

Marsh-Billings-Rockefeller NHP Green Inside/Out Program

Background:

Located in Windsor County, Vermont, Marsh-Billings-Rockefeller National Historical Park (the park) opened to the public in 1998. The 555-acre park is home to the oldest professionally managed forest in the United States, 16 historic structures, 20 miles of carriage roads and hiking trails, an art collection, museum spaces, and 20 acres of Class A turf and gardens.

The core mission of the park is to interpret the history of conservation and demonstrate contemporary stewardship practices. It accomplishes this by managing the historic forest and estate, implementing an energy program that integrates new technologies, and engaging visitors in considering how they can incorporate stewardship practices in their everyday lives. These efforts, collectively called the **Green Inside/Out Initiative**, aim to: 1) increase park energy efficiency; 2) convert systems to renewable energy sources; 3) promote auditing of park efforts through third-party certification (e.g. LEED, FSC); and 4) encourage others to pursue sustainability practices through education, interpretation and demonstration.

The park's green energy interpretation and education work starts with its youngest visitors through its Junior Ranger Program. The Junior Ranger program takes families on a tour of the park's campus where they complete activities on sustainable forestry, green energy, composting, and stewardship. The park's visitor center features exhibits on various sustainability efforts in and surrounding the park. Ranger-led programs through the historic buildings and forests highlight the park's Green Inside/Out initiatives and offer many ways for visitors explore how they too can make a difference in conservation efforts in their everyday lives.

The park is also a member of the NPS Climate Friendly Parks program and has presented to other parks and superintendent groups on its various green energy initiatives, modeling the possibilities for other parks and partners. Locally, the park partners with Sustainable Woodstock, a non-profit organization, to promote and support sustainability efforts in the community that benefit residents and visitors alike.

The park's stewardship initiatives are further enhanced by its partnership with the Woodstock Foundation (a 501c3 charitable, nonprofit institution that promotes conservation, sustainable land use, and heritage) and the NPS Stewardship Institute (established to "advance innovation in collaborative conservation").

In 2008, the park conducted an energy audit/carbon footprint analysis. The 2008 analysis resulted in park operational emissions of 354 metric tons carbon equivalent (MTCE). Although the park's extensive forest resources serve to store carbon and offset the park's emissions, Marsh-Billings-Rockefeller NHP aimed to become a park that utilizes 100% renewable energy. Reduction of fuel oil use has been the primary focus, but improving the park's fleet emissions is also included in this goal.

The park has always used the Pogue, a historic upland pond, for irrigation as Frederick Billings designed it in the late 1800s. The 8,500' deteriorating historic line was recently replaced to ensure that it would continue to be a viable water source for many years to come for both the park and the adjacent partner Billings Farm & Museum, owned and managed independently by the Woodstock Foundation, Inc. The park also has a water bottle filler in the Visitor Center, encouraging visitors to refill; low-flow toilets and sinks in all of the restrooms; and an aggressive compost and landscape management program which reduces water demands for landscape care.

Savings/Results

MARSH-BILLINGS-ROCKEFELLER NHP SUSTAINABILITY PROGRAM SAVINGS / RESULTS					
FY	Energy Type	Consumption	Cost	Savings	Cost Savings
2008	Fuel Oil	20,150 gal	\$54,724		
2018	Fuel Oil	8,000 gal	\$21,820	60% Energy Savings	60%
2008	Electricity	213,645 kwh	\$27,774		
2018	Electricity	176,637 kwh	\$25,951	17% Energy Savings	7%
2008	Propane	2,319 gal	\$6,112		
2018	Propane	588 gal	\$1,908	75% Energy Savings	69%
2008	Renewable Energy	36.41 MMBtu			
2018	Renewable Energy	145.8 MMBtu + 56.7 MMBtu (GSHP) = 202.5		82% Renewable Energy Increase	
2008	MABI Energy Intensity	50.1 kBtu/GSF			
2018	MABI Energy Intensity	22.9 kBtu/GSF		54% EI Reduction	
2008	Gasoline (Fleet)	1,597 GGE			
2018	Gasoline (Fleet)	1,377 GGE		14% Fuel Savings	
2008	GHG	289 MTCO ₂ e			
2018	GHG	143MTCO ₂ e		41% GHG Reduction	

