Modeling-Based Sensor Placement

Data in models can be used to determine sensor types and locations in a wide array of systems:

- Determine hot spots on turbine blades
- Locate high contaminant concentrations in gasifiers
- Hydrodynamics in CFB Boilers
- Gas concentrations in various locations

Sensors will be used more efficiently and provide only the necessary data needed to run an effective power system.

Oregon State University

- Derive criteria for assessing sensor effectiveness and system impact
  - Quantify sensor configuration effectiveness
  - Allow trade-offs in communication, computation, and sensing requirements
  - Develop new objective functions for sensors/sensor sets
- Demonstrate effectiveness and re-configurability of sensors to changing performance criteria
  - Response to changes in systems
  - Response to sensor failures
  - Response to changing system level criteria


University of Maryland / Iowa State University

- Develop an overall network architecture that can effectively accommodate the heterogeneity of a large number of sensors
- Determine how many sensors are sufficient and where the sensors should be placed to ensure a defined degree of convergence and confidence
- Define self-organization subsystems to handle complex adaptive systems with limited external direction and determine how the sensors in each subsystem interact with each other

Reaction Design

- Use ERN concept to generate “reduced order model” or ROM within a plant simulation
- Build the ERN automatically from CFD results
  - Account for multi-phase flow effects
  - Identify dominant flow characteristics

Advanced Research, Coal Utilization Science