



## Practical Problems with Dry Toilet Technologies: The Case of the Green Building Renovation Project in Charleston, SC, USA

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### ABSTRACT

This paper details the experiences of a student-faculty research team in managing waterless urinals as part of a campus sustainability project, the Green Building Renovation. Local historic preservation laws cause the Charleston community to grapple with making buildings efficient while maintaining their historical integrity. The goals of the project were to find and demonstrate various methods to increase energy efficiency and indoor health while balancing community concerns of historic preservation. To fulfil project goals, our team used the principles of sustainability and community participation to renovate a 200-year-old building (the Political Science Department building) at the College of Charleston.

The research team defines sustainability as increasing resource and energy efficiency and improving air and water quality in an economically viable way. After researching green building construction, management, renovation, and environmentally friendly products the group prioritized the use of \$10,000 (Sustainable Universities Initiative of South Carolina funds) to renovate. Simple and inexpensive improvements were implemented first. Expensive and labour-intensive improvements followed, including installing waterless urinals. The student-faculty team devoted over 7000 volunteer hours to the project; as part of the project mission, new students (identified by outgoing students) would maintain the project.



As a student volunteer project (one faculty member served as grant principal investigator and project advisor), no sustainable long-term network is *effectively* in place to address results over time. Despite student involvement, this faculty member has been the primary contact for troubleshooting subsequent problems. When this faculty member began an academic sabbatical leave, the student manager faced significant challenges. In particular, after several months of operation it was discovered that the waterless urinals had been incorrectly installed. This installation problem resulted in urine leaking into the building walls and a noticeably unpleasant odour. Though this problem was solved, urinal management is an ongoing task made more difficult by a continually changing student body and difficulty identifying consistent maintenance. To address this issue, we have written green building management and outreach into a campus student group's mission and bylaws, though to date this student group has been ineffective in providing daily monitoring and upkeep. Based on our experiences we recommend that *both* a student and faculty coordinator are critical for guaranteeing proper functioning and long-term satisfaction. The faculty coordinator should be aware of the long-term advising role required (despite efforts made to keep the project student led), while students should make every effort to document their experiences, enabling continuous and efficient building management and outreach.

## INTRODUCTION

The Green Building Renovation research team (The 'Green Team') was composed of two graduate and four undergraduate students from the Department of Political Science and Environmental Studies Programs. The team was supervised by a political science faculty member with environmental studies research interests. The research team spent one year researching, renovating, and monitoring this site, as well as conducting various outreach initiatives [1,2,3]. Subsequent individual students appointed by the project faculty coordinator continue to conduct outreach for the project, mostly focusing on native species gardening and offering tours of the building. This project has been largely funded by The Sustainable Universities Initiative (SUI) of South Carolina, the Master of Environmental Studies (MES) Program, the Urbanization and South-Eastern Estuarine Systems (USES) Project, and the Department of Political Science.

The goal of the project is to make the building as "green" or sustainable as possible using a broad array of techniques and technologies designed to target the diverse socio-economic levels both within and around the College of Charleston campus. Residents of the Charleston peninsula exhibit a variety of socio-economic levels. Houses in the area around the college reflect this spectrum, ranging from multimillion-dollar single-family homes, to houses subdivided into apartments for students or professionals, to public housing. Around the college, historic buildings display a myriad of uses, for example, dwellings of renters or homeowners, small businesses such as bed and breakfasts, restaurants, or corner groceries, and historic buildings converted into small-scale dormitories for students.



The team wanted to incorporate changes that were financially accessible to all of these groups, while keeping in mind that property renters often cannot make permanent changes to a dwelling. We wanted to provide sustainable examples for all budget types that could be implemented by homeowners or renters, residents or businesses. We began with simple and inexpensive improvements such as checking for leaky pipes, insulating the water heater, and replacing incandescent bulbs with compact fluorescents. More expensive, invasive, and labour-intensive improvements followed. Examples of these include installing ceiling insulation with vapour barriers, using non-VOC (Volatile Organic Compound) paints to refurbish the interior, and installing waterless urinals. Currently, the researchers are continuing public outreach. The College of Charleston campus and surrounding communities have many buildings of a similar age and size providing future educational opportunities (64 of the 114 facilities on campus are historic in nature and require special city approval for any changes or renovations).

