A Sustainable Endowments Institute Report

Greening the Bottom Line

2012









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Executive Summary

With buildings consuming almost half (49 percent) of all energy used in the United States, and three quarters of all electricity, there is a compelling need for investment in energy efficiency upgrades. These energy saving improvements "represent a significant opportunity to save money, reduce climate impact and generate jobs," according to *United States Building Energy Efficiency Retrofits*, a recent report by Deutsche Bank Climate Change Advisors and the Rockefeller Foundation.[D]

The analysis supported by these two prominent institutions shows that investing $279 billion in building retrofits nationwide could "yield more than $1 trillion of energy savings over 10 years." This would be the equivalent to savings of approximately 30 percent of the annual electricity spending in the entire country.

Recognizing such bottom-line and sustainability benefits, leading corporations such as Dow Chemical[A], General Electric[B] and News Corporation[C] have invested in improving the energy efficiency of their own buildings, operations and products. Without having access to the capital resources of large corporations, what innovative affordable methods can higher education institutions use to invest in significant energy efficiency improvements?

One cost-saving and carbon-reducing method with a successful track record is the green revolving fund (GRF). GRFs invest in energy efficiency projects, thereby reducing operating expenses and greenhouse gas emissions. The cost savings boost the bottom line and replenish the fund for investment in the next round of green retrofits, thus establishing a sustainable funding cycle. The Sustainable Endowments Institute (SEI) surveyed colleges and universities to learn how they are implementing self-managed green revolving funds.

As reported in *Greening the Bottom Line 2012*, the survey provides insights into the various approaches to green revolving fund creation, structure and management as well as environmental and financial performance. Based on data from 79 active green revolving funds at the 76 institutions in the survey, the following findings emerged:

Green Revolving Fund Development

- **31 U.S. states and 2 Canadian provinces** have higher education institutions with established GRFs.
- **$111 million in capital** has been collectively committed among established GRFs.
- **900 energy efficiency projects** have been initiated using GRF funding.
- **36 green revolving funds** were created on university campuses between 2011 and 2012.
- **15-fold increase** in the number of GRFs on campus over the past decade.
- **A wide variety of colleges and universities** with varying sizes, diverse geographic locations, and spanning the spectrum of endowment wealth have adopted GRFs.

[A] Dow. *The Future of Energy.* http://www.dow.com/energy/ (12 October 2012)

[B] GE Ecomagination. *Efficiency.* http://www.ecomagination.com/efficiency (12 October 2012)

[C] News Corporation. *Long-term Vision.* http://www.newscorp.com/energy/index.html (12 October 2012)

Green Revolving Fund Benefits

Boosting Return on Investment (ROI) – Established green revolving funds (GRFs) report a median annual return on investment (ROI) of 28 percent. This suggests that GRFs can significantly outperform average endowment investment returns, while maintaining strong returns over longer periods of time.

Achieving Short Payback Period – Schools reported a median payback period of 3.5 years, which means on average more than a quarter of all money invested in projects can be reinvested within one year (given that savings are typically paid back into the fund on an annual basis).

Initiating New Mindset – GRFs overcome the limitations of budgeting energy efficiency projects as expenses, rather than as a low-risk/high yield financing resources. They are transforming energy efficiency upgrades from perceived expenses to high-return investment opportunities.

Facilitating Flexibility – GRFs allow for the use of a variety of capital sources and they can be scaled up over time.

Hedging Against Rising Energy Prices – GRFs are an effective strategy for hedging against rising energy prices without the negative downside of traditional energy price hedges, which incur losses if energy prices stay flat or decline.

Advancing Educational Goals – GRFs foster campus community engagement, creating student leadership opportunities, and developing learning experiences outside of the classroom.

Green Revolving Fund Examples

Reliable ROI – George Washington University's Green Campus Fund invested $141,000 to upgrade the lighting in their academic center in 2010. Since completion, the project is generating $100,000 per year in savings and has already more than paid for itself. With a projected lifespan of at least 8 years, the original $141,000 investment will generate about $800,000 in total savings (or substantially more if energy prices rise).

Alumni Fundraising Opportunity – Creation of a GRF can be presented to alumni as an innovative giving opportunity that will continue to produce income for the school. For example, Agnes Scott College (Decatur, Georgia) raised about $400,000 within just a few months in order to create their new green revolving fund.

Investing Cash Reserves – Earlier this year the University of Vermont board of trustees approved a $13 million investment into a new UVM green revolving fund using capital from the institution's cash reserves. Instead of earning 2.5 percent interest (as they did last year on their other cash reserves investments), the revolving fund will pay 5 percent interest and help UVM invest in substantial new energy efficiency retrofits. UVM's new $13 million fund is now the largest at any higher education institution in the country.

With rising fuel costs and budget pressures creating continued incentives for innovation, SEI expects the number of GRFs to grow steadily in the coming years. Also spurring on GRF development is a growing body of resources to promote GRF best practices in higher education and beyond.

One reason for the recent popularity of GRFs is their ability to unite environmental concerns with financial goals, thus appealing to multiple interests from students, faculty and staff to administrators, alumni and trustees. The GRF is successful at both large universities and small colleges alike for its highly adaptable structure that can be targeted to specific institutional priorities and capital availability. The GRF is versatile and effective, and has reduced energy use, operational expenditures, and the environmental impact of college campuses across North America.

[D]The Rockefeller Foundation. *United States Building Energy Efficiency Retrofits: Market Sizing and Financing Models.* http://www.rockefellerfoundation.org/news/publications/united-states-building-energy-efficiency (18 October 2012)

Introduction

Colleges and universities across the United States and Canada are leaders of innovation. Their mission: to foster the future thoughts and actions of the policy makers, community members and thought leaders that will leave their mark on society and actively shape the future of generations to follow.

University campuses have historically tested new ideas and practices on their campus before they are embraced by society. This innovation has been especially apparent in the shift to adopt environmental practices and enact sustainability policies that affect campus operations. These trends can be seen on thousands of college and university campuses across the country. Climate action plans have been adopted, green buildings constructed, food waste composted, and students, faculty, and staff have engaged in some of the most pressing issues of our time. The widespread adoption of GRFs demonstrates the forward-thinking and problem-solving ethos that embodies the current state of the higher education sector: a focus on combatting growing climate uncertainty while conserving energy and resources.

GRFs are sustainability financing mechanisms that have grown more than 15-fold in the past decade alone. There are 79 active GRFs on 76 campuses in 31 U.S. states and two Canadian provinces.

In order to fulfill their main role of providing education, today's universities face increasing pressure to operate both effectively and efficiently. Under the GRF model, efficiency efforts can be increased, communication and management of environmental initiatives can be streamlined, and operating costs can be reduced. These factors positively impact a university's bottom line and increase its social capital in the higher education community and beyond.

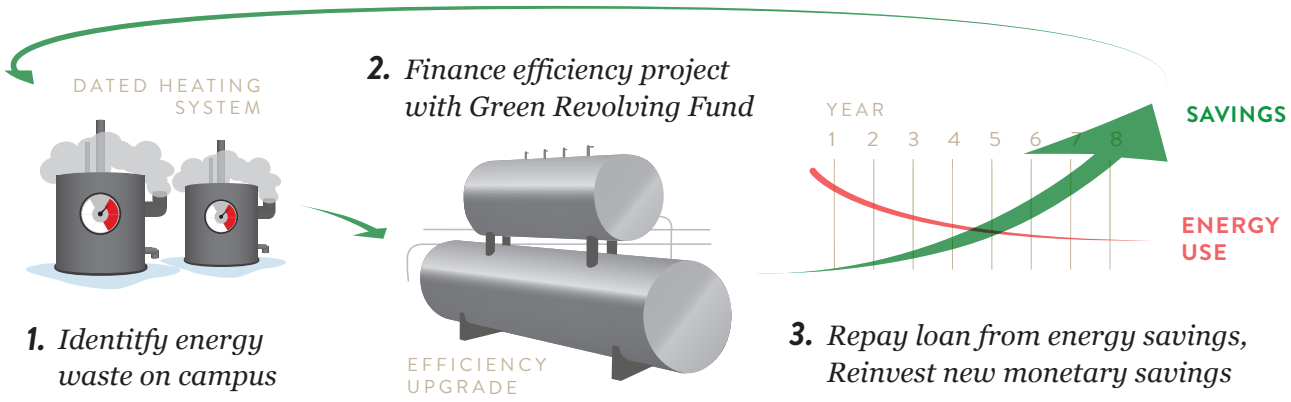
What is a Green Revolving Fund?

A green revolving fund (GRF) is a special account designated for investment in on-campus projects that improve energy efficiency, decrease resource and material use, reduce operating expenses and cut environmental impact. The cost savings from these projects are then used to replenish the GRF (See Figure 1). Once the funds are replenished, they can be redeployed to finance new projects.

GRFs have been used to reduce greenhouse gas emissions, water use, fuel use, and waste volume, and have also been used to organize new learning opportunities and provide increased environmental awareness for students, faculty, and staff. GRFs also help to mitigate rising or volatile utility costs, bolster dwindling budgets by investing in high-return projects, and address demand from stakeholders for sustainability and environmental improvements on campus. While GRF's have been used to invest in many types of projects, they typically target energy and water consumption or campus waste. Schools have undertaken successful GRF projects such as installing energy-saving software in a campus computer lab, upgrading student dorm lighting from incandescent bulbs to energy-efficient LEDs, insulating water pipes inside a student union, and reducing water use in campus buildings by installing low-flow toilets and showerheads.

However, any projects that reduce operational costs while generating environmental benefits are ideally suited to the GRF model.

Figure 1: *How Green Revolving Funds Work*



Why Research Green Revolving Funds?

There are three reasons to research green revolving funds. First, GRFs can offset rising operating costs and environmental impacts; second, GRFs can address institutional environmental goals; and lastly, GRFs can foster cross-functional collaboration on campus.

For fall 2012, the National Center for Education Statistics estimated that there will be 21.6 million students enrolled in colleges and universities in the United States, representing an increase of 6.2 percent in enrollment since 2000. [1]This trend stresses existing campus buildings and, on some campuses, the increase in community members will result in the construction of new structures and facilities. Rising operating costs are an inescapable reality for many schools as buildings and existing infrastructure age and energy prices increase, putting unwelcome pressure on operating budgets.

A study conducted by the Sustainable Endowments Institute in July 2012 found that the five largest university-owned buildings at some of the wealthiest institutions in North America had an average age of 39 years, with 73 percent of the reported buildings constructed more than two decades ago. [2]The oldest buildings in the survey were academic buildings, with an average construction year of 1958.

[1] The National Center for Education Statistics. *Back to School Statistics.* http://nces.ed.gov/fastfacts/display.asp?id=372. (10 September 2012)



Northland College's composting facility (seen above during construction) was funded through the college's Renewable Energy Fund. Replacing an older composting facility built in 1993 by student volunteers, the new facility will continue to reuse food waste in the campus cafeteria by providing fertilizer for crops that can be used in campus meals.

On average, university libraries were built in 1963, and laboratory buildings were constructed in 1985. Though some of the surveyed buildings have reported undergoing regular maintenance and building upgrades since their construction, especially laboratories which are considerably more energy-intensive

[2] In June of 2012, SEI surveyed facilities' managers at institutions with the 300 largest endowments in North America and Canada about the 5 largest buildings on their campus, recording data on building age, size, function, and--where applicable--any upgrades undertaken in the facility since its construction. Seventy-four universities provided data. For more information on this study, email info@endowmentinstitute.org.

than typical university structures, many are priority candidates for deeper retrofits, demonstrating the opportunity for new, more energy- and resource-efficient technology.

Since the launch of the American College and University Presidents' Climate Commitment in 2007, over 660 schools have committed to create a plan for climate neutrality and adopt a Climate Action Plan (CAP) for reaching their goal.[3] Many of the schools surveyed for *Greening the Bottom Line* report having a formal environmental policy to govern campus activities. Within the CAP framework, some schools have established GRFs to meet carbon and greenhouse gas reduction goals.

