Scanning Environmental Sustainability in Higher Education: Best-Practice Project Recommendations for the Clark University Environmental Sustainability (CUES) Task Force

Submitted by:
Dominic M. Pascarelli '08

1. Introduction

This research and its funding are the result of the author's interest in helping Clark University achieve ever higher levels of environmental sustainability. It is the culmination of meetings between the author, the University's Sustainability Coordinator, and the University's Provost. One of the primary reasons the research was advised by the Sustainability Coordinator and paid for by the Provost was its potential contribution to the development of the University's Climate Action Plan.

There are two characteristics of the author that were thought to be particularly beneficial to this research position. First is the interest he showed in issues of environmental sustainability at the University. Second is his experience working with Physical Plant, University Administrators, and, more recently, the University's Sustainability Task Force. This interest and experience were seen as having fostered the critical eye necessary to identify environmental sustainability projects that were particularly well suited to the University.

From mid-May 2008 to mid-August 2008, the author spent more than 250 hours on this project. Thinking in terms of a funnel, this research was designed to narrow the number of possible environmental sustainability projects available for implementation at the University to between 30 and 100. The Sustainability Task Force can then, based on the author's recommendations, further narrow the list and conduct additional research as necessary. Based on its own research, the Task Force will then pick an even smaller number of projects to write a series of white papers on.

There are 50 projects, organized in matrix format into six categories: Increase GHG Emissions Reductions, Increase Energy Efficiency of Infrastructure, Increase Energy Efficiency of Infrastructure, Increase Solid Waste Management, Increase Water Use Management, Increase Sustainability-Specific Funds, and Increase Sustainability Infrastructure. The matrix does not attempt to rate the projects; instead it is a tool to categorize them for more manageable viewing.

The following includes a list the overall objectives of the project, the process by which these objectives were fulfilled, an explanation of the creation of the Matrix, and the author's conclusions/recommendations.

2. Objectives

Originally, the objectives of this project were believed to be fairly straightforward. There were three objectives:

First, was to conduct a survey of the programs/strategies/projects being utilized by other colleges and universities in the United States and beyond to make significant improvements in their environmental performance, specifically greenhouse gas reductions.

Second was to develop a matrix designed to categorize the aforementioned programs/strategies/projects by sector.

Third was to write a report on the findings and include recommendations for which programs/strategies/projects the University is most able to pursue in the short term (0-2 years), medium term (3-5 years), and long term (6-10 years).

As the research period passed, it became increasingly clear that there was not enough time to accomplish the first two objectives – given their breadth – while also accomplishing the third objective with such an amount of detail. In addition to a lack of time, a breakdown of the recommended projects by short, medium, and long term would enter the realm of project ranking, something that was expressly cautioned against.

That said, the first two objectives remain the same, while the third objective has been amended such that project recommendations will be made without a suggestion of timeframe.

3. Process

The author was given a good deal of latitude in determining the process by which the objectives of the project would be fulfilled. As a jumping off point, the author read *Sustainability on Campus: Stories and Strategies for Change*, edited by Peggy Bartlett and Geoffery Chase. After following up on some of the leads in the book, the focus shifted to the American Association of Sustainability in Higher Education's (AASHE) Resource Center. This resource list provides a wealth of information that AASHE has published on sustainability programs/strategies/projects at colleges and universities in the United States and Canada. In addition to the AASHE-published materials, the association's resource center is full of external links that provide the reader with greater detail for specific programs/strategies/projects.

4. Creating the Sustainability Projects Matrix

Having used the aforementioned resources to compile nearly 200 pages of notes, it was time to create a matrix that narrowed the results in a useful manner. After a couple of versions and several drafts, the Sustainability Project Matrix was created. The Matrix has a column of six categories. Three of these categories have three subcategories, one has two subcategories, and two do not have subcategories. Its next column is a list of projects that fall within each category or subcategory. The ten columns that follow explain different characteristics of the project (such as environmental gains, financial gains, and what institutions have implemented them) and concludes with whether or not the project is plausible for implementation at Clark.

The six categories of projects are (1) Increase GHG Emissions Reductions, (2) Increase Energy Efficiency of Infrastructure, (3) Increase Solid Waste Management, (4) Increase Water Use Management, (5) Increase Sustainability-Specific Funds, and (6) Increase Sustainability Infrastructure. The eleven subcategories follow, organized according to the main category each belongs to (1) Stationary Sources, Transportation, Purchased Electricity, (2) General Applicability to Buildings, Grounds Specific, (3) Total Waste, Percentage of Recycling, Percentage of Compost, and (4) Water Use, Use of Drinking Water for Non-Drinking Purposes, Stormwater Management.

