

GREEN TEAMS: UNIVERSITY-NATIONAL PARK ENERGY PARTNERSHIP PROGRAM



James Madison University & National Capital Region Parks

OVERVIEW. James Madison University (JMU) and the National Capital Region developed a partnership to investigate the feasibility of photovoltaics (PV) at parks around the National Capital Region. In addition, JMU students conducted lighting audits at the Antietam National Battlefield Visitor Center.

PHOTOVOLTAIC SYSTEM STUDIES. The two-student project team from JMU conducted feasibility studies for seven PV systems at three different parks in the National Capital Region.

At Antietam National Battlefield, the students designed a PV-powered lighting system for the Visitor Center parking lot and a system for flagpole lighting at the Battlefield Cemetery. For the parking lot, the students first established power and lighting requirements, and then designed a system that employs five pole-mounted PV-powered lights. The total project (uninstalled) would cost about \$12,500.

The students also assessed the feasibility of using a PV system to power lights on the Arizona Avenue Bridge at C&O Canal. While a technically feasible system proved possible, the students expressed concerns about the placement of PV panels in the heavily wooded area and about the system's impact on the historic nature of the bridge. "Technical feasibility does not guarantee practical or cost-wise feasibility," they noted.

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- From JMU Feasibility Report

Lastly, the students examined four options for using PV at the Fort Washington National Park fee demo booth. These options include: 1) powering the total electrical system; 2) powering the HVAC system; 3) powering the lights; and 4) using rooftop PV shingles. Again, while most of the designs were technically feasible, their practical usefulness was in question. At Fort Washington, high cost was the biggest drawback.

"As we look at our designs, it is clear to us that the primary issue for the PV systems is more education than cost-effectiveness," the students noted. "That is, the systems need to be justified on not just an economic basis, but on their role in educating the public; and while this role is important, it is not easily quantified."

The PV studies produced a considerable amount of information on the technical and practical feasibility of using PV in the National Capital Region.

Partnership Successes

- Feasibility studies for seven photovoltaic (PV) electric systems at parks around the National Capital Region.
- Energy audit of lighting installations at the Antietam National Battlefield Visitor Center, with recommendations for saving over one-third of the lighting electricity use.

LIGHTING AUDIT. Based on data gathered during site visits to the Antietam National Park Visitor Center, the students developed recommendations for both behavioral and technological changes to the Center's lighting usage. Their analysis predicted savings of approximately 37 percent of the facility's \$3,000 annual lighting energy costs. Recommendations included using fewer lights where daylighting is adequate, using occupancy sensors, and using more efficient bulbs.

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- Dr. David Narum, JMU Faculty Advisor

In coming years, students will be prepared to conduct a full-scale energy audit at Antietam or at another facility in the region.

VALUABLE EXPERIENCE. The energy partnership between James Madison University and the National Capital Region produced valuable information regarding effective energy management. "The students produced a good deal of work over the short duration of the project," noted Mike Doherty, Energy Coordinator for the National Capital Region parks. "We are looking forward to continuing and expanding the partnership in the years ahead."

There were other valuable, though less tangible, results. "The students gained valuable real-world experience beyond what they learned in their analyses," notes Dr. David Narum, faculty advisor. "They also offered some valuable ideas in their report about future projects." One of these ideas is a display on PV or renewable energy display for educating park visitors.

PERSONNEL. Personnel involved in this project included Mike Doherty, Energy Coordinator, Capital Region National Parks; Dr. David Narum, Research Professor, JMU; Amy Brewer, JMU Senior; and Kevin Schulte, JMU Senior