The Green Building Renovation Project is serving as one model for the college, community, and region working closely with other nonprofits and individuals addressing issues concerning greenhouse gases, native species, and sustainable businesses. In this paper, we highlight the practical aspects of toilet installation for campus projects. We focus on our experiences with dry toilet installation, and make recommendations based on those lessons learned. Specifically, we recommend that when installing toilets, a faculty-student network should be in place to guarantee proper functioning and long-term stakeholder satisfaction.

## METHODS

We used participant observation to chronicle the events surrounding the dry toilet installation and its effects [1]. All three authors were involved with the project from the initiation. The faculty supervisor was involved from the project inception, as grant writer, while the student workers became involved after the granting of funds. All three authors watched and experienced the entire process, keeping journals throughout the experience to document the project. As members involved from the beginning, the authors were also able to observe other team members and campus members involved with various aspects of project. As members of a mutually trusting team, we were privy to the opinions and experiences of other campus members involved in the project. However, the participant observation aspect of the project was strongest during the active project year, when technologies were researched and installed. Problems with the dry toilet installation occurred later in time, after the graduation of some team members. To document experiences related to the mismanaged toilet installation, we saved all email correspondence between the department head, other professors in building, the faculty coordinator, and student coordinators regarding urinal issues. We use these various sources to document events as they occurred, creating a timeline of events. By reflecting on how individuals involved with the process reacted to these events, we strive to gain greater

understanding about what happened, using this understanding to create a tailored plan to address urinal problems.

## RESULTS

A timeline for Green Building events relating to the installation and maintenance of the urinals can be found in Table 1. Monitoring of changes and maintenance of equipment and demonstration materials for the Green Building Renovation project are “passed on” to new students as older students graduate. In addition, an original Green Team member that still remained in the Charleston area after graduation returned to help train the new student coordinators, despite her lessened involvement with the project. Even though one student was identified to promote the Green Building and other related projects (i.e., a Native Species garden adjacent to the building), only one faculty member (the original grant principal investigator) has been the contact for troubleshooting of subsequent problems. This posed significant problems when this faculty member went on academic sabbatical leave during year three of the project. During this time, the new student coordinator faced significant challenges. The student-led nature of this project means that, by definition, most of the individuals involved were not around to observe the long-term effects of the project after graduation. This campus also lacks a staff member specifically appointed to work as an efficiency or sustainability promoter. This means that there is no on-staff expert, knowledgeable about such technologies, to use as a point of communication between students, faculty, and staff.

**Table 1.** Event timeline.

Date	Event
Spring 2002	Grant written and awarded; monitoring (data collection) of building begins
Summer 2002	Student team makes decisions about green building technologies to be implemented
Summer-Fall 2002	Technologies implemented; monitoring (data collection) of building continues
	Falcon Waterless urinals installed
	Falcon Waterless urinal filter instructions posted for staff and tour participants.
November 2003	First problems about urinals reported; believing that problems are a result of compromised filters, a representative of Falcon Waterfree Technologies offers to visit and demonstrate how to install filters.
	It is discovered that urinals were not properly installed
	Urinals continue to smell due to destruction of filters by cleaning staff; team speaks with cleaning staff about proper maintenance and demonstrates filter replacement
Early 2004	Urinals leak again. Faculty coordinator and remaining original

	team member again experience problems changing backwards filter.
	Faculty coordinator works with Falcon representative via telephone to visit site again and determine how to solve filter issues.
	New instructions are posted above the urinals to inform cleaning and project staff.
July 2004	Faculty coordinator and remaining team member involve new/transitioning student coordinator in problem-solving. She is shown how to change the filter by using plastic keys provided by Falcon, and realistically utilizing screwdrivers and other unconventional methods because filters are backwards. Remaining team member (who has already graduated) and new student coordinator post new educational materials on cleaning/maintaining urinal provided by Falcon.
March 2005	College maintenance staff discovers problem with urinals, potentially leading to exterior of building. Department chair emails new student coordinator and primary faculty team member about potential digging on site.
August 2004- August 2005	Faculty team member goes on academic sabbatical, but continues to be point of contact.
October 2005	Second transitioning student coordinator is taught by faculty coordinator and an original team member who has already graduated.
November- December 2005	Newest student coordinator and faculty coordinator meet with Falcon representative again to change filter with new, sturdier Falcon-provided tools, as well as address the incorrect cleaning procedure by housekeeping staff. They also contact male professors in building about monitoring future urinal problems ("community management approach").
Ongoing	MESSA volunteers continue to play a limited role. New student coordinators identified to serve as contacts, and male faculty continue to serve as "urinal monitors" for trouble-shooting. Primary faculty member continues to serve as point of contact for all greenbuilding and native species garden.

