

Key agency slashed as state faces 2025 deadline on overpumping

Cuts put AZ water goals in jeopardy

Tony Davis Arizona Daily Star | Posted: Wednesday, May 12, 2010 12:00 am

It's going to be a lot harder for Arizona to meet a state deadline to stop overpumping groundwater, due to deep budget cuts for the state's water agency, water officials in Tucson say.

The Arizona Department of Water Resources took a 58 percent hit - the third-largest of any state agency - for fiscal 2010-11.

The state faces a 2025 deadline, set by a 1980 law, to reach safe yield in its groundwater use. Safe yield means not pumping more water than what is returned to the ground by recharge of rainfall and treated sewage effluent.

Scientists have warned that overpumping of groundwater leads to sinking of the ground, or subsidence, followed by fissures in the earth. They say that water quality deteriorates as wells sink deeper into the ground to pump.

"Arizona had the flagship groundwater regulatory law in the country, and we have essentially gutted the system," said Steve Weatherspoon, a longtime private water attorney in Tucson who represents Nogales and the Tohono O'odham Nation on water issues.

The state won't return to the days of the 1970s before it had water rules, "but we can stall right here where we are at," said John Mawhinney, a former state senator who helped draft the 1980 law and who now chairs an advisory council to the state water department's Tucson office. It has closed, as will all five regional department offices, due to the budget cuts.

Department Director Herb Guenther, however, said the state won't meet the 2025 deadline with or without staff cuts because it lacks money to buy out water rights owned by farms. The groundwater law gave the state authority to start doing that as early as 2006. Agriculture uses 74 percent of Arizona's water supplies.

Guenther said he thinks Republican Gov. Jan Brewer and her staff not only wanted to cut government spending, but to make the water department "more business-friendly, with less regulation and less harassment. . . . Early on in the administration, their message was very clear: We need to be business-friendly; we want to invite industry into this state," added Guenther, who was appointed by ex-Gov. Janet Napolitano, a Democrat.

The Legislature gave the department authority to raise \$5.6 million in permit fees to make up some of the difference. But the department forecasts that in the current economic climate, the authorized fees will raise \$2 million.

Paul Senseman, Brewer's spokesman, said the spending cuts were needed because of record budget deficits that forced Brewer to focus on core functions of education, health care and prisons.

"Living within our means as a state certainly creates requirements by nearly every agency to make reductions and streamline operations," he said.

He didn't respond to questions about whether the cuts were motivated by a desire to loosen regulations.

Rep. Vic Williams, a Tucson Republican who sits on the House Appropriations Committee, said, "I understand how important our water-resources office is to Southern Arizona, . . . but to put it in front of public safety or the K-12 system, I don't think I'd be willing to do that."

Weatherspoon, Mawhinney and former water department official Michael McNulty said the department cuts will hurt in these ways:

- The state agency's Tucson Active Management Area office has until now set water-use limits for cities, golf courses and industries. Now those limits will be set by Phoenix officials, less sensitive to Tucson concerns because the Tucson office has closed.
- The state already is two years behind and will be further delayed in updating its long-term strategy to meet the 2025 goal for the Tucson area.
- With a smaller staff, the state's regulatory efforts will suffer, making it easier for users to avoid cutting back or to escape the brunt of a requirement that a new development prove a 100-year assured water supply.
- Conversely, the Tucson office's shutdown will make life harder for the private sector. When developers need permits to sink wells or otherwise use water, they'll have to go to Phoenix now, creating "a drag on economic development and revitalization of Southern Arizona that will result from inadequate and delayed accessibility," Sarah Evans, chair of Tucson's water advisory committee, wrote in a letter to Guenther.

Longer waits for permits won't be a problem in today's bad development climate, but when growth returns, "I think things will get pretty hot" with the development community, said McNulty, a Tucson attorney who has represented developers and ran the water agency's Tucson office from 1981 to 1984.

Guenther, however, said the department is prepared to move staffers around, if necessary, to meet demands from developers for permits. The department's plans will still recognize regional differences and be in line with community standards, even though they're set in Phoenix, he said.

But Guenther expects statewide water planning to suffer from budget cuts.

"That's our most important function, to make sure that we are looking for future water supplies, using nothing but renewable supplies as opposed to mining groundwater," he said.

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Arizona Daily Star

Many projects Pima voters OK'd in '97 still wait, but money's spent

Andrea Kelly Arizona Daily Star | Posted: Sunday, May 23, 2010 12:00 am

Thirty-six percent of the projects promised to voters in 1997 bond proposals were never done. But most of the \$712 million has been spent because it was shifted to other projects voters were never asked to approve, or spent on projects that were significantly over budget.

Similarly, a third of the 58 projects completed so far with 2004 bonds are over budget. But many others have cost less than expected. And with much of the work still to be done - project schedules run through 2016 - a final evaluation of those bonds is premature.

