The increase in demand dictates the need for increase in generation capacity, much of which is expected to be in the form of emission-free renewable-energy-based power generation.

This presentation evaluates the potential of several different renewable energy resources for power generation with a focus on the potential energy of sun for solar photovoltaic and solar heat power generation, and solar heat for hydrogen production. The opportunities and challenges associated with the use of sustainable, but variable renewable-energy-based power generation sources will be discussed. Furthermore, novel artificial-intelligence-based peer-to-peer power management strategies for mitigating the variability and improving resiliency of multi-source renewable-energy-based microgrids to find a "trade-off" optimal production point, and a microgrid-based power system architecture will be presented. Lastly, a vision for a future renewable-energy-based Hydrogen-economy society will be presented.
****

Hashem Nehrir's Short Bio
Dr. Nehrir has over forty years of university teaching and research experience. His research encompasses modeling, control, and power management of alternative energy power generation systems, load control (demand response) and application of artificial intelligence for microgrid power management for resiliency and self-healing of power systems.

Dr. Nehrir is a *Life Fellow* of IEEE, the 2010 recipient of Montana State University's *Wiley Faculty Award for Meritorious Research*, the 2016 recipient of *IEEE Power & Energy Society (PES) Ramakumar Family Renewable Energy Excellence Award*, and t*he 2017 recipient of Albert Nelson Marquis Lifetime Achievement Award*, bestowed by Marquis Who's Who Publications Board. He has lectured on his research and educational activities in more than ten countries around the globe.