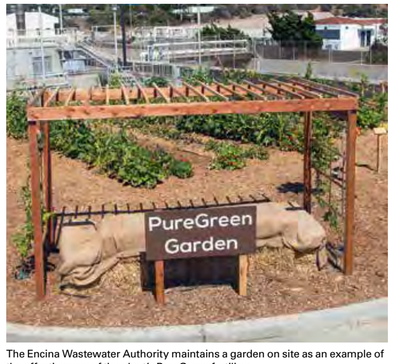


The Encina Wastewater Authority maintains a garden on site as an example of the effectiveness of the plant's PureGreen fertilizer.

Pride in the Products

A CALIFORNIA AGENCY CREATES A BRAND FOR ITS RECYCLED WATER, BIOGAS ENERGY AND PELLETIZED BIOSOLIDS, BUILDING COMMUNITY CONNECTIONS AND WINNING SUPPORT FOR FUTURE INVESTMENTS

STORY: **Ted J. Rulseh**
PHOTOGRAPHY: **Collin Chappelle**

MANY CLEAN-WATER PLANTS CREATE BRAND NAMES for their biosolids. The Encina Wastewater Authority takes the concept further.

Its Class A biosolids pellets go to market under the PureGreen brand. Its electric power and heat from biogas, PureEnergy. Its recycled water, PureWater. Even staff resources and information get a brand name: PureKnowledge.

For the agency, headquartered in Carlsbad, Calif., the brands emphasize that its 67 team members are devoted to more than protecting the Pacific Ocean from pollution. The 40.5 mgd (design) Encina Water Pollution Control Facility recycles, in one way or another, nearly half its 23 mgd average flow.

It generates 76 percent of its own electricity and much of its heat, and is on its way to energy self-sufficiency. Its biosolids are in growing demand in regional fertilizer markets, and selling prices and revenue are rising.

The brand names alone don't make that happen, but Kevin Hardy, general manager, says they're important to forging connections with the community. "You look and see that communities have internalized the benefits of the facilities we operate, but have not internalized the costs because the federal government subsidized their construction," he says.

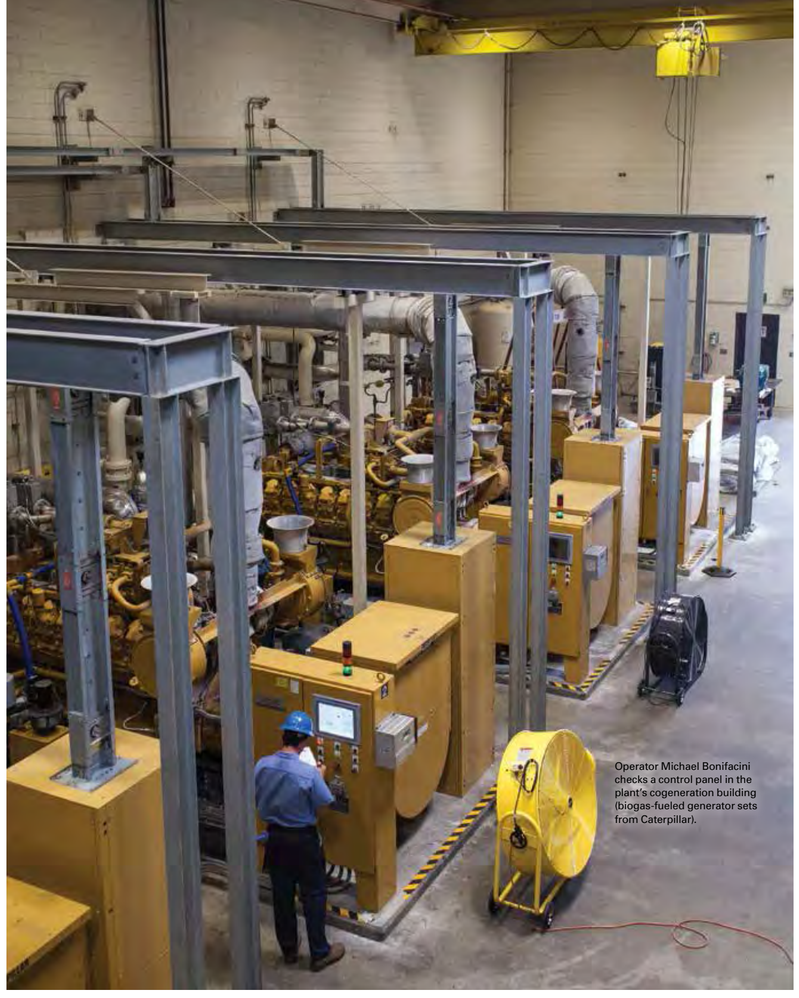
"People like me are concerned that we'll have difficulty securing the necessary investment to operate these facilities and get good environmental outcomes in perpetuity. We feel a consistent identity for our products provides a much needed platform for communication."