The 1997 bonds were supposed to cover 10 years' worth of county construction needs.

Of the 55 road projects submitted to voters, 21 have not been done 13 years later. About \$100 million of \$350 million in road bonds remains unspent, based on the most recent bond progress report provided by Pima County.

The picture for non-road projects is much more bleak. Voters approved \$362 million for 104 projects. Just 68 have been done at a cost of \$444 million, leaving nothing for the 36 remaining projects.

The funding shifts were all approved by the Board of Supervisors on the recommendation of project managers who said the changes were needed to better respond to community needs.

Many of the changes were small, such as adding lights to an extra soccer field at Udall Park.

Others were converted into different projects. A \$1 million plan to build three new sheriff's substations, one each in Vail, Catalina and Three Points, became a \$628,000 project to build a single substation at Three Points and add electrical improvements at the sheriff's central administration building.

A few came in under budget, including the two-mile extension of the Rillito River Park from La Cholla Boulevard to I-10, which was budgeted at \$2.4 million but finally cost \$658,000.

Even more exceeded their budget. A \$1 million plan to build an equestrian facility and athletic fields along the Rillito River Linear Park ended up costing the full \$1 million just to buy the land, on which nothing has been built.

Flood-control projects were big overspenders. Ten of 13 flood-control projects on the 1997 bond ballot combined to go 167 percent over budget, although a portion of the overruns came from federal grants. Other cost overruns, not just in flood control but in all areas, are generally made up by shifting taxpayer funds from other uses.

Wildly inflated materials costs before and after Hurricane Katrina get some of the blame, said Suzanne Shields, Flood Control District director. But a lot of the increased costs were due to the district's expanding the scope of projects.

The Mission View Wash project, creating a flood detention basin along South Park Avenue and East 36th Street, was supposed to cost \$1 million.

Planners realized it would solve flooding in only one area of the stream, Shields said. "It went from small to large, but it addressed water collected from three upstream watersheds, and has essentially removed a much larger area from flooding," raising the final bill to \$8.3 million.

Solid waste was another problem area.

The Sahuarita landfill was supposed to be expanded from 20 acres to 40 with \$900,000. It ended up costing \$4 million before it was finished in September 2007. The three other solid-waste projects had not been done at the time of the most recent annual update in June.

Ursula Kramer, county environmental quality director, also cited increasing construction costs. She said the other projects haven't been done because solid-waste priorities in the county have changed since the bonds were approved.

One of the biggest overruns - \$22 million - involved expanding the Ina Road wastewater treatment plant by 50 percent. Although the originally planned \$62.6 million project came in slightly under budget, an extra \$24 million was spent on additional unplanned work related to the expansion and routine maintenance.

Some of the extra money may have come from wastewater management's not spending \$8 million on four interceptors that were promised to handle sewage. Michael Gritzuk, wastewater director, said they weren't needed because population growth has slowed.

"We will move ahead with the infrastructure when there is a need to do it," he said.

Road bonds approved in 1997 totaled \$350 million. Some of the 21 projects that have not been done were rolled into the 20-year Regional Transportation Plan for more funding. Many of those will eventually be built with a mix of bond and RTA funds, said Priscilla Cornelio, county transportation director.

Of 33 projects that have been done, 21 were over budget by 10 percent or more.

None, however, came close to the 533 percent cost overrun for widening Skyline Drive to four lanes from North Chula Vista to Campbell Avenue. Estimated cost: \$3.6 million. Final cost, after the Transportation Department added two more lanes to part of the road: \$22.8 million.

Like other department heads, Cornelio blamed higher materials costs.

Another 13 projects came in under budget, but some of those were reduced in scope.

Two projects to widen stretches of roadway were scaled back to improve a single intersection on each. One of those, however, the South 12th Avenue/West Valencia Road intersection, ended up costing more than the entire widening project was budgeted for.

A plan to widen Palo Verde Road to six lanes from Interstate 10 to the railroad tracks turned into a protective overlay on the existing asphalt for a much shorter distance.

The county still has \$100 million of the \$350 million in bond authority approved by voters in 1997, if it wants to deliver some of the 21 missing projects. But Cornelio said she doesn't want to sell those bonds because they're supposed to be repaid from state gas taxes and she isn't getting enough money from the state to pay off those bonds and do maintenance such as filling potholes and routine pavement overlays.

The 91-project, \$732 million, 2004 bond package has far fewer changes, but it's also only halfway through the allotted 12-year construction time.

Fifty-eight of those projects have been completed. While 19 individual projects have gone over budget, overall they have been significantly cheaper than expected - a reflection of declining construction costs in response to the flagging economy.

The 58 finished were expected to cost \$428 million, but have a combined price tag of just \$332 million.

