
# 2016 Top Industrial Water & Wastewater Projects

## Brought to you by Industrial Water & Wastes Digest

From olive harvesting to car manufacturing, efficient and reliable water and wastewater systems are integral to a facility's success. Because of their unique features and demands, projects of this nature face their own set of challenges—and rewards.

From May to July 2016, iWWD encouraged project leaders to submit entries showcasing industry-specific projects in design or construction during the past 18 months.

Nominated projects varied in terms of goal, size and price. iWWD examined the obstacles faced and overcome by all parties involved in each project, as well as the final goals achieved and successes met. iWWD is proud to highlight these achievements in its inaugural showcase of Top Projects.

Thank you to the project leaders who submitted entries and photos, and congratulations to those honored in iWWD's 2016 Top Projects. iWWD

Winner profiles, compiled by iWWD Assistant Editor Lauren Baltas and Associate Editor Bob Crossen, are featured on pages 5 to 17. For more information, contact Baltas at lbaltas@sgcmail.com or Crossen at bcrossen@sgcmail.com.

CALORIS® Thermal Process Technology

HONDA
Honda Precision Parts of Georgia, LLC

# Afulilo Dam

**Location:** Upolu, Samoa

**Owner:** John Hinde

**Designer:** Air Diffusion Systems

**Contractor:** King Engineering

**Manufacturers:** Air Diffusion Systems, Kaeser

**Cost:** $375,000

**Size:** 10 million cu meters

**After several weeks of ADS fine bubble operation in Lake Afulilo, bottom oxygen concentrations had significantly increased, helping to eliminate odor and prevent fish kill.**

The Afulilo Dam in Upolu, Samoa, was built in the 1990s to harness hydroelectric power, particularly during the dry season (May through October), with the goal of making the island less reliant on foreign oil. Like many islands, Upolu imports almost everything, including energy. Developing indigenous renewable energy and minimizing over-reliance on fossil fuels was identified as a significant barrier to long-term growth and environmental stewardship. The Afulilo Dam was built as a step in a better, more-sustainable direction.

The dam produces 30% of Samoa's total energy demand, supplying up to 10,000 residences and businesses. It also supplies Samoa's Ta'elefaga Power Station, which provides a significant amount of the island's power. But trouble in paradise began with when hydrogen sulfide concentrations surged in the dam's reservoir, Lake Afulilo.

High concentrations of hydrogen sulfides not only create a corrosion problem at the face of the dam, but also produce a "rotten egg" smell, which has hounded residents of nearby villages for years. It also depleted marine life in Fagaloa Bay, a water body from which many residents make their livelihood.

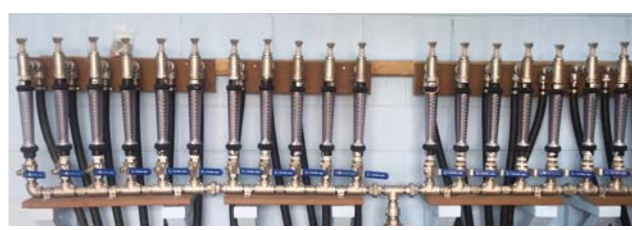
One potential solution Afulilo considered was to funnel water to the ocean via a pipe, where it could disperse. But government officials determined that this was too expensive; moreover, unless ocean currents were studied, there was potential for waste and noxious gases to be blown back to the villages anyway.

After a yearlong investigation by Electric Power Corp. (EPC) and the Scientific Research Organization of Samoa, EPC concluded that aeration and bubble technology was a viable solution for improving Lake Afulilo's water quality.

Air Diffusion Systems (ADS) of Gurnee, Ill., supplied 44 Model "LTC" ADS Diffusers, 82,200 ft of self-sink feeder tubing from the compressor manifold to the diffusers, and two BSD 65 40 hp Kaeser Compressors to deliver 199 cfm at 123 psi to the dam's 640 acre, 2.6-billion-gal reservoir. The diffusers add oxygen to the water column, facilitating a reaction between oxygen and hydrogen sulfide to produce odorless sulfate.

John Hinde, ADS president and owner, traveled to Samoa to personally oversee the installation of the diffusers and train the dam's engineer on maintaining and operating the equipment. The company partnered with King Construction Ltd. in Apia, Samoa, to design, install and maintain the system.