Green Revolving Funds in Higher Education

The track record of GRFs on college campuses originates in 1980, when Western Michigan University launched their Quasi-Revolving fund with financial support from university utility budgets. Although WMU created an effective model able to finance hundreds of projects, the growth of GRFs at other universities was modest in subsequent years; only five institutions establishing GRFs between 1980 and 2000. The early 2000s saw a steady rise in fund establishment and by 2008 there were at least 16 GRFs in operation. As reputation of these early GRFs successes spread, other institutions began to develop similar funds. In just over four years (2008-2012), green revolving funds have grown in number by 550 percent. [4]

In the United States and Canada 76 colleges and universities have initiated a GRF on their campus, with 79 such funds in operation today. Thirty-six institutions have created green revolving funds since January 2011, a number that demonstrates the model's popularity as one of the faster growing sustainability tools in the university sector.[5]

[3] The American College and University Presidents' Climate Commitment seeks to advance sustainability in higher education by accelerating the education, research and community engagement necessary to equip society to re-stabilize the earth's climate, while supporting colleges and universities in eliminating net greenhouse gas emissions from their own operations. As of September, 2012, 659 schools are actively participating in the commitment. For more information see: http://www.presidentsclimatecommitment.org

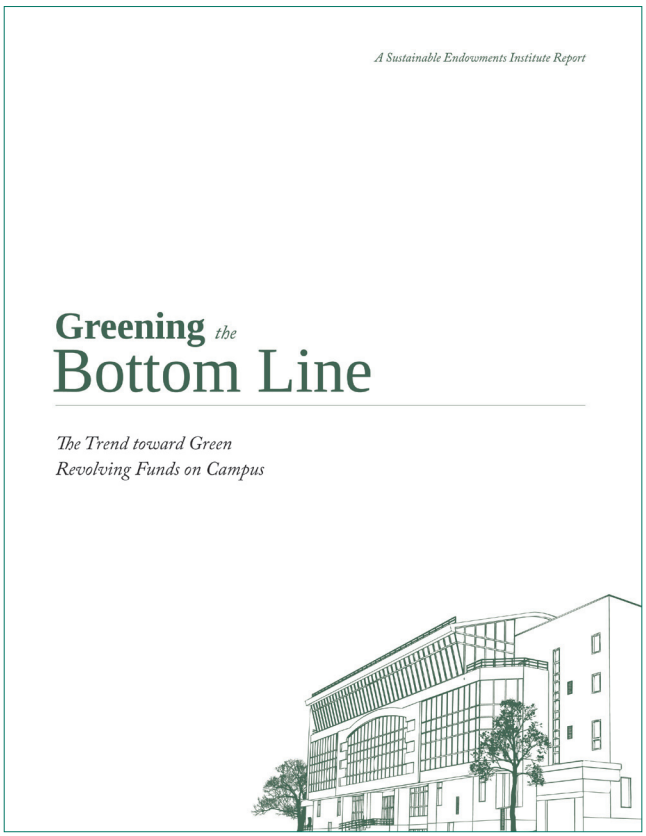
[4] SEI's Billion Dollar Green Challenge, launched in 2011, contributed to the growth of GRFs on college campuses. For more information, see *Appendix D* - page 56 *The Impact of SEI's The Billion Dollar Green Challenge.*

[5] For a full list of schools, please refer to *Appendix A* - page 50 *GRFs Operating in the United States and Canada.*

Key Findings of *Greening the Bottom Line 2011*

Based on survey data from funds at 52 institutions, the following key findings emerged:

- All sizes and types of institutions are creating GRFs.
- The GRF model is adaptable and can be customized to meet a range of institutional goals.
- GRFs help schools advance other goals such as aca demic, co-curricular, and campus community en gagement on sustainability issues.
- Reports to date suggested potential for consistent annual returns ranging from 29 percent (Iowa State University) to more than 47 percent (Western Michigan University).



Researching for *Greening the Bottom Line 2012*

Greening the Bottom Line 2012 retains the criteria for what constitutes a green revolving fund from the 2011 report, namely:

1. The fund must finance measures to reduce resource use (e.g., energy, water, paper) or to mitigate carbon emissions and/or greenhouse gas emissions (e.g., renewable energy development).

2. The fund must revolve, with the savings generated by reducing operating costs tracked and used to repay the fund to provide capital for future projects.

For the 2012 survey, SEI identified **102 institutions** that declared having revolving savings from efficiency or resource-use reduction projects. **Seventy-six institutions, operating 79 funds**, were eligible for inclusion in the survey. A number of schools initially reported funds that are not included in *Greening the Bottom Line* because they do not meet the above criteria. SEI notes that many of these ineligible programs (including operating a grant program, partnering with an energy service company to implement projects and budgeting for energy efficiency) are laudable elements of campus sustainability efforts.

For more information on methodology, please refer to **Appendix B - Page 54.**



Greening the Bottom Line 2012 seeks to:

- Show the changing landscape of the green revolving fund model in higher education since the first edition was published in 2011.
- Provide an in-depth look at the intricacies of operating a green revolving fund, including how schools source seed capital and fund champions, the types of projects that GRFs finance on campus, and who oversees the fund from project proposal to project measurement and verification.
- Highlight the structural components of the GRF model, including the loan versus accounting model and the significance of estimated versus metered savings.

Major Trends

Based on survey data from the GRFs at these **76 institutions**, the following key findings emerged:

- GRFs have been established in 31 U.S. states and two Canadian provinces.
- Over $111 million in capital has been committed among established GRFs.
- GRFs continue to grow on university campuses, with 58 schools creating GRFs since 2008, and 36 created between 2011 and 2012.
- GRFs are adopted at colleges and universities of varying sizes, geographic locations, and endowment wealth.
- GRFs help schools achieve institutional goals, such as fostering campus community engagement, creating student leadership opportunities, and developing learning experiences outside of the classroom.
- 900 energy efficiency **projects** have been initiated using GRF funding..
- 15-fold increase in the number of GRFs on campus over the past decade.

The Evolving GRF Model

Institutions with GRFs

This section addresses the following questions:

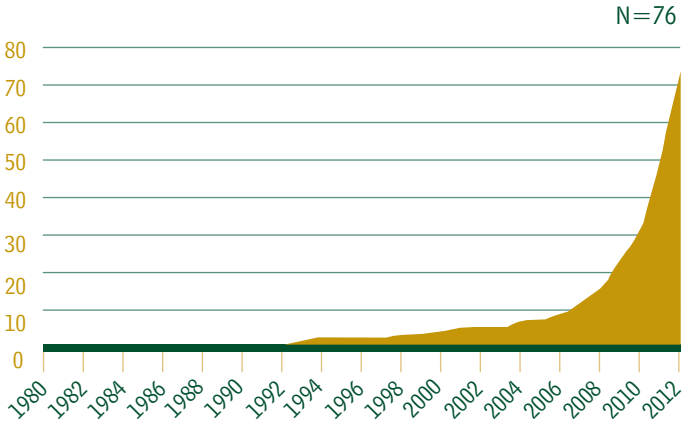
- When were GRFs established?
- What types of colleges and universities are creating GRFs?
- Is there a relationship between institutional wealth and GRF creation?
- How have these trends changed since *Greening the Bottom Line* 2011?

GRFs have been created at a wide range of institutions and establishment does not appear to correlate with institutional size, geographic location, public or private status, or endowment wealth.

Year Established

The number of GRFs have grown considerably since they were first introduced in a university setting in 1980. Though only 12 green revolving funds were created prior to 2008, the last four and one-half years has seen rapid adoption at colleges and universities, with more than 120 percent increase in the number of GRFs in just 20 months.[6]

Growth of Green Revolving Funds: 1980–2012



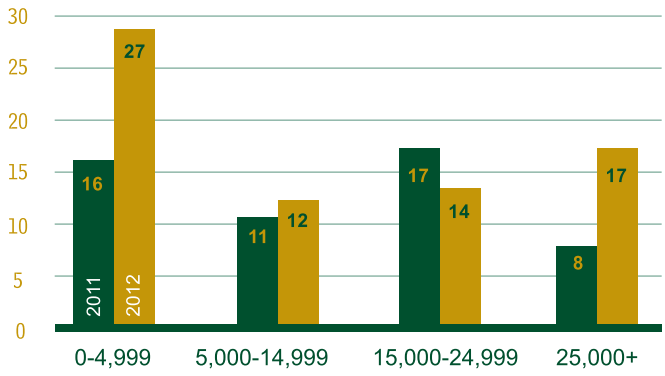
Sizes of Institutions

GRFs continue to be established on campuses of all sizes. The school with the lowest enrollment in the survey was Burlington College (Vermont) with 192 full-time students. Arizona State University reports 70,440 full-time students and has the largest enrollment in the survey. The average enrollment in the survey was 15,271 students, with a median student body size of 12,074 students.

[6]As a significant portion of these new funds are still in the development stage, not all data – including size, project priorities, and fund structure – was available at the time of publication.

The chart below shows the distribution of GRFs at institutions by enrollment size in 2012 compared with 2011.

Distribution of Green Revolving Fund Institutions by Enrollment Size



In the past year, GRF creation increased by over 100 percent in large universities (institutions with 25,000 full-time students or greater), from 8 campuses in the February 2011 report to 17 campuses as of August 2012. Small schools (institutions with 4,999 full-time students or fewer), established 11 new funds, increasing by 150 percent since the 2011 report.

Although recent years show little change in the number of GRFs at mid-sized schools (with student enrollment between 5,000 and 24,999 students), there is great potential for these institutions to develop GRFs on their own campuses.

Types of Institutions

Different types of institutions have developed GRFs on their campuses, including former and current community colleges (Bellevue College in Washington state and Lane Community College in Oregon, respectively), religious institutions (Bethany College in West Virginia and Edgewood College in Wisconsin), a women's college (Agnes Scott in Georgia), the largest public university in the U.S. (Arizona State University) and one of the smallest colleges (Burlington College in Vermont).[7]

Of the 79 reporting funds, 37 are at public institutions and 42 are at private institutions.

New additions to *Greening the Bottom Line* include both publicly and privately funded institutions. The University of Vermont, a public university, began their fund in 2012 with money from the university's cash reserves, a strategy that generated $13 million in capital for the new fund. Other public universities new to the survey were the University of Oregon and the University of Illinois at Urbana-Champaign, which both instituted funds in 2012. Notably, both Western Michigan University and the University of North Carolina at Chapel Hill began their second Green Revolving Fund in 2011. UNC's first GRF was financed through a student-led proposal that enacted a $4 per student per semester fee that in order to "ensure a predictable funding stream for energy efficiency investments in state appropriated buildings," while the second fund received $500,000 from the general operating budget.

The past year also saw growth in GRFs at private colleges. Middlebury College, Rollins College (Florida), Yale University, and Agnes Scott College all began their funds in the last 16 months. Agnes Scott College began their fund primarily from alumni donations and individual gifts to the college and is one of the first colleges in the U.S. to pursue alumni support as a capital source to establish a GRF.

Other GRF commitments came from Bellevue College (formerly Bellevue Community College) in Washington State, Daemen College in New York, and Drury University in Missouri. Bellevue committed $350,000 gathered from student green fees to create its Student Environmental Sustainability Fund. The green fee was proposed and then passed by students in the spring of 2008, though the fund did not take on a revolving characteristic until 2011. Daemen and Drury began their GRFs in 2012, and Drury University created their Sustainability Revolving Fund with proposals submitted by students, facilities personnel, and sustainability staff.



In 2010, Drury University (Missouri) financed the installation and some upgrades to the digital controls panel of campus buildings, including their Olin Library, above. The systems control building heating and cooling and can be adjusted by Drury's energy manager to adapt to weather conditions, seasons, and building use.

[7] While these types are equally represented in our findings, they appear to use different strategies when it comes to finding seed capital. This is covered further on page 22, Sources of GRF Capital.

Institutional Wealth and Endowment

This section addresses the following question:

- Is institutional wealth correlated with GRF establishment?

The institutions surveyed in *Greening the Bottom Line* represent a wide range of endowment value. The majority of institutions (approximately 74 percent) have endowments between $30 million and $2.5 billion, with a median endowment size of $400 million.

But looking at endowment size alone to compare institutional affluence is problematic for two reasons:

1. The majority of colleges and universities in North America do not have endowments.

2. Endowment alone says little about an institution's wealth given differences in program, research and enrollment.

Additionally, there are few national benchmarks available to evaluate an institution's wealth. SEI analyzed survey results by endowment value per student in an effort to understand whether endowment size correlated to an institution's ability or willingness to create a GRF.

On an endowment value per student basis, Yale University remained the institution with the highest per student value, increasing its endowment value per student from $1.4 million in 2011 to $1.65 million in 2012. Bellevue College, a newcomer to the field, had the lowest endowment per student value ($138).

There are a few conclusions to be drawn by looking at endowment value per student figures. First, more than half (60 percent) of the institutions that create GRFs have an endowment value per student figure of less than $50,000. Schools with less than $50,000 saw the most growth in the creation of GRFs on their campuses, from 28 institutions in 2011 to 40 institutions in 2012.

Looking at all endowment value per student figures, growth was slow but steady: changing from six to five campuses with a value between $50,000-$99,000; from eight to ten with $100,000-$249,000; from zero to two with $500,000-$749,000; and from five to six with $750,000 or greater. From this analysis, it appears that at every level of endowment value, schools are developing sustainability programs through the GRF model.

Lane Community College

Location
Eugene, Oregon

Name of Fund
Energy Carryover Fund

Year Established
2006

Size of Fund
$126,000

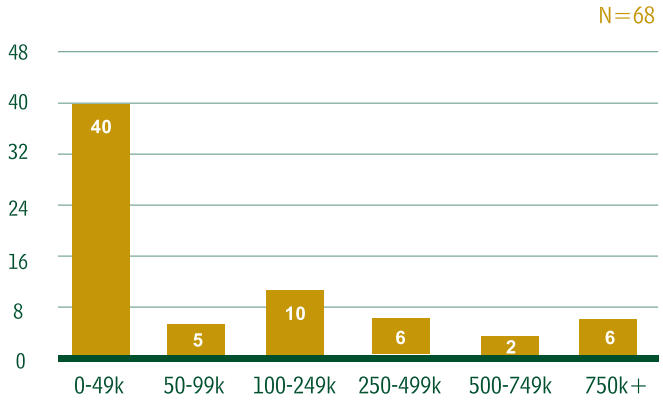
Source of Seed Funding
Utilities budget

First GRF Projects
Monitor and CFL replacements, commissioning main campus digital HVAC controls, and exterior lighting upgrades



The survey also found GRFs at a number of schools with smaller endowments. Six schools have endowment values of less than $10 million, including Green Mountain College (Vermont), Unity College (Maine), and Lane Community College (Oregon). Another, Burlington College (Vermont), has committed $25,000 to their GRF, a sum that is equivalent to more than 20 percent of the College's entire endowment value.