County Administrator Chuck Huckelberry said other than road projects, which depend on declining state revenue to pay off, everything taxpayers were promised will eventually be done, although the county will have to find some other way to pay for them, including the possibility of asking voters to approve more bonds.

Because any changes go through public votes of the Bond Advisory Committee and the Board of Supervisors, there are many opportunities for people to see what is being changed and weigh in.

"What we've done has been very open and transparent about what gets changed or why," he said.

Supervisor Ray Carroll said he is concerned about the amount of outstanding debt the county carries.

"I just want to make sure we're delivering on that debt," Carroll said.

Though all changes to project plans are approved by the supervisors, Carroll said he's been more reluctant to approve changes than he was when the '97 bonds first passed, especially because of the track record of the transportation bond projects.

"I look at them case by case, but obviously there's a lot of concern that I have about changing the requests of voters on anything."

Huckelberry has said the county pays off 80 percent of its debt in the first 10 years, and 100 percent of it in 15 years.

"We use debt to finance capital improvements and we retire it fairly quickly compared to other governments," Huckelberry said.

Supervisor Sharon Bronson said the debt associated with the projects is worth it because it's for projects voters said they want.

Supervisor Richard Elias said the bond projects have created jobs for the community.

Contact reporter Andrea Kelly at akelly@azstarnet.com or 807-7790.

MAY 28, 2010, 8:14 AM

Tougher E.P.A. Action on Factory Farms

By SINDYA N. BHANOO

Bowing to pressure from advocacy groups, the Environmental Protection Agency will step up efforts to monitor the nation's thousands of factory farms.

This week the E.P.A. reached a settlement of a lawsuit filed last year by environmental groups arguing that the agency needs to pay closer attention to the effects of the livestock industry on waterways.

Veronica Lukasova
for The New York Times

Animal waste, bacteria and parasites from chickens, pigs and cows drain into streams and rivers, posing a threat to human health.

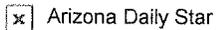
The E.P.A. has agreed to propose a rule that will require concentrated animal feeding operations to report detailed data to the agency every five years, including information on type and capacity of manure storage facilities, quantity of manure generated, available land acreage to apply manure and how excess manure is disposed of.

"Believe or not – the E.P.A. and the public don't have this basic information for thousands of factory farms because historically many have been able to avoid pollution control requirements," said John Devine, an attorney for the National Resources Defense Council, one of the groups that filed the lawsuit.

The new rule is a starting point for change, said Ann Carlson, a professor of environmental law at the University of California in Los Angeles. "If you're not actually figuring out on the ground what's going on, it's tremendously hard to enforce," she said. "This is improving information flow."

Mr. Devine said the data collected would better equip the E.P.A. and the public to assess pollution.

The E.P.A. has committed to proposing the rule by May 25, 2011, and finalizing it by May 25, 2012.

 Arizona Daily Star

Two agencies raise Pima's bond ratings

Andrea Kelly Arizona Daily Star | Posted: Saturday, May 29, 2010 12:00 am

Two agencies have boosted Pima County's bond ratings, saying they consider them a stable investment.

Fitch upgraded the county from AA- to AA this month. Moody's Investors Service lists most of the county's general obligation bonds as Aa3 (the equivalent of Fitch's AA-) and highway bonds as A1. Both are one-level upgrades.

Fitch recently gave Tucson the same AA rating, which is the same grade the city had previously, but the listing was considered a downgrade due to a change in the way the agency rates governments. Fitch also gave city bonds a negative outlook, raising the red flag that there may be further downgrades.

The "stable" outlook for the county's bonds assesses the likelihood of change, said Tom Burke, county finance department director.

"Our current practices are such that rating agencies are not expecting to have to downgrade our rating in the future," he said.

Being upgraded to a higher bond rating lowers the interest payments on most bond sales and broadens the pool of investors, Burke said, saving taxpayers money.

"The ratings are an independent analysis of the stability of the entity to pay the bonds back," he said. A higher rating shows lower investor risk. "Lower risk means people will buy with lower interest rates," Burke said.

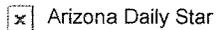
The county plans to sell \$165 million in sewer revenue bonds in June as part of a massive upgrade at Ina and Roger wastewater treatment plants. Those bonds were rated A by Standard and Poor's, lower than Fitch's AA- rating. Standard and Poor's cites the sewer rate increases, which begin July 1, as a stable revenue source to cover the debt.

Fitch rated those sewer revenue bonds AA-, saying that the debt levels are expected to rise, but be paid off quickly with annual rate increases.

Standard and Poor's cited the county's historical reliance on connection fees to have enough coverage for the debt as a potential negative, but still rated the bonds stable since the rate increases to pay for the bonds have already been approved.

Bond ratings affect the amount of interest paid on bonds. In the case of governments, it affects the amount taxpayers pay through property taxes or, for sewer revenue bonds, in monthly sewer bills.

