

Holcombe Department of Electrical and Computer &
Real-Time Power and Intelligent Systems Laboratory Seminar Series

***Challenges in Integrating Renewable Energy Sources in the
Southern African Grid***

**September 21, 2012 - 3 pm to 4 pm,
100A Riggs Hall
Clemson University**

The world is currently facing a very serious energy problem. Existing power generation infrastructure is not able to keep pace with the growing national demand of both developed and developing countries. The methods of power delivery to consumers are also out dated and extremely inefficient. The electric grid in its current state is falling behind 21st century technological advancements and energy demands. Smart grid has been proposed a radical change to the design to electric grid that has the potential to greatly improve the efficiency, reliability, security, and interoperability of the electrical grid. The goals of smart grid include the establishment of advanced digital technologies (i.e., microprocessor-based measurement and control, communications, computing, and information systems), the enabling of greater integration of renewable energy sources and energy storages, and the promotion of economic growth. The introduction of smart meters will make it possible for energy suppliers to charge variable electric rates to users so that charges would reflect the large differences in cost of generating electricity during peak or off peak periods. Such capabilities allow load control switches to control large energy consuming devices such as hot water heaters so that they consume electricity when it is cheaper to produce.

To fully realize the benefits of smart grid, utility industry will need to integrate a vast number of smart device systems and overcome a number of technical issues. Renewable energy will contribute significantly to the production of electricity in the future. Integration of these highly variable, widely distributed resources will call for new approaches to power system operation and control. With the abundant renewable energy resources in the African continent, Africa as whole can improve access to electricity services by adapting smart grid technologies to meet the electricity demand of the future. However, the current transmission and distribution infrastructures of most African countries are ill-suited for high penetration of Renewable Energy. In South Africa, the government and Eskom are working hard to integrate high penetration of renewable energy sources in the next two decades. The recent Integrated Resource Plan (IRP) 2010 for electricity in South Africa suggests a 42% penetration of renewable energy into the grid by 2030. Can this be achieved without major changes in the current transmission and distribution infrastructure? In this presentation, I will discuss the various issues and challenges facing

African countries (in particular South Africa) in successfully implementing renewable energy sources into the grid. Various strategies that can be adopted for successful implementation of renewable energy will be discussed.



Komla Agbenyo Folly has over 16 years experience in research and teaching power system dynamics, optimization and control. He received his BSc and MSc Degrees in Electrical Engineering from Tsinghua University, Beijing, China, in 1989 and 1993, respectively. He received his PhD in Electrical Engineering from Hiroshima University, Japan, in 1997. From 1997 to 2000, he worked at the Central Research Institute of Electric Power Industry (CRIEPI), Tokyo, Japan. He is currently an Associate Professor in the Department of Electrical Engineering at UCT. He was Fulbright Scholar at the Missouri University of Science and Technology, Missouri, USA in 2009. His research interests include: power system stability, control and optimisation, HVDC modelling, grid integration of renewable energy, application of computational intelligence to power systems and smart grid. He is member of the Institute of Electrical Engineers of Japan (IEEJ), the the South African Institute of Electrical Engineers (SAIEE) and a Senior Member of the IEEE. He is member of the advisory board for the International Journal of Innovations in Energy Systems and Power (IJESP).