UPGRADING TREATMENT

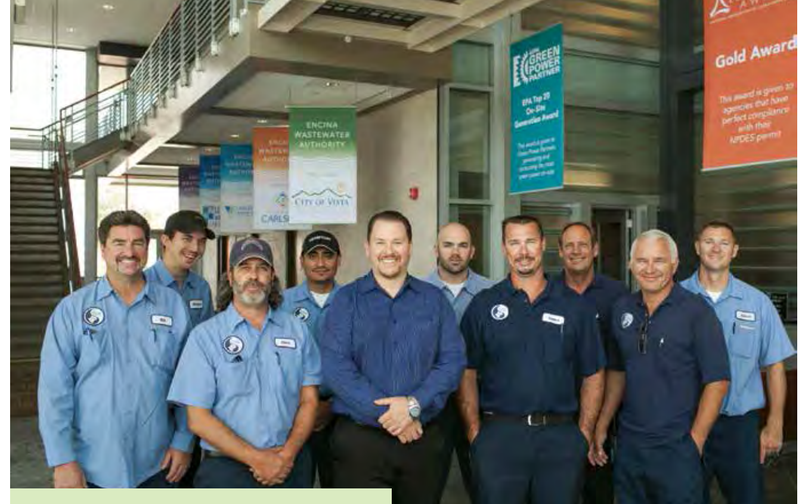
The Encina Wastewater Authority serves 358,000 residents in northwestern San Diego County. The authority is owned by six public agencies under a joint powers agreement in which the agencies share costs in order to get

Encina Water Pollution Control Facility, Carlsbad, Calif.

BUILT: |	**1965; five expansions, latest 2009**
POPULATION SERVED: |	**358,000**
FLOWS: |	**40.5 mgd design, 23 mgd average**
TREATMENT LEVEL: |	**Secondary/tertiary**
TREATMENT PROCESS: |	**Activated sludge, sand filtration**
RECEIVING STREAM: |	**Pacific Ocean/reuse**
BIOSOLIDS: |	**Heat-dried Class A pellets**
ANNUAL BUDGET: |	**$14.2 million (operations)**
WEBSITE: |	**www.encinajpa.com**
GPS COORDINATES: |	**Latitude: 33°06'59.47" N; longitude: 117°19'17.65" W**



Operator Michael Bonifacini checks a control panel in the plant's cogeneration building (biogas-fueled generator sets from Caterpillar).



The team at the Encina Wastewater Authority includes, from left, Bill Bonghi, operator I; Michael Cripe and Chris Scibilia, operator II; Santiago Resendiz, operator; Octavio Navarrete, operations manager; Brian Samoska, mechanic; James Mattern, heat dryer supervisor; Alan Manges, biogas and energy production supervisor; Irek Wenske, operations shift supervisor; and Davey Riedesel, operator.

GETTING NOTICED

The Encina Wastewater Authority is gaining recognition from many quarters for its general excellence and its resource recovery initiatives. The authority is a member of the U.S. EPA Green Power Partnership Leadership Club for on-site renewable power generation.

In two of the past three years, the California Water Environment Association has honored the Encina Water Pollution Control Facility as its Large Plant of the Year. In 2009, the PureGreen program earned a Spotlight on Excellence Award from the California Public Employees Retirement System.

In 2013, PureGreen marketing earned the California Association of Sanitation Agencies' Public Outreach and Education Award and received a Green California Leadership Award from *Green Technology Magazine* for its waste management practices, notably the diversion of material from landfills and return of nutrients to the soil through beneficial use of biosolids.

The Encina Water Pollution Control Facility staff includes Debbie Biggs, director of operations; Octavio Navarrete, operations manager; Joe Cipollini, Fran Deleonardis, Scott Allan and Irek Wenske, shift supervisors; and Luis Campos, Eugene Casados, Michael Bonifacini, Miguel Gutierrez, Larry Martinez, Teva Miller, Davey Riedesel, Mike Sumner and Brad Wichman, operators.

