Virginia Pollution Prevention Case Study
Virginia Living Museum

Company Information

The Virginia Living Museum (VLM) is a private non-profit museum and education center that has been in operation since 1966 and is located in Newport News. In 1987, the VLM became the first living museum east of the Mississippi, combining the elements of a native wildlife park, science museum, aquarium, botanical preserve and planetarium. Today, the VLM continues to be a museum leader in its use of native wildlife to present its message of stimulating knowledge, awareness, and appreciation of the living world. The exhibits showcase all of the state's regions, from the upland coves of the Appalachian Mountains to the salty offshore waters of the Atlantic Ocean, and feature more than 245 different animal species.

More than 2 million students have visited the VLM since 1987. All of the VLM's classes are correlated to Virginia's Standards of Learning and targeted to specific grade levels and have also been endorsed for excellence by the National Science Foundation and both the U.S. and Virginia Departments of Education. For museum members and visitors there are special programs and weekend safaris to the caves, swamps, and fossil banks of Virginia, helping to bring science and nature up close and personal. The VLM has more than 400 active volunteers, which is a testament to the overwhelming support from the local community.

The VLM has been accredited by the American Alliance of Museums since November of 1976. It was accredited by the Association of Zoos and Aquariums in March 2009, becoming the first institution in Virginia, and the 12th in the country, to be accredited by both organizations. The museum has an annual visitation rate of 240,000, making it the most visited attraction in Newport News.

Environmental Challenges and Opportunities

In 2008 the VLM opened a demonstration house that showcases over 30 green building products and practices. This exhibit included 3 small solar panels to demonstrate how electricity can be generated from solar photovoltaic panels. As the VLM encouraged visitors to consider adding solar power to their homes and businesses, it challenged them to "practice what they preach" by finding a way to add solar power to their main exhibit building. This was where the inspiration for the current solar installation came from.

Before their large scale projects like the 165 panel solar installation were implemented, the VLM started with simpler initiatives that did not require substantial financial investment, like an in-house recycling program. While the museum implemented some of the smaller environmental initiatives they also sought grant funds to eventually support the larger initiatives like the green demonstration house and the large rooftop solar array.

Implementation of the Program

The VLM is a certified *Virginia Green* Attraction, committed to minimizing its environmental impacts by preventing pollution wherever feasible in its operations. *Virginia Green* is a statewide recognition program for businesses in the tourism industry that are working to reduce their environmental impacts. The museum obtained its designation in June 2008 as part of the Commonwealth's campaign to promote environmentally friendly practices in all aspects of Virginia's tourism industry. The VLM has instituted a number of pollution prevention activities, such as recycling programs, purchasing recycled-content containers for their food services, water efficiency practices, energy conservation, and renewable energy projects.

Pollution Prevention

The VLM has developed an extensive recycling program throughout their facility. The recycling program started in the mid 1990s and has grown over the years. The VLM recycles aluminum cans, glass, steel cans, grease, plastic, office paper, toner cartridges, newspaper, cardboard, packing supplies, batteries, and electronic equipment. New recycling containers and signage were purchased to increase the visibility of the program, and they have also purchased and designed reusable mugs that will promote effective recycling. The mugs are sold to staff and volunteers so that they can get discounted refills of drinks and prevent discarding numerous cups throughout the day. The VLM recycles roughly 14,040 lbs of cardboard and 8,320 lbs of other recyclables per year, bringing their total yearly recycling to 22,360 lbs. The success of the recycling program has reduced the VLM's need for larger garbage bins as well as reduced their solid waste disposal costs.

In addition to their recyclables, the VLM has made strides in greening their food service practices. Effective food inventory controls have led to minimized waste of unused food. VLM is also filtering grease from the café and eliminating the use of Styrofoam cups and plates in favor of recycled-content plates and utensils. The old cooking oil is stored in containers and picked up by several staff members who have retrofitted their personal cars to be powered by cooking oil. These individuals also collect used cooking oil from several regional restaurants. In an effort to bring this practice full circle, these cars are also part of the VLM's Earth Day display.

Green purchasing is another way the VLM has been making their practices more environmentally friendly. The VLM purchases recycled content paper towels and toilet tissue as well as recycled content office paper. All copying at the facility is double-sided and electronic correspondence and forms are utilized to reduce the amount of paper usage. The museum vehicles have been switched to synthetic oil, which requires changing less often, and environmentally friendly radiator fluid that will not harm animals if spilled.

Water Efficiency and Usage

The VLM tracks their overall water usage and wastewater and performs preventative maintenance on drips and leaks to ensure that water is not being wasted. The VLM has done water-flow metering to help them discover where these leaks are, and also determine the areas of high use. High efficiency dishwashers have been purchased as well as microfiber mops and low flow restrictors on faucets and showerheads. The improved technology has been coupled with water efficient practices, such as discouraging water based cleanup in favor of sweeping and

implementing an effective landscape management plan to utilize drought tolerant species and minimize lawn areas. The VLM has also implemented storm water management that includes minimizing impervious surfaces and installing vegetative buffers around streams and ponds.

