

Green Terminals

Since 2004, shore power has been an integral part of cruise ship facilities at the Port of Seattle. Photo courtesy of the Port of Seattle.

Federal, state and local regulations call for better management of possible pollutants and invasive species, while at the same time shipping lines are calling for green alternatives both for themselves and to pass along in marketing efforts to their own clients. This makes port authorities operating marine terminals along the West Coast very interested in green operations.

By Kathy A. Smith

Bellingham Redevelopment

ONE OF THESE WEST COAST PORTS IS THE PORT OF BELLINGHAM, which operates two major marinas, Blaine Harbor and Squalicum Harbor, whose more than 2,000 slips combined make up much of the marina capacity of the State of Washington. Back in 2007, the Bellingham marinas were among the first to obtain 5-Star ratings in not only how they deal with waste materials by using environmentally friendly substances, but in outreach to the customers.

"Right now when boaters remove their trailerable boats from the water, they run their motors with clean water and clean off their boats, that material goes straight into the storm drain system, which then goes into the city sewer lines," says Dave Warter, Marine Terminals Supervisor. "What we're going to be doing this year is installing a filtration system that will catch materials that might be coming off the hull, like paint or residual oil from motors." In 2009, the Port, which requires Best Management Practices for all users of their facilities, also successfully applied and received the same 5-Star rating for the Bellingham Cruise Terminal, and has done so every year since.

The Port's environmental initiatives at the cruise terminal include sewage pumpouts for the charter vessels and a sewer line for the Alaska ferry so they do not have to discharge while in open water. A recycling plan offers a program for paper, cardboard, bottles and cans and a recycling program for monofilament net at



Kathy A. Smith

“Ten years ago, you didn’t necessarily think about environmental impact on the local waterways and how it even affects the food we eat. It’s nice to have a program in place that helps you steer in a better direction, and we are constantly looking for ways we can be more environmentally-responsible.”

their boat launch. Other initiatives call for using friendlier cleaning products, green light fixtures, including ballasts and bulbs, using sewer drain filters and posting signage at garbage locations on where to take hazardous waste. The Port even offers a program for signage educating the public on the sensitive waters of Bellingham Bay and decals on all storm drains stating ‘Do Not Dump!’

Warter says as far as the 5-Star program goes, “Ten years ago, you didn’t necessarily think about environmental impact on the local waterways and how it even affects the food we eat. It’s nice to have a program in place that helps you steer in a better direction, and we are constantly looking for ways we can be more environmentally-responsible.”

Michael Hogan, Environmental Analyst for the Port of Bellingham says overall, this year, the Port will construct about \$1 million in energy efficiency



The marinas of Bellingham, Washington, which include Blaine Harbor (top) and Squalicum Harbor, offer more than 2,000 slips combined and make up much of the marina capacity of the State of Washington. Photos courtesy of the Port of Bellingham.



NAVY GOALS DRIVE BPA-FACILITATED PORT ENERGY IMPROVEMENTS

By Greg Jose

With 944 installations worldwide, the United States Navy is one of the globe's largest owners of port infrastructure, and is one of the leading consumers of energy in the nation. In recent years, the Navy has identified energy security as a critical challenge to address.

To address this challenge, the Navy established the Alternative Energy Ashore goal, which requires that half of the Navy's total energy consumption ashore come from alternative sources by 2020. The Chief of Naval Operations has defined energy security for shore installations as the mitigation of electrical grid vulnerability through "decreasing overall energy consumption, increasing the energy efficiency of shore systems, increasing the use of viable alternative energy sources and increasing the reliability of energy for critical assets."

This goal and these priorities are driving significant investments by the Navy and related Federal government agencies in improving the energy efficiency of its port and shoreside operations. In the Pacific Northwest, the Bonneville Power Administration (BPA) is the public agency designated as the Federal government's marketing agent for federally-produced electrical power. BPA has established programs for energy efficiency at federal facilities, offering program and contracting support for energy efficiency projects at Direct Served Federal sites like the Puget Sound Naval Shipyard (PSNS) in Bremerton, Washington.

At PSNS, BPA has partnered with the Navy to complete a project that will replace the shipyard's antiquated series street lighting system with a modern, efficient system that will improve lighting performance while reducing overall energy use. The project, conducted by the Bremerton-based engineering services firm Art Anderson Associates, involved an initial condition assessment to establish baseline conditions, a technology evaluation that considered three main technologies for replacement, and development of the engineering design package for the replacement work.

Metal Halide, induction, and light-emitting diode (LED) technologies were evaluated. Research, such as that conducted by the Rensselaer Polytechnic Institute, has found metal halide to have excellent color rendition, but a relatively short life that increases overall life cycle cost. Induction lighting was found to have a favorable service life and 40 percent lower energy consumption when compared with the traditional high-pressure sodium (HPS) system used at PSNS, but has relatively high per-fixture costs. LED technology is the new kid on the block, and is experiencing widespread installation because of its similar color rendition to metal halide and long service life.