The $375,000 project was completed in July of 2016. After several weeks of ADS fine bubble operation in Lake Afulilo, bottom oxygen concentrations had significantly increased, helping to eliminate odor and prevent fish kill. The system is expected to last 20 years, but other, similar aeration systems have lasted more than 40 years. **iWWD**



# Honda (HPPG) Wastewater

top projects 2016

**Location:** Tallapoosa, Ga.

**Owner:** Honda (HPPG) Corp.

**Designer:** Caloris Engineering LLC

**Manufacturer:** Caloris Engineering LLC

**Cost:** $1.5 million

**Size:** 20 gpm

The next time you put the pedal to the metal in a Honda Odyssey, Pilot or Ridgeline, you could be relying on a transmission manufactured at Honda Precision Parts of Georgia LLC (HPPG) in Tallapoosa, Ga.

HPPG recently celebrated its 10th anniversary of manufacturing transmissions at its facility and has produced more than 2.5 million transmissions in its 10 years of operation.

All that transmission manufacturing also gives rise to a lot of wastewater—12,000 gpd, to be specific, consisting primarily of light oils, diecasting fluids and water. Disposing of this wastewater was costing HPPG money, so the company sought a solution to reduce these disposal costs. Other goals for this wastewater reduction process included:

1. Providing an opportunity to recycle and/or reuse water recovered from the process;
2. Meet sewer discharge limits imposed by local authorities; and
3. Include additional capacity to allow for expansion, as needed.

HPPG contracted with Caloris Eng. LLC, to purchase a Caloris Concentrix 100 Compact MVR Evaporator. The evaporator can evaporate 28,000 gpd, depending on feed chemistry and cleaning frequency. The compact, energy-efficient unit arrives mostly preassembled, reducing installation time. MVR, or Mechanical Vapor Recompression, relies on turbofans to generate heating vapors by compressing the water vapors evaporated from the product.

HPPG aimed to reduce its daily wastewater volume by 90%, and to reuse the water recovered for other needs, including cooling tower makeup water. The evaporator was part of an overall system comprising pretreatment components for oil and water separation, suspended solids filtration, and pH adjustment. It was installed and commissioned in March 2016.

"Partnering with Caloris, we've been able to develop a state-of-the-art process that significantly improves our environmental footprint," said HPPG Vice President Mike Jett. "This project yielded some amazing results. We wanted to improve our process and, once we started working with Caloris, we quickly realized the potential we had to reduce water and energy usage."

> **"[W]e've been able to develop a state-of-the-art process that significantly improves our environmental footprint."**
>
> *– HPPG Vice President Mike Jett*

HPPG Facilities Manager Wayne Karcz was equally enthusiastic. "At HPPG, it's a pretty big deal. There aren't any plants using evaporation for wastewater recycling. It reduces water and energy use and helps us preserve the water source for everyone in the area," he said.

"We knew we had an opportunity to help HPPG with their long-term plans. The success of the project has provided them with an opportunity to recover/reuse up to 3 million gal of water per year," said Caloris Product Manager – Packaged Systems Tom Pyper. iWWD

# Liquid Food Waste & FOG Receiving Station

**Location:** Vineland, N.J.

**Owner:** The Landis Sewerage Authority

**Designer:** The Landis Sewerage Authority

**Contractor:** The Landis Sewerage Authority

**Manufacturers:** JWC Environmental, Liberty Process Equipment, SIHI Pumps, Vaughan, Square D

**Cost:** $449, 872

**Size:** 18,000 gpd

"[We're] saving or repurposing a waste that would have went to a landfill or otherwise been disposed of, and turning it into a domestic source of energy."

*– Dennis Palmer, P.E., P.P., executive director and chief engineer for LSA*

The Landis Sewerage Authority (LSA) has shown time and again that it seeks practices to improve its efficiency and sustainability.

The wastewater treatment plant and land application facility originally began with a treatment capacity of 7 mgd, which inadequately protected the area groundwater from the detrimental effects of constituents. And, as its service area grew, the plant needed to increase capacity. To meet these demands, the plant upgraded to 8.2 mgd secondary and tertiary treatment components, ultimately creating a more cost-effective and environmentally sound system.

