

# PROJECT facts

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY

Innovations for  
Existing Plants

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## INTERNET-BASED, GIS CATALOG OF NON-TRADITIONAL SOURCES OF COOLING WATER FOR USE AT AMERICA'S COAL-FIRED POWER PLANTS

PROMIS/PROJECT No.: DE-NT0005957

## Background

Opportunities exist for the utilization of lower-quality, non-traditional water sources. The projects in this interest area will evaluate and develop cost-effective approaches to using non-traditional sources of water to supplement or replace freshwater for cooling and other power-plant needs. The U.S. Department of Energy's (DOE) Innovations for Existing Plants (IEP) Program's research in this area has focused on a variety of issues, including feasibility studies for a variety of non-traditional water types and research into developing advanced water treatment technologies to enable coal-based power plants to use impaired water in recirculating cooling systems without notably increased scaling and without significant decreases in cycles of concentration. Feasibility studies involve multiple issues such as the flow of different non-traditional waters available in different regions, costs associated with collecting and treating each of the variety of non-traditional waters, and consideration of the variety of state-specific regulations pertaining to non-traditional water use.

## Description

To reduce high-quality freshwater withdrawal and consumption for power production, project researchers will create an internet-based, Geographic Information System (GIS) catalog of non-traditional sources of cooling water for coal-fired power plants. Data will be developed to allow the economically beneficial use of oil- and gas-produced water, abandoned coal-mine water, industrial waste water, and low-quality groundwater. By pairing non-traditional water sources to power-plant water needs, the research will allow power plants



## PARTNERS

Arthur Langhus Layne – LLC

Ground Water Protection Council

that are affected by water shortages to continue to operate at full capacity without adversely affecting local communities or the environment. The completed application will be available over the internet.

ALL Consulting will develop a nation-wide catalog of the location, quantity, and quality of non-traditional water sources relative to power plants. The catalog will identify the location and the water withdrawal and consumption demands for existing and planned coal-fired power plants in the lower 48 states (planned power plants will include those for which a permit application has been submitted) and will also identify the location, volume, and quality of the various alternate water sources near those plants across the nation. The catalog will be converted to a GIS-based system and will be available over the internet. By clicking a location on a map, a power plant operator will be able to see (either through a pop-up grid or other visual means) the various potential water sources available, the quality of water, the volumes available, and the distance to those waters. Alternate water sources within 15 miles of a given location will be included in the inventory. This will ensure that operators are aware of their options and allow them to quickly assess the costs of accessing these waters to supplement or replace their current supply on a short- or long-term basis.

## Primary Project Goal

The primary goal of this project is to reduce/minimize high-quality freshwater withdrawal and consumption by creating an internet-based, GIS catalog of non-traditional sources of cooling water for coal-fired power plants.

## Objectives

- Collection and development of data to allow the economic beneficial use of non-traditional sources of cooling water, including oil- and gas-produced water, abandoned coal mine water, industrial waste water, and lower-quality ground water.
- Identify the location and the water withdrawal and consumption demands for existing and planned coal-fired power plants in the lower 48 states.
- Determine the location, volume, and quality of the various alternate water sources near those plants across the nation.
- Provide user interface that allows power plant operators to view the various potential water sources available, the quality of the water, the volumes available, and the distance to those waters by clicking a location on a map.



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• **PERIOD OF PERFORMANCE**

• 10/01/08 to 09/30/11

• **COST**

• **Total Project Value**  
• \$628,635

• **DOE/Non-DOE Share**  
• \$451,385 / \$177,250

## Benefits

The main benefit of this application will allow for in-depth analysis of the location and characteristics of available, non-traditional water sources in order to aid in guiding plant operators in selecting supplemental plant water sources, leading to overall reduction in high-quality freshwater withdrawal.

## Planned Activities

The project's management plans to compile data on non-traditional sources of power plant water, including research on power plant water requirements in terms of quantity and quality as well as the quantity, quality, and location of the various alternate sources of water. Data searches are to target two main universes – coal-fired power plants and non-traditional sources of water. Researchers will have to determine the cooling water requirements for coal-fired power plants in terms of quantity and quality and incorporate that data into the catalog.

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Collection of data for non-traditional sources of water will necessitate several analyses. For abandoned coal mine water, researchers will utilize electronic surface geology maps in order to extrapolate flooding conditions based upon local geological trends including the presence of alluvial and bedrock aquifers. Researchers will access the national produced water database maintained by the USGS in order to produce a GIS-based catalogue of higher quality co-produced water available at certain oil and gas fields across the United States. In addition, researchers will access State and USGS ground water data to identify resources that are suitable for use as cooling water but that are not being used for human consumption because they are of lower quality than other available sources, and will also research industrial processes that generate large volumes of waste water.

The data collected will be analyzed and evaluated to provide the bases of information for the online application. Considerations for system requirements, hosting and security, and the main user interface will influence the performance and final design of the application. Once complete, the application will receive a thorough review. Several technical presentations for training workshops and professional conferences will be prepared as part of the technology transfer effort and online launch of the application.