Barriers of Energy Storage Technologies in Deployment of Renewable Energy Systems

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Abstract
Electricity from renewable energies, such as wind and solar, depend on location, weather, and seasonality. Therefore, electric energy storage technologies play an important role in reliability and resiliency of the various renewable energy grid service. However, there are many barrier to deployment of energy storage technologies. In this talk I will discuss the potential pivotal role of energy storage in a future low carbon and green economy. Then I will analyze two main energy storage technologies (i.e., rechargeable battery and fuel cells) to identify the key barriers restricting further development of energy storages in the new and renewable energy grid infrastructures. I will compare the two types of energy storage technologies from techno-economic factors and confront the fundamental question why cost and reliability are still main barriers for both energy storage technologies despite major investments and efforts by industries and governments over the last few decades. Finally I will examine options and possible solutions to address these barriers at the country and regional levels. Despite many successes, much remains to be done. This will require continued engagement from engineers, regulators, policy makers, market operators, and utilities. I will provide a deeper insight to what we have studied over the years and point out the needs and directions for the future energy storage technologies.

Dr. Junye Wang is a Professor and the Campus Alberta Innovation Program (CAIP) Research Chair at Athabasca University, Canada. He received his M.Sc. degree in thermo-physics from Harbin Shipbuilding Engineering Institute, Ph.D. degrees in chemical and mechanical engineering from East China University of Science and Technology in 1989 and 1996, respectively. Then he joined Shanghai Jiaotong University as an associate professor in 1996. From 1999 till 2012 he worked at the Universities of Sheffield, Greenwich, and Loughborough, and Scottish Crop Research Institute and Rothamsted Research, UK, as research associate, research scientist and principal research scientist, respectively. Dr. Wang has over 30 years' experience of multi-scale and multidisciplinary modelling and is internationally recognized leader in energy, environment and sustainability. Prof. Wang and his team has been developing a modelling framework of integrated terrestrial and aquatic systems by utilizing innovative computational technologies. He has authored/co-authored over 150 papers, including over 80 refereed journal papers, and serves as associate editor and editorial board member on several international journals. He is also a reviewer of papers for over 80 international journals.