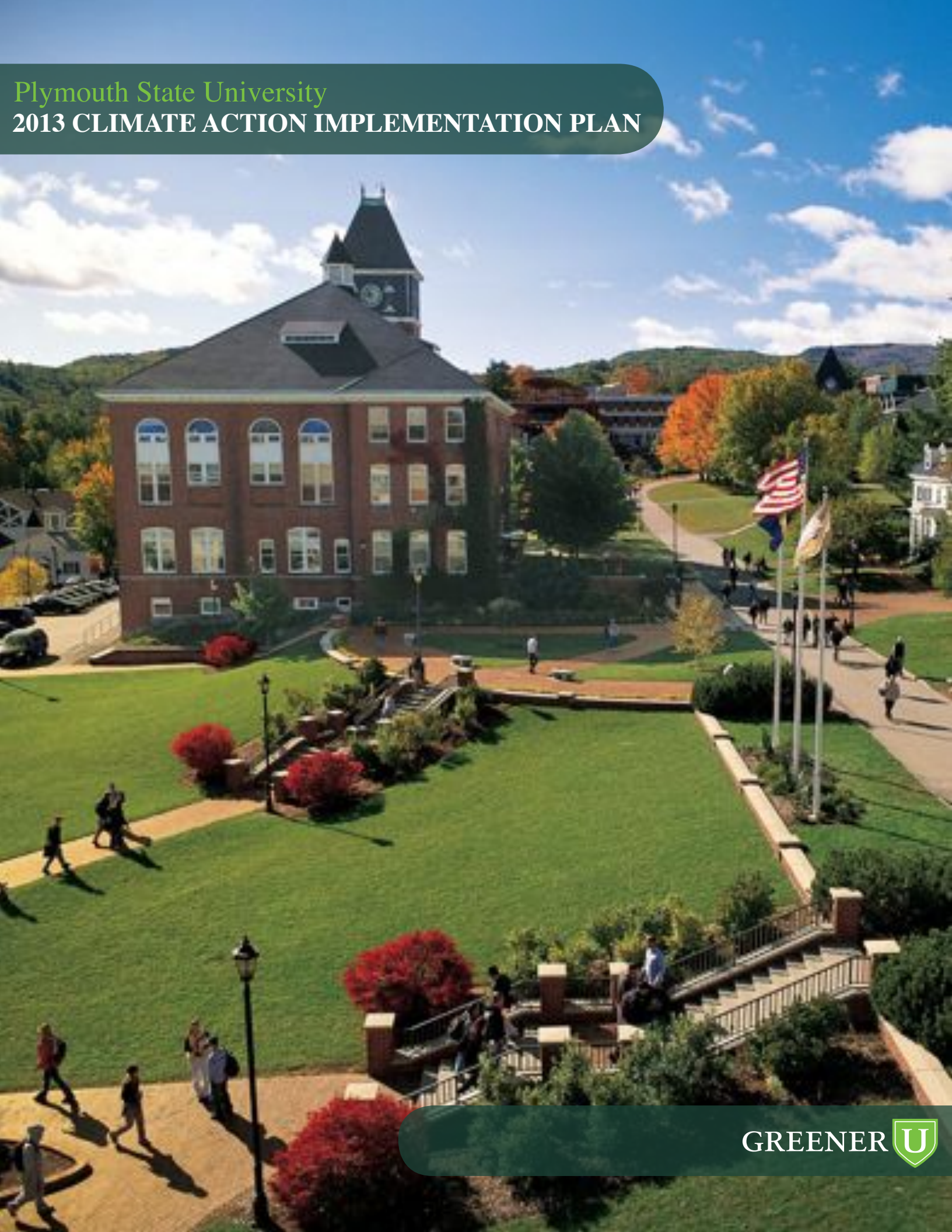
Plymouth State University

# 2013 CLIMATE ACTION IMPLEMENTATION PLAN



GREENER U

# TABLE OF CONTENTS


## 1. EXECUTIVE SUMMARY

1.1 Introduction ……...……..……. 2
1.2 Overview of the Implementation Plan ……...…… 3
1.3 Methodology ……...……... 3

## 2. SHORT-TERM PROJECTS

2.1 Introduction …….. 4
2.2 Short-Term Project Table ……..... 5

## 3. MEDIUM-TERM PROJECTS

3.1 Introduction …….. 6
3.2 Biomass …… 6
3.3 Medium-Term Project Table ……..…… 8

## 4. LONG-TERM TACTICS

4.1 Introduction …… 10
4.2 Process for Periodic Re-Evaluation …… 10
4.3 Greening the University's Electric Supply ……..… 13

## 5. APPENDICES

5.1 Summary of Appendices ……...……..… 14

Building Energy Benchmarking Report
Retrocommissioning scope of work
Solar Rooftop Analysis
Cogeneration / Biomass Financial Resources
Capacity Building
Report from the Public Ideation Session on March 6th
Report from the Public Facilitated Session on March 6th
Public Session Participants' Ranking of Ideas
Results from the Campus-Wide Survey

# 1. EXECUTIVE SUMMARY

## 1.1 Introduction

In 2007, Plymouth State University (PSU) demonstrated its commitment to being a campus leader in sustainability by becoming a charter signatory of the American College and University Presidents' Climate Commitment (ACUPCC). As part of that commitment, the University developed a Climate Action Plan in January of 2010, pledging to reduce campus greenhouse gas (GHG) emissions 50% by 2025 and to make its operations greenhouse gas neutral by 2050.

Such aggressive goals will not be achieved easily and PSU will need to plan and implement projects far beyond business as usual operations in order to accommodate such reduction targets. The 2010 Climate Action Plan begins to outline PSU's strategy for achieving these goals, while this complementary implementation plan serves as a more detailed guide to support PSU's ongoing progress by identifying projects and outlining a process for periodic project planning and assessment. Notably, this implementation plan builds on already significant progress.

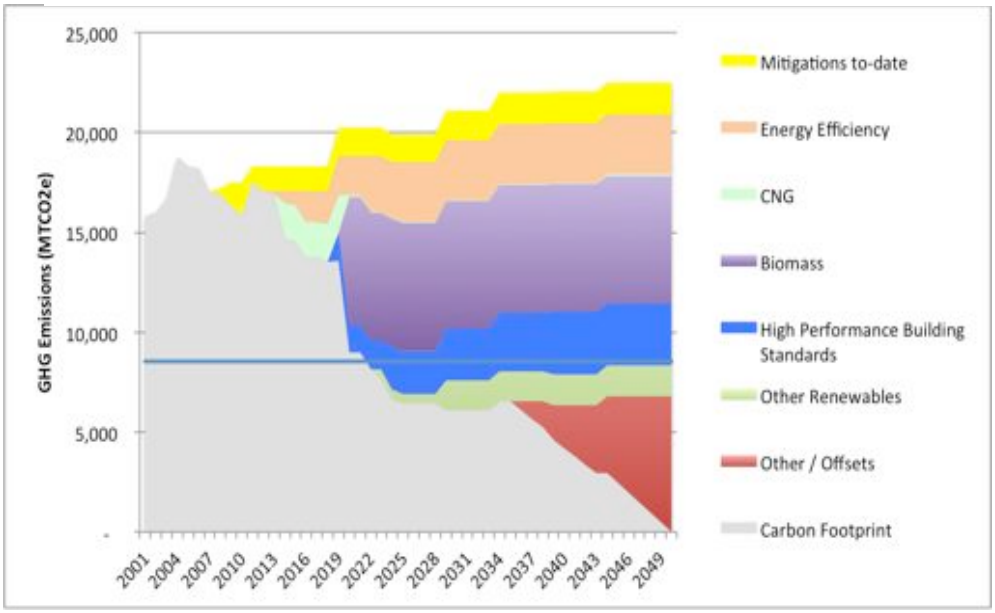
**Accomplishments to date include:**

- Installation of electric and thermal submetering to enable more effective energy management
- Development of green building standards for new construction
- Implementation of many quick payback energy efficiency upgrades, including extensive lighting upgrades and deployment of VFDs on most major fan systems
- Beginning of an in-house retrocommissioning program
- Significant progress toward conversion of the central plant boilers to burn compressed natural gas
- Preliminary exploration and long-term goal of conversion of the central plant to biomass

Largely through the above measures, PSU has held its greenhouse gas emissions more or less constant since 2007 in spite of growth of about 7% in the built campus environment.

Although this represents success on the first objective of stopping growth in greenhouse gas emissions, the efforts will have to be intensified to begin to bend the curve downward toward the first target of 50% reductions by 2025, and ultimately toward carbon neutrality by 2050. This implementation plan outlines next steps that need to be taken to keep PSU moving toward that goal and attempts to address the challenges to and resources needed for successful implementation. As agreed during an initial session with GreenerU, Goody Clancy and PSU in November, this

**Figure 1: Emissions Reduction Trajectory**




*The above graph shows how the various components of this plan can contribute to PSU's success in meeting its Climate Action Plan goals.*

implementation plan focuses on Scope 1 and 2 emissions[1] – those associated with direct emissions on campus (Scope 1) and off campus emissions for which PSU is directly responsible (Scope 2). Scope 3 emissions – emissions generated as a result of PSU's operations, but not directly under its control (such as commuting, faculty travel, etc.) – are outside the scope of this plan.[2] In addition PSU's rural location and other circumstances indicate that reductions in Scope 3 emissions are likely to be modest.

## 1.2 Overview of the Implementation Plan

This plan, a component of the greater Master Planning Process in collaboration with Goody Clancy, consists of four sections as outlined below:

- **Short-Term Projects**: This section focuses on projects targeted for the next three fiscal years, 2014-2016, and addresses these projects with a relatively high level of specificity.
- **Medium-Term Projects**: This section focuses on projects targeted for the period from FY 2017 – 2025 with an eye toward what needs to be accomplished to achieve the goal of 50% greenhouse gas emission reductions by 2025. These projects are addressed with moderate specificity.
- **Long-Term Tactics**: This section includes a very general discussion of the types of projects and approaches that will likely be needed to get the University from 50% GHG emission reductions in 2025 to net zero GHG emissions by 2050. This section includes a schedule for periodic planning and assessment of emerging factors.
- **Appendices:** The appendices include additional information that explains, supports, or further details the actions recommended herein. A brief introduction to each of the appendices can be seen at the beginning of section 5.

## 1.3 Methodology

This three-tiered implementation plan is the product of a collaborative, multi-step process outlined below:

1. Review of the Climate Action Plan (CAP) to determine and understand emissions reduction goals
2. Review of engineering studies assessing the central plant to determine options
3. Meetings with key stakeholders at PSU to discuss projects to date and determine priorities in relation to CAP goals
4. Analysis of campus and building energy data
5. Walkthrough energy assessments of key buildings on campus
6. Meetings with facilities personnel and other stakeholders to review preliminary findings
7. Incorporation of feedback from facilities personnel and other stakeholders

[1] This plan addresses Plymouth State University's Scope 1 and 2 emissions plus emissions associated with electrical transmission and distribution losses. The electrical transmission and distribution losses are technically classified as Scope 3 emissions. However, we have included them in our accounting of Scope 1 and 2 emissions because, like Scope 1 and 2 emissions, these emissions are reasonably within the control of the University, and they are impacted by many of the measures discussed in this plan.