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But nonprofit finds an inexpensive way to make it happen

Some unhappy as gray-water rules take hold

Tony Davis Arizona Daily Star | Posted: Sunday, May 30, 2010 12:00 am

A Tucson law requiring gray-water hookups in new homes takes effect Tuesday, and some home builders are concerned about it.

But a nonprofit builder for low-income home buyers is happy with an alternative gray-water system it's installing at a lower cost than the norm.

City officials say they're open to talking with builders about how to fix bugs in new gray-water systems.

The city law is one of two taking effect Tuesday. The other is a rain-harvesting requirement for businesses with outdoor landscaping. *Details, Page D2.*

Here are some questions and answers about the gray-water law:

Q. What's its purpose?

A. To encourage water conservation, by making it easier to water landscaping with gray water from bathroom sinks, showers and washing machines.

Q: What's it require?

A: The system's first leg - a two-inch "stub-out" extending from indoor plumbing fixtures - is mandatory. The law's backers hope it will encourage homeowners to add outdoor gray-water plumbing at their expense. The city has been holding forums to educate homeowners how to install and use gray-water systems.

Q. How much will meeting the law cost?

A. When the law passed in 2008, the Southern Arizona Home Builders Association predicted it would cost builders \$500 a home. Qualified Mechanical Contractors, a plumbing contractor, estimated the cost back then at \$300 per bathroom. Tucson Plumbing, another plumbing contractor, put the cost at as low \$200 for a 1,500-square-foot home.

Today, home builder Pepper Viner, which has built gray-water systems in south- and southeast-side homes, said the best guess is between \$500 and \$600. Anyone installing a gray-water system can get a \$200 state income-tax credit.

Habitat for Humanity, which has installed an alternative design at a new north-side house, said its system will cost only a little over \$500 for indoor and outdoor plumbing. A conventional outdoor system can cost \$2,000 to \$10,000, city officials say.

Q. Why is Habitat's system cheaper?

A. It designed the indoor plumbing fixtures at higher elevations than outdoor landscaping, so gray water can flow downhill to plants. Pumps and storage tanks aren't needed, unlike in most homes where plumbing is below or at the level of landscaping.

The Habitat home has 10 fruit trees, and Habitat officials predict that they'll get all their water from gray water and rainwater directed off the roof.

Q. Will other builders follow Habitat's design?

A. That's unlikely, said Richard Barna, green-building director for Pepper Viner Homes. The Habitat home is elevated, with a crawl space, while most homes in Tucson are built on slabs, he said, adding, "You kind of go with what's proven."

Q. SAHBA originally opposed this law but backed off in what it called a spirit of cooperation with groups that supported it. How do home builders feel today?

A. With the housing market so slow, "the law hasn't put us in a bind," beyond a little extra plumbing cost, said Tom Doucette, president of Doucette Homes. But practical issues such as keeping systems maintained are a concern, said Doucette, adding, "I'm not saying they can't be overcome."

Pulte Homes said through a spokeswoman that because the law has no incentives to invest in outdoor plumbing, it's very likely that the system home builders install will go unused by consumers.

Q: What does the city say about consumer incentives?

A: Tucson Water will ask the City Council on June 22 to approve such an incentive: an up to \$200-per-home rebate for homeowners who install outdoor gray-water plumbing fixtures, said Eileen Grossman, the utility's conservation manager. The city's water-conservation fee, a surcharge on water bills, would raise enough money for such rebates for 200 homes, she said.

Q: What are some projects in the works that will use the system?

A: Doucette's company will install the systems in 25 to 30 new homes in the Civano project on the far southeast side.

Pepper Viner got \$10,600 total in city grants for gray-water systems at Civano, where it will build 20 homes, and Sunnyside Pointe on the south side, where it is working with nonprofit La Frontera to build 271 homes.

Q: Are builders satisfied with the law's timing?

A: "It would be nice to see some kind of a break-in period to work out the bugs" before the law takes effect, said Barna, head of SAHBA's green-building council.

"We are still running into issues that haven't been anticipated every time we do a system - finding proper valving to separate the gray water from black water and turning on and off a gray-water system," Barna said. "But if we can work it out, it will be a good thing. Water is precious in the desert."

Q: What is the city's response?

A: Officials are trying to set up a meeting with Barna to try to work out his concerns, said Katie Bolger, chief of staff for City Councilman Paul Cunningham.

"If there are problems, let's fix them. It's really a simple technology and it's something we should be proud of," Bolger said. "It's an investment in the future."

Coming Monday

A supporter and an opponent face off over the new rainwater-harvesting law.

THE DETAILS

Two new city laws take effect Tuesday in Tucson, one to require gray-water hookups in new homes and the other to require businesses to use rainfall to water 50 percent of their outdoor landscaping.