Biosolids processing and drying staff includes James Mattern, heat dryer supervisor; and Bill Bonghi, Scott Johnson, Nick Lalonde and Xavier Pearson, operators. Alan Manges is supervisor of biogas and energy production. Joe Sallay, remote facilities supervisor, and Chris Scibilia and Mazi Yazdani, operators, are responsible for remote facilities, water recycling and four pump stations.

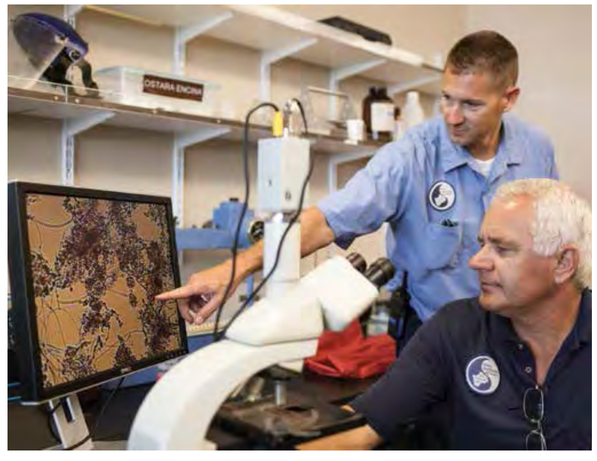
more economical, technically advanced facilities than they could afford on their own. The owners are the cities of Carlsbad, Vista and Encinitas, the Vallecitos Water District, the Buena Sanitation District and the Leucadia Wastewater District.

The Encina Water Pollution Control Facility has seen steady upgrades since it was built in 1965. Biosolids drying and a new biogas-fueled cogeneration system were among the latest additions, in 2009.

The basic primary treatment process starts with a screenings building that includes four bar screens (INFILCO DEGREMONT), recently rebuilt by plant staff using in-house fabricated parts; a rotary screen (Richards of Rockford) that removes smaller objects; and a Hycor dewatering press (Parkson Corp.). The headworks also includes three concrete grit basins, each with a volume of 100,600 gallons (two are in use at any given time). Grit removed is pumped to a dewatering system in the screenings building.

Wastewater then flows to 10 215,000-gallon sedimentation tanks (five or six are in use at any time), where a chemically enhanced primary treatment process takes place. "It's an engineered process that consists of addition of ferric chloride after the bar screens, and polymer just after the grit tanks," says Octavio Navarrete, operations manager. "Coagulation of particles aids in settling and enhances removal of BOD and TSS."

Primary effluent passes through a conduit to four 2.3-million-gallon aeration basins (two at a time in operation). Aeration is controlled by way of six dissolved oxygen probes. Air is delivered by three 500 hp blowers (two Hoffman & Lamson, one Dresser-Roots from GE Water & Process Technologies) and one 350 hp (Gardner Denver) through Envirex membrane fine-bubble



Irek Wenske (foreground) and Davey Riedesel evaluate a sample of the plant's microbiology, checking for common indicator organisms such as amoeboids, flagellates and free-swimming ciliates.

diffusers (Evoqua Water Technologies). The treated water flows to seven secondary clarifiers (five normally in operation). An eighth clarifier tank now functions as an equalization basin.

"Flow through the entire plant is normally by gravity, all the way to the ocean outfall," says Navarrete. "There is no lift station at the head of the plant or anywhere else in the process." The only exception to gravity flow is during peak-flow periods at high tide. In that event, the plant team can call on four 200 hp effluent pumps to send the treated water the last 2 miles through land and ocean outfalls to a 136-port, 800-foot-long effluent diffuser submerged 150 feet below the surface of the Pacific Ocean.

RECYCLING BEGINS

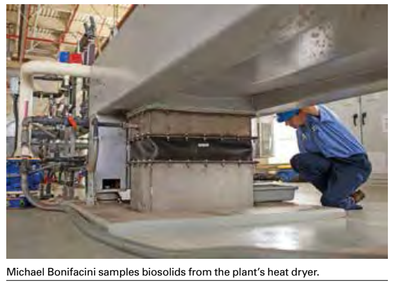
Of course, not all effluent ends up in the ocean. About 4-5 mgd of secondary effluent is diverted to the Carlsbad Water Reclamation Facility next door, and another 1 mgd goes to the Leucadia Wastewater District. "In both cases, their facilities finish the water reclamation process," says Kevin Hardy, Encina general manager. "The

"People like me are concerned that we'll have difficulty securing the necessary investment to operate these facilities and get good environmental outcomes in perpetuity. We feel a consistent identity for our products provides a much needed platform for communication."
KEVIN HARDY

water from CWRF is put into the Carlsbad Municipal Water District's recycled water distribution system, and the water from Leucadia is delivered to the La Costa Golf Course. These recycling efforts help minimize discharges to the ocean."