Forest Center: Constructed in 2008, the 1,700 square feet (SF) building is LEED Platinum certified (Leadership in Energy and Environmental Design) and serves as a central classroom and meeting space for park programs. When finished, it was one of the greenest buildings in the NPS, 3rd NPS building with LEED Platinum certification and the first NPS building to be constructed entirely with Forest Stewardship Council (FSC) certified wood. The building is extremely energy efficient and utilizes cordwood harvested from the park's historic forest in a Garn Wood Boiler to provide much of its heating requirements. A rooftop 6 kW solar array supplements electricity needs. Bathrooms and the kitchenette are equipped with low-flow features and EnergyStar appliances. Exhibits throughout the building highlight its energy features and sustainable design principles so that even the casual visitor can learn more about this important work.

Mansion: In 2010, the park installed a Garn Wood Boiler in the Mansion Garage (484 SF), enabling the park to use in-park harvested cordwood to reduce the amount of fuel oil used to heat the Mansion (34,570 SF). The Garn Wood Boiler needs to be re-stoked with firewood about every 4 hours, so round-the-clock staffing would be needed in order to keep it in constant operation. In 2016, the park installed a Froling Wood Pellet Boiler, which is fully automatic and takes over operation when the Garn Wood Boiler is not used. The park purchases wood pellets from local vendors, some of which purchase surplus park wood (approx. \$255/ton). The installation of the Garn and Pellet Boiler has reduced oil consumption to minimal hot water heating, and use for heat only during periods of extreme cold. A new exhibit in 2019 for the Mansion Garage will interpret how these systems work and highlight all of the green energy efforts at the park. Nearly every visitor to the park will pass this exhibit during their time touring the mansion and grounds.

Pony Shed: The building is off-grid and used for park youth programs and as an artist-in-residence studio. All electrical power to the Pony Shed is provided by the 3.68 kW capacity solar array located in the adjacent field that was installed in 2012. Seasonal heat is provided by a wood stove, from in-park harvested wood. Water is provided by a park well, with septic for wastewater.

Double Cottage: The Double Cottage is 2,436 SF, and is used for staff housing. Heat for both units is provided by a single Froling Wood Pellet Boiler located in the basement of the building. This unit was installed in 2013 and replaced an oil boiler.

Carriage Barn: The Carriage Barn is 13,136 SF. The newly installed (2018) Geothermal heating and cooling systems replace over 3,000 gallons of fuel oil previously used for heating. The fuel oil boiler remains as a back-up heat source and continues to heat the domestic water.

Belvedere Complex: The complex is made up of the Belvedere (1,728 SF), the Greenhouse (2,250 SF), the Bowling Alley (3,042 SF), and the Garden Workshop (3,556 SF). Until September 2018, the Belvedere Complex was heated primarily with over 2,000 gallons fuel oil per year, with a propane boiler to provide occasional heat to the greenhouse. A Froling wood pellet boiler was installed in 2018 and it will now be the primary heat source for 8,518 SF of the Complex area (not including the greenhouse). The propane boiler will serve as a back-up for the greenhouse, which is only heated on rare occasions when large snow events are forecast, so that the snow melts instead of accumulating on the structure.

FLEET and Water: In their energy assessment of the park in 2008, fleet used 1,597 gallons gasoline –5 vehicles, one of those a hybrid. By 2018, the park’s fleet had a plug-in electric vehicle and 3 hybrids (6 vehicles total) and used only 1,377 gallons gasoline equivalent (GGE). This is a 14% reduction in gasoline, with an associated 25% reduction in greenhouse gas emissions. The park has a water bottle filler in the Visitor Center, encouraging folks to refill. Low-flow toilets and aerators on water fixtures are installed throughout the park, and the leaky water line from the pond for irrigation purposes has been replaced.

Organization and Management:

Sustainability is core to the mission of Marsh-Billings-Rockefeller NHP and is incorporated in every aspect of the park’s operations from management of the historic forest to facilities operations focused on renewable energy sources and interpretive programs that allow visitors to explore practices that they can consider for their homes and lives. The approach was initiated in the park’s General Management Plan during the park’s early day of operations (1998) and reaffirmed through subsequent planning documents, including the Forest Management Plan, Foundation Document, and annual work plans. The park’s approach to this work has been intentional, starting with solid baseline documentation and planning. For example, the green energy work started with a Carbon Footprint Analysis/Energy Audit followed by a Master Energy Plan to help prioritize and guide investments over the course of several years.