Much like its treatment capacity upgrade, LSA sought to upgrade its energy efficiency. The plant began a project to design-build a receiving station to accept liquid food waste; cooking fats, oil and grease (FOG); and cow manure. The facility also grinds, heats, mixes and pumps the waste to the anaerobic digester to produce methane gas. To control odors, a biofilter was constructed.

The methane gas produced at the station is key to its success. The gas is processed through an engine to produce electricity and hot water. Similarly, the remaining liquid after heat treatment and digestion contains valuable nutrients like nitrogen and phosphorus, which are used on the LSA farm to grow corn, hay, straw, wheat and rye. Thus, the receiving station repurposes the waste it encounters to create energy—and save money.

"The energy production story [is important]," said Dennis Palmer, P.E., P.P., executive director and chief engineer for LSA. "[We're] saving or repurposing a waste (liquid food waste and fats) that would have went to a landfill or otherwise been disposed of, and turning it into a domestic source of energy."

The project was not without challenges. The receiving station was partially funded by a federal U.S. Department of Energy (DOE) grant, obtained by the New Jersey Department of Agriculture. LSA had to ensure it consistently met DOE standards on the facility. And to ensure its new biofilter was approved for operation, LSA had to obtain an air permit.

Despite these small setbacks, the project is doubly rewarding, as the LSA staff's tenacity and expertise were instrumental in overcoming them. Executives are most proud of the fact that "we designed, specified and constructed [the facility] in-house with our own employees," Palmer said.

Now that it's complete, the receiving station offers benefits beyond the creation of energy. In July 2016, LSA hosted three Mandela Fellows from Africa through the Rutgers Mandela Washington Fellowship program. The program empowers young African leaders through academic and hands-on training and networking. At LSA, Fellows visited the facility to inspect and learn about its energy production capabilities, witnessing how the creation of energy can facilitate company efficiency and sustainability.

"The LSA likes to utilize and pursue new and innovative technology and projects to have a positive impact on the environment and renewable or domestic-based energy," Palmer said. iWWD


LSA
WASTE
DISPOSAL
STATION

# Slave Lake Pulp, a Div. of West Fraser Mills Ltd.

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**Location:** Slave Lake, Alberta, Canada

**Owner:** Slave Lake Pulp, a Div. of West Fraser Mills Ltd.

**Designer:** ADI Systems

**Contractors:** Geomembrane Technologies Inc., Biogasclean

**Manufacturers:** Geomembrane Technologies Inc., Biogasclean

**Cost:** $40 million

**Size:** 1,660 gpm

The town of Slave Lake in Alberta, Canada, has had more than its fair share of struggles. In 1988, the town suffered flood damage when nearby Sawridge Creek overflowed its banks. In May of 2011, wildfires decimated 40% of the town; as residents endeavored to rebuild, more floods arrived mere months later.

Two years after the wildfire and subsequent flooding, Slave Lake Pulp, a Div. of West Fraser Mills Ltd., was fighting its own battle. Slave Lake Pulp, a 240,000-tonne-per-year Bleached-Chemi-Thermo-Mechanical Pulp (BCTMP) mill, processes aspen to produce hardwood pulp for the global market, to be used in products such as coated board grades, printing and writing papers.

Slave Lake Pulp was using a conventional activated sludge system to treat its high-strength wastewater, but this process was energy-intensive. The mill sought a solution that could cope with the fluctuations in its wastewater's chemical oxygen demand (COD) concentrations ( from 5,000 to 19,000 mg/L) caused by the mill's frequent alterations in pulp brightness grades. It also desired power generation capabilities. With help from the Climate Change and Emissions Management Corp. and the Government of Alberta, the mill began a biomethanation and power generation project.

Slave Lake Pulp contracted with ADI Systems to install a wastewater treatment and biogas treatment system at the mill. ADI installed a 120,000 cu meter ADI-BVF reactor system for anaerobic effluent pre-treatment—the first "low-rate" anaerobic digester installed at a North American pulp and paper mill.

The reactor consists of an earthen basin with concrete perimeter wall lined with a geotextile underlay and a geomembrane liner and insulated cover. The geomembrane cover captures biogas from the reactor, which is scrubbed in a BioGasclean biological scrubber system to reduce its concentration of hydrogen sulfide (H2S). The BioGasclean system includes two 550 cu meter scrubbing tanks containing packed media and Thiobacillus bacteria.