Energy Use and Conservation

The VLM has installed a high-efficiency HVAC as well as fluorescent light bulbs in all canned spotlights, ballasts, and lamps. The energy bills are tracked so the VLM can see the usage reductions from these equipment upgrades and their other energy conservation practices in place. Natural lighting is used where possible and lighting sensors are used in areas that aren't used consistently. The VLM also uses thermal-rated windows and insulation and directional lighting in the parking lots and outdoor areas to reduce electricity usage. The Facilities Director at the museum is continually reassessing the museum's energy use to find new ways to conserve. When the incandescent light bulbs were replaced with fluorescent bulbs, the VLM saved an estimated $1,100 annually in the museum store alone. A computer controls all lighting so that after hours the lights are automatically turned off in areas where the cleaning crew is not working. The VLM's chillers have also been reprogrammed to only run when needed instead of all the time.

In 2013 the VLM installed 165 solar panels on its south facing roof, one of the largest non-profit solar installations in the Hampton Roads area. The project was funded with a $150,000 grant from Dominion Virginia Power's charitable foundation. The solar panels were installed by Bay Electric Co. Inc., which also donated $14,879 toward the project and included a monitoring system with solar and weather data. The solar array will produce more than 4,900 kWh of electricity per month, which is enough to fully power more than six U.S. homes. The system is expected to save the VLM more than $5,000 in electricity costs in the first year alone and will prevent more than 41 metric tons of carbon dioxide from being released.

The solar array will not only save the VLM in electricity costs, but it will also be used as an educational display. The solar array is only a few feet away from the observatory deck and visitors will be able to view the educational signage as well as a digital screen display with real time solar electrical system production from the panels. This educational aspect and visibility to all that came through the museum was the most important aspect of the project to the VLM.

Community Awareness and Outreach

In addition to greening their own practices, the VLM also promotes conservation to all of its visitors. There are two plant sales a year at the museum to encourage use of native plants in home gardens. The VLM also hosts an annual Earth Day weekend event that highlights environmentally friendly practices that can be implemented at home. The VLM Earth Day event includes recycling collections, allowing visitors to bring in old sneakers, batteries, used books and used electronic items for recycling by local companies. A free tree and reusable grocery bag are given to each visitor as part of the event as well. Native plants are available for sale, as these plants are much more sustainable in local gardens and they require less watering, fertilizer and pesticide applications. Local conservation non-profits participate in the event and have displays out to encourage earth-friendly practices. Live animal conservation programs happen throughout the day as well. Approximately 1,000 people attend the Earth Day event each year.

The museum has also constructed an environmental education center and backyard habitat designed to demonstrate how consumer choices for products and landscaping can improve the environment. On June 20, 2009, the VLM opened the Goodson House, a "Living Green House" environmental education center. In its exhibit house and yard, homeowners, architects and contractors can see all the latest techniques and products they can use to build and maintain an earth-friendly home, presented in a way that makes them understandable to the general public. The "Living Green House" is a 600-square-foot exhibit house that includes recycled building materials, roofs covered with living plants, solar technology, rain barrel usage, a geothermal heat pump, and a kiosk that lets visitors calculate their own carbon footprint. The 3,000-square-foot "Conservation Garden" features earth-friendly gardening techniques such as the use of native plants, mulching and composting, and landscaping methods for reducing stormwater runoff. The $315,000 project was partially funded by a $150,000 matching grant from the Chesapeake Bay Gateways Network. The garden was also supported through a donation from the local Huntington Garden Club.

Evaluation of the Process

The recession has impacted the VLM's revenue through reduced charitable donations, fewer school groups, and reduced tourist admissions income. This has led the VLM to explore alternate ways to fund these new environmental projects, primarily grant funding. Through the grant application process the VLM learned to be patient while seeking funds to implement environmental initiatives, because it doesn't always work out on the first try. The VLM was denied numerous grant applications before successfully acquiring the financial support for their solar panel array through the Dominion Virginia Power grant.

In addition to going through a learning process with applying for grants, there was also a lot for the VLM to learn about installing a major solar panel system on an existing roof. The VLM had to determine the answers many logistical questions, such as:

- Can the existing roof structure support the weight of the panels and tracking system?
- Can the solar array be installed without impacting the warranty on the existing roof?
- Can the solar array be secured to withstand hurricane force winds?
- Does the facility have sufficient roof space with the proper orientation to make the solar panels effective?

Luckily the VLM was able to address these questions and successfully move forward with the solar array project. The VLM was focused on their main goal with all of these environmental initiatives, which was to install them in a way that would maximize their visibility to the museum's visitors. By creating see through walls and supporting educational signage, visitors can see how these various environmental products work and the environmental impact they provide.

Continual Improvement of the Program

The VLM's strategic planning includes a commitment to protect Virginia's natural resources by increasing conservation programming, grants for citizen science programs, and support for student conservation initiatives to the public. The strategic plan also has a goal of continuing to

green the museum's practices through energy efficiency initiatives, going paperless where possible, promoting recycling, and evaluating the incorporation of solar water heaters.

The VLM's "wish list" of future initiatives includes:

- Adding solar water heating to their education center;
- Adding a roof water collection system to reduce stormwater runoff from their site and to provide rainwater for use in irrigation and toilets; and
- Adding a small wind turbine to demonstrate how wind can be converted to electricity and to educate visitors about the future offshore wind turbines coming to Virginia.

The VLM's Green Team is constantly in search of new initiatives and products that the museum could consider to increase its conservation practices. Through involvement with Hampton Roads Green Building Council, U.S. Green Building Council, and the Chesapeake Conservation Landscaping Council, the Green Team keeps current with national conservation and green building advances.