Distribution of Green Revolving Funds by Endowment Value per Student



GRF Goals

GRFs can be developed to achieve a variety of institutional priorities and goals.

This section addresses the following questions:

- What are the institutional goals of existing GRFs?
- Do GRFs advance financial, environmental, and educational goals?
- How do schools structure their funds to achieve these goals?

Types of Funds

Greening the Bottom Line 2011 suggested three categories of fund structures to describe different institutional goals:

- The **Efficiency Fund** to provide capital for energy and/or water efficiency measures,
- The **Innovation and Engagement fund** to seek out community engagement and project proposals, and
- The **Hybrid Fund** that combined both interests in efficiency projects while also supporting greater campus or community involvement.

In the 2012 survey, 36 institutions operated funds that fit the efficiency description, primarily using their fund to reduce water, electricity, and/or resource use on campus. More than half of all schools surveyed operated a hybrid GRF. As hybrid funds solicit input and support from a wide range of campus stakeholders to implement energy, water efficiency, and waste reduction projects, this type of fund may be more attractive to schools that can generate support inside the university body around sustainability issues.

Only four institutions operate an innovation and engagement fund: Grand Valley State University (Michigan), Dickinson College (Pennsylvania), the University of North Carolina at Chapel Hill, and Yale University. Both Grand Valley and the University of North Carolina operate a separate fund that is geared towards purely energy-efficiency projects.

Meeting Financial Goals

Nearly 41 percent of reporting institutions stated that they created their GRF to provide additional or alternative funding sources for sustainability projects. Twenty-eight percent of reporting schools cited a desire to create a GRF that would counteract growing utility rates or increased energy usage on campus, especially related to individual building operating costs. Several institutions that stated a main objective of their funds was to reduce energy usage on campus reported that completing building energy audits or a greenhouse gas (GHG) inventory helped to clearly outline the financial need to establish a GRF model at their school. As this survey question was open-ended, it is likely that more schools have utilized energy audits and GHG inventories to provide a justification for their fund.

In 2012, GRF administrators reported that the need for a GRF stemmed from two main financial concerns: a need to source new funding for projects and a need to reduce operating expenses on campus.

Environmental Goals

Many schools report using GRFs as a way to meet environmental commitments that aim to reduce their carbon emissions, energy use, pollution, and the amount of waste generated on campus. Sixty-two percent of the funds surveyed explicitly reported that their fund was established to target environmental objectives. Drury University (Missouri) and the University of Pennsylvania installed their campus GRFs into their formal Climate Action Plans as a method to achieve their institutional commitments.

Environmental goals are evident inside many schools' GRFs, including in the University of North Carolina's GRF mission statement:

"The purpose of the UNC-Chapel Hill Green Revolving Fund is to reduce greenhouse gas footprint and resource consumption, save the University money through avoided costs, grow the University's financial capacity to invest in future GRF projects, and inform the Carolina community about the GRF's cost-effective efforts to meet the University's commitment to climate neutrality." [8]

Fund proponents at Kalamazoo College (Michigan) leveraged their 2009 Climate and Sustainability Action Plan to formalize their Climate Commitment Revolving Fund. The college had already been infor-

[8] The University of North Carolina at Chapel Hill's Facilities Services- Energy Management. *GRF Application.* www.save-energy.unc.edu/Portals/2/GRF%20Application.docx (9 October 2012)

mally operating a GRF, using the savings collected from utility rebates to fund projects on campus. The Arizona State University Sustainability Initiatives Revolving Fund, launched in the spring of 2012, focuses on energy-reduction projects to help the university achieve carbon neutrality by the year 2025.

The University of Denver, too, emphasized their environmental targets:

"We had already established a history of short-term paybacks related to the dollars invested in energy initiatives," explained Tom McGee, Energy Engineer at the University of Denver. "Electrical consumption was a significant component of our overall carbon footprint and this funding mechanism would help contribute to the achievement of our carbon reduction goals."

Meeting Educational Goals

GRFs can benefit many different types of educational goals on campus. In the past decade, there has been a growing emphasis to create opportunities for students, faculty, and staff, and GRFs can create another portal for them to learn new skills by proposing or managing a project.

"Student engagement has been a challenge for our campus, and creating a revolving loan fund that students could access for projects provides an additional path for students to engage with sustainability efforts on campus," said Brittany DeKnight, the Associate Director at Furman University's David E. Shi Center for Sustainability.



Grand Valley State University added approximately 8,000 feet of 1.5 inch steam piping installation to the main tunnel and branches underneath the campus; steam valves were also covered with insulated boots. The project is estimated to save the university approximately $187,935 every year in reduced operating costs.

Furman courts student participation in their fund by stipulating that all project proposals must have a representative from the student body involved in the project along with a faculty or staff advisor. In fall 2010, students enrolled in a first-year seminar course on sustainability and renewable energy proposed a project to re-install a 2.4 kW solar panel that had been removed during the construction of four student houses on campus. Due to inadequate funding, the panel had remained unused since 2007. With support from their professor and the approval of facilities services, the solar panel was re-installed on a campus facilities building where the generated energy is used to charge some of Furman's electric vehicle fleet.



Other student learning opportunities can be created by guaranteeing student representation on a GRF committee. For example, the University of Montana, Missoula requires that their GRF, the Kless Revolving Energy Loan Fund, have a governing committee with four student representatives, two of which must be student government senior representatives.

Combining Forces: Vermont State Colleges' Green Revolving Loan Fund

The Vermont State Colleges (VSC) system is comprised of five schools (Castleton State College, Lyndon State College, Johnson State College, Vermont Technical College, and the Community College of Vermont) and is governed by a single publicly-appointed Board of Trustees. In April 2012, the Board oversaw the creation of the $2 million Vermont State College Green Revolving Loan Fund. The fund will be available to all VSC campuses for energy-efficiency and sustainability projects that will produce demonstrated cost savings.

"Care for the natural environment and working landscape is part of the Vermont brand. So is frugality," said Timothy Donovan, Chancellor of the VSC. "By creating investment capacity that is focused on reduction of energy costs, the VSC have reaffirmed their commitment to containing the long term costs of college, environmental sustainability, and continuing to provide an affordable, high quality education to students."

Green Revolving Fund Formation

This section addresses the following questions:

- Which campus stakeholder groups have initiated the creation of GRFs?
- What sources of capital do schools use to seed campus GRFs?

Champions

The most common champions who have proposed establishing GRFs were administrators (56 percent of the time), facilities personnel (48 percent), or members of the sustainability staff (35 percent). Thirty- seven percent of reporting institutions cited student effort as a catalyst to create their fund. These categories were not mutually exclusive, and many funds (57 percent) reported more than one stakeholder group as a fund champion, from four schools reporting multiple fund champions in 2011 to 40 schools in 2012. Collaborations often included partnerships between sustainability officers, facilities staff, and students.

Many types of administrators advanced GRF creation, including Presidents and the Vice Presidents for Operations and Business and Finance. Seven institutions utilized existing sustainability committees in the creation of their GRF (including Whitman College, Northland College, and Denison University). One school (the Massachusetts Institute of Technology) cited an alumni-led campaign that initially proposed MIT's GRF.

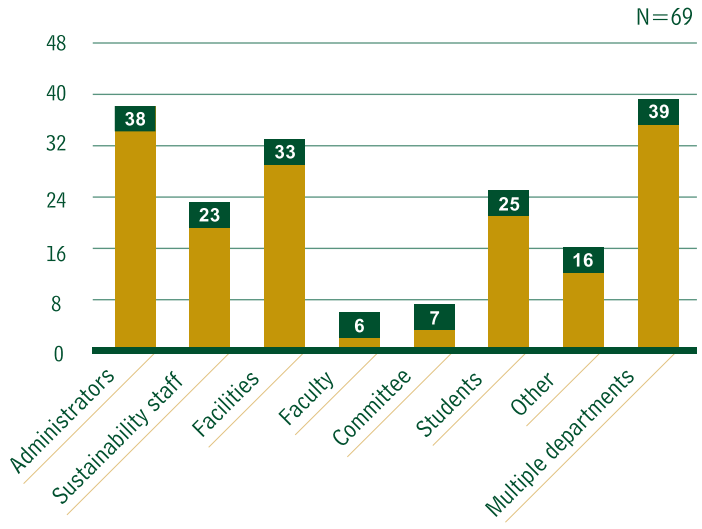
The Green St. Mary's Revolving Fund Charter

- To cultivate environmentally sound ventures throughout the St. Mary's campus.
- To provide a stable and efficient funding mechanism for said ventures.
- To grow through its utilization of a revolving loan mechanism.
- To weather budget shortfalls and market down turns.
- To prevent budget shortfalls by funding renewable energy projects.
- To serve as a highly visible embodiment of the College's dedication to sustainability.
- To encourage campus-wide participation in the fight for carbon neutrality.[9]

[9] St. Mary's College of Maryland. *Memorandum of Understanding.* http://www.smcm.edu/sga/documents/gsmrf/CharterandMOU.pdf (9 October 9 2012)

Students were involved in initiating 37 percent of GRFs, and at least 9 funds sought out student assistance and input in the operation and governance of their fund. Students were involved in many ways, including learning about the model at a national conference then bringing the idea back to campus (at Bucknell University). Other students tackled the establishment of a GRF as an independent research project for an environmental course. Students were also credited with spearheading a proposal that was then presented to the campus environmental committee (Carleton College) or a college's board of trustees (Hampshire College).

Green Revolving Fund Champions



Sources of GRF Capital

This section will address the following questions:

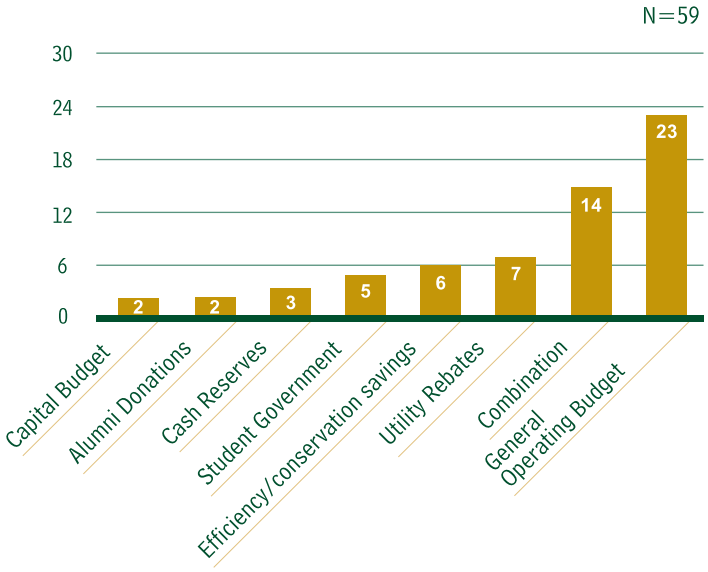
- What funding sources have schools used to seed their GRFs?
- What new sources of funding were identified in 2012?

Schools reported 14 distinct funding sources for their GRFs:

- General operating budget
- Alumni donations
- Efficiency/conservation savings
- Cash reserves
- Capital budget
- Endowment investments
- Student government funding
- Student green fees
- Donation from an outside foundation/organization
- Funding from a campus environmental committee
- Utility budgets
- Utility rebates
- As an award from state energy-efficiency program
- American Recovery and Reinvestment grants

The most common approach for capitalizing a GRF came as an allocation from the general operating budget (23 funds). Funding sourced from campus utilities was also a common source, providing the capital for GRFs on 8 campuses. Fourteen funds seeded GRFs by combining multiple funding sources.

Green Revolving Fund Common Sources of Capital



Some schools used capital from outside the operating budget to invest in their GRFs. Two institutions, the California Institute of Technology (Caltech) and Weber State University, used endowment funds to invest in their GRFs. To date, Caltech has allocated almost $8 million into the Caltech Energy Conservation Investment Program and, excluding utility incentives, reports a portfolio return on investment of 24 percent. It is important to note that both institutions structured GRF capitalization as endowment investments, not as payouts from the endowment. This enabled them to avoid any issues related to donor restrictions on gifts to the endowment.

A few schools seeded their GRF with off-campus dollars. The University of New Hampshire reported seeding their GRF entirely with money from an American Recovery and Reinvestment Act grant.[10] The Georgia Institute of Technology and Weber State University reported using a portion of an ARRA grant to support their GRFs. At least one school (George Mason University) funded their GRF with payments received from a demand response program.

The University of Vermont investment cash reserves to capitalize its fund. UVM created their Energy Revolving Fund with $13 million through a proposal passed by the Board of Trustees, which represents approximately 10 percent of the institutions overall cash reserves. While not every school institution has cash reserves, UVM's decision to capitalize their GRF with an investment from the institution's cash reserves highlights the shift towards thinking about energy efficiency retrofits as an investment rather than an expense.

State grant programs can also provide seed funding. The University of Utah received over $300,000 in grants from the state of Utah Division of Facilities Construction and Management for energy-efficiency improvements. These grants helped the university fund four projects on their campus. The savings from these projects were combined with money from their operating budget and pre-existing energy savings and were used to seed the university's Energy Management Projects fund.