[2] This plan is focused on providing a 50% reduction in Scope 1 and 2 emissions by 2025 and 100% reduction in Scope 1 and 2 emissions by 2050. In order to achieve the University's climate action plan goals, PSU will also have to achieve comparable reductions in Scope 3 emissions.

# 2. SHORT-TERM PROJECTS

## 2.1 Introduction

PSU has done significant work to establish momentum and make progress towards the ambitious GHG emissions reduction goals identified in the university's Climate Action Plan. In addition to pursuing a number of other energy-efficiency and conservation measures, PSU has improved energy efficiency in their existing building stock via high-efficiency lighting upgrades, building envelope improvements, and HVAC control improvements. The University is also about to embark on a major GHG emissions reduction project converting their central boiler plant – which currently operates on number 6 fuel oil – to compressed natural gas (CNG). In and of itself, this project will reduce the university's scope 1 and 2 emissions by 10%.

The information contained in the short-term table below builds on PSU's already considerable efforts by identifying projects that can be implemented within the next 3 years and that continue momentum toward PSU's 2025 goal of 50% emissions reductions. The short-term project table in the following reflects both the most immediate and the most detailed portion of this tiered implementation plan. As such, it was designed with careful consideration of PSU's available resources and capacity for implementation.

## 2.2 Short-Term Project Table

This area is intentionally left blank.
Please see the short-term project table on the following page.

| SHORT-TERM PROJECTS (YEAR 1-3) FISCAL YEARS 2014-2016 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project Title** | **Project Description** | **Estimated Emissions Reductions (MT of $CO_2e$)** | **Estimated Required Investment ($)** | **Estimated Savings ($/Year)** | **Estimated Payback (Investment/ Annual Savings)** | **Suggested Resources for Successful Implementation** | **Co-Benefits/Ancillary Benefits** | **Scoring*** | | |
| | | | | | | | | **Financial** | **Co-Benefits** | **Cost of $CO_2e$ Reductions** |
| Compressed Natural Gas (CNG) Project | Convert existing boilers to dual-fuel<br>• Install infrastructure to support mobile compressed natural gas tanks<br>• Replace existing burners with dual-fuel burners | 1,774 | $400,000 | $520,000 | 0.8 | • Underway | • Cleaner boiler operation, reduced boiler maintenance<br>• Strong public relations opportunity | Green | Green | Green |
| Phase 1 Targeted Building Energy Efficiency Projects | Power Plant<br>• Lighting retrofits<br>Langdon Woods<br>• Hot water pump control<br>Highland Hall<br>• Chiller replacement<br>• Boiler replacement<br>Lamson Library<br>• Occupancy control for stack lighting<br>• Chiller/cooling tower optimization<br>• 3-way to 2-way valve conversion | 829 | $700,000 | $160,000 | 4.4 | • External energy expertise (see attached outline retrocommissioning scope)<br>• Project Management support – find the right balance of allocating internal resources and bringing in external support<br>• Utility rebates | • Opportunities to improve occupant comfort<br>• Improve lighting quality<br>• Improved building maintenance<br>• Supplementing infrastructural improvements with complementary outreach and engagement programs could improve co-benefits | Green | Yellow | Green |
| Exterior Lighting Upgrades | Convert to LED and standardize across campus | 461 | $300,000 | $80,000 | 3.8 | • Project Management support – allocation of internal resources<br>• Utility rebates | • Aesthetic improvement | Green | Yellow | Green |
| Steam Line Replacements | Replace 425 linear feet of steam main | 85 | $980,000 | $20,000 | 49 | • Engineering<br>• Project Management | • Necessary to maintain heat to campus<br>• Reduced future emergency repairs | Red | Green | Red |
| Building Energy Management Best Practices | • Documenting DDC standards and existing conditions<br>• Operator training (e.g. Building Operator Certification) | 138 | $25,000 | $20,000 | Neutral | • External training opportunities via formal classes<br>• Consider customized training for optimizing building energy performance | • Professional development benefits for staff<br>• Greater staff participation in energy & CAP initiatives | Yellow | Green | Yellow |
| User Energy-Conservation Training & Outreach | • Address the "user" side of building energy management through awareness and behavioral change programming<br>• Install a demonstration student photovoltaic project | Small | Small | Small | Long | • Expanded sustainability staff | • Greater campus community involvement and buy-in<br>• Significant student education and engagement benefit | Yellow | Green | Red |
| Solid Waste Training & Program Reinvestment | • Maximize aversion and diversion through training and signage programs that address both users and operators<br>• Develop structure/policy to capture savings and/or revenue from recycling and reinvest into continued waste aversion/diversion programming | Small | Small | Small | Long | • Expanded sustainability staff | • Greater campus community involvement and buy-in<br>• May reduce costs associated with waste<br>• Creates a partially self-sustained program/funding model | Yellow | Green | Red |

* Scoring Key: Green marks "best-case scenario" for the scoring category listed. Yellow represents a moderate rating, whereas red represents the least favorable rating.

# 3. MEDIUM-TERM PROJECTS

## 3.1 Introduction

Building on the short-term projects and laying the groundwork for longer-term GHG reductions, the medium-term projects identified in the following table are designed to help PSU realize its goal of reducing GHG emissions by 50% by 2025. The cornerstone of this mid-term phase is the biomass conversion of the central plant, which will contribute an estimated **27% reduction** to Scopes 1 and 2 GHG emissions. Based on our understanding of the existing infrastructure and a review of the conversion studies that have already been conducted, we believe that the biomass transition is both feasible and largely backed by key stakeholders at PSU.

The information contained in the medium-term table identifies projects that can be implemented between 2017 and 2025. In order to reflect and accommodate for shifting variables in less-immediate projects, the table represents a second and relatively less-detailed tier in the implementation planning process.

## 3.2 Biomass

Converting the central boiler plant to biomass is a central component of this implementation plan. This approach has developed based on significant deliberation on the part of the Plymouth State community. As the University proceeds down the path toward implementation of this tactic, there are a few aspects of biomass that could influence its viability as a greenhouse gas reduction strategy and should be monitored and revisited:

*Emissions*

For the purposes of this analysis, we are considering biomass to be a carbon-neutral energy source. This is based on the assumption that any greenhouse gases emitted in the combustion of the biomass are recaptured and sequestered via growth of trees that replace those that are harvested for fuel. While this is a reasonable assumption for sustainably harvested fuel, there is some disagreement in the environmental science community over this assumption. Additionally, it is widely understood that the sequestration portion of the carbon cycle associated with biomass takes decades.

*Fuel Supply*

As mentioned above, fuel sourcing is critical to successfully meeting greenhouse gas objectives associated with a biomass project. The University must develop and enforce a strong fuel supply specification as part of any biomass fuel procurement.

Key elements of a sustainable biomass fuel supply include harvesting fuel locally and ensuring that the amount of fuel harvested is well within the regenerative growth potential of the region from which it is drawn. While there is plenty of spare forest growth in the region to support a biomass plant on the scale contemplated by PSU, land use may change over time. As Plymouth State moves forward with plans for a biomass and afterwards, the University should periodically revisit the fuel supply issue and study it in enough detail to assure itself that its fuel supply remains consistent with the University's principles.

*Alternatives*

The biomass conversion is projected to reduce GHG emissions by over 4,000 $MTCO_2e$, just over one quarter (27%) of existing scope one and two emissions. This will be a huge hole to fill in the University's climate action plan if it elects not to proceed with a biomass project. Following are some options that would warrant closer consideration if the University were investigating biomass alternatives:

> *Used vegetable oil*
>
> The reprocessing of used vegetable oil for use in fueling vehicles and boilers is currently commercially viable. In fact, there is a New Hampshire based company, AMENICO (http://www.amenico.com/), which collects used vegetable oil, re-processes it and distributes the reprocessed oil as fuel for the regional market. It is our understanding that the fuel is not currently cost competitive with natural gas or biomass, but that may change over time.

*Cellulosic biofuels*
Liquid fuel produced from wood and agricultural waste is an emerging technology that might be attractive for Plymouth State in the future. Production of the fuel is currently commercially viable. We are aware of at least one company in Ottawa, Canada, Ensyn Corporation (http://www.ensyn.com/) that produces this type of fuel commercially. As with the used vegetable oil, the fuel is not currently cost competitive with biomass and natural gas, but that may change over time.

*Geothermal*
Wholesale conversion to ground source (geothermal) heat pumps for heating the campus is not practical. However, if biomass is not deemed feasible, there may be targeted opportunities to convert to geothermal as part of major renovations for individual buildings. Geothermal heat pump systems still require electricity to operate the heat pumps and the well water pumps, thus conversion to geothermal heat pumps would require greater emphasis on low-carbon or carbon neutral electric supply.

## 3.3 Medium-Term Project Table

This area is intentionally left blank.
Please see the medium-term project table on the following page.

| MEDIUM-TERM PROJECTS (YEAR 4-10) FISCAL YEARS 2017-2025 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project Title** | **Project Description** | **Estimated Emissions Reductions (MT of $CO_2e$)** | **Estimated Required Investment ($)** | **Estimated Annual Savings ($/Year)** | **Estimated Payback (Investment/ Annual Savings)** | **Suggested Resources for Successful Implementation** | **Co-Benefits/Ancillary Benefits** | **Scoring** | | |
| | | | | | | | | **Financial** | **Co-Benefits** | **Cost of $CO_2e$ Reductions** |
| Window/Roof Replacements | Roof Replacement<br>• PE Center (if building is ultimately retained)<br>• Silver<br>• Speare<br>Window Replacement<br>• Speare | Small | Large | Small | Long | • Initial investment/ongoing maintenance | • Necessary improvements to retain building functionality | 🔴 | 🟢 | 🔴 |
| Phase 2 Targeted Building Energy Efficiency Projects | Boyd Hall<br>• Controls recommissioning<br>• Chiller/pump optimization<br>Prospect Dining Hall<br>• Steam pipe insulation<br>• Occupancy control of the dining room Air Handling Unit (AHU)<br>Silver Center<br>• LED lighting/daylighting controls – common areas | 599 | $1.0 Million | $120,000 | 8.3 | • External energy expertise<br>• Project Management support – find the right balance of allocating internal resources and bringing in external support<br>• Utility rebates | • Opportunities to improve occupant comfort<br>• Improve lighting quality<br>• Improved building maintenance | 🟡 | 🟡 | 🟡 |
| High-Performance Building Standards | • Adopt a policy that requires LEED Silver + a minimum of 5 energy performance points (20% below ASHRAE 90.1-2007 for new buildings and 16% for existing buildings)<br>• Include renovation projects as well as new construction | 525 | Moderate incremental cost | | Moderate-quick | • Support from VP of Finance to ensure successful implementation<br>• Strong project management coupled with reasonably deep expertise in high performance buildings<br>• Firm institutional commitment to high performance building standards | • Public relations<br>• Sustainability leadership | 🟡 | 🟡 | 🟡 |
| Cogeneration Plant Conversion | Biomass Conversion – per WERC study<br>• 22,000 pph wood chip boiler<br>• 300 kW backpressure steam turbine | 4,588 | $15 million | $600,000<br>(Incremental savings based on CNG baseline) | 25 years | • Engineering for feasibility analysis, Design, Permitting and Planning.<br>• Financial Resources<br>○ Capital funds<br>○ RECs<br>○ 3rd party financing<br>• Careful evaluation of sustainability criteria for fuel supply | • Opportunity to interact constructively with regional economy<br>• Public relations<br>• Sustainability leadership | 🔴 | 🟢 | 🔴 |
| Campus-wide Lighting Controls | Occupancy sensors and daylighting controls throughout the campus (where appropriate) | 309 | $250,000 | $56,000 | 4.5 years | • Initial investment/ongoing maintenance | • Improve lighting quality<br>• Improve occupant comfort | 🟢 | 🟡 | 🟢 |

