



Modeer

## Confronting the Intersection of Water, Energy, and Air Quality at the Central Arizona Project

**W**ater and energy are inextricably linked. Water is needed in order to produce almost all forms of energy, and power is needed in order to move water. Now air quality issues are surfacing as an additional factor that water providers will need to accommodate as they pursue more sustainable operations. At Central Arizona Project (CAP), power plant emission control regulations represent a potential threat to the affordability of Arizona's primary renewable water supply.

CAP was constructed by the US Bureau of Reclamation under the authority of the Colorado River Basin Project Act of 1968 and is now operated by the Central Arizona Water Conservation District. CAP is a massive water delivery project that transports water from the Colorado River to water users throughout the rapidly growing regions of central and southern Arizona and helps ensure that the state has full access to its Colorado River entitlement.

CAP diverts Colorado River water from Lake Havasu, on the Arizona/California



The Navajo Generating Station provides 95% of the energy CAP uses to move 1.6 million acre-feet of Colorado River water each year.

border, and transports it across the desert by means of a 336-mile-long water conveyance system. The system delivers surface water to about 80% of Arizona's population, including cities, towns, irrigation districts, private industry, and Native American communities. Because CAP's service area is at much higher elevations than the Colorado River, a pump lift of about 3,000 feet is required to deliver CAP water to users at the terminus of the conveyance system south of Tucson.

As a result of this long lift, CAP is also the largest single user of electricity in Arizona. In 2009, CAP consumed approximately 2.8 million MW·h to deliver more than 1.6 million acre-feet of Colorado River water.

Ninety-five percent of this power comes from the coal-fired Navajo Generating Station (NGS) located in the northeastern portion of Arizona adjacent to Lake Powell. Construction of NGS was the result of an environmental compromise brokered by then Secretary of the Interior Stewart Udall. NGS was specifically authorized by Congress in lieu of constructing additional dams on the Colorado River near the Grand Canyon to meet CAP's power needs. CAP, through the

US Bureau of Reclamation, owns nearly one quarter of the energy generated at NGS. Electric power providers in Arizona, California, and Nevada own the remaining generation capacity.

#### **AIR QUALITY A LONG-STANDING ISSUE**

Because the Navajo power plant is located near 11 national parks and wilderness areas, including the Grand Canyon, it falls under the US Environmental Protection Agency (USEPA) Regional Haze Rule, which established a national goal for visibility in Class 1 areas across the United States. The best available retrofit technology (BART) provisions of the Regional Haze Rule require reductions in the emissions of air pollutants that impact visibility.

As a result, controlling emissions that impact visibility has been a priority for CAP and the power plant owners for decades. The NGS participants have, to date, invested more than \$400 million to install state-of-the-art controls for sulfur dioxide emissions and are achieving high levels of particulate emissions control. The NGS is the only plant in the United States to have had such controls installed exclusively for visibility purposes.

The remaining compounds of concern under the Regional Haze Rule are nitrogen oxides (NO<sub>x</sub>). According to the USEPA and various environmental groups, NGS is the fourth largest source of NO<sub>x</sub> in the United States. In 2008, the plant owners set aside more than \$43 million to begin installing low-NO<sub>x</sub> combustion technology at NGS, which will significantly cut NO<sub>x</sub> emissions. Using USEPA methods, the Salt River Project (operator of the NGS plant) conducted a study of NO<sub>x</sub> control technologies, which concluded that this combustion technology will reduce NO<sub>x</sub> to levels that are even lower than the applicable BART presumptive limit. Retrofit of NGS with this technology will be completed by the end of 2011.

In August 2009, USEPA published an Advanced Notice of Proposed Rulemaking to seek public input on controlling NO<sub>x</sub> emissions from the NGS. The USEPA is evaluating both the low-NO<sub>x</sub> combustion technology and an emission-control system known as selective catalytic reduction (SCR). The agency received more than 6,000 comments during the initial public comment phase. USEPA representatives have stated that their intention is to promulgate a Notice of Proposed Rulemaking for BART technology at the NGS in fall or winter 2010.



Native American and non-Native American cotton farms depend on affordable surface water if they are to stay in business and not return to withdrawals from limited groundwater supplies.