Here's what the laws will require:

Gray water ordinance:

- Gray-water use allowed includes wastewater from bathtubs, washing machines, showers and bathroom sinks.
- Wastewater from kitchen sinks and toilets is considered "black water." It must be discharged to the sewer system instead of onto landscaping.
- New homes and duplexes must be built with stub-outs. That's piping extending about 2 inches from a home's exterior wall, to carry gray water from indoor plumbing outdoors to landscaping.
- All new single-family homes must include building drains for showers, bathtubs and bathroom sinks that are kept separate from other plumbing-fixture drains that can allow for future installation of outdoor pipes to distribute the gray water.
- Homeowners are responsible for installing outdoor gray-water distribution systems.

Rainwater-harvesting ordinance and development standards:

- At the time developers of new commercial, office or apartment projects submit development plans to the city, they must submit a plan showing the physical layout of their sites, containing technical details of how they will supply at least 50 percent of their landscape's water from rainfall.
- They must also submit a water budget, outlining how much water their projects' landscaping will need and how they expect to get half of that from rainfall.
- The 50 percent requirement kicks in three years after they get their final certificate of occupancy.
- The projects are exempt from the 50 percent rules in years when annual rainfall is less than 9 inches, which has happened five times in the last 10 years.
- Developers can use active harvesting devices such as cisterns or other tanks. Or, they can use passive methods, such as digging depressions in the ground to

catch rainfall, or allowing water to flow by gravity to plants.

- Developers using passive harvesting must design projects so rainwater seeps into the soil within 24 hours.
- Sites must be designed to minimize ponding in areas that could create nuisances for pedestrians. Ponding isn't allowed on public sidewalks or pedestrian-circulation paths.
- Storage tanks may be made of metal, plastic, masonry, reinforced concrete or fiberglass.

Contact reporter Tony Davis at tdavis@azstarnet.com or 806-7746.



Arizona needs solar technologies that use less water

by Jon Kyl - Jun. 5, 2010 12:00 AM
Special for the Republic

With its 300-plus days of sunshine annually, Arizona would seem a perfect place to produce solar power

Elected officials and solar developers alike are touting the positive effects of solar power in Arizona and the nation - claiming it will create hundreds of thousands of "green" jobs and replace energy production using fossil fuels with carbon-free energy.

Both federal and state governments have enacted policies to accelerate the deployment of solar energy in Arizona, including subsidies and a state requirement that utilities produce a certain percentage of their power from "renewable" energy.

The reality, however, is not that simple. While Arizona enjoys abundant sunshine, it is also burdened with limited water resources. Conventional concentrating solar power (CSP), the solar technology of choice for utility-scale solar-power generation, requires billions of gallons of water to produce electricity. It is, in fact, the most water-intensive method of all thermal energy produced today, consuming nearly twice as much water per megawatt hour as a coal-fire power plant.

I recently prepared a report about the potential water-energy crisis in Arizona, developing as a result of the rush to deploy water-intensive solar production in the state.

Nearly all of the current federal applications

for solar projects in Arizona call for conventional CSP, and at least one of these projects is being "fast-tracked" through the environmental-review process. If all of these projects are built, it would require 151,720 acre-feet of water per year, enough water to serve 606,880 Arizonans. These projects will have long lives - at least 30 years - so it's necessary that we account for their impact on our state's water supply. Moreover, much of this power produced with Arizona water will not even be used by the state's own residents but will instead be exported to California, which has already recognized solar power's potential to be a water guzzler and now forces its solar developers to use less water-intensive technologies or wastewater. Arizona has yet to take such steps and must consider doing so.

Arizona, however, can still be the solar capital of the world if we focus on more responsible solar technologies that use far less water and develop advanced utility-scale technologies that will be cost-competitive with fossil fuels. Some companies are already deploying CSP in California and Nevada using a "dry-cooling" process - and could do the same in Arizona. Our universities - the University of Arizona's

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Steward Observatory Mirror Lab and Arizona State's Global Institute of Sustainability - are also pioneering new, promising technological alternatives; but, unfortunately, the U.S. Department of Energy

has yet to recognize or provide the critical support needed to help make these alternatives a reality.

Rushing to deploy conventional CSP will have unintended consequences that its proponents may regret. Many Arizonans will remember the rush to develop corn-based ethanol as an alternative fuel. After billions were spent on federal subsidies, the science now shows that growing corn for fuel is not so "green" after all. Even one of ethanol's top champions, former Vice President Al Gore

, who promoted it as a carbon-friendly alternative to gasoline, now admits it was all a "mistake."

While it's true that Arizona's sunny climate is ideal for solar-energy production, its arid landscape poses significant challenges to the deployment of solar systems that rely more heavily on water than other forms of energy production.