Some secondary-treated water is also recycled and used throughout the Encina plant processes. About 4.75 mgd is used for many in-plant needs, including equipment washdown, tank cleaning, cogeneration engine cooling, solids thickening and dewatering, odor reduction facilities and site landscape irrigation. An additional 0.25 mgd is treated in a DynaSand upflow sand filter (Parkson) and used for chemical batching, pump seals and a chemical scrubber.

On the solids side, primary and secondary sludges are pumped to two of the plant's three 2.3-million-gallon anaerobic digesters — another digester tank now serves as a solids holding tank.

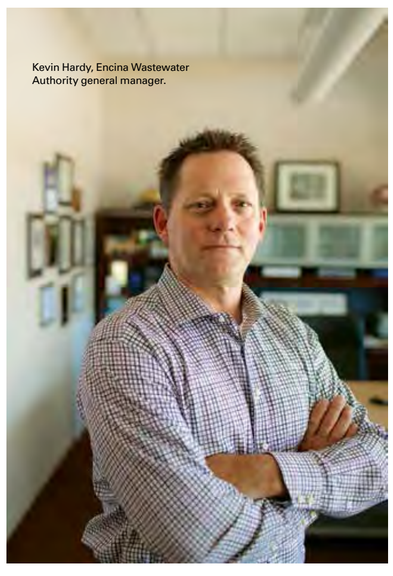


Michael Bonifacini samples biosolids from the plant's heat dryer.

Three centrifuges (Alfa Laval Ashbrook Simon-Hartley) dewater the digested material to cake at 21 to 22 percent solids — and so begins the process of creating PureGreen fertilizer.

"The cake is sent to a screw conveyor, which delivers it to one of two bins," says James Mattern, heat dryer supervisor. "From there, it is delivered by a Moyno progressive cavity pump to a mixer to be blended with material that has already gone through the dryer but is either oversized or too fine to meet our standards for final pellet size. We mix about 60 percent cake to 40 percent dry solids in the mixer, which has tines inside it, like a rototiller."

The blended material enters a rotary drum dryer (Andritz DDS 40 process) and is heated to about 200 degrees F by a mixed gas furnace. Through direct and indirect application of hot air, the material is dried to about 94 percent solids. Resulting pellets drop from a hopper into a shaker screen for



Kevin Hardy, Encina Wastewater Authority general manager.

sizing. Those of the correct size go through a pellet cooler and into storage silos. The pellets are sprayed with a dust control agent and loaded into trucks or bags for transport.

On the way from the digesters to the dryer, the biosolids generate energy in the form of biogas. The plant's biogas-to-energy initiative dates back to 1983 with an upgrade in 1995. That older system included five biogas-fueled engines, three driving electric generators and two directly driving aeration blowers.

In 2009, the authority replaced those units with four 750 kW Caterpillar G3516 gas engine-generators that can operate on digester gas, natural gas or a blend. Heat captured from engine exhaust and coolant feeds the digestion process by way of plate-and-frame heat exchangers (Alfa Laval Ashbrook Simon-Hartley). The electricity fulfills about 76 percent of the plant's demand.

POWER IN BRANDING

The Encina authority continues striving to improve its position, and branding is essential to that effort. "The PureWater program is about supporting our member agencies in water recycling and engaging with the community to talk about the quality of the water we're putting in the ocean and the overall health of the local marine environment," says Hardy.

PureEnergy, meanwhile, aligns with the authority board's goal to achieve energy independence in a financially prudent way and with an energy management strategic plan adopted in 2011. The energy management plan has unfolded in three phases: First an energy audit undertaken with help from local utility San Diego Gas & Electric, next execution of that audit's recommendations, including replacement of aging pumps with new high-efficiency units and finally a project to increase biogas production by taking brown grease into the digesters.

The biogas project involves a public-private partnership in which a design-build team of the HDR engineering firm and Filanc Construction will build a grease receiving station. Liquid Environmental Services (LES) will collect brown grease from area food service businesses' grease traps, deliver it to the facility and pay a tipping fee. The facility is to be online in early 2015.

