

# Eye-Opening

STIMULUS FUNDS HELP THE SCOTTSDALE WATER RESOURCES DEPARTMENT SEE THE POTENTIAL FOR ENERGY EFFICIENCY FROM SAVINGS FROM MORE EFFICIENT AERATION

By Doug Day

**W**hen the American Recovery and Reinvestment Act passed in 2009, officials with the Scottsdale (Ariz.) Water Resources Department were drawn to it by the availability of grant funding.

Scottsdale secured a grant through the U.S. Department of Energy for turbo blowers to replace multi-stage centrifugal blowers at two wastewater reclamation plants. The \$1 million grant covered nearly the entire \$1.08 million project, which went online in early 2012 after three years of planning and design by Valentine Environmental Engineers and installation by MGC Contractors, both local firms.

There is the potential to see as much as a 40 percent reduction in electrical use for process air requirements with the implementation of the turbo blowers, selected through a public bidding process.

“Since then, we’ve started looking at opportunities that aren’t tied to stimulus funds,” says Art Nunez, director of Water Reclamation Services.

## TOWARD OPTIMIZATION

Nunez has worked in Scottsdale, a suburb of Phoenix, for 20 years, during which time the city has built about \$500 million in treatment infrastructure for drinking water and wastewater. “That was largely due to the growth this area experienced in the 1990s and early 2000s,” he says. “In the growing mode, it’s a matter of ‘get it in the ground and figure out how to make it work.’”

The explosive growth has ended, so now the department can take time to optimize the systems. “As we’re doing that, we’re seeing more opportunities to save money on our electric budget, which is about \$16 million a year for the entire department,” Nunez says.

Scottsdale’s 20 mgd Water Campus includes water reclamation and advanced water treatment plants. Commissioned in 1998, the facilities are the largest and newest wastewater treatment systems in Scottsdale. The water reclamation plant uses microfiltration and reverse osmosis to provide irrigation for 23 golf courses and a city-owned sports complex, and replenishes groundwater through more than 50 recharging wells.

Two of its four 400 hp blowers were replaced by 300 hp APG-Neuros turbo blowers at a cost of \$771,000. The old blowers provided a steady airflow of 5,400 scfm, while the turbo blowers are rated at 3,600 scfm and can be turned down to match the wastewater flow. If the air demand exceeds the capacity of the new blowers, one of the older blowers is placed in operation.

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**ART NUNEZ**



Two 300 hp APG-Neuros turbo blowers will save the Scottsdale Water Campus wastewater treatment plant about 47.5 million kWh over the next 10 years, a reduction of about 40 percent. The units can be adjusted to match wastewater flows. The \$771,000 cost was covered by a U.S. DOE grant through the American Recovery and Reinvestment Act.



PHOTOS COURTESY OF SCOTTSDALE (ARIZ.) WATER RESOURCES DEPARTMENT

The old turbines used 5.3 million kWh annually and could not be turned down to meet airflow needs. The reduced power needs of the adjustable turbo blowers will have a substantial impact in reduced electrical use and will offer the potential for a significant dollar savings based on current electricity prices, according to Nunez. Over 10 years, the energy savings are estimated at 47.5 million kWh, reducing 34,000 metric tons of greenhouse gases.

## RENEWING THE OLD

The 1.7 mgd Gainey Ranch Reclamation Plant, online since 1984 for irrigating a nearby golf course, was one of the state’s first wastewater reuse facilities. Its three 75 hp/1,050 scfm blowers, which used 1.1 million kWh a year, were replaced with 50 hp/1,050 scfm APG-Neuros turbo blowers at a cost of \$324,000. The project will save about \$50,000 a year in electricity, save 6.4 million kWh in 10 years, and reduce greenhouse emissions by 4,600 metric tons over the next decade.

There is much less maintenance expense, as well, and the turbo units are noticeably quieter. “Historically, you go into a blower building and you have your earmuffs on and you’re yelling to the guy next to you,” says Nunez. “Now it’s like standing next to a washing machine.”

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But it's not just the noise reduction operators like. "Operators are inquisitive," Nunez says. "They like new technology, and they get to learn something new." The blowers are controlled by the plant's SCADA system, which was updated to handle the new equipment. "They need a certain amount of backpressure,

so the control side is a little different," Nunez notes. "They give us a lot more flexibility."

### KNOWN FOR INNOVATION

The staff also replaced the original Gainey Ranch jet aeration system with a fine-bubble diffuser system, which was not part of the DOE grant. "We knew we wouldn't get full advantage of the blowers with the old aeration system," says Nunez.

Scottsdale uses more than 6 million gallons of reclaimed wastewater every day for irrigation and another 4 million gallons for recharging groundwater in the desert community. A portion of its wastewater is conveyed to the regional 91st Avenue Wastewater Plant in Phoenix, which sends reclaimed water 50 miles to the Palo Verde nuclear plant for use as cooling water, helping to conserve valuable water resources in the region. The nuclear plant uses 20 billion gallons of reclaimed wastewater every year.

"The city of Scottsdale is very innovative," adds Nunez. "It's nice working for an organization that supports that kind of philosophy." **tpo**

## GENERATION ON THE HORIZON

Experience in saving energy through efficient equipment has prompted more interest in energy technologies at Scottsdale wastewater reclamation plants. One possibility being studied by Valentine Engineers is adding inline turbines to generate electricity, using the pressure of water flowing through pipes.

"We're pretty confident that we have at least a couple of applications," says Art Nunez, Water Reclamation Services director. "We have so many pressure zones in our water production and distribution system. The reclaimed water distribution system alone consists of five pump stations moving water 14 miles at 150 psi through 36-inch lines, so we're looking at all of that."

Also on the list is a large solar installation. "We're negotiating for a 3 MW solar project on the 145-acre Water Campus site that has a lot of open space," Nunez says. "Things look good, and it's looking like it may very well make sense." Such a deal would include a long-term purchased power agreement for a company that would build the facility at no cost to the city.

Besides reducing the energy bill, more onsite generation might help Arizona Public Service, the local utility, reduce demand on its system. For the past three years, the city has participated in the APS load curtailment program, in which the plants reduce their use during times of high demand in exchange for incentive payments. In 2011, the water department received rebates in excess of \$160,000. "We continue to expand our involvement in that program each year and are looking at breaking a quarter-million dollars in rebates," says Nunez.