| MEDIUM-TERM PROJECTS CONTINUED (YEAR 4-10) FISCAL YEARS 2017-2025 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project Title** | **Project Description** | **Estimated Emissions Reductions (MT of $CO_2e$)** | **Estimated Required Investment ($)** | **Estimated Annual Savings ($/Year)** | **Estimated Payback (Investment/ Annual Savings)** | **Suggested Resources for Successful Implementation** | **Co-Benefits/Ancillary Benefits** | **Scoring** | | |
| | | | | | | | | **Financial** | **Co-Benefits** | **Cost of $CO_2e$ Reductions** |
| HVAC Controls Upgrades | • Rounds Hall<br>• Silver Center<br>• Memorial Hall<br>• Speare Hall<br>• Belknap Hall<br>• Smith Hall<br>• Hyde Hall | 210 | $600,000 | $40,000 | 15 years | • Engage qualified outside engineering resource to thoroughly retrocommission target buildings | • Address deferred maintenance by replacing old control systems that are past their useful life | 🔴 | 🟢 | 🔴 |
| ALLWell Center | Phases 2-4 of the ALLWell complex will add approximately 190,000 square feet (net) to the built environment at PSU. Inevitably, this will add to the campus greenhouse gas emissions. The current plan calls for a high performance building incorporating many advanced energy efficiency techniques and a wood pellet boiler for all thermal needs at the complex. | 1,621 (relative to conventional construction) | N/A | $280,000 | N/A | • Strong management to incorporate energy goals into the design and construction phase<br>• Support from VP of Finance to ensure that high performance remains a budgetary priority | • Opportunity to interact constructively with regional economy<br>• Public relations<br>• Sustainability leadership | 🟢 | 🟢 | 🟢 |
| Compressed Natural Gas Vehicle Fueling | With the conversion of the boiler plant to CNG, the University will now have the option to consider converting its fleet to CNG. | 87 | $1 million† | $55,000 | 18 | • New vehicles or the conversion of existing vehicles | • Lower cost than gasoline<br>• Longer engine life and potential savings from decreased maintenance | 🔴 | 🟡 | 🔴 |
| Solar or Other Renewables | Installed costs for Solar PV systems continue to fall. With installed cost for commercial scale systems approaching $3.00 per watt, solar is becoming a viable option in New England. See the solar site analysis in the appendices. | 470 | $1.5 million | $85,000 | 18 | • State guidance allowing for participation in a power purchase agreement (to allow for a third party to reap tax benefits) | • High-profile demonstration of commitment to sustainability | 🔴 | 🟢 | 🔴 |
| Solid Waste Infrastructural Development | Infrastructural development/expansion for solid waste including:<br>• Cardboard bailer<br>• Asphalt ramp to allow trucks to load at container height<br>• Truck side-loaders | Small | Moderate | Small | Long | • Initial investment/ongoing maintenance | • Reduces labor and offsets costs | 🔴 | 🟡 | 🔴 |

† Order of magnitude price based on "Business Case for Compressed Natural Gas in Municipal Fleets", National Renewable Energy Laboratory, Caley Johnson. Technical Report NREL/TP-7A2-47919, June 2010. http://www.afdc.energy.gov/pdfs/47919.pdf

# 4. LONG-TERM TACTICS

## 4.1 Introduction

Recognizing both the inherent and considerable uncertainty associated with long-term planning and an ambitious carbon neutrality target of 2050, the long-term section reflects the final and least-detailed tier of this implementation plan. The intent of this section is to provide some context for what the 2025-2050 period may look like, as well as serve as a "placeholder" to which PSU stakeholders can periodically return and add increasing detail as the university nears its 2050 target.

## 4.2 Process for Periodic Re-Evaluation and Revision

The inability to accurately predict, model, or otherwise account for a number of factors during the 2025-2050 period challenges the inclusion of a detailed long-term project table (as seen for the short- and medium-term sections) in this plan. Uncertainties, which will need to be assessed in future years, include (but are not limited to) emerging technologies, available funding, energy markets, climatic shifts, and a number of other factors. However, this plan lays out a number of emissions reduction targets along the way to the ultimate 2050 carbon neutrality goal and additionally includes a schedule for ongoing evaluation, planning, and action. After the initial 3-year, short-term project set, this plan recommends that PSU develop and implement a project table for a secondary 4-year set, followed by regular short-term project planning every 5 years until the year 2050. PSU should additionally undertake medium-term project planning approximately every 10 years. These planning sets and spans are illustrated in Figure 2 below and followed by a more detailed table that includes key targets and actions for the University.

**Figure 2: Schedule for Ongoing Project Planning**


| YR | SUMMARY OF REQUIRED EVALUATION | KEY ACTIONS |
|---|---|---|
| 2016 | The year 2016 marks the end of the initial short-term period as detailed in this report. It is recommended that PSU return to the implementation plan at this time to assess its progress over the past 3 years. The success (emissions reductions) of completed projects should be evaluated, while a new short-term project table should be developed for the 4-year period 2017-2020 (this table may also include any incomplete projects from the initial 2014-2016 short-term period). In addition, any new factors affecting emissions should be integrated into and accounted for within an emissions reduction trajectory moving forward. | • Evaluate success of projects completed during the 2014-2016 period (set 1)<br>• Develop a new short-term project table for the 4-year period 2017-2020 (set 2)<br>• Modify the emissions reduction trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward |
| **2016 SCOPE 1 & 2 EMISSIONS TARGET: 13,766 $MTCO_2e$** | | |

| | | |
|---|---|---|
| 2020 | The year 2020 marks the end of the second short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the third set, years 2021-2025.<br><br>In addition, it will be necessary to reassess renewable energy technologies and other advancements in sustainable technologies, identify feasible options, and plan for the implementation of these technologies moving forward. Taking into account current projections of energy generation and demand, emerging technologies, the policy environment, and PSU's geographic location, GreenerU recommends the particular assessment and potential adoption of the following:<br>• Low-impact[3] hydroelectric generation on the Pemigewasset and/or Baker River (focus on conduit[4]/small hydropower infrastructure)<br>• Installation of community[5] and/or distributed[6] wind projects<br>• Procurement of power from a local or regional wind farm (e.g. Groton Wind Farm)<br>• Local capacity for solar technologies (thermal and electric)<br>• Increasing the carbon sequestration capacity of PSU's existing land holdings<br><br>These findings should be incorporated into the development of a medium-term project table for the years 2026-2035 (span 2). | • Evaluate success of projects completed during the 2017-2020 period (set 2)<br>• Develop new short-term project table for the 2021-2025 period (set 3)<br>• Modify trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward<br>• Conduct alternative energy assessment<br>• Conduct assessment of emerging sustainable technologies<br>• Conduct review of emerging regional climate trends/impacts and assess corresponding adaptation strategies<br>• Develop a medium-term project table for the years 2026-2035 (span 2); projects should be informed by the assessments noted above |
| **2020 SCOPE 1 & 2 EMISSIONS TARGET: 8,974 $MTCO_2e$** | | |
| 2025 | The year 2025 marks the end of the third short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the fourth set, years 2026-2030. | • Evaluate success of projects completed during the 2021-2025 period (set 3)<br>• Develop new short-term project table for the 2026-2030 period (set 4)<br>• Modify trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward |
| **2025 SCOPE 1 & 2 EMISSIONS TARGET: 8,532 $MTCO_2e$** | | |

[3] Learn more about the certification of low-impact hydropower projects at http://www.lowimpacthydro.org/.
[4] The National Hydropower Association writes that 'In conduit hydropower, existing tunnels, canals, pipelines, aqueducts and other manmade structures that carry water are fitted with electric generating equipment. Conduit projects often qualify as small hydro, and are able to extract power from water without the need for a large dam or reservoir. Conduit projects are efficient, cost-effective and environmentally friendly, as they are able to generate electricity from existing water flows, exploit synergies with infrastructure already in place and often requiring less of a capital investment'. See more at http://www.hydro.org/tech-and-policy/technology/conduit/.
[5] See http://www.awea.org/learnabout/smallwind/CommunityWind.cfm for more information on community wind projects through the American Wind Energy Association (AWEA).
[6] See http://www.awea.org/learnabout/smallwind/index.cfm for more information on distributed wind projects through the (AWEA).

| | | |
|---|---|---|
| 2030 | The year 2030 marks the end of the fourth short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the fifth set, years 2031-2035.<br><br>At this time, it will also be necessary to reassess renewable energy technologies and other advancements in sustainable technologies, identify feasible options, and plan for the implementation of these technologies moving forward. Such assessments should be integrated into a third and final medium-term project table to be implemented during the years 2036-2045 (span 3). | • Evaluate success of projects completed during the 2026-2030 period (set 4)<br>• Develop new short-term project table for the 2031-2035 period (set 5)<br>• Modify trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward<br>• Conduct alternative energy assessment<br>• Conduct assessment of emerging sustainable technologies<br>• Conduct review of emerging regional climate trends/impacts and assess corresponding adaptation strategies<br>• Develop span 3 medium-term project table for the years 2036-2045 (projects informed by assessments noted above) |
| **2030 SCOPE 1 & 2 EMISSIONS TARGET: 6,099 $MTCO_2e$** | | |
| 2035 | The year 2035 marks the end of the fifth short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the sixth set, years 2036-2040. | • Evaluate success of projects completed during the 2031-2035 period (set 5)<br>• Develop new short-term project table for the 2036-2040 period (set 6)<br>• Modify trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward |
| **2035 SCOPE 1 & 2 EMISSIONS TARGET: 6,541 $MTCO_2e$[7]** | | |
| 2040 | The year 2040 marks the end of the sixth short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the seventh set, years 2041-2045.<br><br>At this time, it will also be necessary to reassess renewable energy technologies and other advancements in sustainable technologies, identify feasible options, and plan for the implementation of these technologies moving forward. Such assessments should be integrated into short-term planning, as well as – where applicable – the existing medium-term project table for span 3. | • Evaluate success of projects completed during the 2036-2040 period (set 6)<br>• Develop new short-term project table for the 2041-2045 period (set 7)<br>• Conduct alternative energy assessment<br>• Conduct assessment of emerging sustainable technologies<br>• Conduct review of emerging regional climate trends/impacts and assess corresponding adaptation strategies<br>• Modify trajectory and projects based on delivered emissions reductions<br>• Integrate emergent factors affecting emissions reductions into trajectory and projects moving forward |
| **2040 SCOPE 1 & 2 EMISSIONS TARGET: 4,200 $MTCO_2e$** | | |
| 2045 | The year 2045 marks the end of the seventh short-term set. This plan thus recommends evaluating completed projects and developing a short-term project table for the eighth (and final) set, years 2046-2050. | • Evaluate success of projects completed during the 2041-2045 period (set 7)<br>• Develop final short-term project table for the 2046-2050 period (set 8)<br>• Modify trajectory and projects based on delivered emissions reductions and emergent factors affecting emissions reductions |
| **2045 SCOPE 1 & 2 EMISSIONS TARGET: 2,468 $MTCO_2e$** | | |