LES will pay 4.5 cents per gallon initially and, under an eight-year contract, will contribute $300,000 toward the capital expense for the receiving station. "The reason we signed a longer-term contract is that LES made a commitment to help us develop a market here in North County, which has been somewhat underserved by grease haulers," says Hardy.

"The cost of hauling and land-applying biosolids doubled, and doubled again, in five years. As we stared at that $2.2 million operating cost, we resolved to explore whether we could instead make a capital investment to better serve our communities and reduce the volume of material we manage."
KEVIN HARDY

"This program also provides our member agencies with a solution they can offer to the businesses in their communities that has added value. It helps achieve their maintenance goals by keeping grease out of the system, and also results in some green power being produced in the region. That's a good win for them." The system will be designed with capability to accept other organic wastes in the future, including some forms of food waste. Ultimately, says Hardy, the authority hopes to produce enough biogas both to fuel the cogeneration engines and to replace the natural gas now fed to the biosolids dryer.

A PROVEN PRODUCT

While returns from the biogas project are speculative for now, the PureGreen fertilizer is gaining strength in the local market.

Until 2009 when the heat dryer came online, the authority shipped biosolids at about 16 percent solids to a farm near Yuma, Ariz., more than 200 miles away, at a cost of $2.2 million a year. The move to Arizona became necessary when two California counties took steps to effectively ban the importation and land application of biosolids.

"We were sending five truckloads a day, seven days a week," says Hardy. "The cost of hauling and land-applying biosolids doubled, and doubled again, in five years. As we stared at that $2.2 million operating cost, we resolved to explore whether we could instead make a capital investment to better serve our communities and reduce the volume of material we manage.

"Today, we ship one truckload per day, four or five days a week. The dryer also creates a Class A exceptional quality product that has no restrictions on its use. It can be used in a wide variety of fertilizer applications — not just in the narrow land application or landfill concepts that many biosolids programs are built around."

Encina Water Pollution Control Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
CBOD	205 mg/L	7.1 mg/L	25 mg/L monthly avg.
TSS	270 mg/L	7.6 mg/L	30 mg/L monthly avg.
Ammonia	N/A	34.0 mg/L	350 mg/L daily max.
Total nitrogen	N/A	0.2 mg/L	1.2 mg/L daily max.
Phosphorus	N/A	N/A	None

At first, the authority sold its 6,000 tons per year of biosolids pellets to a nearby cement kiln as fuel, largely to ensure a reliable outlet. In the past three years, however, the majority of the PureGreen branded product has been shifted to the fertilizer market, mainly to nurseries, golf courses and fertilizer blenders who appreciate its 5-6-0 NPK analysis, high organic matter content and low salt index. A share of the credit belongs to Eric Have, a wastewater operator who had sales experience and applied it to developing the PureGreen market.

Doug Campbell, director of environmental compliance for the authority, observes, "We're registered in five states as a commercial fertilizer, and we're looking to acquire a specialty fertilizer license in California."

PureGreen revenue reached nearly $80,000 in 2013, and it's primed to increase. Recent marketing innovations include bagging material in 1,400-pound tote sacks for sale to wholesale distributors. Totes have sold for as high as $135 — or $193 per ton. "Not surprisingly, as we take the size of the packaging down, the price per ton goes up," Hardy says.

GOING SOCIAL

Today, the value of the branding for PureGreen, PureEnergy and PureWater is as critical to the program's development as the sales revenue. "All of us who have made a career in wastewater have experienced a conversation stopping as soon as we described where we work," Hardy says. "That's not a judgment, but it is reality. We needed a platform to create good engagement — a way to sustain a conversation with our public. We started by talking about what we do: We protect the Pacific Ocean, we produce and use renewable resources, and we practice fiscal responsibility.

"As we started talking in those terms with our elected officials and staff and began experimenting out in the public, we found that all of a sudden people wanted to ask, 'How do you do those things?'

"A natural next step was to extend the conversation into the social media world and compete for the attention of the millennial generation — the Facebook and Twitter demographic. We felt that having a consistent, hashtagable identity for these products would provide a platform for communication. So far it seems to be resonating.

"Social media is a low-risk place to learn lessons about how we can brand our operations in a way that encourages good communication that the community can understand, and that provides a compelling argument for investing in facilities. It's about being transparent in what we do and the standards we strive for, and talking about the people who work to make it all happen." **tpo**