

# Modern Power Plant Controls

## Drivers and Recent Activities

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# Strategic Drivers for Advanced Control



Operational Flexibility



Optimizing O&M



Cost Competitiveness



Workforce Transition

# Program 227 – Process Controls and Automation

## ▪ Key Objectives

- Advanced process control strategies for flexible operations
- Automation development/solutions for consistent operation and reduced operator burden
- Improvements in existing process control systems
  - DCS management for operational improvements
  - Alarm management logic techniques
  - Improved actuation techniques to minimize process variability
- Controllability of emerging power systems and low carbon processes
- Optimization techniques for plants, unit operations and fleet

## ▪ Value to Funders

- Plant demonstrations with member participation
- On demand training via guidance documents and innovative product delivery
- Novel and emerging control techniques evaluations via EPRI's Research Simulator



***Improved and integrated process control as well as automation techniques to reduce damage, improve plant performance, and enable consistent operations during flexible operations.***

# Program Value Statement / Tech Transfer Awards

- **Steam Temperature Control Strategies for Combined Cycle Units, 2019 ([3002016316](#))**
  - Tech transfer award recipient
  - MPC successfully deployed on a CC plant with superior performance to PID
- **Process Control Strategies for Low Load Operation, 2019 ([3002020541](#), [3002016325](#))**
  - Six controls improvements implemented
  - Lower, stable minimum load
  - Increased efficiency at minimum loads
  - Improved ramp rate from minimum loads
- **Increased Automation, 2019 ([3002016326](#))**
  - Options, approaches, practices
  - Readiness index developed





# Exploring Plant Control Strategies to Support Grid Frequency Response

## Objective

- Explore gaps in the research related to frequency response in the area of generator and governor controls

## Research Value

- Understand requirements and gaps of generator and governor control strategies to support frequency response
- Better frequency response strategies can help support power system stability

## Key Activities/Deliverables

- Report on current state and gaps
- Developing plant simulations showing techniques and improvements



# Digital Demonstration Facility

## Objective

- Establish a Demonstration Facility that
  - Provides the needed infrastructure to reduce implementation time for demonstration of emerging technologies
  - Creates a data pipeline between utility and EPRI for model development
  - Integrates plant digitization technologies to demonstrate step-change benefits
  - Assesses challenges and benefits of technologies
  - Accelerates evaluation and adoption of beneficial technologies

## Current Status

- 6 Utilities, International participation
- 12 total projects
- 7 EPRI Programs currently in collaboration
- 3 Universities
- 1 National Lab
- 7 Technology Providers
- 1 OEM
- ~\$12.25M in Research
- Extensive use of EPRI's Data Analytics Stack for data sharing/controls simulator

**Accelerated evaluation and demonstration of intelligent technologies**

# Intelligent and Autonomous Plants Grand Challenge Working Group



- Monthly Meetings
  - Roll Call/Announcements
  - Project deep dives
- Multidisciplinary

- Free to Participate
- Have others that may be interested? Let us know!

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A blue-tinted photograph of four people, two men and two women, standing in a row. They are dressed in professional attire, including lab coats and a hard hat. The text 'Together...Shaping the Future of Energy™' is overlaid in white on the image.

Together...Shaping the Future of Energy™