[7]The 2035 target reflects an increase over the 2030 target due to expected addition of approximately 72,000 square feet of building space in this time period.

| | | |
|---|---|---|
| 2050 | 2050 is PSU's final carbon neutrality target. While this plan promotes significant reductions prior to the 2050 carbon neutrality date, PSU may need to purchase carbon offsets/renewable energy credits as a final step. | • Purchase carbon offsets as a last resort to compensate for irreducible greenhouse gas emissions |

## 4.3 Greening the University's Electric Supply

The medium-term projects previously outlined will eliminate GHG emissions associated with fueling the central boiler plant. In addition to significantly reducing campus electric consumption, the contemplated biomass conversion includes a small (300 kW) backpressure steam turbine to generate approximately 8% of the campus's current electric requirements. However, even with the energy efficiency measures and the renewable energy generation, we are projecting **campus electric use (net of the cogenerated electricity) of approximately 5.8 million kWh annually by 2025. Using the current GHG intensity for grid electricity in New England, that will result in approximately 3,500 $MTCO_2e$ in annual emissions, accounting for approximately 55% of the projected 2025 Scope 1 and 2 emissions**. Thus, greening the campus's electric supply will be a critical component of the last phase of this plan. Following are a few options that may warrant deeper investigation as 2050 approaches.

*Increased Site Generation of Electricity (biomass fueled)*

The WERC biomass study is based on a 300 kW backpressure turbine. As design progresses on the biomass plant, careful consideration should be given to the optimal turbine size. As turbine size increases, production at low steam loads will decrease due to lower efficiencies at lower loads. However, production at higher steam loads will increase because the larger turbine size will be able to make use of more steam in high load periods.

In addition to optimizing the sizing of the backpressure turbine, the University may consider installation of a condensing turbine that would be capable of generating electricity independent of campus steam loads. The condensing turbine offers a lower overall efficiency, because the steam is used only for electric generation with no concurrent thermal benefit. Additionally, the installation of a condensing turbine would require significant additional capital investment in a separate turbine, condenser and cooling tower. Based on current fuel and electric costs, it would not make economic sense to generate electricity using a condensing turbine. However, the relative costs of fuel and electricity will change over time, and PSU should periodically revisit this option.

*Site Cogeneration Using Liquid Biofuels*

There have been significant advances in the commercialization of liquid biofuels in recent years, including cellulosic biofuels and fuels from reprocessed used vegetable oil. If the trend toward commercial viability continues, it may be practical to augment the campus biomass boilers with a reciprocating engine (or other emerging technology) fueled by liquid biofuels.

*Participation in Regional Renewable Project*

Opportunities to participate in regional commercial scale renewable energy projects will likely emerge over the life of this plan. The most recent example is a spate of wind power developments like the 48 MW operating Groton Wind Farm or the 45 MW Alpine Ridge Wind Farm proposed for Groton. Recent drops in New England electric prices have contributed to a cooling off of wind development in the region, but market forces and government regulation could easily change direction and help promote another surge in wind development in New England. Likewise, technological developments may lead to other commercially viable sources.

# 5. APPENDICES

## 5.1 Summary of Appendices

The following pages include:

**Building Energy Benchmarking Report**
GreenerU has used submetered data to document and compare PSU buildings to those on other New England college, university and boarding school campuses. This report helped identify key buildings during the investigation phase of this plan, and may lead to additional insights.

**Retrocommissioning scope of work**
This standard retrocommissioning scope of work is included as a guide for the work that PSU will need to undertake in order to achieve greater energy efficiency in its existing building stock.

**Solar Rooftop Analysis**
GreenerU conducted a cursory web-based aerial review of PSU's rooftops to provide an indication of potential solar installations.

**Cogeneration / Biomass Financial Resources**

- Lawrence Berkeley National Laboratory: report on Qualified Energy Conservation Bonds.
- Dsireusa.org: information on New Hampshire Renewable Energy Portfolio Standard – of particular interest because of the recent modification allowing for renewable energy credits for thermal energy generated using biomass.

**Capacity Building**
This appendix briefly addresses some of the overarching elements that PSU will need to consider and potentially pursue for successful project implementation.

**Report from the Public Ideation Session on March 6th**
This report briefly introduces and summarizes the results of this public campus engagement event. This report may be used to help identify sustainability projects on the PSU campus that have greater public support and a higher likelihood of success.

**Report from the Public Facilitated Session on March 6th**
This report briefly introduces and summarizes the results of this RSVP-only campus engagement event. In addition to providing commentary on existing challenges for campus sustainability at PSU, this report may be additionally used as an "idea bank" for campus sustainability projects.

**Public Session Participants' Ranking of Ideas**
As a follow up to the facilitated session on March 6th (mentioned above), participants were asked to rank the ideas generated for campus sustainability projects, policies, programs or other actions. The existing results can be used to help prioritize actions, or the ranking can be used as an ongoing tool for prioritization and collecting feedback from the PSU community.

**Results of the Campus-Wide Survey**
A campus-wide survey was designed and released in order to better understand knowledge, perceptions and attitudes toward sustainability at PSU. The results of the survey are included within this appendix.

# BUILDING ENERGY BENCHMARKING REPORT

## Introduction

GreenerU employed their comprehensive energy use benchmarking tool to assess building energy use at Plymouth State University. This proprietary benchmarking program consists of energy data from 17 higher education institutions totaling 741 buildings all from the New England region. Our building energy use program provides a comparison with peer institutions and within the PSU campus and are normalized for building square footage. The results will assist in prioritizing the buildings in which the most energy is being used relative to similar buildings. Although direct comparisons of buildings cannot be made since each building is unique, we have grouped similar buildings into categories. The categories into which the buildings are grouped into are: Academic, Administrative, Athletic Centers, Laboratories, Residence Halls, Student Centers and Ice Arenas.

## Conclusions

After comparing the Energy Use Index of the major buildings at Plymouth State University we have concluded that the Ice Arena, Prospect Dining Hall, Highland Hall and Lamson Library are good candidates for further study. Additionally, the P.E. Center might be a good candidate for thermal improvements. It should be noted that this report provides an overview of the building specific energy usage on the PSU campus based on the data we have. It is recommended that a more detailed energy audit is required for more indepth suggestions on energy efficiency conservation measures.

## Academic Buildings Electric Use

Chart 1 below establishes the Academic Buildings Energy Use Index (kWh/Square Feet-Year) at PSU relative to other academic building at PSU and relative to other academic buildings within the higher education community in New England. The median of all academic buildings EUI is also shown as a horizontal line on Chart 1. A lower EUI indicates that the building level electricity usage normalized by square footage is better. Chart 1 illustrates that Lamson Library and Hyde Hall are both higher electric energy consumers per square foot than the median of all academic buildings. These are the buildings in which the greatest opportunity for energy improvement may exist. Rounds Hall, Memorial Hall, Draper Maynard and Silver Center are all lower energy consumers than the median of our database.

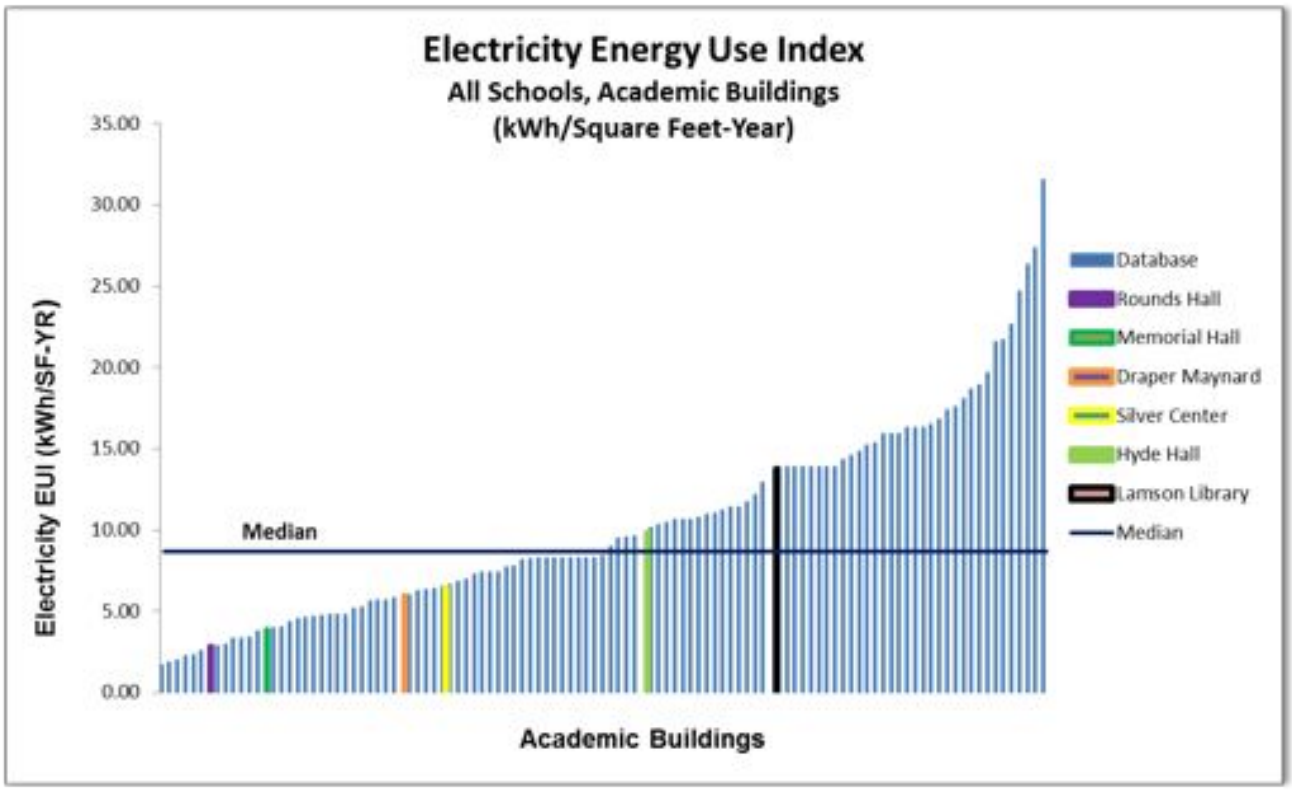
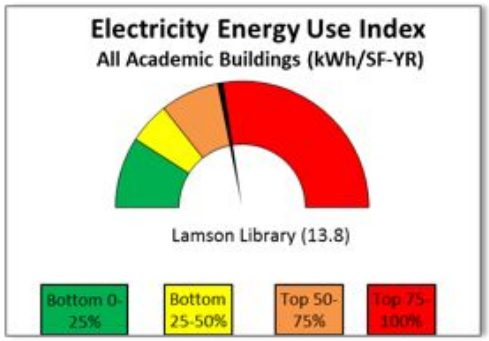
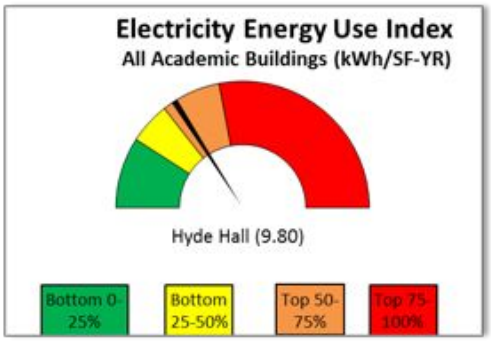
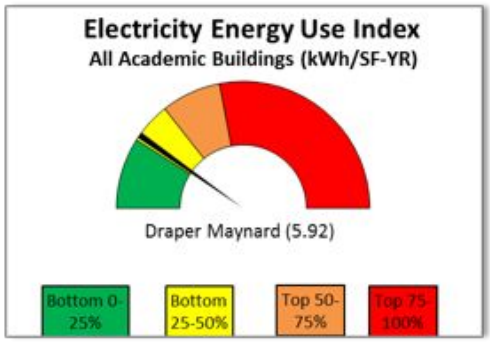