The water-consumption requirements of current solar-energy production could put considerable additional strain on Arizona's already limited water supply. It should not be used to generate power exported to California and other states.

State and federal policymakers should ensure that energy policy takes these factors into account in order to protect Arizona's limited water supplies.

Jon Kyl is a United States senator

representing Arizona.

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Water lessons from Singapore

San Francisco Chronicle

June 6, 2010

Some of the most interesting water stories are coming out of Singapore -- an example of a place with serious water constraints and important political and economic incentives to address those constraints in a sustainable way. For years, Singapore has been buying water from its neighbor, Malaysia, to help satisfy the needs of around 4.5 million people. In a move with all sorts of political, economic, and environmental implications, the government of Singapore recently announced that it will not renew one of its two water agreements with its neighbor Malaysia under two water agreements, signed in the very early 1960s. This water comes at an economic cost, though a very small one -- the rate paid to Malaysia is very low. But it also comes with a political cost: their dependence on Malaysia for water constrains and affects their political relationships. In the past few years, Singapore has been working hard to diversify their water "portfolio."

Water Number: 4. Today, Singapore depends on four different sources of water: about 35% of their water comes from rainfall captured on its own limited territory, about 15% is high-quality recycled water produced by its NEWater treatment plants, 10% comes from desalinated water, and around 40% is water imported from Malaysia.

As a result of the heavy dependence on Malaysia, the Public Utilities Board (PUB) of Singapore has been working for years to do two key things: reduce the demand for water by improving efficiency and cutting waste; and expanding alternative sources of supply. California could take a lesson from these two approaches. I know that water agencies (state, federal, local, and agricultural) argue the state is already doing these things, but compared to Singapore, California's efforts are half-hearted.

For example, Singapore is working to reduce household water use and eliminate leaks. But their household water use is already a fraction of Californians (even accounting for the state's huge outdoor water use). The figure below shows domestic water use in Singapore, with slight, but steady improvement over the last 14 years. More importantly, however, current domestic water use there is around 155 liters per person per day, or around 40 gallons per person per day. Domestic water use in California is over 130 gallons per person per day, more than three times higher. Even California indoor water use alone is higher than all domestic use in Singapore. "Unaccounted for" water in Singapore -- a measure of system leaks and inefficiencies -- is at the remarkably low level of under 7 percent.

Pacific Institute, PUB data

Domestic water use in Singapore from 1995 to 2009 (liters per person per day) showing improving efficiency of use.

On the supply side, Singapore has long ago run into peak water limits. They are effectively tapping all of the renewable supply of rain that falls in their territory, though some small new reservoirs let them squeeze every drop out of their catchments. So their efforts to expand new supply have focused on alternatives: highly treated wastewater that is used to satisfy a wide variety of demand, and desalination.

A \$2.2-billion NEWater (wastewater treatment and recycling) plant soon to open in Changi will turn wastewater into high-quality supply, adding 800,000 cubic meters per day (over 200 million gallons per day) to Singapore's water options. Combined with four existing plants, highly treated wastewater will be capable of supplying a third of Singapore's total needs. In 2005, a desalination plant capable of producing 30 million gallons of water a day opened, and more are being considered.

But before moving to these options, Singapore raised the price of their water. They charge \$1.17 per cubic meter for the first block of 40 cubic meters of water (around 10,000 gallons) and over \$1.40 per cubic meter for water use above this level, along with substantial additional conservation fees and tariffs, with targeted subsidies for the poor.

What are the lessons for other parts of the world, including California? Price water properly, collect wastewater and treat it for reuse, move more aggressively to conservation and efficiency, and consider new supply options, such as desalination when it can be done economically and environmentally acceptable manner. Instead, we're moving toward new costly and damaging surface storage reservoirs, cutting back on efficiency programs, failing to learn lessons that could help grow more food with less water, ignoring leaks and waste in old infrastructure, and continuing to fail to meter and price water properly. Maybe Malaysia has some water they can sell us now that Singapore doesn't need it any more.

Peter Gleick, [Pacific Institute](#)

Read more: http://www.sfgate.com/cgi-bin/blogs/gleick/detail??blogid=104&entry_id=65162#ixzz0qNJCya2m

Peoria's Butler Water Reclamation Facility draws international attention

by Sonu Munshi - Jun. 7, 2010 09:31 AM
The Arizona Republic

Its entrance can pass as any low-profile office site, but inside, industrial-sized pipes, monitoring screens with colorful maps and codes, and the constant whoosh of compressed air, reveal clues about why, as far as treating wastewater goes, Peoria's Butler Water Reclamation Facility continues to attract international attention.

Butler opened in 2008 and is still the largest membrane bio-reactor facility in North America, a leading technology which helps clean wastewater better in a much more compact space than older techniques.

This week, the facility played host to about 20 delegates from Holland, Spain, Germany, Hong Kong and Singapore, visiting Phoenix for an international water conference.