Preliminary cost estimates for SCR technology show capital costs ranging from \$660 million up to as much as \$1.2 billion and annual operating costs of approximately \$13 million. In addition, the Salt River Project study concluded that SCR would provide few incremental visibility benefits over low-NO<sub>x</sub> combustion—less, in fact, than the human eye can perceive. Given the enormous disparity in costs yet minor difference in regional haze control between the two technologies prompts the question “What level of NO<sub>x</sub> control is appropriate?”

### POWER COSTS WILL RISE

The cost of energy is a large component of the rates and fees associated with the delivery of Colorado River water by CAP. The installation of low-NO<sub>x</sub> combustion is anticipated to add approximately \$0.50/acre-foot to the energy costs of CAP water delivery, an increase of about 1%. SCR technology would, at best, require an additional \$10/acre-foot, increasing customer energy costs by approximately 20%. Large municipal and agricultural customers could see cost increases of millions of dollars annually. For CAP’s Native American and non-Native American agricultural customers, who operate on very slim profit margins, higher energy rates could lead to a return to unus-

tainable groundwater pumping. Although groundwater is a less expensive alternative to Colorado River water, it would represent a giant step backward in Arizona’s pursuit of renewable water use.

### NGS DECOMMISSIONING A POSSIBILITY

NGS faces other uncertainties, including the need for new lease and coal supply contracts, new greenhouse gas and emission control regulations, and the intent of a major plant owner to withdraw from the operating partnership. With the additional expense of SCR, the remaining partners may decide to close the plant rather than incur the enormous costs. Such a scenario was experienced recently when the owners of the Mohave Generating Station chose to close the plant rather than incur the costs of environmental upgrades.

Closing the NGS would deprive CAP of its primary source of electricity and force the district to purchase power at much higher market rates. Using recent market fluctuations as a guide, this could result in a 50–300% increase in CAP energy charges. Should NGS close, CAP

customers could see energy rates increase by \$25 to \$200/acre-foot.

In addition, CAP currently sells excess energy from its share of the NGS’s generation capacity. CAP uses these revenues to repay the federal government for Arizona’s share of the cost of constructing the CAP system. Loss of these revenues would necessitate an increase in charges to CAP customers. A portion of the energy-sale revenues are also used to directly benefit Arizona’s Native American tribes under the Arizona Water Settlements Act.

Closing NGS would be economically devastating for the Navajo Nation and Hopi Tribe, both of which earn millions of dollars in combined wages, lease payments, and royalties related to the operation of the station. The Hopi Tribe has already suffered significant loss of revenue following the closure and decommissioning of the coal-fired Mohave Generating Station.

### TIME NEEDED FOR SWITCH TO ALTERNATIVE ENERGY SOURCES

CAP is very interested in using renewable power sources to operate the canal system and has continued

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and will continue to support efforts to develop alternative energy supplies. However, there are currently no solar or wind power supplies available that can guarantee CAP a constant source of electricity. Solar power, whether from photovoltaic panels or from solar concentrators, is unavailable at night, and is vulnerable to weather conditions that reduce the intensity of sunlight hitting the solar panels or mirrors. Weather conditions also affect the reliability of wind power. In the absence of effective power storage, solar and wind power cannot replace the base-load power supplied by the NGS.

CAP and many other affected entities are encouraging USEPA to allow time to rigorously evaluate the low-NOx combustion technology now being installed. This technology will meet the standards set by the USEPA for NOx emissions and is much less expensive than the alternative technology currently being considered.

During this evaluation phase, alternative energy technologies will mature, and effective power storage methods will be developed. Solar, wind, and other renewable

power resources that meet the needs of the CAP system will become available.

CAP is also engaged in a broad public involvement campaign to inform its customers, stakeholders, and the millions of Arizonans who rely on CAP-delivered Colorado River water about these issues and to motivate them to take action to encourage their state and federal representatives, the Obama administration, and the USEPA to support a measured path in setting new NOx regulations. Outreach methods include printed and electronic materials, a new website ([www.CAPSmartEnergy.com](http://www.CAPSmartEnergy.com)), a media relations campaign, and a significant investment of time in presentations to community members, businesses, and other advocacy and networking groups.

#### **IT'S NO LONGER JUST ABOUT THE WATER**

The interconnectedness of water, power, and air quality must be acknowledged and addressed if the water industry is to successfully move to expanded use of renewable resources and meet the challenges posed by ever-more-stringent air

quality regulations. It is hoped that CAP's response to the proposed Regional Haze Rules can serve as a case study for other water providers and those with a stake in maintaining affordable and sustainable water for future generations.

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