First Person—Flexible, Connected, Resilient

Trio of White Papers Explores Power System Transformation

The power system is rapidly changing into a highly integrated network of power generation, delivery systems, and customer-sited distributed energy resources such as solar, energy storage, and grid-interactive appliances. Based on examination of these trends, EPRI and electricity sector stakeholders determined that the future power system needs to be more flexible, connected, and resilient. EPRI kicked off 2016 with the release of three white papers on these characteristics.

Learn about the motivation for producing these white papers from EPRI Senior Vice President of Research and Development Arshad Mansoor.

Flexibility

Power system flexibility is the ability to adapt to changing conditions while providing safe, reliable, affordable, and environmentally responsible electricity. EPRI's white paper on flexibility describes technologies that EPRI and electricity sector stakeholders are developing and applying to address the challenge of flexibility.

Connectivity

Connectivity refers to the widespread deployment of grid communications, providing access to data streams and functions that inform decisions and behaviors from the power plant to the end consumer. As the electric power system transforms from a one-way power flow network to one that enables intelligent and interactive two-way power and information flow, connectivity will be paramount. EPRI's connectivity white paper discusses challenges and opportunities with emerging technology innovations to improve grid communications.

Resiliency

Resiliency is the ability to harden the grid against—and quickly recover from—extreme weather and other high-impact, low-frequency events. EPRI's resiliency white paper discusses the three key elements of a resilient grid—damage protection, recovery, and survivability—and related technologies under development.

In Development

Ready for Service

EPRI Guidance Helps Operators Bring Fossil Plants Online and Offline Safely and Reliably

By Chris Warren

For power plant operators and grid operators these days, a fossil-fueled plant is like a backup quarterback in the NFL. When the grid operator needs that plant in the lineup, the plant operator and the plant must be able to respond quickly, reliably, and effectively. Like a backup quarterback, the plant has to be ready to perform, no matter how long it has been inactive.

For fossil plants, this requires a well-executed layup. Plant staff must take effective measures, such as adding nitrogen and certain chemicals to protect equipment from corrosion, leakage, and other mechanical problems that could delay a prompt return to operation.

A layup lasts longer than a routine shutdown. “With a shutdown, you keep the temperature in the boiler the same as when it’s generating because you’re anticipating the need to be online in the next 24 to 48 hours,” said EPRI Senior Technical Leader Mike Ruszkowski. “Layup is longer term, usually weeks or months. But if you’re in layup and several other plants trip offline, you have to be available to come online quickly.”

More Layups with a Changing Grid

As the grid incorporates more natural gas and renewables and as demand management increases, coal-fired units increasingly are used only during periods of high electricity demand, such as hot summer and cold winter periods, with layups scheduled between them. Because these plants were designed to operate continuously at full load, operators need to take measures to protect generation equipment when they are cycled frequently online and offline or operated at low loads for short periods.

EPRI has developed guidelines to help plant operators successfully manage the increased frequency and complexity of layups. This work is part of EPRI’s Changing Mission Profile initiative to help operators manage flexible operations of baseload plants.

Required: Communication, Vigilance, Planning

According to George Verib, a FirstEnergy senior consultant for water and steam chemistry, a major challenge with layups and shutdowns is a lack of clarity about their duration. “There have been times when a shutdown would last for two or three weeks, and managers couldn’t take protective layup measures because the plant was always on 24-hour notice to come back online,” said Verib.

Ray Chambers, an EPRI technical executive who worked on the layup guidelines, points to communication as the most important factor, because independent system operators and plant operators don’t have the same priorities. “Reliability of generation equipment is a guiding principle for plant operators, while system operators are looking for the lowest cost of generation over the next few hours,” said Chambers. “Therefore, it’s essential to communicate with your independent system operator or dispatcher—and if possible, get agreements with them—so that you know when you’re going to be offline and for how long.” This enables plant operators to choose the proper layup techniques and assemble the appropriate materials, equipment, and workers to execute them.

Also important: Keep a consistent maintenance schedule. “A three-month layup should not translate into ignoring the plant for two-and-a-half months,” said Ruszkowski. “Crews need to stick to a schedule and regularly complete tasks such as checking pump and motor oil levels and testing fans. If equipment problems arise, you need time to address them.”

A well-executed layup requires a plan to get back online. This should detail timing of tasks—such as draining off protective chemicals—and ensuring that the right personnel are on-site during the restart. “There’s nothing worse than having to call a plant manager at three in the morning to let him know that the plant cannot start up on time because of equipment problems and a lack of maintenance staff on-site,” said Ruszkowski.

Key EPRI Technical Experts

Mike Ruszkowski, Ray Chambers