

2009

Allerton Park and Retreat Center

Green Allerton Alternative
Energy/ Conservation Project Summary



Project Completion Report to the Student Sustainability Committee

Project Purpose

Allerton Park and Retreat Center received a \$25,500 grant from the Student Sustainability Committee in October of 2008 for the 'Green Allerton Alternative Energy/Conservation Project'. The purpose of this project was to bring together University faculty, Park staff and a graduate student scholar to investigate and generate viable alternative energy heating system solution for four buildings at the Park. The objectives of the project are to research, design and install a new alternative energy system in the Woodshop, Paint Shop, Operations Building and Visitor Center Green house.

The 'Green Allerton--Alternative Energy/ Conservation Project' is a continuation of the Park's efforts to address its stated mission:

- To develop programs for research and education that focus on a comprehensive understanding of nature, landscape and sustainable systems.
- To employ balanced, integrated management techniques that preserve Allerton's natural and cultural reserves
- To be good stewards of a natural setting where visitors gain a better understanding of their relationship to nature

The Green Allerton initiative¹ focuses on operational sustainability issues at the Park, including:

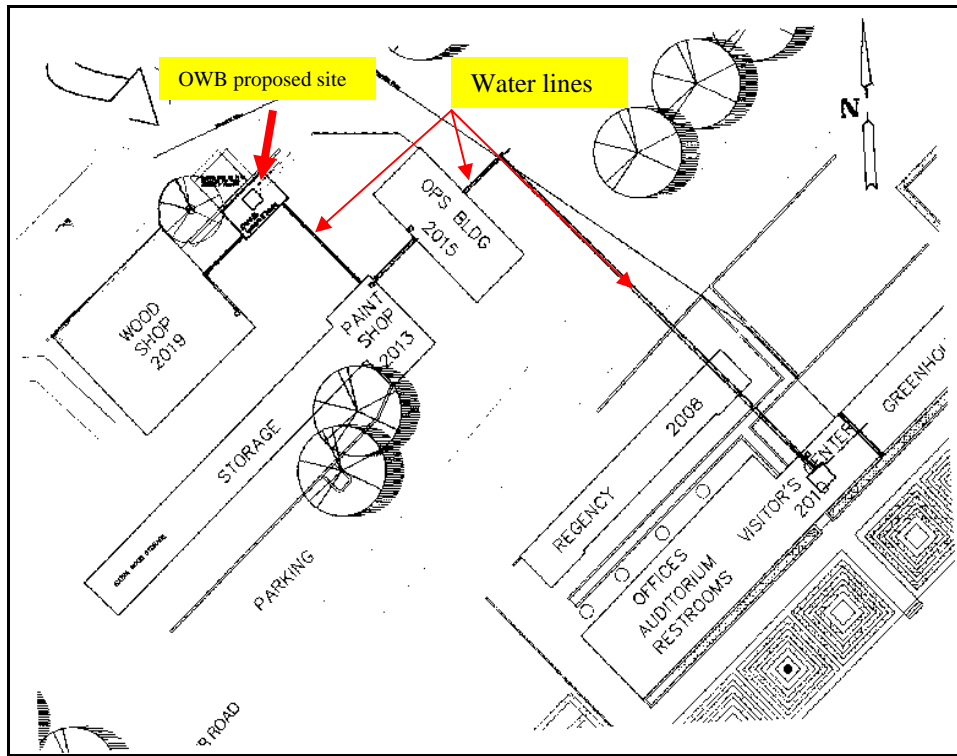
- Recycling efforts
- Energy conservation initiatives
- Reduction of Fossil fuel use
- Water conservation initiatives
- Park grounds energy efficient operations
- Facility maintenance and conservation
- Purchasing
- Waste stream management

Project Summary

In November of 2008, Brian Dewhurst, Architecture Scholar at Allerton Park, began his research regarding the appropriate alternative energy solution for heating the four abovementioned structures. (See location map below). In addition, he surveyed the current heating systems for these structures and what type of energy conservation retrofitting measures would need to be made to these building to reduce heat loss. Generally, he found that the structures needed weather stripping around windows and doors. The insulation in the Paint and Wood Shops was sufficient for the use that these structures get during the heating season. The

¹ Allerton Park. Green Allerton Paper. 2007

Operations building was a former dairy building and has walls that are 12” thick cement and would be sufficient. The Green house windows, sashes have been replaced and caulked.