The scrubbed biogas is burned in a new co-generation facility, producing up to 6 MW of green electricity for Slave Lake Pulp to use. The mill has boosted capacity up to 9 MW by using natural gas as a supplement to treated biogas.

Despite the technical and personnel changes incurred when working in Slave Lake—including a challenging labor market, high winds, harsh winters and few winter daylight hours—the highly concentrated mill wastewater, and the high sulfur content of the biogas, the project was completed in June of 2016.

The BVF reactor digests more than 85% of the BOD anaerobically, enabling Slave Lake Pulp to decommission two of its four existing aeration basins. Chemical usage is down by 50% to 70% and, of course, Slave Lake Pulp also is benefitting from its new energy source.

"Energy recovery through biogas utilization is very attractive for energy-intensive industrial plants, such as those within the forestry sector," said Daniel Bertoldo, ADI Systems. "The shift from the traditional approach of treating pulp mill wastewater with 'high-rate' granular sludge-based anaerobic reactors sets a new precedent for the industry."

"We're proud that we were able to deliver a solution that provided the projected financial, environmental and operational benefits to Slave Lake Pulp," Bertoldo said. iWWD

"Energy recovery through biogas utilization . . . sets a new precedent for the industry."

– *Daniel Bertoldo, ADI Systems*

# California Olive Ranch - BJM Stainless Steel Pumps Installation

**Location:** Artois, Calif.

**Designer:** California Olive Ranch

**Contractor:** R.F. MacDonald

**Manufacturers:** BJM Pumps

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California Olive Ranch prides itself on its olive oil harvesting and production innovations. Since 1998, the company has established ranches and fostered California farm land for olive orchard growth. It developed new ways to press olives for olive oil production, as well.

Pumps in the olive oil creation process have to handle extreme conditions. They have to overcome 70 ft of static head through three-inch pipes in high heat. The caustic fluid and pump height necessary for production wore old cast iron pumps out quickly.

“BJM is one of the few companies that can provide a stainless steel pump of this size for this kind of duty condition,” said Ben Wells, BJM regional manager. “Not many people make a pump that will handle 200° F water.”

The original cast iron pedestal pumps sat on a column extended into the water so as not to be damaged by the heat and chemicals of the process. That installation, however, was not conducive to extending pump life and BJM replaced them with a pump that could handle the conditions and load.

“They haven’t had any real issues since the pumps have been put in,” said Logan Jennings, California Olive Ranch plant operations manager.

Those pumps are just one step in a lengthy process that California Olive Ranch takes great effort to ensure is also environmentally friendly and sustainable. In growing olives, it mulches its fields with trees and reuses the water from its mills for other processes. iWWD

# Liquid Natural Gas Plant Project

**The modular design of the system gives it the capability to expand to the original desired flow rate when the plant's production requirements call for additional water.**

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**Location:** Philippines

**Size:** 415 gpm

**Cost:** $3.1 million

**Designer:** Genesis Water Technologies Inc.

**Contractor:** Genesis Water Technologies' local consortium

A liquid natural gas plant in the Philippines was looking to combat water scarcity to provide a sufficient amount of clean water for its plant operations and fire suppression system, as well as potable water for its workers. After exploring alternative water sources, the plant chose a seawater reverse osmosis system to provide the quality of water necessary for the desired applications.

The system sources water from deep wells, utilizing seawater reverse osmosis systems to treat the source water laden with high total dissolved solids. This process uses energy-saving nanocomposite membranes and DLP nanofiber prefiltration technology. To treat the water to potable standards, chemical feed systems were added for pH neutralization and remineralization.

The team was challenged to find a suitably clean water source to reduce pretreatment cost. The team also had to maximize objectives for process sustainability with optimized capital and operational expenditure costs.

Initially the system was designed to treat a flow of up to 2,656 gal per minute (gpm), but the design was modified to reduce initial capacity to approximately 20% of that—415 gpm. The modular design of the system gives it the capability to expand to the original desired flow rate when the plant's production requirements call for additional water. This design change dropped the project's cost from $6.6 million to $3.1 million.

The ongoing project is scheduled for completion in 2017.

"We look forward to using this project as a model project to continue to serve this energy client in meeting their clean water needs throughout the Philippines with innovative solutions to combat water scarcity," said Nick Nicholas, technical manager for Genesis Water Technologies. iWWD