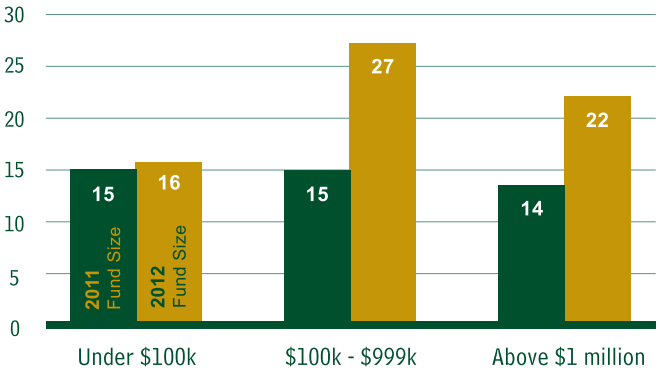
[10] The University of New Hampshire, Sustainability Institute. *Climate Action Plan.* http://www.sustainableunh.unh.edu/wildcap (10 October 2012)

Fund Size

Schools reported a wide range of GRF values, between $12,000 (Bucknell University's Green Fund) to $13 million (the University of Vermont's Energy Efficiency Fund). The median fund size was $400,000.

The number of funds with $1 million or more grew by 57 percent, from 14 funds in 2011 to 22 funds as of August 2012. Funds with values between $100,000 and $999,000, as well as funds with values under $100,000, grew approximately 80 percent and 7 percent, respectively. Growth across all fund categories indicates GRFs can be effective at different scales. Survey data also indicates that funds do not have to be large to be effective- in fact, more than 65 percent of GRFs surveyed have less than $1 million in funding. These funds collectively have financed more than 300 sustainability projects.

Number of Green Revolving Funds by Capitalization



Fund Structure and Management

Schools with GRFs were asked a series of questions to determine how funds were structured and managed. Over 67 percent of reporting funds use a committee, either a preexisting campus sustainability committee or a fund-specific body, to approve projects.

Members of a school's administration participated in project selection on 42 campuses and, in some cases, managed the fund themselves. The CFO at Rollins College (Florida) and the Senior Vice President of Operations at Boston University provide the final approval for revolving fund projects, as well as broad oversight of the fund's operations. Administrators provide fund oversight, or aid in project selection and identification, in 48 percent of institutions surveyed, many on fund-related committees. While these committees can be made up of many different stakeholders, most seek out members from finance, facilities, sustainability staff, faculty, and the student body. One school (Bethany College, Kansas) includes alumni and local community members on their GRF Committee.

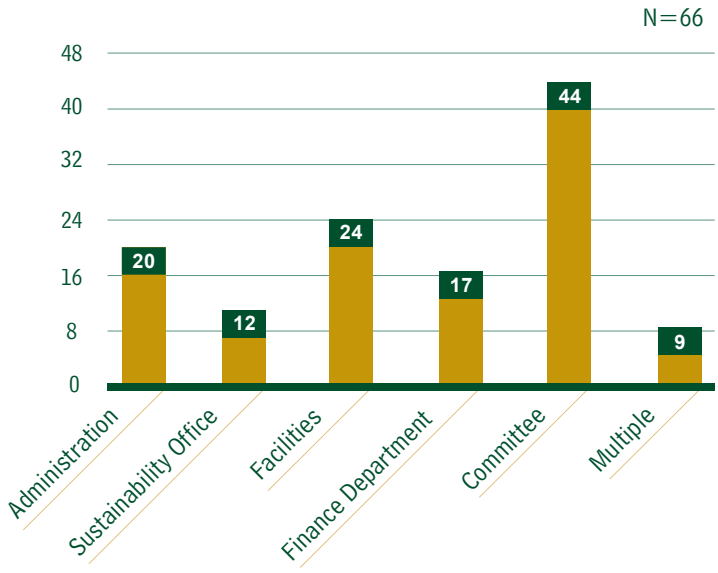
SEI noted that schools structure their GRF approval process to target certain types of project proposals. At Caltech, for example, the Associate Vice President for Facilities can approve projects up to $100,000, but any application to the fund greater than $100,000 must also be approved by the Vice President of Business and Finance.

Project Selection

GRF administrators identify their potential projects in a variety of ways.

Agnes Scott College makes a priority list of potential projects from a list of deferred maintenance projects and weighs their importance to college operations, looking especially at the project's carbon reduction potential and payback period. The college also uses input from the facilities department and student research to build their project list. Daemen College's Energy Saving Revolving Fund identifies projects by targeting retrofits and technologies with the best payback. The University of Calgary (Alberta) identifies projects through research by a working group of the campus environmental committee, or through direct recommendations from departments. The University of Southern Maine began by identifying projects at the leadership level of Facilities, but now has a dedicated Director of Energy and Utilities within the Sustainability Office.

Project Selection Process for Green Revolving Funds





The College of Saint Benedict and Saint John's University in Minnesota share a GRF. In the summer of 2012, the College of Saint Benedict underwent a campus-wide lighting upgrade to update college buildings from 35W four foot lamps to 25 Watt lamps. The project cost $50,000, $15,000 of which went to 3 student employees who carried out the upgrade. The project is estimated to have an annual savings of 715,000kWh, the equivalent of approximately 425 tons of carbon per year. The college estimates a project payback of about a year.

At least 30 percent of responding schools indicated that they had conducted an energy audit to identify potential projects. Stanford University's Whole Building Energy Retrofit Program (WBERP) uses detailed building-level engineering analysis to identify the top 25 energy-consuming buildings on campus and targets funding based on priorities within those buildings. The WBERP began funding projects in 2004 and to date the fund has financed 22 projects. The fund records an average portfolio ROI of 22 percent after having completed 11 projects.

A Sample of Green Revolving Fund Committees and Their Structures

Institution	GRF Committee	# of Members	Member Representatives
Agnes Scott College	Sustainability Steering Committee	7	1 administrator (Chair, VP for Business & Finance), 2 staff, 2 professors, 2 students
Arizona State University	SIRF Committee	6	4 administrators (the Associate Vice President for Planning and Budget, senior administrators from Financial Services, Facilities Development, and the Provost's Office), and 2 sustainability staff (the University Sustainability Office and the Director of Sustainability Practices)
British Columbia Institute of Technology	Funding Sub-committee of the BCIT Sustainability Committee	6	4 administrators (the Director of Financial Services, the Director of Supply Management, the the Director of Educational Support Services, and the Assistant Director of Facilities Management) and 2 sustainability staff (the Director of Sustainable Development and Environmental Stewardship and the Energy and Sustainability Manager
Drury University	President's Council on Sustainability	31	Students, Staff, Faculty, Administrators, Alumni, and 1 member of the Board of Trustees
Iowa State University	Live Green Loan Fund Advisory Committee	7	4 Administrators, 1 faculty, 1 staff, 1 student
Northland College	Sustainability Work Group	7	3 administrators (the Vice President for Student Affairs and Institutional Sustainability, the Vice President for Finance and Administration, and the Facilities Director), 1 sustainability staff (the Regional Sustainability Coordinator), 1 professor, 2 students
Oregon State University	The Student Sustainability Initiative Fee Board	9	Voting members: 5 students Non-voting members: 2 faculty, 2 students
Swarthmore College	The Sustainability Committee	5+	Administrators, staff, faculty, students, and alumni
University of Illinois at Urbana-Champaign	Academic Facilities Maintenance Fund Assessment/ Conservation Committee	7+	5 administrators (the Executive Director of Facilities & Services, a representative of the Provost, the Student Trustee from the Urbana campus, a representative of the Vice Chancellor for Research, and a representative of the Vice Chancellor for Student Affairs), and students.
University of Montana at Missoula	Kless Revolving Energy Loan Fund Committee	8	2 staff (a representative from Facility Services and Associated Students of the University of Montana, Missoula Business Manager), 2 faculty (a member of Environmental Studies, a faculty member from the College of Technology), and 4 students

Payback Criteria

Thirty-four schools in the survey specified maximum simple payback periods for project funding. Schools had a range of maximum payback periods for project criteria, from two years to ten years, with an average of six years. Many institutions also specified that, while they had upper limits for project payback periods, fund administrators wanted the criterion to be flexible to other considerations such as outstanding environmental or educational benefits. Some administrators also indicated that they expected their payback requirements to lengthen over time as "low-hanging fruit" projects were exhausted.

Interest Charges

Eighty-one percent of reporting institutions indicated that they do not currently charge interest to projects funded by their GRF. For those that charge interest, the rates ranged between 1 percent (at The University of Texas at Dallas) and 5.5 percent (at The University of Minnesota, Twin Cities). The average interest rate was 3.3 percent, with a median interest rate of 3 percent.

A small number of schools (14 percent), including Thompson Rivers University (British Columbia) and the University of Arizona, stated that while they currently did not charge interest, fund administrators would re-consider the need to charge interest once the fund became more established. At the Georgia Institute of Technology, interest is included on project funding provided to departments not under the jurisdiction of Facilities. Schools have also found ways to grow their GRFs other than through charging interest. One example is the College of Saint Benedict and Saint John's University, brother and sister schools in Minnesota that share a GRF. Their Revolving Loan Fund was formed in 2010 and requires loans to be paid back to the fund until 120 percent of the original loan is repaid. Middlebury College charges loan recipients one additional annual payment, 90 percent of which goes back into growing the fund, while 10 percent goes to the professional development of sustainability staff. Hampshire College is considering a model where payments to replenish the fund would continue for up to a year or two after the original loan had been repaid in order to grow the fund.



Through their Campus Energy and Sustainability Investment Program, the Georgia Institute of Technology is targeting infrastructure projects (including steam pipe insulation) to promote future building capacity. Above, the Georgia Tech Carbon Neutral Energy Solutions Laboratory, opened in the Fall of 2012, is a 42,000 square foot laboratory that will provide space for energy research programs. The facility has a net-zero site energy use due to its sustainable design and renewable energy generation.

Green Revolving Fund Performance

ROI and Other Benefits

This section addresses the following question:

- How do GRFs perform financially?
- How does GRF performance compare from 2011 to 2012?

This survey revealed a pattern of reliable returns on investment (ROI) and short repayment periods. Eighteen schools reported ROI figures. These ranged from 20 percent (at both Georgia Tech and University of North Carolina at Chapel Hill) to 57 percent at Boston University.[11] Established funds report a median annual ROI of 28 percent.[12] This suggests that GRFs can significantly outperform average endowment investment returns, while maintaining strong returns over longer periods of time.

As in 2011, SEI sought to quantify the number and types of projects that have been funded and/or completed through GRF financing and to identify individual project and aggregate portfolio return on investment for the funds. This proved to be challenging for two reasons:

- There is limited long-term data available: The majority of funds—67 of 79 (85 percent) were formed between 2008 and 2012— so comprehensive long-term performance data is not yet available.

- There are variations in terminology used by fund administrators: At one school, a single project might refer to one building that is installing lighting, energy, and HVAC retrofits simultaneously, while at another, a project could refer only to a lighting system upgrade. Among the 52 GRFs that provided data on project numbers, existing GRFs have financed approximately 900 projects. Without a standardization of terminology across institutions it is difficult to discern the scope of each project or their aggregate impact, but SEI expects overarching definitions to become adopted as GRFs continue to grow.

Despite these analytical limitations, the data shows that GRF performance is strong. SEI draws this conclusion from three kinds of data: the portfolio results reported by long-established GRFs, portfolio results provided by a few newer GRFs, and individual project performance information submitted by schools.

[11] One school, George Mason University, has reported 69 percent ROI. However, their figures are based on one capital-intensive project. The project, a $208,000 investment to the exterior lighting on their Fairfax campus, replaced the existing 250W high pressure sodium bulbs with 30W LED lighting. The project is projected to payback the investment in less than one year.

[12] Due to each school's accounting methods used and the youth of some funds, return on investment figures were calculated based on annual, not lifetime, returns. For more information on how we calculated this figure, please see *Appendix C* - page 55. Calculating Return on Investment.

Reported Payback

Twenty-eight funds provided data on their portfolio project payback. Of those, 18 provided minimum payback periods — an average of 1.6 years and median minimum payback period of 1 year. Twenty-seven schools reported average portfolio project payback periods, with an average of 3.8 years and a median reported payback period of 3.5 years. Seventeen schools reported maximum payback periods for GRF projects, with an average of 7.8 years and a median of 6 years.

Campus Highlight:

University of Colorado, Boulder

The University of Colorado, Boulder's Energy and Climate Revolving Fund (ECRF) was created in 2008 with a $500,000 loan from CU's student government. The ECRF has completed 80 projects since its inception and as of spring 2012, the ECRF reports an average annual ROI of 37.8 percent. ECRF managers attribute this return in part to "[using] familiar networks and contractors for projects to build trust to confront the uncertainty of taking on debt."

Schools That Reported Return on Investment Data

INSTITUTION	FUND NAME	ESTABLISHED	FUND SIZE	PROJECTS	ROI
California Institute of Technology	Caltech Energy Conservation Investment Program	2009	$8,000,000	30	24%
Harvard University	Green Loan Fund	2001	$12,000,000	200	29.9%
Iowa State University	Live Green Revolving Loan Fund	2008	$1,000,000	13	24%
Stanford University	Energy Retrofit Program	1993	$2,000,000	381	27%
Stanford University	Whole Building Energy Retrofit Program	2004	$8,000,000	25	22%
Swarthmore College	Renewing Fund for Resource Conservation	2009	$43,500	N/A	28.6%
University of Colorado, Boulder	Energy and Climate Revolving Fund	2008	$521,186	80	37.8%
University of Denver	Energy Reserve Fund	2009	$6,570,297	32	53%
Western Michigan University	Quasi-Revolving Fund	1980	$385,000	101	47%
Boston University	Sustainability Revolving Loan Fund	2008	$1,203,000	13	57%

Loan vs. Accounting Model

In the 2011 report, SEI suggested two accounting categories to describe the structures of most GRFs: the loan model and the accounting model. In the 2012 survey, SEI specifically asked schools to place their funds into one of those categories.

