ADVANCES IN SUSTAINABLE ENERGY GENERATION, DISTRIBUTION AND UTILIZATION

Dan M. Ionel, Ph.D., IEEE Fellow
Chief Engineer, Regal Beloit Corporation
Visiting Professor, University of Wisconsin – Milwaukee

Abstract
The field of energy sustainability continues to benefit of wide interest and major developments. A new record has been set by Vestas V-164, the world’s most powerful wind turbine. With a height half of that of the Sears/Willis tower and an 8MW rated power output, the turbine incorporates more than 10,000 components, multiple subsystems, and innovative technologies, such tower-long DC power connection, integrated medium-speed gearbox and generator, and multi-level optimal controls. After covering these topics, the increasing role of efficient energy utilization will be discussed. Aspects of electric motor and power electronic drives, which account for more than 60% of electricity consumption, will include a theoretical section on IEEE award-winning research on laminated core and magnet power losses, multi-physics simulation and large-scale computational artificial intelligence design optimization, as well as examples of industrial R&D for high-volume products, such as the latest generation of high-efficiency electronically-controlled motors by Regal Beloit Corp. The presentation will conclude with a brief review of on-going M-WERC sponsored research by a joint team from UWM and Marquette University working on the distribution of energy including storage, demand response, and renewable energy integration at smart-building and smart-city level.

Biography
Dr. Dan M. Ionel currently holds a dual industrial and academic appointment. He is Chief Engineer with Regal Beloit Corp., a Fortune 1000 Company and a world leading manufacturer of electric equipment, including electric machines, motion control products, and power electronics, and a Visiting Professor with University of Wisconsin Milwaukee, where he teaches and advises graduate student research on topics of electric power engineering, sustainable and renewable energy systems. His previous industrial appointment was as the Chief Scientist of Vestas, the world’s largest wind turbine manufacturer. Dr. Ionel’s R&D projects led to long lasting technological contributions and benefited of multi-million dollar industrial support, as well as of NSF, NIST, and DOE grants. He has published more than 100 journal and conference papers, including two winners of Best Paper Awards from the IEEE IAS-EMC, and holds over 30 patents, including a medal winner at the Geneva Invention Fair. An IEEE Fellow, Dr. Ionel served as the Inaugural Chair for the IEEE Industry Applications Society Renewable and Sustainable Energy Conversion Systems Committee, and is currently Editor of IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, Technical Program Chair of IEEE ECCE 2015 Conference, the General Chair of IEEE IEMDC 2017 Conference, and the Editor-in-Chief of the Electric Power Components and Systems Journal.