

# Water Utilization in Cooling Systems: Recycling, Re-use, and Dry Cooling



Reducing water use in traditional cooling systems through recycling and re-use methods and dry cooling

For most power generating facilities and some industrial facilities, primary cooling methods require large volumes of water in once-through or evaporative cooling (cooling tower) systems. Increasing environmental pressures to protect aquatic communities and preserve water sources and quality have forced the use of new cooling technologies in many power projects. These technologies include use of treated sewerage effluent and other degraded water sources as cooling system water supply. In some cases, dry cooling is being installed.

Application of these technologies to new or existing facilities requires the resolution of other environmental and technical issues, such as cooling tower drift, scaling and corrosion, and wastewater discharge. This project will provide participants with the information needed to adopt such technologies efficiently and prudently.

**Project Summary** This supplemental project will conduct research in two areas:

- Development of guidelines for the use of recycled and reclaimed water in cooling water systems.
- Sponsorship of workshops and research to identify and address issues that inhibits the adoption of dry cooling for new facilities.

In the first area, the guidelines for using recycled and reclaimed water in cooling water systems will address issues that could arise before and after conversion to alternate sources. While the emphasis will be in the use of tertiary-treated sewerage effluent, the guidelines may also include other in-plant and external sources, such as produced water from energy production and seawater.

The guidelines will address such topics as:

- System design and metallurgy
- Pretreatment and treatment requirements
- Scaling, fouling, and corrosion issues
- Denitrification
- Biological/pathogenic growth and control
- Cycle chemistry and concentration
- Treatment/discharge of blowdown water

EPRI will gather information from literature searches, review of existing facilities, past EPRI products, and experts to develop the guidelines. The guidelines will provide a useful tool for evaluating all of the potential issues, benefits, and costs associated with using alternative water sources for cooling purposes.

In the second area, the project will provide information on the use of dry cooling in power generating projects. Some

facilities are already being required to consider dry cooling for new units, either to minimize impacts on source and receiving water bodies and aquatic communities, or because of local concerns about adequate freshwater sources. However, the use of dry cooling brings technical and economic hurdles that often limit the economic feasibility of a project, such as thermal efficiency and capacity penalties and high initial capital costs.

Under this project, EPRI will be hosting one or more workshops on dry cooling to review the associated environmental, technical, operational, and economic issues. Based on input from this workshop, EPRI may develop an R&D program to advance this technology or reduce the economic penalties associated with its use.

**Deliverables** Upon completion of the projects, participants will have the information necessary to properly evaluate the use of advanced cooling technologies at their own facilities. The reports and guidelines will provide methods for determining what factors must be considered in the design, operation, and maintenance of the systems, and for determining the economics of switching to alternative cooling techniques. The specific products will include the following:

- **Water recycle and re-use guidelines.** This document will provide the information required to implement the use of tertiary-treated sewerage effluent and other degraded water sources in cooling water systems.
- **Dry cooling workshop/proceedings.** This workshop and its proceedings will document known applications of dry cooling, the environmental and economic reasons for its use, and technical/economic/operational issues that limit its further use.

**Benefits of Participation** In addition to receiving pre-publication information as it is developed, participants will benefit from the possibility of follow-on case study analysis at their own facilities as part of the project. This project will also provide participants with access to the world's leading experts in these technologies.

**Demonstrated Value** This project builds on the success of many prior EPRI studies. In addition, EPRI has enlisted the support of one customer with extensive background and expertise in water management and conservation to support the work.

**Price of Project** The price to participate in this project varies with the desired deliverables. Potential participants are invited to contact EPRI to discuss specific needs and potential participation. Companies that fund any Environment program can use Tailored Collaboration (TC) funds, if available, for up to half of the cost matched by EPRI TC funds. Companies that have not purchased any Environment programs can participate through cofunding.

**Who Can Participate** Any company, public agency, or nonprofit organization can participate in this EPRI supplemental project.

**Project Status and Schedule** This project has already received interest from one customer as a TC project. It is expected to take 18 months to complete.

**Contact Information** For more information, contact the EPRI Customer Assistance Center (EPRI CAC) at 800.313.3774 ([askepri@epri.com](mailto:askepri@epri.com)).

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