As one of the country's fastest growing cities, and still only a third built out, Peoria needs to keep up with demand for water. The Butler facility helps, by turning wastewater into a reusable resource, said Shawn Kreuzwiesner, Peoria's systems planning manager.

Peoria's population is about 150,000. City officials estimate that could be closer to 500,000 by 2055.

"We live in an arid environment, so we need to manage our available and future water

resources judiciously," Kreuzwiesner said.

Cost and benefits

At a cost of \$135.3 million, Butler is the city's priciest public works project.

In 2009, it was recognized as American Public Works Association's Public Works Environmental Project of the Year.

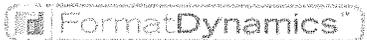
The Butler plant treats 10 million gallons of wastewater a day. It provides treated water that helps maintain landscaping at the facility, near 79th Avenue and Butler Drive. The treated water is not potable - as signs across the facility remind everyone - but the city does use it to recharge water in groundwater aquifer. Peoria gets water credits in return, which allows the city to take back water from the aquifer to meet future needs.

The city bought 40 acres for the facility but because the technology allows part of the plant to be built below ground, using much less space than a traditional wastewater plant, it actually occupies just 18 acres. The city plans to put a city park on the remaining land.

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Although half the size of Peoria's Beardsley Water Reclamation Facility, the Butler plant treats more than twice as much wastewater a day.

Process

The wastewater is treated through a series of filters, including basins that contain microorganisms that help filter wastewater. Membrane tanks resembling giant flexible drinking straws act as physical barriers to separate liquids from solids.

In the end, soot-black wastewater looks identical to tap water.

The site also uses a special technology to clean the air released of any odors.

Future plans

The plant sits next to agricultural land and the future city park, which is expected to be completed in 18 months. The plant would supply treated water to help landscape the yet unnamed 80-plus acre park.

According to Linda Bezy-Botma, Peoria's utility operations manager, the city will become its first reclaimed water customer. By this fall, treated water is expected to be used to wash city vehicles at a city facility.

Ron Jong, an engineer at a prominent Dutch water company, Vitens, toured the "modern and state-of-the-art facility" and called it "refreshing" to see Arizona's emphasis on water reuse.

The visitor from Holland said in light of the twin issues of water shortage and a growing population, Arizona water officials were

smart to focus on treating wastewater for use in irrigation and other areas, saving potable water.

"Reclaimed water use is going to be critical in Arizona," Jong said.

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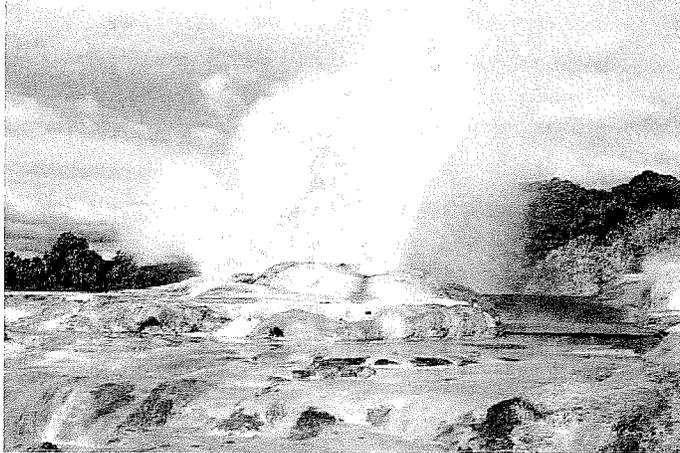
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New Zealand Scientists Invent Steamy Hot Sewage Recycling Solution



Written by Tina Casey

Published on June 9th, 2010 in **General Technology, Recycling, Water**



We are always on the lookout for sustainable new developments in the burgeoning field of wastewater recycling, so of course this item from New Zealand caught our attention. A PhD project by a Victoria University student is undergoing commercial development as a means of reclaiming water, high-pressure steam, fertilizer products, and acetic acid from wastewater.

The project offers a sustainable management solution for wastewater and runoff from dairy farms, wineries, and meatworks in New Zealand, which as Lord of the Rings fans know has some spectacular environments worth protecting as well as lots of sheep. Here in the U.S. there is a similarly motivated push by the EPA and Department of Agriculture to promote methane biogas production in the dairy industry. It's the high pressure steam and acetic acid that give the New Zealand venture a new twist.

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Wastewater Recycling and Wet Oxidation

The new process is called Wetox, as in wet oxidation, which is a means of removing suspended solids from wastewater using heat and oxygen under high pressure. Until now, the process has been used primarily for industrial wastes, and has not come into more widespread use in part due to its expense. The New Zealand researchers have developed a more cost effective method. New environmental regulations and the rising cost of waste disposal would also make an investment in Wetox more attractive. The byproducts could be used on site to help offset the cost, or sold off site.