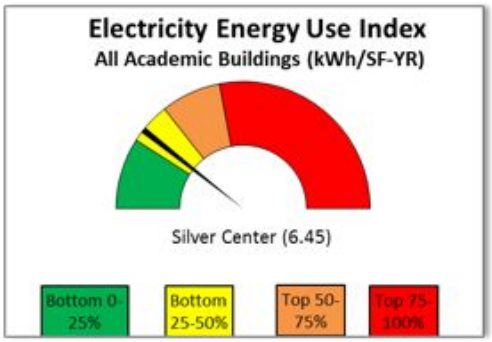

Chart 1 EUI for all Academic Buildings

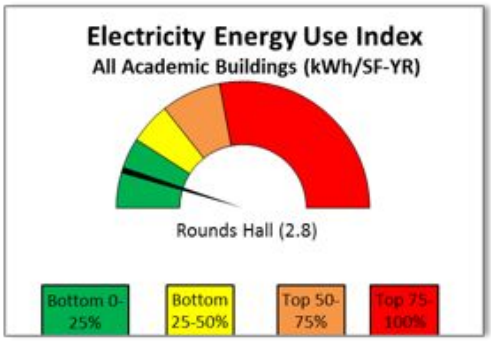
The building-by- building dashboards below provide a more detailed picture of each academic building at PSU relative to its peer group. The green section is the electric EUI of the bottom 25% of all academic buildings. This is the best quadrant as far as energy use in buildings. Yellow represents 25-50% academic buildings in the next lower EUI; orange is 50-75% of academic buildings with the corresponding range of EUI and red is the upper 75-100% buildings with that range of EUI.




Charts 2-6 Electricity Energy Use Index for specific PSU Academic Buildings relative to peers

## Academic Buildings Thermal Use

Thermal data was available for those buildings heated with #2 heating oil. The Thermal Energy Use Index for academic buildings reveals that Highland Hall is below the median for similar buildings in our energy use database.

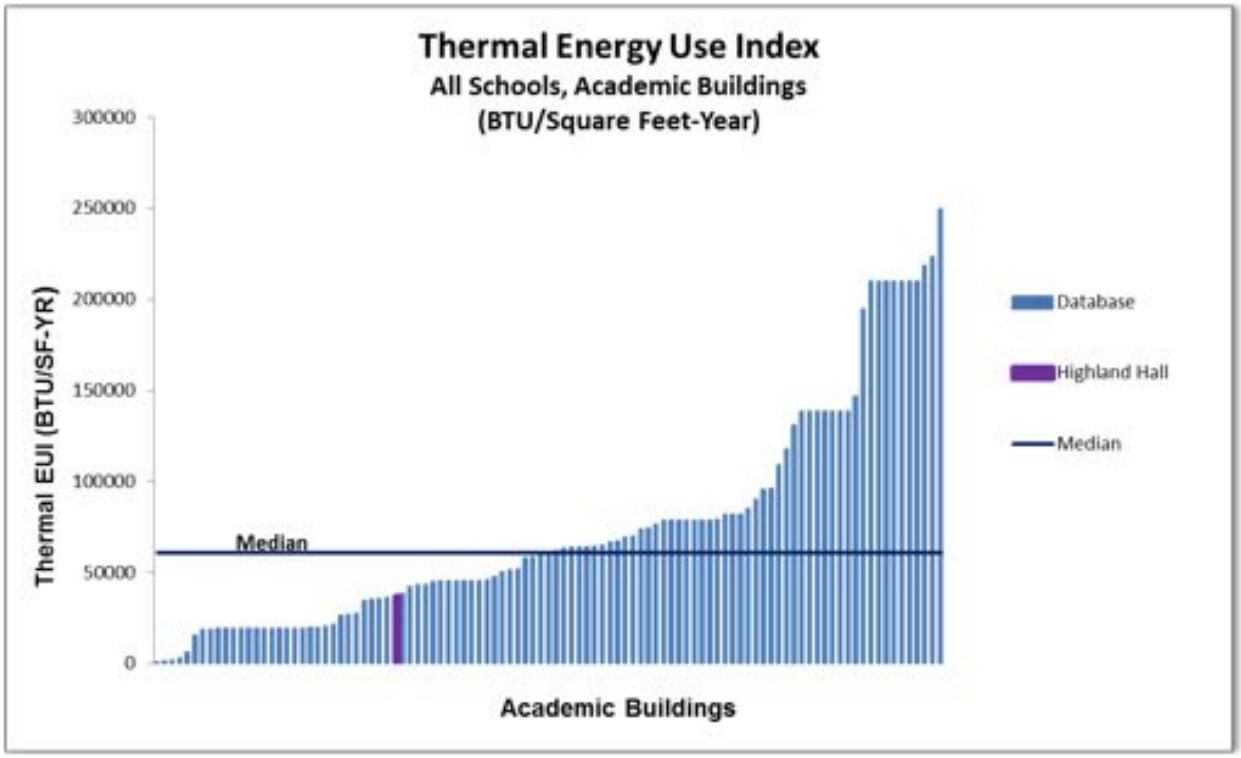



Chart 7 Thermal EUI for all Academic Buildings

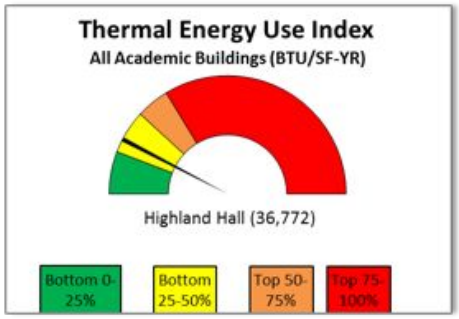



Chart 8 Thermal Energy Use Index for specific PSU Academic Buildings relative to peers

## Administrative Buildings Electric Use

The charts below show that the electric energy use index for Russell House and Ellen Reed House is low relative to their peers while Highland Hall and Speare Hall are above the median for similar buildings in our energy use database.

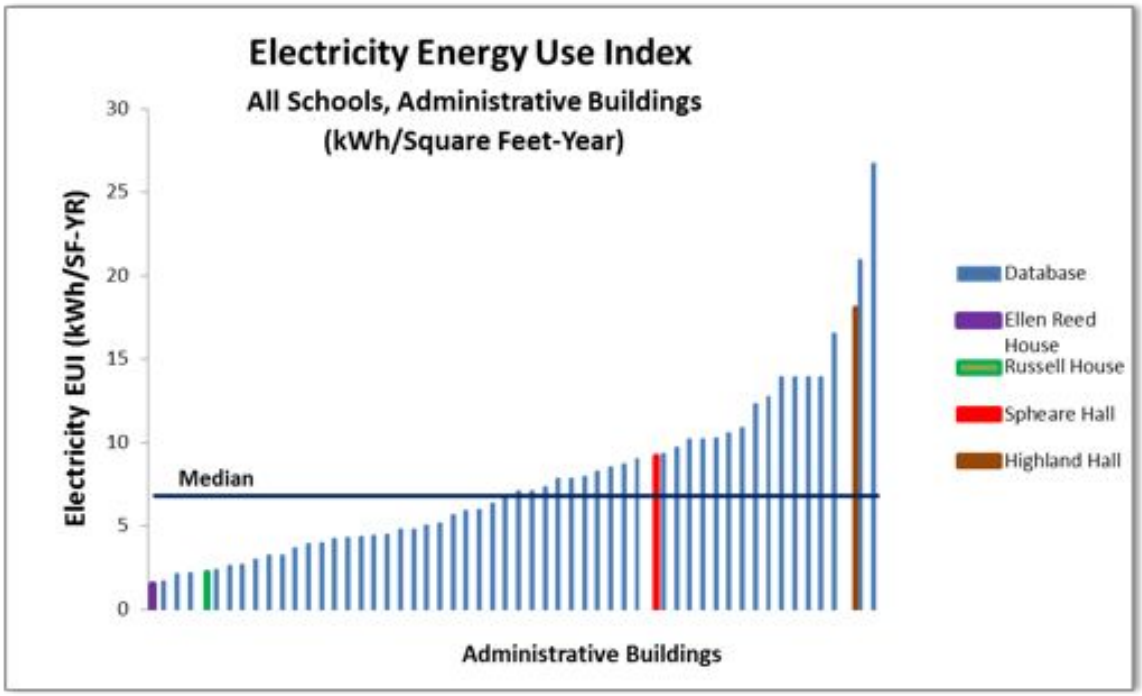
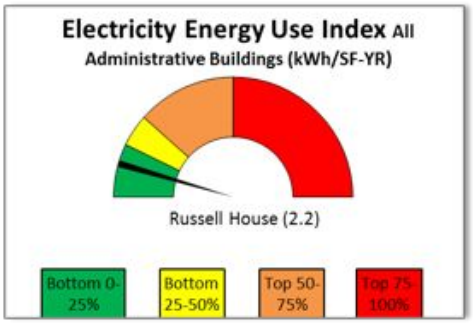
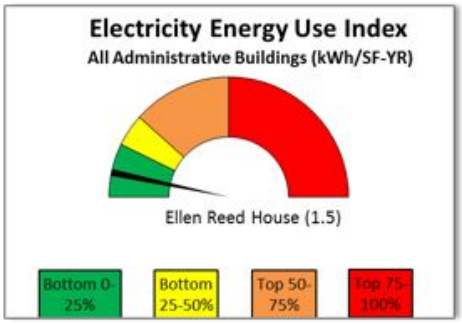
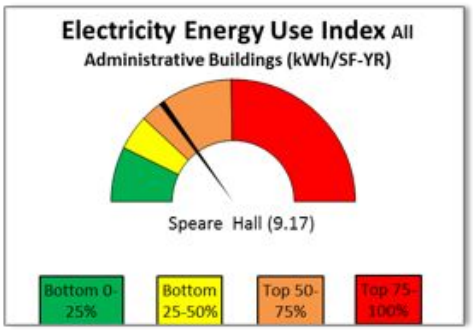
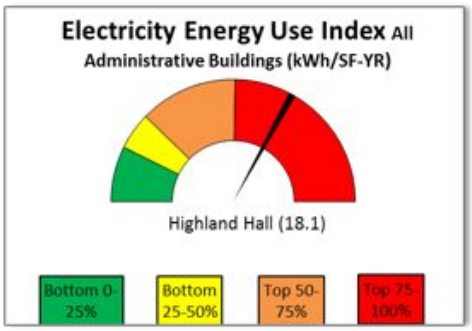



