AVESTAR® Center for Operational Excellence of Power Generation Systems for the Smart Grid Era

NETL-RUA Regional University Alliance

AVESTAR®

Motivation/Challenges

- Growing pressure to optimize efficiency, reliability, safety, and environmental performance of power generation plants connected to an electric grid with increased renewable energy deployment.
- Renewable generation increases need for power plant cycling and load following, while minimizing emissions and equipment damage.
- Rapidly evolving power plant and grid operations, automation and control technologies, and demographics require advanced dynamic simulation-based tools and training systems for the smart grid era.

Technology/Capability Overview

- Simulation-based Technology and Tools
  - Portfolio of high-fidelity real-time dynamic simulators for power plants with CO_2 capture
    - ✓ Integrated Gasification Combined Cycle (IGCC)
    - ➢ Natural Gas Combined Cycle (NGCC)
    - ➢ Supercritical Once-Through (SCOT) Pulverized Coal
- World-class simulator and training facilities at NETL and West Virginia University
  - Full-scope operator training systems (OTSs)
  - 3D virtual immersive training systems (ITSs)

Industry Significance

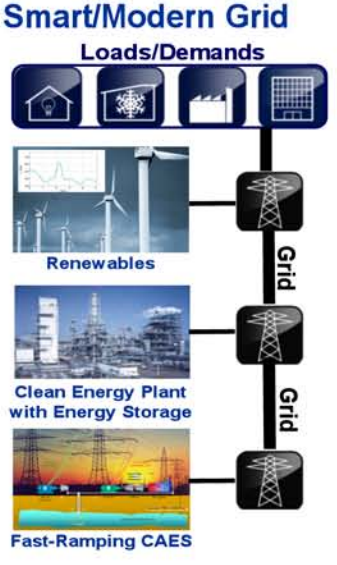
- Accelerate progress toward achieving Operational Excellence for power generation systems in the smart grid era
  - 1) Asset, 2) Control, 3) Environment & Safety, and 4) People
- Enhance operational and control performance of combined fossil and renewable power generation systems with distributed energy resources and energy storage

Benefits to Partners

- Research and Development
  - Access to virtual power plants, smart grid test beds, modern dynamic simulator facilities, and leading energy/grid experts
- Training and Education
  - Industry workforce training and engineering education via hands-on, simulator-based experiential learning
  - Team-based operations and safety training for power plant and grid operations personnel using integrated OTS/ITS solutions

Opportunities

- Research and Development
  - Dynamic simulators for conventional fossil energy plants and renewable generators integrated with energy storage and grid simulators to offer virtual power plants (VPP)
  - Collaborative, internationally-recognized R&D on dynamics, control, sensor networks, and decision-making tools to optimize smart grid operations and stability
- Training and Education
  - Realistic, hands-on, dynamic simulation-based environment for training operators, engineers, researchers, and students on:
    - ➢ Power plant operations and control
    - ➢ Grid dynamics and control
    - ➢ VPP operations for accelerated renewable energy deployment on a smart grid with strong interactions between multiple energy generators and consumers



Contact

- Dr. Stephen E. Zitney, Director, AVESTAR Center, stephen.zitney@netl.doe.gov
- AVESTAR Center Web Site: www.netl.doe.gov/avestar

NETL Carnegie Mellon PENNSTATE University of Pittsburgh VirginiaTech WestVirginiaUniversity URS