A project-specific life cycle cost evaluation determined that LED was the clear winner, with notable capital, energy, and maintenance costs savings over the second-place induction lighting system. The cost savings versus the existing HPS system was even more notable, cutting

the overall electric bill in half and maintenance by 75 percent. The high cost of maintenance and lack of available parts (ballasts, drivers, and transformers) for the antiquated existing system adds urgency to get started. BPA is already moving ahead with the first of two installation phases based on the construction package developed by Art Anderson Associates, and the Navy will lead the effort to complete the second phase in the near future.

Energy security and efficiency is, of course, not a priority limited to the military. In this era of rising energy costs and fiscal belt-tightening, port owners small and large are looking seriously at ways to reduce their overall energy footprint.

For Federal sites directly served by BPA, or for those served by one of BPA's public utilities, the BPA Energy Smart Federal Partnership program can provide up-front technical assistance, utility coordination and packaging of projects for third-party financing through programs like the Utility Energy Service Contract (UESC). The UESC program allows the utility to arrange funding to cover capital expenses, which are repaid over the contract term from cost savings generated by the improvements.

A similar funding model for non-federal industrial sites is facilitated by BPA's Energy Smart Industrial (ESI) program. Industrial firms with a utility serviced by BPA are eligible for the ESI program, which includes most of the utilities in Idaho, Montana, Nevada, Oregon, Washington and Wyoming.

improvements to Port facilities.

The Port is also making significant investments on Bellingham's central waterfront to clean up historic contamination, rebuild waterfront terminals and transition underutilized heavy industrial property into productive reuse. The Port has partnered with the City of Bellingham to guide the redevelopment of a 237-acre piece of Bellingham's downtown waterfront. The long-term vision for this former mill site is a new mixed-use neighborhood, featuring residential, commercial, light industrial and institutional uses, as well as parks, trails and a healthy shoreline.

Bellingham's waterfront redevelopment plans include a new downtown marina. The Port will remove more than 400,000 cubic yards of contaminated treatment sludge from

a 37-acre wastewater treatment lagoon, which was formerly used to treat process water from a complex pulp, paper and chemical facility. Once the lagoon is cleaned out, it will be converted into a new marina, which will include a mile of public access along the outside of the breakwater and shorelines reshaped to support salmon recovery efforts.

"When the Port makes major capital investment decisions, it strives to integrate a range of economic, environmental and community benefits into its plans and projects," says Hogan. For example, the Port recently performed maintenance dredging in Squilicum Harbor. Rather than pay millions of dollars to transport and dispose of the dredge material offsite, the Port reused the dredge material as part of an environmental cap at a nearby clean-up site. This project supported bay-wide



The Port of San Francisco has offered shore power at Pier 27/29 since late 2010, and was the first of its kind for cruise ships in California. Photo courtesy of the Port of San Francisco.

environmental clean up efforts and reduced the environmental footprint of the project.

Oyster Power

Since 2004, shore power has been an integral part of cruise ship facilities at the Port of Seattle. "The biggest source of emissions in most ports comes from vessels," says Stephanie Jones Stebbins, Director of Seaport Environmental and Planning. "So shore power makes sense for cruise vessels because they call frequently and have a very large power demand." In fact, last year, the Port saw over 200 cruise ships.

On the container side, Jones Stebbins says the Port's 'At Berth Clean Fuels Program' has seen good participation and been an effective approach to reducing vessel emissions. "Between using low sulphur fuel and plugging into shore power, last year, 57 percent of the vessels calling into our port did one of the two."

Additionally, ports in Puget Sound recently completed an emissions inventory. The Port of Seattle's diesel particulate emissions from ocean-going

vessels while at berth went down 34 percent over the past six years, and from their clean fuel incentive program, they removed more than 1,000 metric tons of sulphur from the environment. The Port is upgrading and retrofitting cargo handling equipment to be less harmful to the environment, evidenced by cargo handling diesel particulate emissions dropping by 39 percent, and emissions from trucks going down 53 percent as well over the past six years.

With respect to storm water run-off, Jones Stebbins says the Port has designed a very effective treatment using oyster shells in catch basins that has significantly reduced metals like zinc and copper from tires and brake pads. For cleaning docks, their maintenance shop developed a machine that sucks up the cleaning water with a large shop vac or vacuum truck. This prevents the dirty water from getting into the environment. The Port has also partnered on a terminal project with

the local utility on lighting, which saves 1 million kilowatts a year, a savings of \$100,000. And a number of the Port's sites are brownfield developments, former industrial sites where chemicals like PCBs were used in manufacturing which Jones Stebbins says have now been addressed.

"The Port of Seattle is a vibrant and active cruise and cargo terminal which includes 32 acres of habitat the Port has restored or enhanced and we will be building an additional 40 acres," says Jones Stebbins.

Grant Power

The Port of San Francisco predominantly serves cruise ships, with one existing cruise terminal at Pier 35, and a second under construction at Piers 27/29, expected to open in early 2014. The new terminal will be fully LEED-certified and will be the Port's primary cruise terminal.