Chart 9 Electric Energy Use Index for all Administrative Buildings




Charts 11-13 Electricity Energy Use Index for specific PSU Administrative Buildings relative to peers

## Administrative Thermal Use

Administrative Building level thermal data was available for those heated with #2 heating oil. The Thermal Energy Use Index reveals that these six buildings (Human Resources, Holmes House, Counseling Center, Mary Taylor, 16 Merrill and Bagley House) are all below the median for similar buildings in our energy use database.

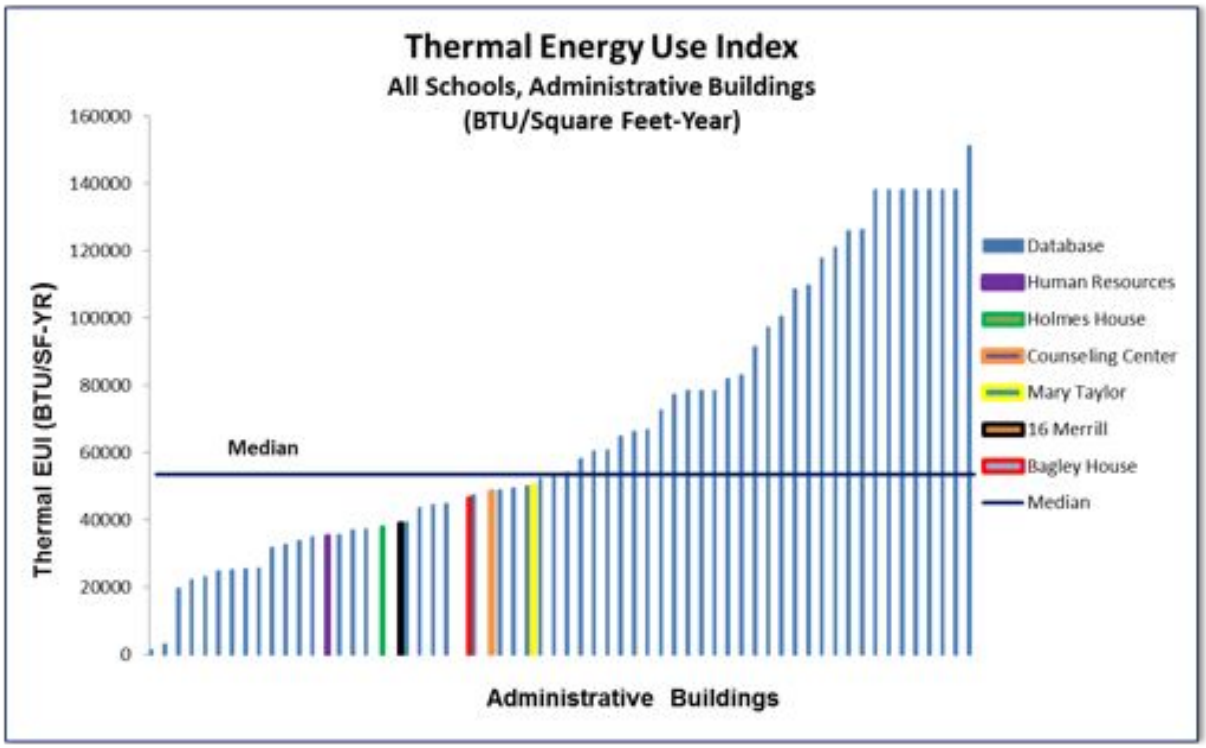
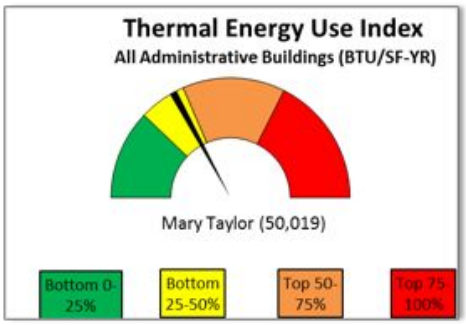
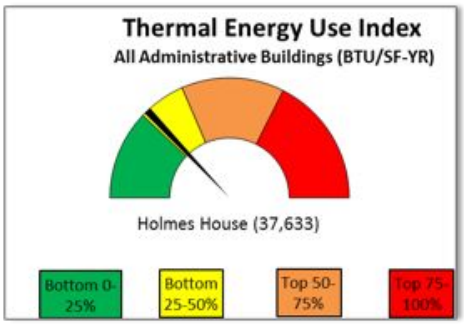
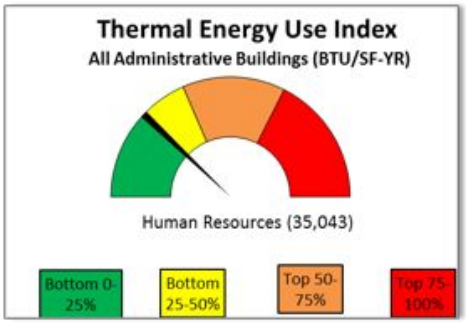
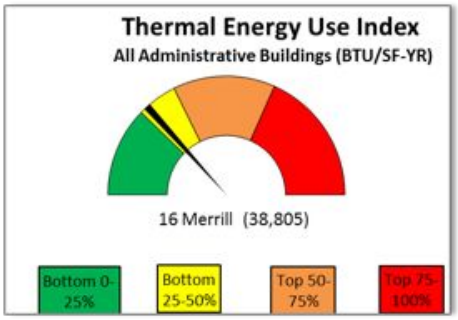


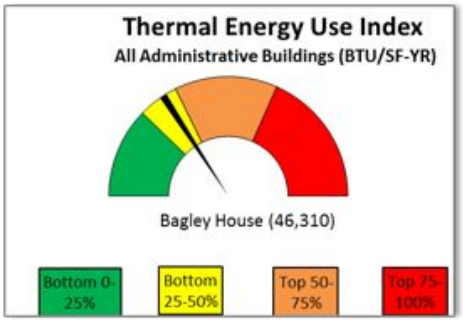

Chart 14 Thermal Energy Use Index for all Administrative Buildings

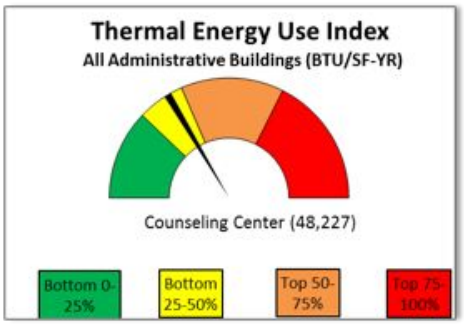



Charts 15-20 Thermal Energy Use Index for specific PSU Administrative Buildings relative to peers

## Athletic Centers Electricity Use

The P.E. Center at PSU has a lower electricity use index than the median of its peers and falls within the lowest 25% EUI of its peers.

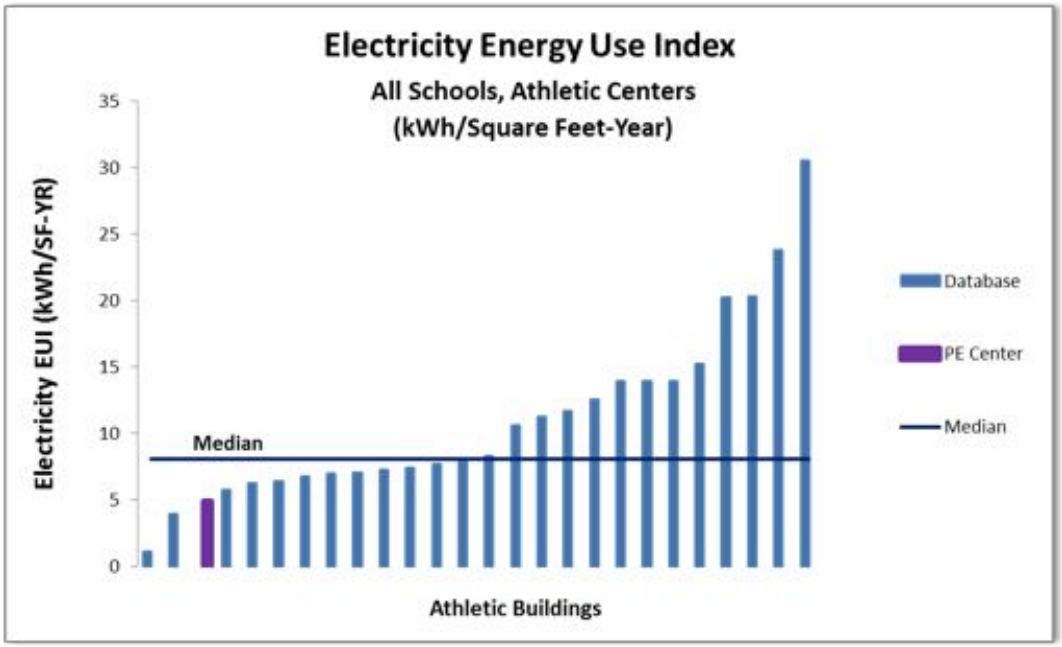



Chart 21 Electric Energy Use Index for the PSU P.E. Center relative to its peers

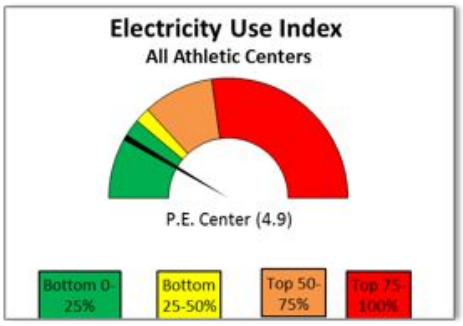



Chart 22 Electric Energy Use Index for the PSU P.E. Center relative to peers

## Athletic Centers Thermal Use

The P.E. Center at PSU is heated with #2 heating oil. Relative to its peers, the P.E. Center is above the median Thermal Energy Use Index and in the top 75-100% of similar buildings.