2009Green Allerton Alternative Energy/Conservation Project Site

The heating units for all building were greater than 30 years old. Back up heating would be needed for the Visitor Center green house. The heating units in the Paint and Wood shops and Operations Building would be replaced in conjunction with the OWB. The boiler that heats the green house was running in fair condition and would be sufficient as a back-up system. (See photos below)



Ops Building 1970 heating unit



VC 1960 boiler/ heating unit

After consulting the EPA' recommended list for Outdoor Wood Burning (OWB) appliances, the Park staff selected Central Boiler's Model #ECL2300 (See photo below). This unit was purchase and installed in mid-summer 2009. Water line connections to the various structures were completed in September 2009. (See photos below)



Central Boiler #ECL2300



Water line connections to the various structures were completed in September 2009. (See photos below). Testing of the Boiler took place during the weeks of October 5 and 10, 2009. Staff has been trained in the loading and cleaning the boiler ash receptacle. This training will continue for about a month until all staff would have a chance to feed and clean the boiler.



Water line installation

The Park staff and volunteers have been cutting up and storing wood that has been harvested from the regular park woodland maintenance and landscape renovation projects. Storage of the wood is located near the OWB. One is the long-shed for long term drying of the wood and the second is an old snack shack that has been converted in the short term wood storage. The wood stored in this shed will be used on a daily and weekly basis. (See photos below)



Long term wood storage



Short term Wood Storage

Financial Statement

Table 1. Expenses/Income Accounting for Alternative Energy Project

Expenses	Budget	Actual Expenses
OWB unit	25,500	22087.4
Hardware	incl	3413*
Rental Costs	600	100
Wood storage structure	3,000	0
Signs	1,000	1,000
Labor	2,500	3620
Personnel	6,360	6,360
Total	38,960	33167.4

Income	Actual Income	
SSC Grant	25,500	25,500
Allerton Park	12,460	10080
Friends of Allerton Park	1,000	1000
Total	38,960	36,580

*Amendment		
Log splitter	SSC	3,413
	AP	4,212
Total		7,625

Heating Season Required Maintenance

During the testing of the boiler mechanical systems, the Park staff noted the approximate length of time that was needed to feed the OWB in order to maintain the appropriate temperature for the four buildings. Two of the buildings (paint and wood shop) have limited activity during the heating season. The thermostat will be set at 60 degrees. The Operations building has staff activity primarily during the week from 8 am to 4 pm during the week. The thermostat will be set at 63 degrees during the week and 60 degrees on the weekend during the heating season.

The visitor Center green house will require temperature around 70-75 degrees once the plants have been moved indoors and/or new seedlings has been started. This generally occurs in late October or early November and will continue through mid-May, depending on the outside temperature. The green house has a computerized temperature monitor that will engage the back-up heating should there be an OWB failure. In addition, this monitor will alert staff as to any temperature extremes.

Manufacturer's recommendations will be followed as to maintaining the heating unit. Testing of the water lines will be conducted at the beginning and end of each heating season. Water lines have been insulated and special antifreeze will be injected into the lines to prevent freezing of the lines.

Energy Savings

Since this will be the first heating season in which the OWB will be employed, staff will be monitoring the energy use. A base line energy cost was obtained from the 2008-2009 heating season where over \$13,500 was spent on natural gas utility bills for the four structures. With the installation of the OWB, any costs from natural gas would be incurred if the back-up boiler system would be engaged. Constant vigilance and regular maintenance checks will reduce a failure possibility. In addition, there is always a possibility of a natural disaster during the heating season. However, monitors have been installed to alert staff of such problems.



OWB operating testing operation and emissions



The EPA has instituted a Voluntary Partnership agreement (Phase 2) that caps average air emission level to .32 lbs/million BTU heat output². Tests have indicated that the ECL 2300 model emits .2 lbs/million BTUs of PM³.

Acknowledgement

Signage recognizing the SSC as a funding partner in this project is expected to be installed in the fall or winter of 2009-2010. Due to the nature of the OWB the sign will be placed a safe distance from the unit. Park visitors will be able to see the basic operation of the unit but not interfere with the loading and cleaning. Tours of the operations would be available upon request.

Special Thanks

Special thanks to the Students for Sustainability Committee for their willingness to be a funding partner with Allerton Park and the Friends of Allerton in the development and installation of this project. Both the SSC and Allerton Park are committed to developing a more sustainable campus and its operations.

² U.S. EPA Oct. 23, 2008 <http://www.epa.gov/woodheaters/pdfs/hangtag2.pdf>

³ EPA List of Cleaner OWHH 2008 and Central Boiler Brochure E Classic model 2300