



THE WSU-PNNL ADVANCED GRID INSTITUTE

DESIGNING AND OPERATING POWER ELECTRONIC DOMINATED ENERGY SYSTEMS OF THE FUTURE

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ABSTRACT

As the energy system transforms to a diverse set of distributed energy resources, power electronics (PE) is becoming ubiquitous for the control of electric power. Power electronic dominated systems (PEDS) have inherently different operating characteristics than traditional systems. They have much faster dynamics, more flexibility, greater volatility and many more control points and decision variables. New approaches to designing and operating these systems are needed to underpin a successful energy system transformation from legacy designs and operating principles to the distributed and decarbonized system of the future. PNNL's lab-level research initiative titled Energy System Codesign with Multiple Objectives and Power Electronics (E-COMP) is taking on this challenge. E-COMP is creating new theory, models, algorithms, and software to enable optimized design and operation of future PEDS. This talk will introduce the E-COMP project and explain how the principle of co-design can be used to optimize design and operational decisions in a joint way for multiple objectives. An example use case of offshore wind integration will also be presented to highlight the utility of the approaches being pursued.

BIO

Dr. Salsbury is a Chief Research Scientist at Pacific Northwest National Laboratory. He is an internationally recognized researcher with more than 30 years of experience spanning universities, national labs, and Fortune 100 companies in the USA, UK, and Finland. His education in electro-mechanical systems and control theory includes studies at Oxford and Loughborough Universities in the UK, and at MIT in the US. He has published 5 books/chapters and more than 75 archival journal and conference papers. His current research focuses on the application of control and optimization to energy systems, leading several projects funded by the DOE and DOD. He also spearheads the PNNL-funded E-COMP project, aiming to facilitate the energy system's transition.