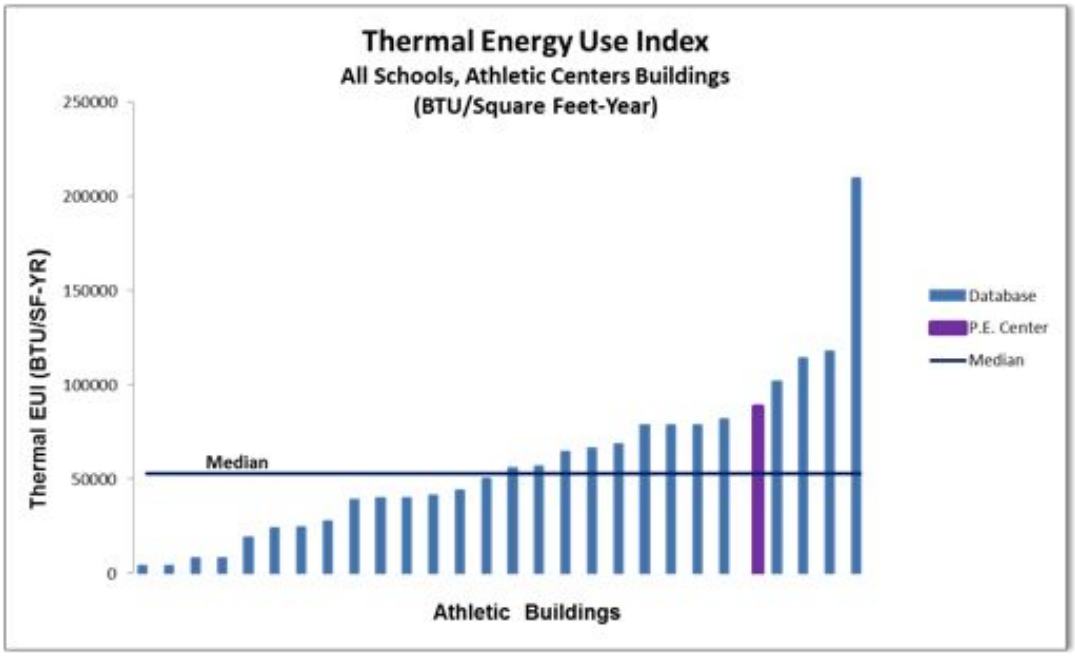



Chart 23 Thermal Energy Use Index for the PSU P.E. Center relative to its peers

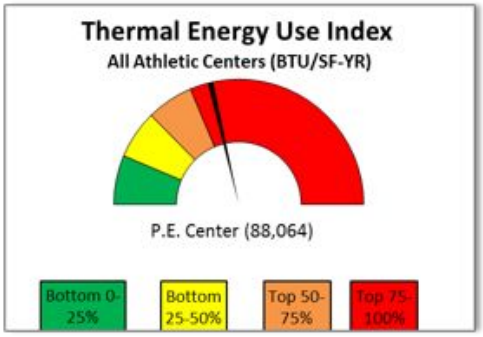



Chart 24 Thermal Energy Use Index for the PSU P.E. Center relative to peers

## Laboratories Electric Use

Boyd Hall at PSU has an electric energy use index that is below the median of similar buildings in its peer group. It is within 25-50% of the science buildings in our database.

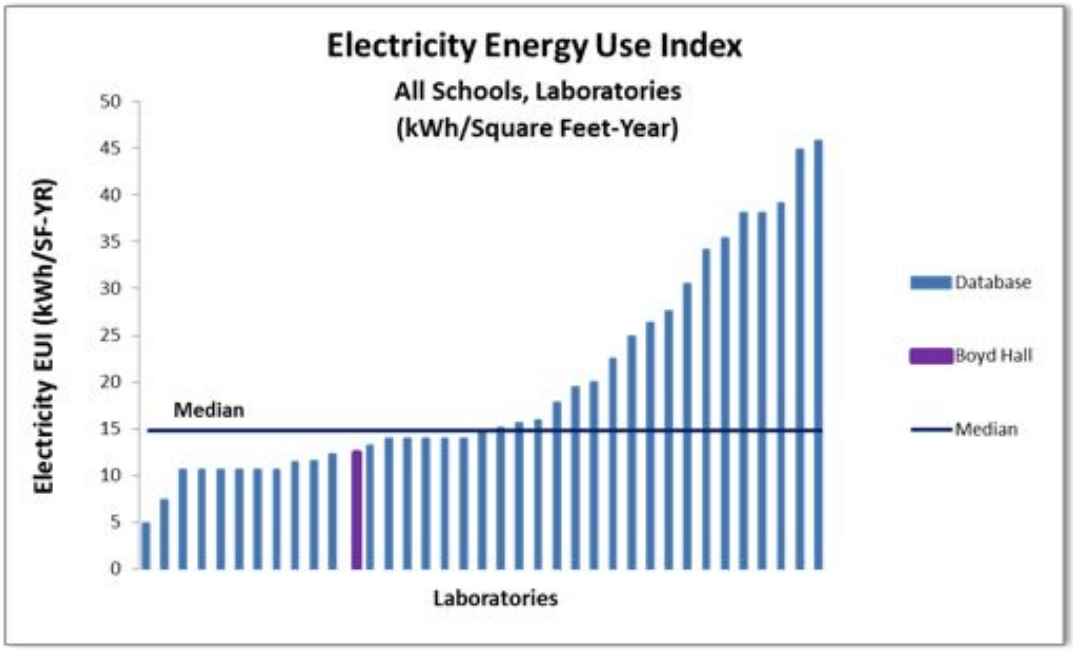



Chart 25 Electric Energy Use Index for the PSU Boyd Hall relative to its peers

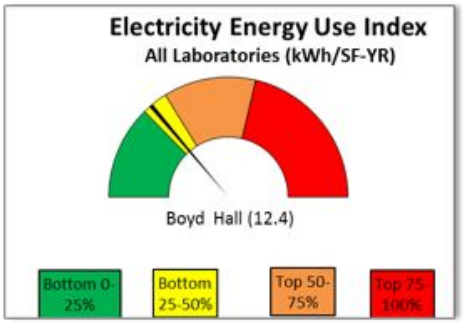



Chart 26 Electric Energy Use Index for the PSU Boyd Hall relative to peers

## Residence Halls Electric Use

Chart 29 below displays the Electric Energy Use Index of the residence halls at PSU relative to each other and also relative to other higher education residence halls in New England. Langdon Woods has the highest EUI of the residence halls studied at PSU and is above the median of its peers. Mary Lyon Hall, Pemigewasset Hall, Belknap Hall, Smith Hall, Blair Hall, and Grafton Hall are all between 25%-50% of the EUI in their peer group. Samuel Read Hall is in the lowest 25% EUI of its peer group. Individual building's data are given on the next page.

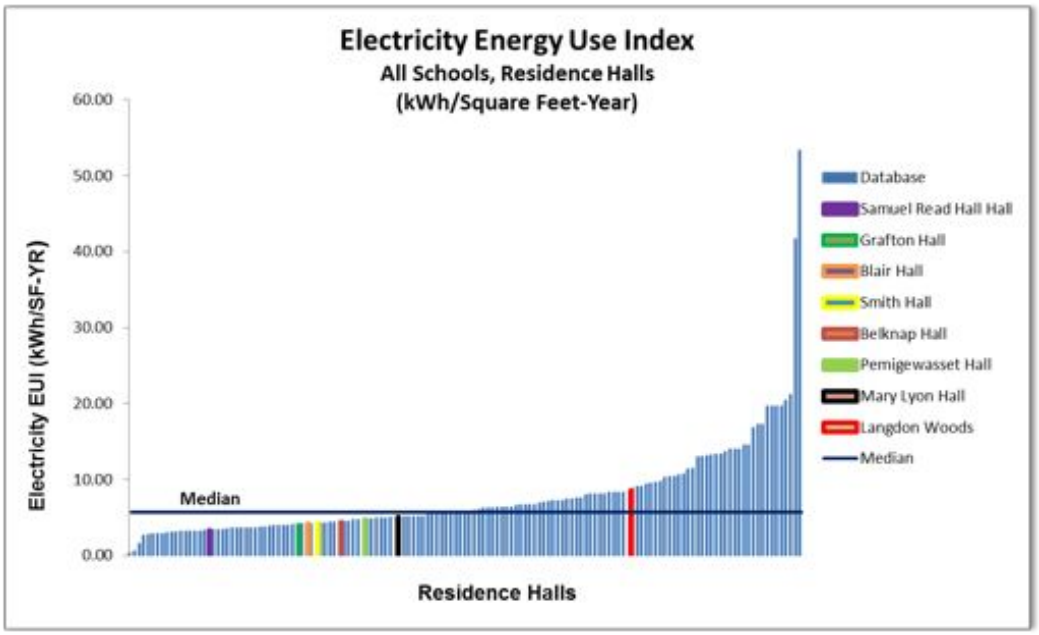
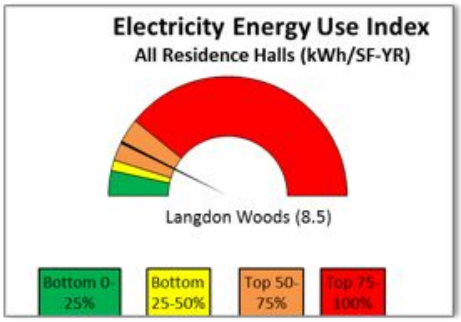
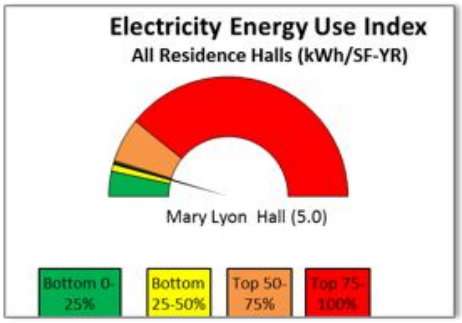
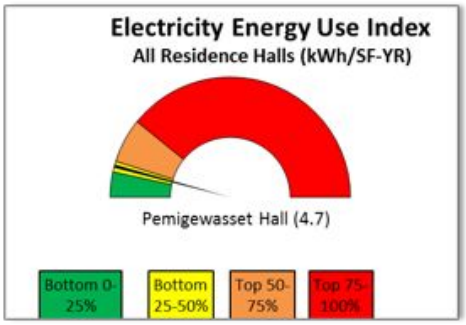
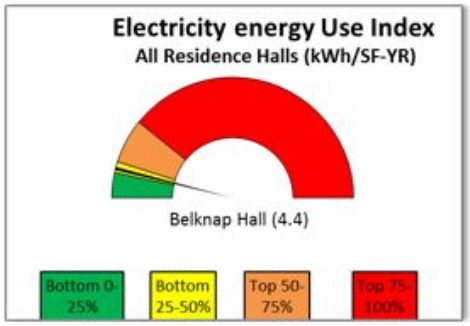


