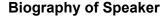# Smart Grid, Artificial Intelligence and Climate Change

G Kumar Venayagamoorthy, PhD, MBA, FIEEE, FIET, FSAIEE, FAAIA

Abstract

The modern electric power and energy system, also referred to as the 'smart grid', is complex and one that is expected to be conscious, distributed, flexible and intelligent. Such an electric power system architecture can facilitate secure and optimal power flow, maximizing the utilization of clean energy sources including solar and wind power. Furthermore, the smart grid threaded with evolving intelligence and artificial intelligence (AI) can optimally manage flexible loads and energy storage including electric vehicles for enhancing net-zero operations. Reliable, resilient, and efficient operations and management of power systems with variable and uncertain power and energy sources require distributed intelligence and advanced computational technologies to ensure continuous electricity supply. How much AI will be needed? How will these AI systems be developed for grid operations and management? What kind of digital and energy resources will be consumed by these grid AI systems? Will all these be sustainable and mitigate climate change? This keynote will shed some light to these questions and address the potentials and promises of distributed AI in smart grid operations, control and management.

Biography of Speaker

G. Kumar Venayagamoorthy is the Duke Energy Distinguished Professor of Power Engineering and Professor of Electrical and Computer Engineering at Clemson University since January 2012. Prior to that, he was a Professor of Electrical and Computer Engineering at the Missouri University of Science and Technology (Missouri S&T), Rolla, USA where he was from 2002 to 2011. Dr. Venayagamoorthy is the Founder and Director of the Real-Time Power and Intelligent Systems Laboratory at Missouri S&T and Clemson University. In 2007, he was visiting researcher with ABB CRC.

Dr. Venayagamoorthy received his PhD and MScEng degrees in Electrical Engineering from the University of Natal, Durban, South Africa. He received his BEng degree with a First-Class Honors in Electrical and Electronics Engineering from Abubakar Tafawa Balewa University, Bauchi, Nigeria. He holds an MBA degree in Entrepreneurship and Innovation from Clemson University, USA.

Dr. Venayagamoorthy's research interests are in the development and innovation of power systems, smart grid and artificial intelligence technologies. Dr. Venayagamoorthy is an inventor of technologies for scalable computational intelligence for complex systems and dynamic stochastic optimal power flow. He has published over 550 refereed technical articles which are cited ~23,000 times with a h-index of 70 and i10-index of > 300. Dr. Venayagamoorthy has given over 500 invited technical presentations including keynotes and plenaries in over 40 countries to date.

Dr. Venayagamoorthy is the Chair and Founder of the IEEE PES Working Group on Intelligent Control Systems and IEEE Computational Intelligence Society (CIS) Task Force on Smart Grid. He has served/serves as Editor/Associate Editor/Guest Editor of several IEEE Transactions and Elsevier Journals. He is the Editor for the IEEE Press Series on Power and Energy Systems.

Dr. Venayagamoorthy is a Fellow of the IEEE, IET (UK), the South African Institute of Electrical Engineers (SAIEE) and Asia-Pacific Artificial Intelligence Association (AAIA), and a Senior Member of the International Neural Network Society (INNS). He is an IEEE CIS and IES Distinguished Lecturer and a Member of the Board of Governors and Vice-President for Industry Relations of the INNS.