The preceding six categories and their eleven subcategories were chosen based on (a) the University's upcoming deadline for submitting its climate action plan (b) objectives stated as 'next steps' in the University's Sustainability Report, (c) areas of environmental sustainability where the University has been rated poorly in the past, (d) areas of environmental sustainability where the University will be rated in 2008, and (e) the author's review of best practices in environmental sustainability in institutions of higher education.

5. Conclusions and Recommendations: A Synthesis of the Sustainability Projects Matrix

5.1 Holistic Environmental Sustainability Management

The overall trend in holistic environmental sustainability planning at the more successful colleges and universities (e.g. Pennsylvania State University, Mt. Allison University, University of

California – Santa Barbara, University of California – Berkeley, University of Wisconsin – Oshkosh, Harvard University, and others), the majority of which do not claim environmental sustainability as the core mission of their institution, is doing a thorough job auditing all of the major aspects of the institution that impact the environment. The result of this effort is a comprehensive document whose length is generally around 100 pages. (Clark must not strive for page length for these benchmark documents, but instead the quality and comprehensiveness that each represents.) It is this document that is used as the baseline for all environmental sustainability policies and projects that happen on campus.

This baseline is essential and, if it starts smaller as it has at Clark, can be updated by some individuals as others work to plan and execute programs based on the initial document. Also, this baseline document can easily be put onto the institution's sustainability web page for the purposes of transparency. Such transparency is useful for anyone from students interested in helping the university by completing a research project focused on environmental sustainability to administrators, staff, and faculty members interested in using the university's sustainability record to attract the best faculty, students, and staff or more funding.

Therefore, the baseline document must not be viewed as an end in itself, but the means to completion of all sustainability policies and programs on campus. Here it is necessary to explain that, increasingly, this baseline document is leading colleges and universities to develop climate plans. These plans, many of which further narrow their focus to heating and cooling, signify the first of several action plans that are necessary in following through on the objectives and goals set by the overarching sustainability plan. Embarking on the climate action plan first is justified by the fact that the greatest portion of the institutions' environmental impact is caused by greenhouse gasses associated with heating and cooling.

Clark University is encouraged to consider the climate plans of Oberlin College and the University of California – Berkeley as the two best examples of best practices in climate plan writing. The Rocky Mountain Institute (RMI), the organization that wrote Oberlin's climate plan, is one of the foremost environmental think tank and/or solution factories in North America. In comparison to Berkeley's climate plan, the quality and content of the RMI report are as good, if not better. Additionally, RMI's document is more straightforward and more generalizable in terms of specific greenhouse gas reduction strategies. Again, Clark should not feel it must reach a certain page number, rather it must strive for the quality and comprehensiveness of the aforementioned documents.

5.2 Specific Environmental Sustainability Projects

Despite the fact that the Sustainability Projects Matrix drastically narrowed the number of projects Clark could pursue, it is useful to consider the projects based not on whether Clark can potentially accomplish them but whether Clark currently has the resources to do so. Since this sort of determination is ultimately beyond the extent of the author's knowledge, what follows are the projects that have the potential to make large environmental gains, particularly greenhouse gas reductions. Based on the author's limited experience working with Physical Plant, University Administrators, and the Sustainability Task Force, his inclination is that the University does have the resources to undertake the projects outlined below. It is his recommendation that University employees more skilled in this field conduct further research to determine whether the resources do indeed exist.

Three of the eight projects under the Stationary Sources subcategory can make significant greenhouse gas reductions. First is the addition to the heating system or conversion of the heating system from natural gas-fired boilers/cogeneration plant to wood biomass-fired boilers/cogeneration plant. This can both drastically reduce the cost of heating/electricity generation but also the number of greenhouse gasses released per unit of heat or electricity generated (a 20-30% reduction, according to

Mt. Wachusett Community College). The two largest obstacles in need of further research are (1) whether Clark has space to build a wood-biomass plant that is large enough to be economically feasible and (2) whether Clark has the space to store the amount of woodchips necessary for operation of the plant.

Second is installing solar thermal systems for heating and/or preheating water on all structures whose rooves can hold them. This can drastically reduce the amount of greenhouse gasses produced per unit of heated water and save a significant amount of money on water heating. These positive outcomes are only magnified by the fact that the University uses hot water for a large number of activities, including space heating, restroom uses, dishwashing in the cafeteria, and heating the swimming pool. One reason this option is currently so financially attractive is because of the opportunities for subsidies from both the federal and state governments. The largest obstacle in need of further research is whether Clark has a combination of roof space and solar exposure that would enable a solar thermal water heating system large enough to both make a significant impact in greenhouse gas emissions and the cost per unit of water heated.

Third, replacing flat roof coverings with white marble (stone) chips can make significant greenhouse gas reductions (saves 25% on heating and cooling, according to Jolie, 2008). The three largest obstacles in need of further research are (1) determining whether the energy savings would be in the same range for Clark's flat-rooved buildings, (2) whether any of the flat rooves are in need of replacement, and (3) whether the economics are such that the project would still be financially attractive even without the rooves needing replacement.

