



## **Microgrid and Distributed Energy Resources**

Argenis V. Bilbao, PhD.

Electrical & Computer Engineering Department, Texas Tech University

### **Abstract**

This presentation overviews the concept of microgrids and the different microgrid types. The energy sources typically used in microgrids are discussed along their advantages and disadvantages. Other less conventional energy sources like fuel cells are briefly overviewed. The microgrid being developed by Texas Tech University will be described and its individual energy sources and loads will be shown. The microgrid's short and long-term goals will be discussed with the status of the project along the next steps to follow. Parallel work currently being performed by graduate students on the simulation of TTU's microgrid will be presented. Towards the end of the presentation, the status of TTU's PMU deployment will be shown.

### **Argenis V. Bilbao, PhD.**

#### **BIO**

Dr. Argenis Bilbao obtained his BS, MS, and Ph.D. from Texas Tech University (TTU). As a Ph.D. student, he performed work in competitively funded federal research projects under the scope of the Department of Energy (DoE) and the Department of Defense. The DOE project involved the development of custom low-cost phasor measurement units (PMU) for educational purposes. As part of the project sponsored by the DoD, characterization of ultra-high voltage power insulated gate bipolar transistors (IGBT) and metal-oxide field effects transistors (MOSFETs) was performed. Soon after completion of his Ph.D. degree in August 2016, he joined TTU as a faculty member in the Electrical and Computer Engineering Department. Dr. Bilbao's current position is "Research Assistant Professor". He conducts research in the fields of embedded systems, pulsed power, power electronics, and grid modernization. Currently he is funded by the DoD to test and characterize the next generation of high-voltage silicon carbide (SiC) and gallium nitride (GaN) power semiconductor devices through the PowerAmerica consortium. Under the grid modernization umbrella, he is one of the technical leads of the GLEAMM project funded by the State of Texas. The aim of this project is to design and deploy a research microgrid to create and commercialize new grid-related technologies. He has previous experience developing embedded systems with processor architectures like ARM, M68k, and MIPS.