## PROBLEMS WITH MAINTENANCE AND USE

Maintenance and use of the waterless urinals has proved problematic in several ways. First, the urinals were installed backwards by campus staff, meaning that filters are placed counter clockwise instead of clockwise. Though this sounds insignificant, when the urinal is incorrectly installed, removal of the filter for scheduled maintenance changes is a difficult process involving several screwdrivers and potential splashing of human waste on



student and faculty volunteers. This process is inconvenient and off-putting to the cleaning staff, making the installation and maintenance of the urinals contrary to the original purpose of modelling simple and effective sustainable technology in a historic campus building. After watching the former student coordinator struggle to change the filter (a demonstration process to the staff that was supposed to portray the benefits of the waterless urinal technology), the cleaning staff specifically stated their beliefs that installing the urinals were a mistake and a historic building was no place to add this type of technology.

Another problem involves cleaning staff dumping bleach or other cleaning solvents into the urinal to “clean” it. Dumping bleach into the filter works against the urinal design by destroying the urinal filter and the odour barrier, therefore discharging an unpleasant smell throughout the building. They continue to do this because it is a quicker task than changing the backwards filter. It is important to note that the cleaning staff has a lengthy list of obligations (and do not have salaried positions or healthcare and other benefits), and promoting sustainability on campus is not one of them.

In addition, the head of the department, the faculty coordinator, the department administrative assistant in charge of keeping filters stocked, and all student coordinators to date who have helped troubleshoot urinal problems have been women. Clearly, these women have to rely on feedback and reports from male staff members to obtain a picture of urinal status. The existing available lines of communication lead directly to women involved with the project. One has to wonder about the comfort level of male faculty and staff in discussing urinal issues with students, their female colleagues, or their supervisors.

On several occasions problems with urinals were brought to the attention of the green building team by the individual whose office is closest to the men’s bathroom (a female). In essence, team members were not made aware of a problem until it had become so significant that the ensuing smells reached an office down the hall. This was most likely due to the combination of the cleaning staff’s apathy and the male staff’s unwillingness to discuss the urinals, whether due to comfort level or time constraints. Finally, in respect to the overall success of the project, the problems with the urinals detracted from the sustainable message being promoted by team members. The urinals were a highlight of the green building tour. Every person who heard about them wanted to see them, really making the green building “famous” on campus. To have a keynote technology, a bragging point for building tours, appear so obviously problematic, sends a message about the usefulness and relevance of not only the urinal technology, but also sustainability in a broad sense. This is even more unfortunate because the technology itself is not faulty, and resulting problems were preventable. Correct installation, proper care by staff, and a firm network in place to catch problems immediately, and then solve those problems, could have saved this aspect of the project.

The installation problem was solved through former student assistance and the faculty contact working from her sabbatical status. However, ongoing problems continue to plague urinal management. The urinal filters continue to be destroyed by campus staff members



(i.e., housekeeping) who fail to understand proper filter maintenance even after direct education efforts (e.g., signage, verbal and visual training about proper cleaning techniques, etc.). As mentioned earlier, this improper cleaning most likely has become habit from when the urinal filters were backwards. The problematic nature of urinal management is made more difficult by the continually changing student body. In an attempt to address this issue, we have written the management and outreach of the Green Building into a campus student group's mission and bylaws. However, the student activist group identified to provide long-term maintenance of the model green building has not yet been effective in providing daily monitoring and upkeep. At the same time, building occupant complaints about the urinal odour and operation continue. Accordingly, the faculty advisor has been the primary contact for problems and has identified a new approach.

At present, the monitoring is more effective. In particular, one male faculty member on the second floor and one on the first floor have been identified to inform the research team about problems. Since both of these male faculties are environmentally-oriented, the reports of problems have been more reliable. These faculties always report problems to the primary faculty researcher, rather than to any other point of contact. Also, repeated contact to Falcon has resulted in the regional manager stopping by twice to "check in" about the system, and bring a new filter. Finally, one student has been identified for the current and next academic year as a point of contact (a woman at present; a man for academic year 2006-2007). The MESSA volunteer organization continues to not play a significant role, and the new approach taken by the team is reflective of individual level coordination versus organizational responsibility.