In the loan model, the project applicant (the department, school, or campus group who submits the project proposal) agrees to borrow from the fund. After agreement, funds are transferred to the project proponent's budget. Loan repayment is typically managed through budget transfers, but the project proponent has the responsibility to initiate the transfer to the GRF.

Schools use the loan model on campuses where project proponents have control over budgets and can independently provide repayment to a loan fund. The loan model can also be used at institutions where the departments or individual schools inside a university control their own utilities budget. GRFs that focus on projects that create savings in locally-controlled budget items, such as paper, printer toner, or other supplies, have also gravitated towards the loan model.

For example, the University of Texas at Dallas' Revolving. Sustainability Account is planning to dole out $140,000 through the loan model. Created in 2010, the fund will finance projects in the campus Activities Center, upgrading lighting and control systems.

Twenty-one institutions report they use the loan model to structure their GRFs.

In the accounting model, funds are transferred to the project applicant (the department, school, or campus group whose project has been approved), but repayment is handled through the transfer of funds to the GRF from a centrally-managed budget where the savings were generated, such as a utilities budget. As an example, consider an accounting model GRF that funds an electricity efficiency project with an initial cost of $30,000 that is expected to save $10,000 per year. The fund provides the $30,000 up front, and then repayment is made over three years by transferring $10,000 saved each year in the electricity budget back to the GRF. This accounting procedure is handled by the central finance/budget office and typically takes place at beginning or end of each fiscal year.

The accounting model is generally used where projects create operational savings in budgets that are managed centrally. The Greens Fund at Hiram College uses the accounting method, and noted "once the energy saving measures are in place, the savings are plowed back into the fund from utility budgets to provide resources for future projects."

Thirty-nine funds use the accounting model for their GRF.

Six schools (British Columbia Institute of Technology, Dartmouth College, University of Illinois, Urbana-Champaign, University of Kansas, University of Pennsylvania and University of Southern Maine) use a process that combines both offering loans and allocating money from separate budgets to operate their campus GRFs. Some of these schools use a loan model for GRF projects outside of the central budgeting and utilities unit, such as for auxiliaries, and an accounting model for those inside the unit. Stanford University reported that they use another method besides loan or accounting as the revolving mechanism. Stanford campus units purchase utilities from a central department as customers, and a surcharge is added to their bills allowing for the GRF to be replenished. This model allows for the cost of installing GRF projects to be passed on to the units which financially benefit from the installed energy-efficiency projects.

George Washington University

Location
Washington, D.C.

Name of Fund
Green Campus Fund

Year Established
2010

Size of Fund
$2,000,000

Source of Seed Funding
Accumulated budget savings from the university reserves

Number of GRF Projects Completed
33

Notable Project
Academic Center Lighting Retrofit
Cost: $141,000
Project ROI: 53 percent

GRF Management

This section addresses the following questions:

- How do schools calculate their savings?
- How are funds structured?
- What restrictions do some funds put on their GRF?



The David Ambler Student Recreation Fitness Center at the University of Kansas underwent a comprehensive lighting upgrade in 2011, including the replacement of 168 pulse-start metal halide fixtures with 4-lamp, high-output T5 high bay fluorescent fixtures. Since its completion, the project has recorded more than 165,200 kWh savings annually. Photo credit: KU Marketing Communications.

Estimating and Verifying Project Performance: To Meter or Not to Meter

As schools prepare GRF project lists, they typically estimate project savings in order to prioritize projects and make funding decisions. When it comes time to repay the GRF based on those savings, there are two main ways to manage fund repayment: by using the original project estimates or by retroactively calculating savings based on actual performance.

This decision is generally made based on the availability of actual project performance data. Schools that have data from individual building meters (or even finer-grain sub-meter data) can use this data to determine individual project performance. However, many campuses, especially older campuses with a central plant, do not have this kind of metering in place, and therefore rely on estimated engineering data for fund operation. Seven schools reported using actual meter data for verifying GRF funded projects, while ten schools reported using estimated project performance data. Thirty-eight schools reported using a combination of both, or that they use actual meter data when available, but not for every project.

The University of New Hampshire's Energy Efficiency Fund uses both meter data and estimates to track the cost savings associated with their GRF projects.

"There are different ways to do it, but we just sub-meter all of our buildings," said Matt O'Keefe, Campus Energy Manager at UNH. The University also chose to use engineering data because of the numerous reports and tools available to energy managers.

"What we tried to do is not reinvent the wheel. There are a lot of reports that have already been written, giving you ballpark figures of what to use. You use those discount figures with your engineered estimates and what your meters show you and you get a much truer result of what the savings actually are," Said O'Keefe.

Thompson Rivers University's Sustainable Energy Revolving Fund stressed the importance of metering to effectively track energy and cost savings.

"One challenge is that the expected savings from the retrofit must be verified, therefore detailed monitoring and verification of savings is necessary," said Thomas Owen, the Director of TRU Environment and Sustainability. "There must be a way to prove that projected savings will in fact be achieved."

Carleton College's Manager of Campus Energy and Sustainability, Martha Larson, noted that this data may not be discerned so readily.

"In some cases it is not possible to break out actual savings based on how our campus is metered. In other cases, there are too many additional variables so metered values are not reliable, like measuring reductions in water use."

For those schools that already use individual building metering and engineering data, tracking energy savings can be as simple as reconciling projected data with the energy readouts after the successful installation of the efficiency project. For other schools, where such data may not be available, Larson recommended stipulating that project proposals incorporate projected payback information as part of their application to the fund, and require a project to note whether savings will be based on real or estimated data.

Using meter data has clear verification benefits; however, many GRFs thrive in its absence. Harvard University's Green Loan Fund based their cost savings on anticipated savings calculated from projected estimates and not from individual metering.

"At Harvard, there are so many projects happening all at once at the building level, and that could be affecting what the readouts should say." said Jennifer Stacy, Harvard Sustainability Office's Coordinator of Business and Finance. "Originally when the Loan Fund was started, we went with estimated instead of actual to encourage more projects to get done. Post-project "M and V" [measurement and verification] could be a huge cost on top of the project. When it comes down to it, we can invest that money in M and V, or we can invest that money in other [projects]."

Stacy attributes the success of the estimation model to Harvard's extensive energy audits – nearly 85 percent of Harvard's campus has undergone a comprehensive energy audit.

Tracking Savings: Some Considerations

Without accurately tracking energy and cost savings, there is no way to demonstrate the GRF's true impact and economic benefit to the campus. Two necessary processes to track are cost savings data and fund transfers, either from the main green revolving fund or across different budgets.

When George Washington University began their GW Green Campus Fund in 2009, the Office of Sustainability and student leaders encountered challenges in how to track and re-allocate the savings. They found a solution to their problem by reaching out to other campus departments to develop a system that worked for them.

"The Budget Office worked collaboratively with sustainability and facilities to create a customized financial tracking and reporting system for the fund through the energy budget in facilities," explained Mark Ellis, Sustainability Project Facilitator at GW. Projected savings from GRF projects are estimated based on in-house expertise inside the facilities department and industry standards. Numerous schools reported that they handle tracking internally by capitalizing on staff and personnel inside the campus such as sustainability officers, facilities, and in some cases, students.

Keeping the process as simple as possible is the key to future success at some schools.

"Keep it simple," said Dennis Carlberg, Boston University's Sustainability Director. "We look at simple payback based on the energy analysis."

"Keep it simple," said Dennis Carlberg, Boston University's Sustainability Director. "We look at simple payback based on the energy analysis."

At the University of New Hampshire, the Energy Efficiency Fund seeks to be conservative when projecting estimated savings, reporting that a broad portfolio of projects will help normalize forecasted savings.

Weber State College's Energy and Sustainability Manager, Jacob Cain, emphasized the significance of tracking savings to help garner future support from the administration.

"Make sure you have an accurate and documented method for reporting energy savings. If those numbers are loose, you will lose administrative support."

GRF Restrictions

While many schools outline specific successful criteria that project proposals should have, some schools restrict the types of investments their GRF can make.

Hampshire College's Sustainability Revolving Fund explicitly prohibits investments in the purchase of carbon offsets, for renewable energy credits (RECs), in projects that are intended to cover budget shortfalls, and in projects that would pay for staff, faculty, or student salaries. Oregon State University and Grand Valley State University also prohibit GRF funds from supporting salaries, wages, or stipends for university staff.

Other schools prohibit spending on expenses that would have been funded through other means, especially those mandated by university- or state-regulations. Caltech's CECIP fund is one example, prohibiting "projects that are required by law or are part of alternatively funded capital projects."

Other Fund Management Considerations

Funds can encounter accounting issues if inadequate preparation is given to how the fund will specifically operate on campus. Important questions need to be answered at the launch of the project, including: where will the money be coming from and who will be keeping track of fund transactions? On what timetable will the funds be repaid? If a school uses the accounting model, special care needs to be given to ensure accurate accounting across the different budgets that are being used to replenish the GRF, and that all transfers are acceptable according to institutional policy.

Denison University's Sustainability Coordinator, Jeremy King, explained, "The primary challenge regarding the development and operation of the fund deals with accurate and effective accounting. It has required some manipulation of our current accounting system and estimation of realized savings through investments made by the fund. As utility costs continue to fluctuate, it makes the task of tracking the funds effectiveness even more difficult."

Additional Findings

In addition to the findings listed above, the following trends emerged:

- Multi-stakeholder collaboration dramatically increased from 2011 to 2012,
- Fund administrators gained support on campus by making the business case to start a GRF, and
- GRF proponents cater fund size to target specific institutional goals.

Multi-stakeholder Collaboration Increased

New to *Greening the Bottom Line 2012*, SEI documented GRFs' ability to foster collaborative projects that draw together expertise across departments, student groups, and the administration. This characteristic can respond to rising demand from students, professors, and other institutional stakeholders that have increasingly called for environmentally-minded practices.

As of 2012, 40 institutions have credited multiple campus groups with initiating and managing GRFs. These collaborations often included partnerships between sustainability officers, facilities staff, and students.

GRFs are often driven by interdepartmental collaboration. Oberlin College's (Ohio) Green EDGE fund was founded through collaboration between student groups, faculty in economics and environmental studies, and staff within the facilities and finance departments. Unity College's (Maine) Sustainability Fund is managed through a collaboration between the offices of facilities, finance, and sustainability on campus.



Mars Hill College's Fox Residential Dormitory underwent renovations in the fall of 2012. The dorm houses 122 students and replaced one large boiler with three gas-fired units, upgrades that the college calculates to be 90 percent efficient or greater. The College is anticipating a payback period between 5 and 7 years depending on use, and three separate units allow the campus to run one them independently if necessary during the summer months when less heat is required.

This increase in cited collaborative origins of GRFs was substantial. It indicates that, among funds founded in the past several years, there is a strong emphasis on university administrators, staff, and students to work together on sustainability initiatives and environmental work that might have been previously fragmented across campus.[13]

Such efforts may enable these stakeholders to reach outside of their traditional departments and unite environmental efforts on campus.

[13] It should be noted that the 2012 survey had a larger sample size, reflecting the increase of newly created GRFs; the sample size grew by roughly 50 percent. Additionally, the 2012 survey asked more detailed questions about GRF history, a characteristic that may have resulted in a greater opportunity for fund administrators to report the full narrative of how a fund came to be, including mentions of the many collaborations that occurred between departments and stakeholders before a fund was formally launched.

When reaching out to other campus stakeholders, some schools recommend open and transparent reporting of GRF activity. Gaps in communication can lead to unnecessary tension between stakeholders, especially when it comes to launching new programs across campus departments. Some fund administrators cited difficulty keeping all parties, whether they be facilities, sustainability council, students, or higher-level administrators, informed on GRF happenings. For example, George Washington University provides information to the many groups on campus involved with the fund, including the Division of Operations, Facilities Services, Office of Sustainability, University Budget Office, and the Office of Finance. Developing clear project guidelines for both environmental and financial goals, enforcing fund deadlines for applications, reporting, and verifying project data, as well as setting up a system to coordinate between all invested parties are some strategies to streamline fund deliberation and share information.

Schools Make the Business Case to Start a GRF

Highlighting the financial benefits first and the environmental benefits second can address administrative concerns before a sustainability case is made. Bottom-line considerations are a universal concern for decision makers in higher education, and therefore highlighting those benefits first can spur on support for sustainability initiatives where historically there may have been little interest.

The financial argument is clear when looking at GRF's ROI data: GRFs have demonstrated annual portfolio returns ranging from 20 percent at Georgia Tech and the University of North Carolina at Chapel Hill, to 59 percent at Boston University, with a median annual reported ROI of 28 percent.

"There are always opportunities to save money and show the University administration that energy efficiency is a good investment," said the University of Utah's Energy Manager, Jeff Wrigley. "We have some of the lowest utility rates in the nation and are able to generate strong financial returns."