Currently, the Port sees about 60

**The sea can be hostile.
Hazards abound.
Disaster and risk of injury
are never far away.**

**Training programs dedicated
to the safe return of men and
women who work on the water.**

fremontmaritime.com

BIOREMEDIATION

While ports and terminals pay homage to becoming greener on large-scale projects like reducing harmful CO₂ emissions, John Paparone, owner of North Carolina-based Environmental Solution, Inc., says people often forget they need to pay just as much attention to the smaller day-to-day green tasks.

One way to address waste is through bioremediation, which uses naturally occurring, safe and beneficial microorganisms to degrade environmentally harmful contaminants and turn them into non-toxic compounds.

For example, when it comes to treating storm water runoff, Paparone says many products typically being used today only move contamination from point A to point B and do nothing to actually break down hydrocarbons.

"A bioremediation cleaner/degreaser cleans like your standard cleaner/degreaser but more importantly, it also starts to clean up the waste stream while it's in motion from the moment of impact and will continue to do that throughout the lifespan of that waste stream. So whether the waste stream ends up going into the ocean, a city sewer system or holding pond, those microbes will continue to work," he says, adding that these kinds of products pose no harm to employees.

Collection tanks are another area where bioremediation can make a big difference to the environment. Rather than bleed off or pump out hydrocarbons to be transferred elsewhere for disposal, the offending contamination can be treated in place, which can significantly lower cleanup costs. "Here you would use an oil/water separator product which can be put on a hydrostatic pump that has a timer on it and then all you have to do is go around once a month and change out the product. It's less time-consuming, less manpower intensive and is extremely safe."

Adding bioremediation products to existing spill kits can also cut time and costs.

"Typically ports will have a 55-gallon drum with socks, diapers and pads to absorb spills. Adding bioremediation powder to these kits will not only introduce bioremediation into the cleanup process, but reduce the number of pads needed to 10 percent," says Paparone. For vehicle and equipment fluid leaks, the same pads are used in combination with a more traditional absorption product like "kitty litter" but they don't fully clean the site and should be disposed of in accordance with local HazMat requirements.

cruise vessels a year, and has a shore-side power system at Pier 27/29 that has been in place since late 2010, which at the time was the first of its kind for cruise ships in California and only the fourth in the world, according to Jay Ach, Manager of Regulatory & Environmental Affairs, Maritime Division.

On the ship repair side, in October 2012, the Port, which owns the shipyard at Pier 70 that is leased to BAE San Francisco Ship Repair, completed installing shoreside power for the **Dry-dock #2** and for Wharf 4 next door, providing 8,000 amps at 480 volts of power to vessels. The shipyard, originally covering a much larger area, was built beginning in the late 1800s, and there are plans to redevelop the area surrounding it, so addressing asbestos

in the buildings, lead paint, soil contamination and seismic stability will be high on the agenda.

Ach says environmental regulations in California ports are some of the most stringent in the country. He believes all of the state's ports also work hard to go beyond regulations. The California Air Resources Board, through its Transportation Fund for Clean Air and Carl Moyer programs, fund air pollution reduction initiatives. He says many of the Port's tenants can also access these grant programs. "Our tug companies and bar pilots have replaced or upgraded engines, and one of our local dredging companies has replaced or retrofitted a lot of diesel engines using grant funds."

Other agencies also helped with

the Port's shoreside power initiative. "We had a budget of \$5.2 million for our shoreside power facility at Pier 27, and \$1.9 million of that came from the Bay Area Quality Management District. The San Francisco Public Utilities Commission that operates the Hetch Hetchy water and power system contributed \$1.3 million, and the U.S. Environmental Protection Agency also contributed \$1 million through the Diesel Emissions Reduction Act (DERA) Program. So we received \$4.2 million in grant funds, with just \$1 million out-of-pocket expenses for the Port," Ach says.

He also notes that the Port's planning and engineering groups each have participating LEED-certified professionals who work closely on energy efficiency projects. This will bode the Port well as it undertakes more development/redevelopments which now include the northern waterfront, a declared historic district with old pier shed buildings, and the move of the Exploratorium hands-on science center to Piers 17 and 19.

Mark Sisson, Senior port planner/analyst for AECOM's California office reports that AECOM was the lead planning consultant for the development of Terminal 2 in Vancouver, British Columbia's Deltaport, the region's largest container terminal located at Roberts Bank.

The terminal will be largely an electric facility with electric dock cranes, cold ironing, and a large capacity rail yard that will reduce the number of trucks. The facility will be open almost 24 hours, which will also smooth out demand for trucks and support reduced emissions. Sisson says with the container yard being automated, trucks will no longer have to wait in queues to be unloaded with their engines idling. Instead, they will back up to individual container stalls where a robotic electric crane will unload them.

Terminal 2 will be a high-density terminal, with higher capacity per acre, which will include the use of clean materials that meet stringent land use regulations. **PM**