EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Optimized Operation of Cooling Systems

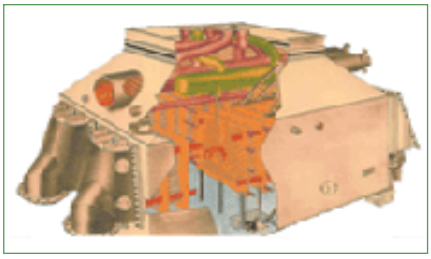
This is a proposal for the Advanced Cooling Technologies supplemental project. Final project tasks will be selected through prioritization by the project funders.

Issue

The optimum operation of a cooling water system can be determined by monitoring its component's operating parameters in addition to other plant parameters, Since the inter-relationships are complex and those parameters are ever-changing during normal operation, real time solutions require advanced computational capabilities.

Description

Dynamic programming and other computer-based solution techniques will be evaluated and explored in operating power plant applications to develop an online optimization methodology.



Value

- Heat rate improvement
- Increase of net generation
- Reduction in cooling water use during specific times of the year

Approach

Two host sites are preferred: one with a cooling tower and another utilizing once-through cooling. Load following operation will be needed during evaluation period. Potential computational techniques and controllers will be evaluated and installed on each site. The optimization algorithms and solution methodologies will be developed as the project progresses, The units' performance will be evaluated over a time period which includes months of summer/hot weather operation and compared to historic levels with the same ambient and external conditions.

Project Deliverables

Deliverable Title	Planned Completion Date	Deliverable Type
Evaluation of Potential Techniques to Optimize Operation of Cooling Systems	Eighteen months from project initiation	Technical Report

How to Apply the Results

Steam condensers and the backpressure they apply on the low pressure turbine have the single largest heat rate impact of any power plant component. There are many parameters that affect that backpressure, but are outside an operator's control. There also are an equally large number of parameters within the power plant operators' control. Combing these two sets of parameters makes the operational optimization of the condenser multi-dimensionally complex. Currently power generating stations rely upon technical and operating staffs to periodically tune cooling systems for the unit's best operation. There are no known methods of continuous online optimization for cooling system operation. Neural net solutions are not applicable for this application, but dynamic programming is an option to solve the multitude of layers of simultaneous equations.

(continued on back page)

Cost Estimate

This project is estimated to require 18 months and between $100,000 and $500,000 to complete.

For More Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

The Electric Power Research Institute, Inc. (EPRI, www.epri.com) conducts research and development for the global electricity sector. An independent, nonprofit organization, EPRI brings together experts from academia and industry as well as its own scientists and engineers to help address challenges in electricity generation, delivery, and use, including health, safety, and the environment. EPRI's members represent more than 90 percent of the electricity generated and delivered in the United States, and international participation extends to 40 countries. EPRI's principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, N.C.; Knoxville, Tenn.; and Lenox, Mass.

Together…Shaping the Future of Electricity

September 2008

Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com