The British Columbia Institute of Technology explicitly states in their fund documents that "all applications must include a business case which clearly outlines the objectives, costs, timeframes and deliverables for the project." But making the "business case" for sustainability can involve much more than ROI data.

"Facilities managers [were] worried about going into debt," said the University of Colorado, Boulder's Environmental Center Director, Dave Newport. "Also there's a fear by facilities managers that their savings will be raided, leaving them with zero net savings."

By showcasing the revolving nature of the fund and making clear that a dedicated fund will help support new and ongoing projects on campus, fund proponents can help allay some fears, especially for those stakeholders worried about taking on loans. In many cases, schools are already considering new projects that would save the university resources and money. The qualitative benefits of GRFs, including the ability to connect operating and capital budgets to reduce administrative burden, can positively impact a university's bottom line.

Demonstrating how the GRF could help a university achieve energy reduction goals is also an effective strategy when looking to start a fund on campus.



A University of Victoria student uses a portable electric pump in a chemistry laboratory. The pumps replaced older aspirators that required a constant water flow. UVic's Revolving Sustainability Loan Fund provided a $30,600 investment, with an estimate payback of approximately 3.6 years.

Swarthmore College reported that they found success establishing their GRF after they demonstrated the success of energy-efficiency projects. For those schools that have that yet to finance such projects, looking to other schools for data on cost and energy savings can provide the material needed to begin conversations about the GRF.

"It's easier to branch out after a proven track record has been established," noted Swarthmore's Director of Maintenance, Ralph Thayer.

Schools Cater Fund Size to Target Specific Goals

Allocating the appropriate amount of funds to a campus GRF depends on a school's priorities and the impact that a school plans to make with their fund. If the goal of the fund is to involve students, a smaller fund may be more nimble. Small funds with $100,000 or less can often can be developed and passed without much need for additional sign-off by the higher-level administration. Small funds can also be a good fit for schools that are interested in starting pilot programs or financing smaller-scale, "low-hanging fruit" projects that are less time-intensive to implement and require less administrative oversight. For the University of Texas, Dallas' Energy Conservation & Sustainability Manager, Thea Junt, determining fund size proved to be an operational challenge.

"For small projects, my boss said, 'Just do 'em!' So they did not go through the revolving fund. For larger projects, with 'outside' customers such as our auxiliary units, I needed enough capital in order to support a good sized project."

However, small GRF's are not able to fund more capital-intensive projects like whole building retrofits that achieve greater energy reductions and can provide further opportunities for cost savings. Funds that are too small in size may not be able to tackle as many projects, and often cannot bundle short- and long-term project paybacks together to stabilize return to the fund over many years. Additionally, if unsuccessful, a small fund may give the indication that the green revolving fund model is not a good fit for the campus, when in reality the size of the fund limited its ability to direct appropriate resources to researching, installing, and tracking projects which would prove their savings.

Larger funds require more personnel time to manage, whether internally within a facilities department or sustainability office, or externally by hiring consultants or contractors. Large GRF's also mean a greater ability to fund more projects, requiring the need for a detailed and streamlined reporting and management process. UVM recommends securing larger financial commitments where possible to be able to fund external technical and financial support for GRF projects.

The goal for each institution should be to earmark enough funds to allow the GRF to be effective without being cumbersome.

Institutional Challenges

This section addresses the following questions:

- What common institutional challenges have GRF's encountered in the creation or operation of their fund?
- What solutions have fund administrators found to overcome those challenges?

There are three main areas where schools often encounter obstacles during the creation or operation of their GRF:

- Community engagement, which includes insufficient stakeholder buy-in and difficulties encountered when partnering with the student body,
- Managing the fund, which includes limited internal staff and support time, and
- Identifying and selecting projects, which includes the dilemma of a poor or limited applicant pool.

Community Engagement

Obtaining Stakeholder Buy-in

An initial challenge for many fund champions is getting enough campus support from stakeholders to launch their GRF. Without the necessary support, the GRF may not receive adequate funding, community input to guide the fund, or project proposal ideas. Nearly 30 percent of reporting institutions advised getting buy-in and soliciting input from a wide variety of stakeholders as a method to build a representative, supported, and lasting GRF.

Common university stakeholders that are often included in the GRF's development and oversight process include staff, administrators, faculty, members of the Board of Trustees, and students. George Washington University recommends reaching out specifically to faculty, staff, and students, as well as to encourage members of the Division of Operations, Facilities, Sustainability Office, the University Budget Office, and the Office of Finance where appropriate.

The University of Illinois, Urbana-Champaign's Director for Budget and Resource Planning, Mike Marquissee, advocated for fund administrators to talk with multiple departments and organizations on campus before the fund is launched.

"Make sure you get input on the system from all appropriate stakeholders, so it can be widely accepted as a great program."

The University of North Carolina seeks stakeholder buy-in through a campus-wide campaign to departments by advertising the environmental and financial value of avoided costs. Hampshire College recommended that after the necessary stakeholders are selected, fund managers should convene them early in the GRF creation process to help shape the direction and process of the GRF. Fund administrators at the University of Montana, Missoula, recommended gathering student government representatives or other student leaders on your side before launching the fund. Many institutions take student interests seriously and getting the endorsement of the student body or environmental organizations through petitions, surveys, or events held on campus can demonstrate the broad-based support for such a fund.

The Student Factor – Partnering with the Student Body

A few funds report difficulties when they included students in the fund formation process or fund management. However, inviting students into the conversation can be a strategic way to build community support and capitalize on student energy and its potential to bring innovative project ideas to campus.

A common difficulty that comes from partnering with students is due to their short time as campus community members. The typical university student enrolls at his or her school for approximately four years, but many programs and projects are designed to operate well past that time frame. GRF's that seek student input and involvement have in some cases cited difficulties with students' ability to devote substantial time to the fund, especially when extracurriculars like sports teams, clubs, work study jobs, studying abroad, and internships, can affect a student's ability to work consistently with the fund. So how do schools balance student involvement and potentially high-turnover?



In 2011, three students at Middlebury conducted a study to document the frequency and duration that lights remained on in campus laundry rooms. Based on the study's promising results, Middlebury administrators decided to fund a campus-wide upgrade in all 12 of Middlebury's student laundry rooms. In total, the project cost $6,000 and Middlebury calculates an annual payback of approximately $1,000.

Administrators from the College of Wooster's Revolving Environmental Efficiency Fund (REEF) have given serious consideration to the students that will become an integral part of their fund.

"Carefully selecting student leaders who truly display passion and motivation and sticking power has been difficult," said Laurie Stickelmaier, the Vice President

for Finance and Business at Wooster. However, the College of Wooster has kept students involved in the fund, but does select younger students, particularly sophomores and juniors, who are able to devote one year or more to the fund.

Offering course credit in exchange for work hours is another strategy to keep students involved.

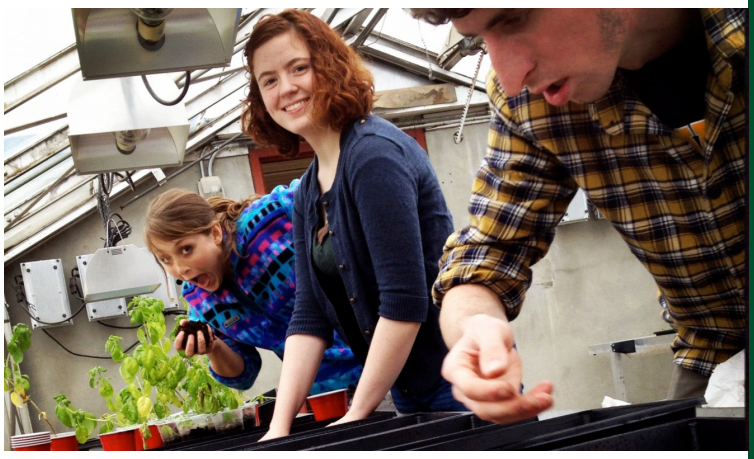
"Obtaining class credit for developing proposals seems to be necessary," said Robin Saha, the Chair of the Kless Revolving Energy Loan Fund Committee at the University of Montana, Missoula. "Experience has shown that very few students can or do devote the necessary time unless they are developing a project for a class they are taking."

Student turnover can precede a project's lifespan, especially when the students work on large projects with long payback periods.

"Since our fund requires a six-year payback maximum and saved costs are accrued over six years, the students who originally proposed the project depart during the reporting period," said Martha Larson, the Manager of Campus Energy and Sustainability at Carleton.

Carleton has implemented measures to ensure consistent student leadership on such projects: having the student responsible for the project select their successor before they leave the fund or graduate.

"Set clear reporting requirements with consideration of how students should pass on the responsibility as the original proposers graduate and move on," recommended Larson. Larson also recommended having a designated staff member who can assist with the responsibility of tracking and reporting on the project data throughout the full length of the project term.



At Whitman College, Student Agriculture at Whitman (SAW) students undertook a greenhouse garden project, planting a variety of greens including lettuce and pea shoots. In the photo, students plant pea shoots in the rooftop greenhouse, which can then be donated to a campus dining hall.

Even for funds that actively recruit student leaders and student-led project proposals, student participation can be lower than desired. To increase their student in involvement in their fund, the University of North Carolina raises awareness of the fund during student elections. Mars Hill College, also in North Carolina, has sought high student participation by involving them in the initial stages of their MHC Green Revolving Fund, a characteristic that has adapted their GRF to student concerns and priorities.

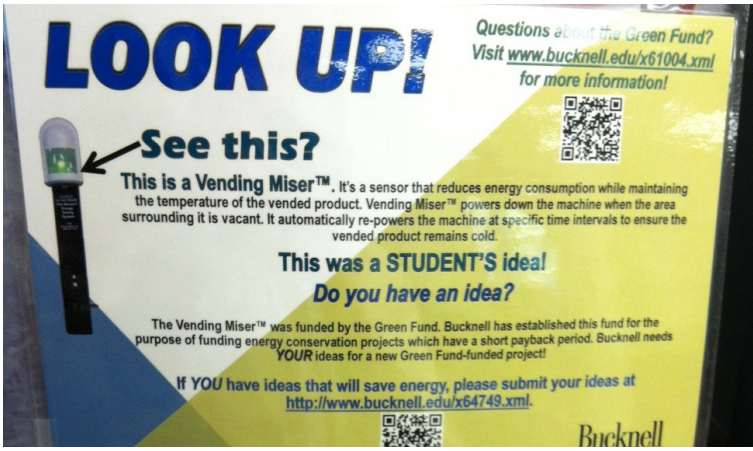
Managing the Fund

Internal Staff and Support

Many schools reported that creating new programs and funding sources would require additional management time and place more pressure on administrators' already-limited availability. The majority of schools surveyed reported that they had a desire to tackle new projects but the inability to have current staff devote additional time to the advertising, explaining, and reporting on GRF projects that funds require.

One school reported that their sustainability staff was currently "maxed out," a sentiment echoed by many schools, even those with Sustainability Offices or dedicated sustainability staff. A number of fund administrators reported these concerns, speaking to the universality that many administrators face: a long list of projects that need to be tackled with limited staff time and resources.

Bucknell University reached into their campus community to involve students and faculty that could assist the sustainability staff on campus. Students and interested faculty can lighten the burden of identifying projects or working with other departments, and can also act as key ambassadors to promote the fund. Carleton College outlined a direct chain of command for approving projects, and set firm timelines to ensure that projects do not overextend the staff working on them. ASU connected with financial experts that guided the fund's operations.



Bucknell University's Green Fund installed over 40 vending machine misers in buildings across campus. The technology, proposed as a student project in 2010, can be installed into existing vending machines and enables them to power down when not in use, conserving energy.

"Identify subject matter experts who are able to lend advice in establishing the return on investment analysis and link those returns to budgets," recommended Lisa Frace, the Associate Vice President of Planning and Budget at Arizona State University.

For GRFs that are created outside the facilities department, seeking facilities input and guidance can encourage future collaboration and help to identify the best projects that can provide a high return.
For more information, refer to page 40, *The Student Factor- Partnering with the Student Body.*

Identifying Projects

There are many potential GRF projects that a campus can tackle, ranging in size, scope, funding necessity, and the administrative support required to complete the project successfully. GRFs have supported projects as small as planting a small campus garden to as large as complete building retrofits. But for some schools, identifying those project opportunities can be difficult.

"Our biggest challenge has been recruiting applicants," explained Melissa Goodall, Assistant Director at the Yale Office of Sustainability. "Those who truly understand the program and its intent have taken full advantage of it, but we need broader traction."

To better raise awareness of their GRF, Iowa State University keeps the original campus members who championed the fund involved in fund processes.

"These individuals are helpful in encouraging proposal submissions in their various roles throughout campus," said Merry Rankin, the Director of Sustainability at ISU. Stanford University's Associate Director of Facilities Energy Management, Gerry Hamilton, also highlighted the importance of promoting the fund through outreach, especially about the availability of funds to targeted departments on campus. Stanford operates two funds which have cumulatively invested more than $41 million in energy-related projects."

One place to look for project ideas is inside the facilities department. Campus facilities often have a shortlist of projects to complete, some of which may have been highlighted for their projected energy-saving or efficiency impact. The University of Vermont focused on updating historic buildings on campus through careful and deliberate long-term planning.

"The attention has turned to the renovation and energy upgrade needs of existing buildings, many with constraints due to their designation as historic, "said Gioia Thompson, Director of the Office of Sustainability at UVM. "Energy projects of a scale of $1M or more tend to fall within a 7 to 15 year simple payback period." UVM also noted that the decision to target efficiency projects inside historic buildings may fit within a university's larger programmatic goals.