## DISCUSSION AND CONCLUSIONS

Based on our experiences to date, we recommend that when installing toilets or any other significant green change, a team comprised of a student coordinator and a faculty coordinator should be in place to guarantee proper functioning and long term satisfaction. The faculty coordinator should be aware of the long-term advising role required (even if other efforts are made to keep the project student led), and the students involved should make every effort to document their experiences so new individuals involved can be efficient in their approaches to management of the building and outreach. As founding Green Team members, we should have emphasized these issues more as each student took over. Another active solution would be to host an open house and workshop regarding all building technology every year, when new students join the project team. Finally, incorporating a male contact for urinal problems will remove any barriers in communication resulting from the, to date, all female project contacts.

There is one paid student staff position incorporating sustainability goals on the College of Charleston campus, the Student Campus Recycling Coordinator. This individual works with the college's Committee for Recycling and Environmental Responsibility and could be the appropriate monitor of waterless urinal maintenance. Coincidentally, this group (backed



by the College President) meets in the Green Building and would be a suitable choice to coordinate with the faculty sponsor to ensure maintenance of the waterless urinals and other green campus technology. This plan mimics the system that other US schools focusing on sustainability have successfully utilized by placing an intuitionally-backed network with a paid coordinator continually monitoring, re-vamping, and promoting sustainability issues, and subsequently using the successes and lessons learned to motivate student activism and education of environmental initiatives on campus. With a financially-compensated and institutionally-backed student in charge of high profile alteration (e.g. installation of expensive waterless technology in a model sustainability project), benefits to efficient problem-solving include larger and more diligent communication between campus staff, faculty and students; better tracking of data and history of technological problems and solutions; increased project organization and campus participation to ensure a solution to any future problems. All of these benefits to having a paid student coordinator with campus power will ultimately lead to tangible results, thus further encouraging institutional and community support of sustainability projects [4,5,6,7,8].

In retrospect, the problems with the urinals should have been addressed immediately, with team members prioritizing active problem solving. Implementing several changes in current team structure have the potential to create an effective network capable of solving any problems with green building maintenance, including urinal difficulties. The best strategy to ensure change on campus and benefit the most from the technology demonstrated in the green building is to incorporate the lessons learned; specifically, appointment of a paid student coordinator, backing by the institution and the student group with urinal maintenance instructions and volunteerism in its by-laws, continuation of education efforts to campus faculty and staff, and continued data collection and journal records passed between students with each graduating year. A cooperative effort between Falcon, the College of Charleston, and continuing patience of the campus community will ultimately produce an effective model of resource conservation.

## REFERENCES

1. Halfacre, A.C., Owens, K.A., Zimmerman, K.S. & Hart, Z.H. *The green building project: promoting political science learning through a collaborative research approach*. PS 297-302. 2004.
2. Zimmerman, K.S. & Halfacre, A.C. *Barriers to Student Mobilization and Service at Institutions of Higher Education: A Greenbuilding Initiative Case Study on a Historic, Urban Campus in Charleston, South Carolina, USA*. International Journal of Sustainability in Higher Education. January 7 (1): 1-17. 2006.
3. Owens, K.A. & Halfacre, A.C. *As Green as We Think? The Case of the College of Charleston Green Building Initiative*. International Journal of Sustainability in Higher Education. In Press 2006.
4. Bernard, H. R. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. Alta Mira Press, London. 1995.



5. Newport, D., Chesnes, T. & Lindner, A. *The 'environmental sustainability' problem: ensuring that sustainability stands on three legs*. International Journal of Sustainability in Higher Education. 4 (4): 357-363. 2003.
6. Shriber, M. *Institutional assessment tools for sustainability in higher education: strengths, weaknesses, and implications for practice and theory*. International Journal of Sustainability in Higher Education. 3 (3): 254-270. 2002.
7. Smith, A.A. & The Student Environmental Action Coalition. *Campus Ecology: A Guide to Assessing Environmental Quality and Creating Strategies for Change*. Living Planet Press, Los Angeles, California. 1993.
8. Starik, M., Schaeffer, T.N., Berman, P. & Hazelwood, A. *Initial environmental project characterizations of four US universities*. International Journal of Sustainability in Higher Education. 3 (4): 335-345. 2002.