The park also seeks review from third-party entities to reinforce its achievements and provide transparency to the public about the park’s commitment to stewardship practices. For example, in 2005, the park was awarded the first Forest Stewardship Council (FSC) certification of a national park for its management of the historic forest. FSC requires a rigorous annual audit of park forestry operations to

ensure that the park continues to meet best management practice standards in areas such as maintaining forest health, responsible harvesting and wood utilization, and community engagement.

The park also works in partnership with many other organizations to achieve both results on the ground at the park and to serve as a model for visitors, the community and other NPS sites. The park benefits from its partnership with the Woodstock Foundation (a 501c3 charitable, nonprofit institution that promotes conservation, sustainable land use, and heritage) who manages the adjacent Billings Farm & Museum which is also focused on promoting stewardship through progressive agricultural practices. The Woodstock Foundation also holds and manages a Fund for the benefit of the park which has been instrumental in supporting park energy efficiency and green infrastructure investments (see below). The park also works with a strong network of community non-profits to offer programs that promote sustainability, including events like Forest Festival, workshops for landowners, and tours of park green energy systems. The park is frequently asked by the State Department and other international organizations to provide tours to conservation practitioners from abroad to learn from the park's efforts and consider how the lessons can transfer to their home countries and work.

Technical Expertise and Knowledge:

The park uses a team-approach to its Green Inside/Out Initiative that taps the expertise of staff from all divisions of the park, as well as community partners, university programs, and local architects and technical experts. The park has worked closely with the Woodstock Foundation funding to leverage NPS funds through challenge cost-share projects to complete many of its energy conservation projects.

Founded by Laurance S. and Mary F. Rockefeller in 1968, The Woodstock Foundation, Inc. is a 501c3 charitable, nonprofit institution that promotes conservation, sustainable land use, and heritage as values that are essential to culture, community, and the human spirit. The Foundation owns and operates the Billings Farm & Museum and is an active partner of the park. The Foundation supports the National Park through a fund dedicated to preservation, conservation, and responsible forest management of the Park's resources. Most importantly, the Woodstock Foundation supported several assessment and planning projects that brought in local architects and engineers from the area with deep knowledge of sustainable design and green energy systems that helped scope projects that would fit the historic context of the park while delivering desired energy saving-outcomes.

Employee Engagement;

The park's mission to interpret sustainability is at the heart of all employee's work. For example, in 2016 all staff participated in a collaborative process to identify key values that shape the park's workplace and priorities through 2020 – top among them was a commitment to “Be Sustainability Leaders.” The staff identified a number of action items under this goal and signed up as part of the “talent pool” to help lead the implementation of each item.

The park's interpretive program embraces the sustainability mission and incorporates messaging throughout many programs (as discussed above). This work is guided by the following interpretive themes developed by park staff and our partners:

- **Commitment Across Generations.** Stewardship is a commitment to caring for home, land, and community that is passed from one generation to the next, requiring each new generation to assess and adopt practices of the unique social, economic, and ecological issues of their times.

- Stewardship in Practice. The practice and philosophy of caring for place and the resilience of land and people inspire an examination of the role each of us can play in caring for our homes, communities, and shared legacy of natural and cultural treasures in everyday actions.

The park is also home to the National Park Service Stewardship Institute, which is a small team of park staff that work with a network of partners nationally to support NPS leaders in addressing contemporary challenges. As part of their work, the Institute manages the Superintendents Leadership Roundtable which engages over a third of all Superintendents in the field. Some of these groups meet at the park for their leadership workshops. As a model of preservation and sustainability, the park provides an inspirational setting for these meetings which often involves a tour of the park and discussion of current practices as case studies for group dialogue.

Can-Do Savvy:

Park staff describe their core challenge as deciding what form of energy and heat systems would be suitable for their locality, cost effective, and most importantly able to be creatively integrated into the historic buildings without compromising preservation goals. Their vision and work has been to constantly evolve from using mostly fuel oil to using mostly their own sustainable, harvested wood or other locally-available renewable energy sources. The park is continuing to expand its Green Inside/Out Initiative through partnerships with other organizations such as youth corps and nonprofit organizations to share lessons learned and advance a stewardship ethic beyond the boundaries of the park.