Departments outside of facilities may know their building space well, and can be a source for additional project ideas.

"Solicit departments for projects before establishing a loan fund," advised Brandon Trelstad, Oregon State University's Sustainability Coordinator. "Determine from where the demand will come and foster that demand."

Students are also an oftentimes untapped resource for both small- and large-scale projects, and coupling the identification of project opportunities with class credit, can be a great incentive to complete the work during a given semester. For more information, refer to page 39, The Student Factor - Partnering with the Student Body.

A handful of schools report that marketing the fund around campus, such as advertising funding availability to specific departments and utilizing email listservs, has helped raise awareness of campus GRFs. Campus-wide knowledge that the fund exists and a clear understanding of what the fund is and what it can do can drive project proposals.

"Promote, promote, promote," recommended Bucknell University's Director of the Campus Greening Initiative, Dina El-Mogazi. The most important thing that a GRF advocate can do is promote their GRF around campus, which can have many benefits, including a greater possible applicant pool to tap into new and diverse projects, the potential for additional fundraising around sustainability projects and the GRF, and positive media attention concerning the university's improved impact on the environment.



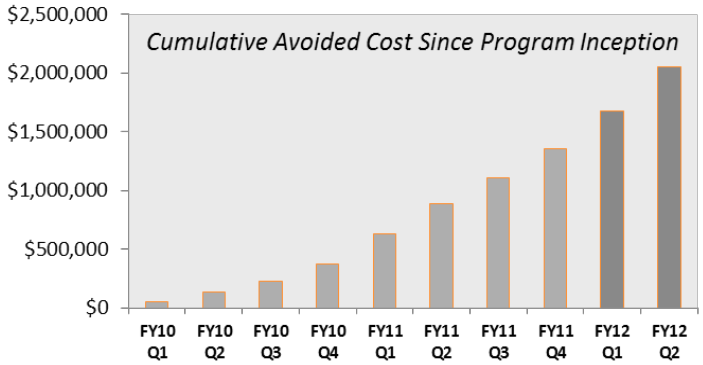
The British Columbia Institute of Technology took an innovative approach to resource-use reduction on campus through their Virtual Reality Paint Training System. The program, housed inside the Institute's Auto Collision department, trains students to spray paint and coat vehicles without the need to heat the spray booth, purchase paint, filters, and solvents, and eliminates local air pollution, a common by-product of traditional automotive painting. The program was funded by the campus' Sustainability Revolving Fund as it targeted three aspects of their GRF selection criteria: energy conservation, pollution reduction (i.e.: hazardous waste, solid waste, liquid waste, gaseous emissions), and operational improvements that decrease environmental impacts.

Conclusion and Looking Forward

GRFs have established financial, educational, and environmental benefits. The model has been demonstrated to reduce campus operational expenses and resource use, while providing a stable funding stream for new and ongoing sustainability projects. GRFs can enrich campus life in interdisciplinary and holistic ways, such as by providing new learning opportunities for students, faculty, staff, increasing collaboration across departments, and improving the level of environmental awareness inside the university community.

There is great diversity in how GRFs are developed, structured, and implemented on campus. As the number of funds operating in North America grows, there is also growth in the body of resources, knowledge, and best practices available to facilitate GRF establishment in higher education and beyond.

Numerous schools emphasized the importance of looking at the field of GRFs to learn what works, what may not work, and what would work best at a specific institution. Sharing data and asking advice of other schools who have more established funds can help a campus avoid under-performing projects or administrative issues that may not be apparent in the founding of the GRF.



Since 2009, Caltech's Energy Conservation Investment Program (CECIP) has recorded approximately $2 million in avoided costs due to their energy-saving projects.

"Don't reinvent the wheel," said Caltech's Director of Sustainability Programs, John Onderdonk. "Talk to other universities that have made this work and assimilate those programs into a custom program that will work at your school."

For all schools seeking to start a GRF, but especially those that are part of a larger state university system, instituting a GRF can take time and tenacity. However, with GRFs operating at public universities within 22 state systems in North America, that obstacle is not insurmountable.

"Persistence is key in getting the proposal heard by the right people," noted Bucknell's El-Mogazi. "Successful examples from peer institutions are usually quite persuasive."

Some of the most prevalent recommendations reported by schools revolved around two themes: creating a fund that caters to your institution's distinct priorities and strengths and connecting with other institutions to learn best practices.

"Establish a fund and funding processes that work for your situation," noted Unity College's Sustainability Coordinator, Jesse Pyles. "Remember that the goal is to reduce energy costs and emissions, and to increase awareness."

Aligning the fund with institutional goals on climate neutrality, budget reduction, and overall reduced environmental impact can be an attractive lure to gain support from the campus community, alumni network, and board members. The University of North Carolina at Chapel Hill recommends seeking the highest level of potential support in all related departments. UNC fund managers have three straightforward recommendations: "Ask for advice. Do your homework. And be prepared for meetings."

For anyone considering the GRF model but with reservations, George Mason University's Energy Manager, Patrick Buchanan, offers clear and compelling advice: "Just do it. Great way to make ideas happen."

Acknowledgements

The Sustainable Endowments Institute has benefited from many individuals who lent their expertise, insight, and time to create Greening the Bottom Line 2012.

First, many thanks to the college and university staff who shared information about their GRFs. Through their hard work and communication, best practices and real-world lessons can be shared with an audience of engaged administrators, alumni, faculty, staff, and students who seek to advance sustainability in higher education and beyond.

We are particularly grateful to Emily Flynn, the principal author of this report and Manager of Special Projects at the Sustainable Endowments Institute (SEI). Emily's dedicated work on this publication reflects her diligent research ethic and persistent personal commitment to the field of sustainability. Emily deserves special recognition for taking a complex data set and transforming it into an accessible and practical report.

As the principal author of last year's Greening the Bottom Line 2011, Dano Weisbord laid a strong foundation for all GRF research. His strategic guidance and support was invaluable throughout the research and writing process for the 2012 edition.

Mark Orlowski, as the Executive Director of SEI and a contributing author, provided direction and management of this report. In 2010, Mark reached out to collaborators and advisors to create the first edition, Greening the Bottom Line 2011—an effective document for institutions considering the creation or expansion of their green revolving funds. The 2012 edition is a testament to Mark's vision and hard work to advance sustainability by helping transform perception of energy efficiency upgrades as expenses and instead, to value them as high-return investment opportunities.

Rob Foley, Senior Research Fellow at SEI, was instrumental in the survey process and data analysis for Greening the Bottom Line 2012. His sharp mind and attention to detail was vital, and we are very grateful for his work.

The report gained critical insight from Joe Indvik at ICF International. His perspective as a former student sustainability leader at Dartmouth College and his expertise in economics, energy efficiency, and sustainability strategy influenced not only this document, but SEI's future GRF research.

This report was significantly improved thanks to the time and thoughtful input of many reviewers: Lisa Hiserodt, Max Storto, Shoshana Blank, Daniel Pesquera, and Deborah Flynn.

We especially wish to thank those who have provided generous foundation grants for Greening the Bottom Line 2012: David Rockefeller Fund, John Merck Fund, Kresge Foundation, Merck Family Fund, Rockefeller Brothers Fund, and Wallace Global Fund. We are honored that these foundations recognize the importance of researching and disseminating the investment value of green revolving funds and the benefits to higher education and other institutions.

The content and outreach of Greening the Bottom Line 2012 has been greatly enhanced by partnering with leading organizations advancing sustainability in higher education. Please refer to the organization names and logos displayed on page 2 for a complete list of our partners.

Acknowledgements

We appreciate the hard work of the graphic designers and editors who ensured that the images and text were accurate and effective. The clarity of the text was enhanced immeasurably by the knowledgeable, caring, and dedicated work of wordsmiths at EcoMotiva. Michael Crigler at Prank Design deserves special commendation for taking on this ambitious project with an even more ambitious timeline. His creativity, patience, and attention to detail were exceptional as we worked through many challenges together.

We are especially fortunate to have our work guided by a dedicated and outstanding Advisory Council:

Jennifer Andrews
Clean Air - Cool Planet

Sam Arons
Google

Carter Bales
New World Capital Group

Beth Bogart
Progressive Source Communications

Bill Coleman and Jasmine Tanguay
CLF Ventures

Blaine Collison
U.S. EPA Green Power Partnership

Tony Cortese
Second Nature

Mike Crowley
Institute for Sustainable Communities

Julian Dautremont-Smith
Alfred State University

Felicia Davis
United Negro College Fund (UNCF) Special Programs

Douglas I. Foy
Serrafix Corporation

Heather Henriksen
Harvard University

Robert Hutchinson
Rocky Mountain Institute

Scott Johnstone
Vermont Energy Investment Corporation

Van Jones
Princeton University

Greg Kats
Capital E

Julian Keniry
National Wildlife Federation

David Kopans
GreenerU

Liz Maw
Net Impact

Bill McCalpin

Scott McDonald
Courtney's Foundation

Judy Nitsch
Nitsch Engineering

John Onderdonk
Caltech

David Orr
Oberlin College

Billy Parish
Solar Mosaic and Energy Action Coalition

Louisa Plotnick
Clinton Climate Initiative

Debra Rowe
U.S. Partnership for Education for Sustainable Development

Leo Pierre Roy
Vanesse Hangen Brustlin (VHB)

Leith Sharp

Gus Speth
Vermont Law School

Anne Stephenson

Michael Thomas
New England Board of Higher Education

Dano Weisbord
ActionAid International

Dan Worth
National Association of Environmental Law Societies

Acknowledgements

Beyond words, images help tell the story, and we wish to express our gratitude to all the schools that provided photographs for the report.

The Sustainable Endowments Institute regrets any possible omissions or misinterpretations of the data that was collected independently or that schools provided. We invite any additions or corrections and intend to update Greening the Bottom Line 2012 with any necessary changes and adjustments. College and university leaders who commit their limited resources to making sustainability an integral part of their schools make our work significant. This group of leaders is growing each day. We offer our sincere thanks for your dedication, especially to those of you who took the time to respond to the Institute's survey and phone inquiries.
We hope that Greening the Bottom Line 2012 gives you additional tools and inspiration to advance sustainable and rewarding investments in energy efficiency at your institution.

Appendix A

GRFs Operating in the United States and Canada

Institution	Location	Type	Name	Est.	Fund Size Current	Fund Size Committed
Agnes Scott College	GA	private	Agnes Scott College's Green Revolving Fund	2011		$1,000,000
Arizona State University	AZ	public	ASU Sustainability Initiatives Revolving Fund (SIRF)	2010	$1,500,000	
Bellevue College	WA	public	Student Environmental Sustainability Fund	2011	$350,000	$70,000
Bethany College	KS	private	Bethany College Green Revolving Fund (BCGRF)	2011	$25,000	$75,000
Boston University	MA	private	Sustainability Revolving Loan Fund	2008	$1,203,000	
British Columbia Institute of Technology	BC	public	Sustainability Revolving Fund	2010	$100,000	
Bucknell University	PA	private	Bucknell University Green Fund	2010	$11,560	
Burlington College	VT	private	Burlington College Green Revolving Fund	2011		$25,000
California Institute of Technology	CA	private	Caltech Energy Conservation Investment Program (CECIP)	2009	$8,000,000	
Carleton College	MN	private	Sustainability Revolving Fund (SRF)	2007	$79,600	
Catawba College	NC	private	Catawba Green Revolving Fund	2012		$400,000
College of Saint Benedict / Saint John's University	MN	private	Revolving Loan Fund	2010	$123,115	
College of Wooster	OH	private	The College of Wooster REEF	2009	$20,000	
Daemen College	NY	private	Daemen College Energy Saving Revolving Fund	2012		$26,000
Dartmouth College	NH	private	Dartmouth Green Revolving Fund	2011		$1,000,000
Denison University	OH	private	Green Hill Fund	2011	$712,500	$287,500
Dickinson College	PA	private	The Idea Fund	2011	$16,500	

Institution	Location	Type	Name	Est.	Fund Size Current	Fund Size Committed
Drury University	MO	private	Sustainability Revolving Fund	2012		$300,000
Edgewood College	WI	private	Edgewood College Sustainability Fund	2011		$180,000
Ferrum College	VA	private	Ferrum College Green Revolving Fund	2012	$150,000	$420,000
Furman University	SC	private	Student Climate Action Revolving Fund	2009	$43,000	
George Mason University	VA	public	Electric Recoveries	2008	$234,000	$15,000
Georgia Institute of Technology	GA	public	Campus Energy and Sustainability Investment Program	2011	$1,000,000	$5,000,000
Grand Valley State University	MI	public	Sustainability Reinvestment Fund/ Energy Reinvestment Fund	2011/ 2006	$45,000	$3,500,000
Green Mountain College	VT	private	Green Mountain College Revolving Loan Fund	2011		$30,000
Hampshire College	MA	private	Hampshire College Sustainable Revolving Fund	2011	$79,000	$321,000
Harvard University	MA	private	Green Loan Fund	2001	$12,000,000	
Hiram College	OH	private	Hiram GREENS Fund	2012		$600,000
Iowa State University	IA	public	Live Green Revolving Loan Fund	2008	$1,000,000	
Kalamazoo College	MI	private	Climate Commitment Revolving Fund	2008	$100,000	
Lane Community College	OR	public	Energy Carryover Fund	2006	$126,000	
Lethbridge College	AB	public	Green Revolving Fund	2012		$250,000
Mars Hill College	NC	private	MHC Green Revolving Fund	2011	$200,000	
Massachusetts Institute of Technology	MA	private	Energy Conservation Investment Fund	2007	$2,000,000	
Miami University of Ohio	OH	public	Miami University Revolving Green Fund	2009	$50,000	
Middlebury College	VT	private	Middlebury Revolving Loan Fund	2011	$294,000	$706,000
Northland College	WI	private	Northland College Green Revolving Fund	2011	$200,000	
Oberlin College	OH	private	Oberlin College Green EDGE Fund	2008	$90,000	
Oregon State University	OR	public	Sustainable Energy Revolving Loan Fund	2010	$300,000	$700,000
Rollins College	FL	private	Rollins Green Revolving Fund	2012	$1,000,000	