Four of the five projects listed under the Transportation subcategory can make significant greenhouse gas reductions. Each of the four projects (1) Establishing an expense to park on campus that is commensurate to the land value (2) Working with City of Worcester to make streets surrounding Clark resident-only parking, (3) Establishing a lottery for student parking passes, and (4) Incentivizing carpooling is geared toward reducing the intensity of greenhouse gas emissions per person traveling, to, from, and around campus.

Raising the price of parking so that it better reflects the value of the land serves to keep faculty and staff from driving to campus each day unless it is absolutely necessary to do so. It also serves as an incentive to use an alternative mode of transportation, such as a bicycle, carpool, or bus. There do not appear to be any significant obstacles to this project.

Working with the City of Worcester to make the streets surrounding Clark resident-only parking will prevent individuals hoping circumvent the University parking system from simply parking on the street. This not only benefits the University by ensuring revenue but also benefits local residents who are able to find spaces on the street rather than parking in their yards. The one major obstacle in need of further research is whether this action is merely a negotiation between the University, the City, and the residents or whether further action e.g. passage of legislation is needed.

Establishing a lottery for student parking passes will also entail establishing a cap on the number of passes issued. The pass would simply give the individual an opportunity to choose whether s/he would like to purchase parking rights on the campus. Therefore, without such a pass, a student would not be able to purchase such rights. The lottery allows the University to have greater control of overall parking by capping the number of possible spaces available to students. This also allows them to have greater control of vehicle emissions. The primary obstacle in need of further research is whether students would support such a measure.

Incentivizing carpooling would likely come as part of a wider restructuring of parking lots and fees. There could be a separate carpool lot created; however, that is not entirely necessary given that higher prices may result in administrators, faculty, and staff splitting the cost of parking and carpooling.

Another measure that might increase carpooling is breaking down parking permits by day e.g. the fewer days you buy, the less you have to pay, and the cheaper it is if carpooling is chosen. The most significant obstacle in need of further research is whether the University Police would be willing to enforce a more complex parking system.

Three of the nine projects listed under the General Applicability to Buildings subcategory can make significant greenhouse gas reductions. Each of the three (1) Installing occupancy sensors that shut off lights in common areas e.g. hallways, bathrooms, classrooms, offices, labs, (2) Powering down computers, other office equipment, and even entire buildings at night and over breaks, and (3) Replacing steam lines and insulating them better is aimed at demand-side energy management.

Installing occupancy sensors and powering down office equipment and buildings can significantly reduce the amount of electricity used in campus buildings. However, 'use' is a relative term. With the exception of some computers that may be left on for the purposes of software updates, automatically shutting off lights that keep empty rooms lit, office equipment that sits idle, and buildings without occupants amounts to a large reduction in electricity that is essentially being wasted. The three largest obstacles in need of further research are (1) what rooms it is most economically attractive to put occupancy sensors in (2) what, if any, office equipment cannot be shut down at night and over breaks, and (3) what level, by law, different buildings can be shut down to over breaks and at other times.

Replacing steam lines and insulating them better can considerably reduce the amount of energy the University needs to heat the campus. This is because leaky steam lines loose both steam/water and heat as they crisscross the campus. Both the addition of water to keep the steam plant running optimally and the generation of more heat to warm the additional (mostly likely cold) water uses a significant amount of University resources. In the same vein, the less insulation around the pipes, the more energy that is required to reheat the water as it cycles continuously through the heating system. The two biggest obstacles in need of further research are (1) determining what sections of the pipes are in worst repair and (2) what the most economical strategy for replacement and better insulting all steam lines is.

For additional projects that may be within reach of Clark's resource capabilities (and will heighten Clark's environmental sustainability while saving a significant amount of money, but do not directly reduce greenhouse gas emission) the reader is encouraged to view the Increase Solid Waste Management, Increase Water Use Management, Increase Sustainability Specific Funds, and Increase Sustainability Infrastructure categories and their associated subcategories of the Sustainability Projects Matrix.

5.3 Final Thoughts

Given the desired focus of the above recommendations on projects that are thought to be the most economically attractive, there is a need for further research into whether building the in-house capabilities to develop and execute Clark's sustainability plan, or even its climate plan, is economically practical. It seems that doing so may be more costly and take longer than contracting an energy service company (ESCo) or an agency like the Rocky Mountain Institute (RMI) to assist in the completion of a comprehensive audit of environmental sustainability and Clark University. This audit, as mentioned previously, becomes the overarching sustainability plan and the baseline for all environmental sustainability projects on campus. Further, this strategy affords the University the opportunity to build in-house talent capable of managing projects that are determined as being both necessary and possible by the ESCo or RMI-like agency.

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