Acetic Acid and Sustainable Chemicals

Currently, a good chunk of the world's acetic acid supply comes from petroleum feedstocks. This ubiquitous chemical has a wide variety of uses in manufacturing, from plastics and glues to fabric, household cleansers, and food additives (vinegar is a dilute form of acetic acid). By offering a non-petroleum feedstock, Wetox is part of a green chemistry trend that seeks non-toxic, sustainable alternatives to petroleum and other toxic chemicals.

 Arizona Daily Star

Minnesota plant will produce fertilizer from wind

By DIRK LAMMERS | Posted: Wednesday, June 9, 2010 12:45 am

The winds sweeping across the Northern Plains could soon help farmers fertilize their crops of corn, wheat and sorghum.

Minnesota researchers have designed a \$3.75 million carbon-free system that uses wind power from a towering turbine to produce anhydrous ammonia, a common nitrogen-based fertilizer.

It's a perfect supply-and-demand match, as the region has no shortage of wind and U.S. farmers use millions of tons of fertilizer, said Michael Reese, director of the University of Minnesota Renewable Energy Center at Morris.

The test plant will produce fertilizer for use on university farm land. But those working on the project say a similar system in which fertilizer is produced and sold nearby could contribute to the local economy.

It also would take advantage of the region's wind potential while skirting that industry's main hurdle of needing expensive transmission lines to ship electricity east to the urban areas that need it, Reese said.

"Rather than put that investment in transmission lines, why don't we put that investment into an energy intense industry in rural areas where this renewable energy is at?" he asked. "It seems like kind of a no-brainer to me."

The venture would again make anhydrous ammonia a renewable commodity, which it was until the 1950s and 1960s.

Fertilizer production in the early 1900s was powered primarily by hydroelectric dams, but companies scrapped that method after realizing they could make it more cheaply using natural gas.

Anhydrous ammonia is stored in pressurized tanks similar to propane, and it can be applied directly to fields or used as an ingredient in other nitrogen fertilizers. It's shipped to farmers through a network of pipelines, railcars and tanker trucks.

The U.S. is the largest importer of fertilizer in the world, with more than half its nitrogen coming from overseas. The country imported about \$1.4 billion worth of anhydrous ammonia in 2009, or 6.1 million U.S. tons, according to the U.S. Department of Agriculture.

Construction on the Morris plant began this week, and it should produce fertilizer by the end of the year.

The plant will use surplus energy generated onsite by a 1.65-megawatt wind turbine that already helps power the nearby campus.

The system creates fertilizer by using an air separation unit to pull nitrogen from the air, while the turbine powers large electrolyzers that separate water into hydrogen and oxygen. The nitrogen and hydrogen are then synthesized into anhydrous ammonia using a century-old chemical process called Haber-Bosch.

The technology is proven, and using wind to power the electrolyzers instead of natural gas makes it a carbon-free process that releases no greenhouse gases.

The question is whether a renewably produced fertilizer can compete in the market. At the current price of about \$500 a ton, that would be difficult. But if prices return to the near-\$1,200-per-ton range seen a couple of years ago when natural gas prices spiked, "then sure, I believe it would work," Reese said.

Such price jumps are tough on farmers.

The 2008 run-up was followed by a sharp drop, but many farmers had already locked into high prices for the spring and couldn't take advantage of that, said Mark Fiscus, location manager of the Heart of Iowa Co-op in Story City, Iowa. Farmers now are benefiting from the lower costs, he said.

"They've settled down kind of into a midrange in which guys can at least plan a little better now," he said. "There's still some fluctuation."

One of the big impediments to a profitable wind-to-fertilizer system is the electrolyzer, said John Holbrook, an ammonia expert exploring its use as a motor fuel.

"You've already got one arm tied behind you because those are very expensive and pretty inefficient," Holbrook said.

His company, Richland, Wash.-based NHThree LLC, is working on a new process called solid state ammonia synthesis, which could improve efficiency by bypassing the Haber-Bosch process and the electrolyzer.

As with any commodity, transportation adds to the cost, and the nation's 3,100 miles of ammonia pipelines miss many areas, requiring the use of truck and rail.

Producing and using fertilizer locally could help make it more affordable, Holbrook said.

Private companies also are exploring ways to make so-called green ammonia.

San Francisco-based SynGest, Inc., plans to build an \$80 million facility about 40 miles west of Des Moines, Iowa, that will produce ammonia fertilizer from corn cobs, and an Oregon nonprofit called Northwest Hydrogen Alliance Inc. is studying the feasibility of storing energy by producing anhydrous ammonia. The idea would be to buy cheap excess hydropower at off-peak times during the spring melt to produce anhydrous ammonia for use as fertilizer or to store hydrogen.