Institution	Location	Type	Name	Est.	Fund Size Current	Fund Size Committed
Skidmore College	NY	private	Campus Sustainability Fund	2008	$50,000	
St. Mary's College of Maryland	MD	private	Green St. Mary's Revolving Fund	2010	$72,740	
Stanford University	CA	private	Energy Retrofit Program (ERP)/ Whole Building Energy Retrofit Program (WBERP)	1993/ 2004	$2,000,000/ $8,000,000	$15,000
Swarthmore College	PA	private	Renewing Fund for Resource Conservation	2009	$43,500	
The George Washington University	DC	private	Green Campus Fund	2010	$2,140,000	
Thompson Rivers University	BC	public	TRU Sustainable Energy Revolving Fund	2012	$75,000	
Tufts University	MA	private	Tufts University Energy Reserve Fund	2000	$1,743,586	
Unity College	ME	private	Unity College Sustainability Fund	2011	$120,000	
University of Alberta	AB	public	Sustainability Enhancement Fund	2011	$350,000	
University of Arizona	AZ	public	UA Green Revolving Fund	2011	$250,000	$750,000
University of British Columbia	BC	public	UBC Sustainability Fund	2011		$1,000,000
University of Calgary	AB	public	Revolving Energy Fund	2011	$1,000,000	
University of Colorado, Boulder	CO	public	Energy and Climate Revolving Fund	2008	$521,186	
University of Denver	CO	private	Energy Reserve Fund	2009	$6,570,297	
University of Illinois Urbana - Champaign	IL	public	Revolving Loan Fund	2012	$1,500,000	
University of Kansas	KS	public	Revolving Green Loan Fund	2010	$40,000	
University of Minnesota- Duluth	MN	public	UMD Green Revolving Fund	2011	$100,000	
University of Minnesota - Twin Cities	MN	public	Energy Conservation Internal Loan Program	1998	$4,000,000	$1,000,000
University of Montana - Missoula	MT	public	Kless Revolving Energy Loan Fund (KRELF)	2009	$249,422	
University of New Hampshire	NH	public	UNH Energy Efficiency Fund (EEF)	2009	$1,325,000	
University of North Carolina at Chapel Hill	NC	public	Renewable Energy Special Projects Committee Fund/ Green Revolving Fund	2004/ 2011	$151,065/ $500,000	
University of Notre Dame	IN	private	Green Loan Fund	2008	$2,000,000	
University of Oregon	OR	public	UO Green Revolving Fund	2012	$360,000	$640,000

Institution	Location	Type	Name	Est.	Fund Size Current	Fund Size Committed
University of Pennsylvania	PA	private	Penn Green Fund	2009	$1,000,000	
University of Southern Maine	ME	public	USM Revolving Green Fund	2009	$107,258	
University of Texas at Dallas	TX	public	UT Dallas Revolving Sustainability Account	2010	$140,000	
University of Utah	UT	public	Energy Management Projects	2007	$741,355	$231,222
University of Vermont	VT	public	Energy Revolving Fund	2012	$13,000,000	
University of Victoria	BC	public	Revolving Sustainability Fund	2010	$250,000	
University of Virginia	VA	public		2010	$1,000,000	
Vermont State Colleges	VT	public	VSC Green Revolving Loan Fund	2012		$2,000,000
Weber State University	UT	public	Energy Conservation Projects	2010	$5,000,000	$4,000,000
Western Michigan University	MI	public	Quasi-Revolving Fund/ Green Revolving Fund	1980/ 2011	$385,000	$1,000,000
Whitman College	WA	private	Sustainability Revolving Loan Fund (SRLF)	2008	$50,000	
Yale University	CT	private	Yale Sustainability Microloan Fund	2011	$100,000	

Appendix B

Methodology

Surveying for *Greening the Bottom Line 2012*

Between February 1 and May 15, 2012, Sustainable Endowments Institute sent surveys to over 90 institutions. This expanded list of schools came from a few sources: the original 52 institutions surveyed in *Greening the Bottom Line 2011*, schools indicated by web research or through outreach for the Billion Dollar Green Challenge, email and phone communication with school administrators outside of the original list of schools, and relevant industry publications and press releases.

The streamlined survey tool focuses on quantitative fund data and qualitative responses to clarify and add detailed information about each fund. As of August 2012, SEI had identified 76 institutions that had either committed to creating, or are operating, a total of 79 funds (four institutions have more than one fund for different purposes, and two partner institutions share a fund). All data published in this report derives from the *Greening the Bottom Line 2012* survey and is supplemented by material from the *Greening the Bottom Line 2011* survey and independent research.

Appendix C

Calculating Return on Investment

There are a variety of ways to account for project or fund financial performance, including annual return on investment (ROI)[14] , lifetime return on investment, internal rate of return, and payback period. Many schools use a combination of these, or other, forms of accounting to measure both the speed at which the fund can recapitalize itself after issuing loans or funding projects, and the success of the fund measured in financial terms or compared to other potential investments. *Greening the Bottom Line* asked schools to provide annual ROI data and payback periods (see below) for their funds, and to explain their method for calculating returns. Despite a refined survey tool and more comprehensive data from schools surveyed, the following limitations apply to these data:

- Limited long-term data: The recent formation of most funds–67 funds created between 2008 and 2012 –means that some performance data may not be indicative of the overall returns that will occur over the life of a fund. For some schools, this may mean higher initial returns because low-cost "low hanging fruit" projects are tackled first. For other schools, this may mean lower initial returns because fund operating procedures are still being developed and refined, or comprehensive high cost and high return projects are not yet within the fund's reach. Despite the fact that many funds are relatively new, the continued high performance of schools like WMU (47 percent) and Stanford (27 percent) over the past decades of operation suggest that the strong performance of newer funds will continue into the future.

- Variable terminology: The refined survey questions and strong data provided by institutions in the second *Greening the Bottom Line* report provides an even clearer picture of how fund- and project-performance are measured. However, terms such as "return on investment," "payback period," and what constitutes a single project or bundle of projects may vary somewhat from institution to institution.

- Possible variation in calculation methods: Most schools that reported returns data provided either payback periods (the number of years for project savings to equal cost) or annual return on investments (the ratio of annual savings to initial project cost, expressed as a percentage). However, there may be variations in the precise formulas that schools used to calculate their payback period or ROI. All efforts were made to clarify that schools were providing data in either ROI or payback period format. Additionally, other factors such as the way utilities are purchased and accounted for may cause differences in calculation methods.

[14] Rate of return: an amount of income (loss) and/or change in value realized or anticipated on an investment, expressed as a percentage of that investment (p. 744). In the case of GRFs, the ROI represents the average annual return to the institution for all projects paid for by the fund. Shannon P. Pratt and Roger J. Grabowski. *Cost of Capital: Applications and Examples.* New York: John Wiley and Sons, 2010.

Appendix D

National Sustainability Initiatives

The Billion Dollar Green Challenge

The Billion Dollar Green Challenge contributed to some growth of GRFs over the past year. The Billion Dollar Green Challenge, a program of the Sustainable Endowments Institute, was launched in October 2011 to encourage colleges, universities, and other nonprofit institutions to invest a combined total of one billion dollars in self-managed green revolving funds that finance energy efficiency improvements. In *Greening the Bottom Line 2012* survey responses, 28 schools that created GRFs during 2011 and 2012 were signatories of The Billion Dollar Green Challenge. The Challenge was listed as a factor for creating GRFs on a number of campuses.
Learn more at www.GreenBillion.org.

The American College & University Presidents' Climate Commitment

The ACUPCC is an intensive partnership among more than 650 colleges and universities to accelerate the education, research and community engagement to equip society to re-stabilize the earth's climate, while setting an example by eliminating net greenhouse gas emissions from their own operations.
Learn more at www.presidentsclimatecommitment.org

AASHE'S STARS Program

The Sustainability Tracking, Assessment & Rating System™ (STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance. STARS® was developed by the Association for Advancement of Sustainability in Higher Education (AASHE), an acknowledged thought leader that advances sustainability by providing invaluable resources, with broad participation from diverse representatives of the higher education community.
Learn more at https://stars.aashe.org

Clean Air Cool Planet's Campus Carbon Calculator

Since 2002, CA-CP has provided the Campus Carbon Calculator as a free, comprehensive, transparent, and customizable solution to measuring and analyzing institutional greenhouse gas emissions. The Calculator is the most widely-used tool in US higher education for tracking campus carbon footprints and modeling emissions reduction scenarios.
Learn more at
http://www.cleanair-coolplanet.org/toolkit/inv-calculator.php

Appendix E

Key Statistics about Green Revolving Funds

CATEGORY	DATA
Fund Descriptions	Total green revolving funds: **79**
	Number at private institutions: **42**
	Number at public institutions: **37**
	Number of U.S. states represented: **31**
	Number of Canadian provinces represented: **2**
GRF Size	Smallest fund: **$12,000** (Bucknell University)
	Largest fund: **$13 million** (University of Vemont)
	Median fund size: **$400,000**
	Average fund size: **$1.41 million**
	Combined total value: At least **$111 million**
Fund Formation	First fund formed: **1980** (Western Michigan University)
	1980 to 2000: **4 funds formed**
	2000 to 2005: **3 funds formed**
	2005 to 2010: **32 funds formed**
	2010 to 2012: **36 funds formed**
Return on Investment	Minimum reported ROI: **20%** (Georgia Institute of Technology and the University of North Carolina at Chapel Hill)
	Maximum reported ROI: **57%** (Boston University)
	Median reported ROI: **28%**
Payback	Minimum reported average project payback: **1.6 years**
	Maximum reported average project payback: **7.8 years**
	Average reported average project payback: **4.4 years**

About the Authors

Emily Flynn,
Principal Author

Emily Flynn is the Manager of Special Projects at the Sustainable Endowments Institute. As a leader of The Billion Dollar Green Challenge, she works with colleges and universities to implement energy-efficiency and resource-use reduction projects.

As the author of two case studies on *Green Revolving Funds in Action*, Emily reported how colleges are instituting and implementing innovative energy efficiency financing. She was the lead researcher in the *Minority Serving Institutions Green Report Card* (2011), the first publication to report on the sustainability activities of HBCUs, hispanic- and tribal-serving institutions in North America.

Emily's work has been featured in industry publications and online news sources. Before joining the SEI team, Emily worked with Project Piaba, a community-based interdisciplinary project of the New England Aquarium. Her focus was on the ecological and socio-cultural systems of the middle Rio Negro basin, Brazil and its impact on sustainable fisheries and poverty alleviation.

Emily is a graduate of Williams College where she received a Bachelor of Arts in Human Ecology.

Mark Orlowski,
Contributing Author

Mark Orlowski is founder and executive director of the Sustainable Endowments Institute, a Cambridge-based special project of Rockefeller Philanthropy Advisors. Mark leads the Institute's research and outreach efforts on college sustainability initiatives including development of the *College Sustainability Report Card* and the Billion Dollar Green Challenge.

Mark has worked with students, faculty, administrators, and trustees at more than 100 schools. He has spoken at dozens of conferences as well as at the United Nations and at more than 80 colleges in over 30 states.

Along with widespread coverage by campus newspapers, numerous reports on the Institute's work have appeared in the national and business press. Media coverage includes articles in the *Boston Globe, Bloomberg, CNN Money, Forbes, Chronicle of Higher Education, New York Times,* and *USA Today.* Mark has also been profiled in *BusinessWeek* and the *Chronicle of Philanthropy* as a social entrepreneur.

A graduate of Williams College, Mark chaired the Campus Environmental Advisory Committee and served on Williams' Advisory Committee on Shareholder Responsibility. He also attended Berkshire Community College and earned a master's degree in management at Harvard University.

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Dano Weisbord is Senior Advisor for Organizational Sustainability and the Acting Head of Innovation and Learning in the Secretariat of ActionAid International where he promotes environmental and business innovation across operations in 47 countries. He was the principal author of *Greening the Bottom Line: The Trend Toward Green Revolving Funds on Campus*, released by the Sustainable Endowments Institute in 2011.

Dano was the first Environmental Sustainability Director at Smith College in Northampton, Massachusetts where he developed a sustainability and climate action plan, and sought to integrate academic work with environmental problem solving. Prior to joining Smith College, Dano was a Senior Project Manager with CLF Ventures Inc., the consulting arm of the Conservation Law Foundation in Boston, Massachusetts, where he assisted corporate clients from the energy and development sectors execute environmentally beneficial projects.

Dano has degrees from the Rhode Island School of Design and Tufts University. He lives in London, UK with his family.

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