

In the Field

The Next Generation of Generation

EPRI, Dozens of Collaborators Drive Technology Development to Digitize Power Plants

By Scott Sowers

As fossil power plants operate more flexibly in a dynamic grid, can sensors, data analytics, and other digital tools help them optimize operations and maintenance? EPRI's I4GEN Program is pursuing a range of answers to this central question.

Launched in 2015, I4GEN is advancing diverse technologies to digitize power plants. The I4GEN vision: Sensors deployed throughout the power plant gather massive amounts of real-time data on equipment condition, while automated data aggregation and analysis tools support effective decision making. Fundamental to this is connectivity among plant systems, software, hardware, and staff.

I4GEN has assembled a working group to help drive technology development and share insights. Its 70 participants include utilities American Electric Power (AEP), Duke Energy, Louisville Gas and Electric, Kentucky Utilities, Southern Company, Tennessee Valley Authority (TVA), We Energies, and New York Power Authority. Technology providers include Siemens, which develops hardware and software for the electric power industry, and Emerson, a major supplier of control systems.

The group is using case studies to examine the application and benefits of sensors, advanced diagnostics, digital dashboards, and digital worker technologies such as tablets, smartphones, and augmented reality.

Case studies will begin in fall 2017. One is slated to investigate how to improve advanced pattern recognition (APR) software, which collects and analyzes data on pressure, temperature, vibration, and other equipment parameters. Traditionally, plant personnel manually collected data from plant components. APR provides data electronically every five minutes, enabling utilities to promptly identify faults and problems that require maintenance. For many utilities, however, it is a challenge to screen the large volumes of APR data for actionable information.

"APR is a great technology for detecting potential anomalies," said Duke Energy Technical Manager Greg Augspurger. "But after warnings are provided, people must extract insights from the data and recommend corrective actions. Often, changes in operating conditions are detected that do not require corrective action; this still requires human investigation to make the appropriate determination."

According to Augspurger, Duke Energy sees potential in I4GEN to significantly advance data analytics and APR technology application for electric utilities.

As a starting point, EPRI is planning to evaluate several analytic software packages and determine their usefulness in extracting insights from data.

I4GEN is focusing on user-friendly digital dashboards that distill key insights and actions from the oceans of sensor data. Given each power plant's unique set of operating conditions, it would be impractical to build a single interface that works across the fleet.

"The goal is dynamic and reconfigurable dashboards that provide the right data for the right people," said EPRI Principal Technical Leader Susan Maley. "An operator does not have the same dashboard as the financial manager. As new equipment is added, users would want to reconfigure their dashboards."

A challenge to achieving this arises from the fact that power plant systems use various software that communicate in different languages.

“Their interoperability is poor,” said Maley. “They don’t even identify plant components in the same way. We need a single unifying digital platform for the power plant.”

With I4GEN, EPRI and the working group seek to advance a vision of connectivity and communication among power plant systems, hardware, software, and users.

Key EPRI Technical Experts

Susan Maley