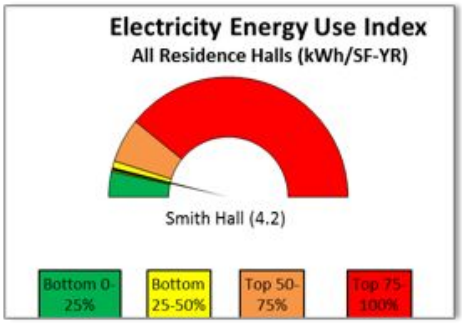

Chart 27 Electric Energy Use Index for the PSU Residence Halls relative to its peers

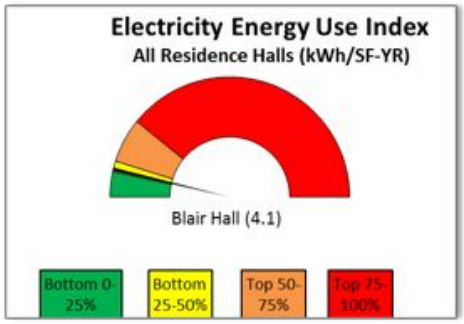


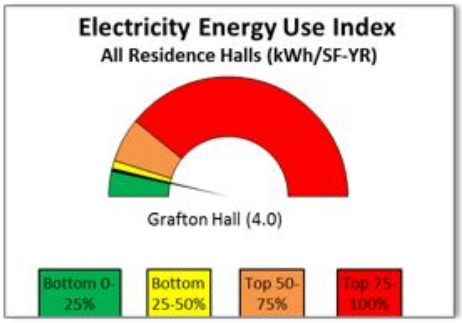



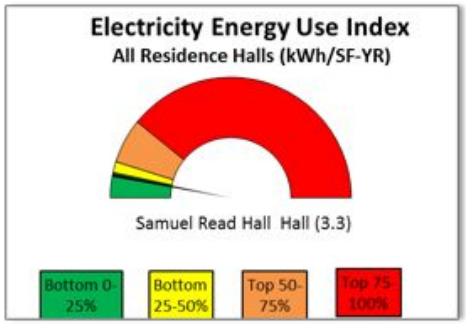




Charts 28-35 Electricity Energy Use Index for specific PSU Residence Halls relative to peers

## Residence Halls Thermal Use

The Center for Young Children and Families is above the median Thermal Energy Use Index and in the top 50-75% of similar buildings.

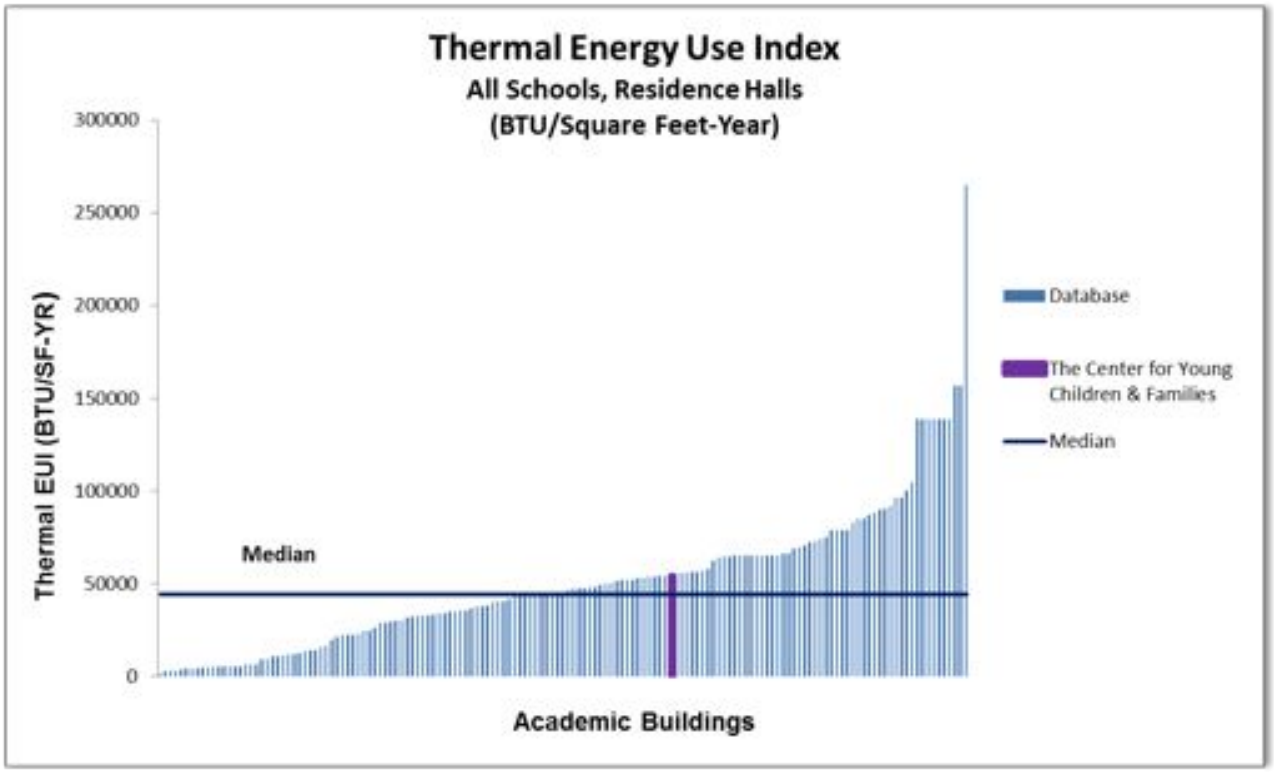



Chart 36 Thermal Energy Use Index for the PSU P.E. Center relative to its peers

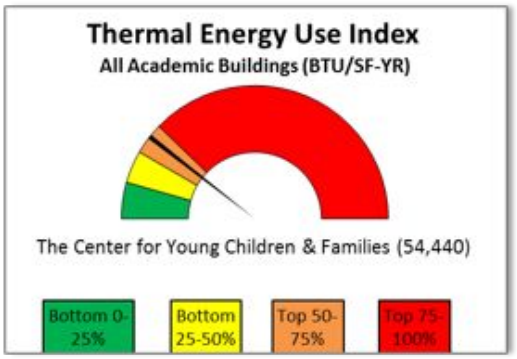



Chart 37 Thermal Energy Use Index for the PSU P.E. Center relative to peers

## Student Centers Electric Use

Chart 38 below displays the Energy Use Index for Hartman Union Building and Prospect Dining Hall relative to each other and also relative to other Student Centers. However, Prospect Dining Hall is in the top 75-100% of our EUI Student Centers, all of which have dining facilities.

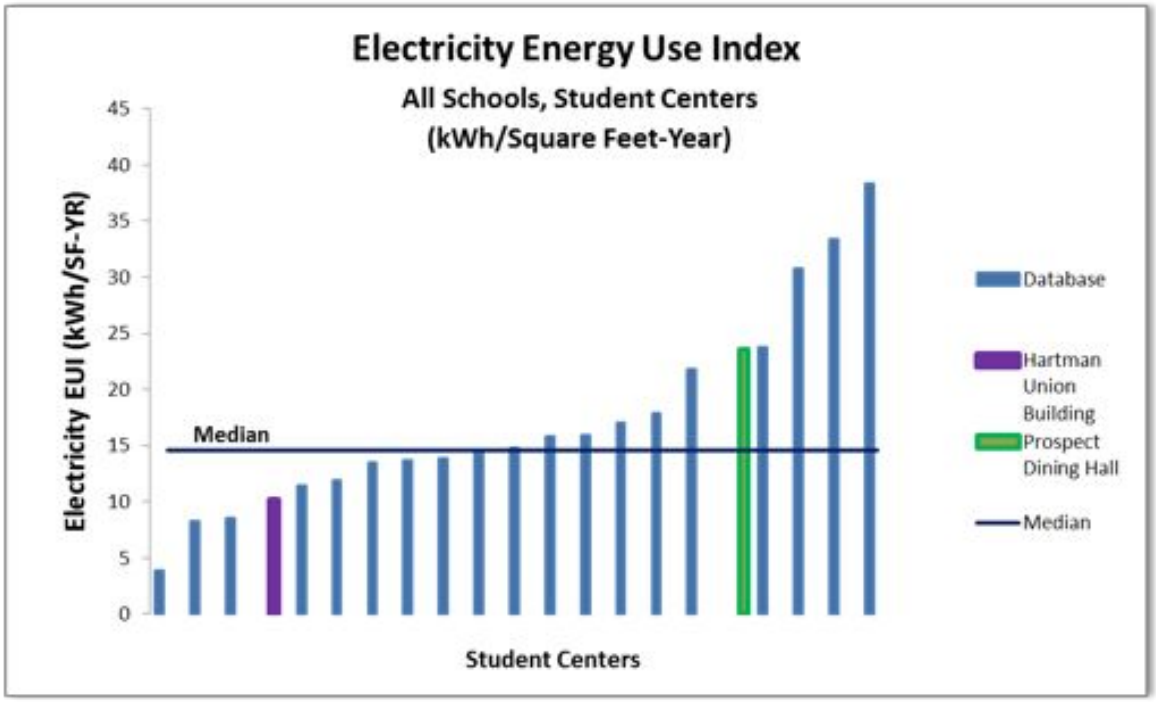
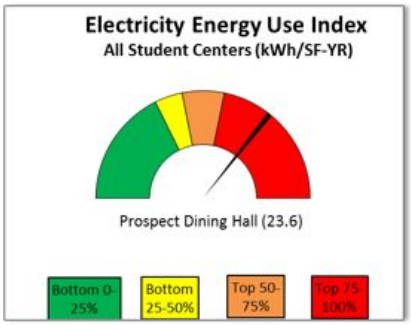
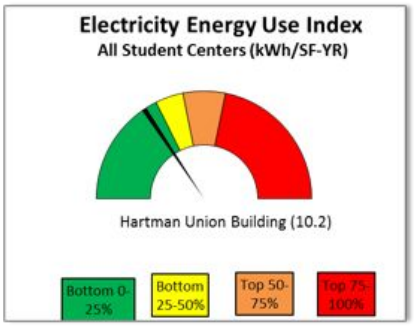



Chart 38 Electric Energy Use Index for the PSU Student Centers relative to its peers




Charts 39-40 Electricity Energy Use Index for specific PSU Student Centers relative to peers

## Ice Arenas Electric Use

GreenerU compared the Energy Use Index of the Ice Arena at PSU with the five ice arenas in our database. As shown in Chart 41 below, PSU has the highest EUI of the comparable ice arenas.

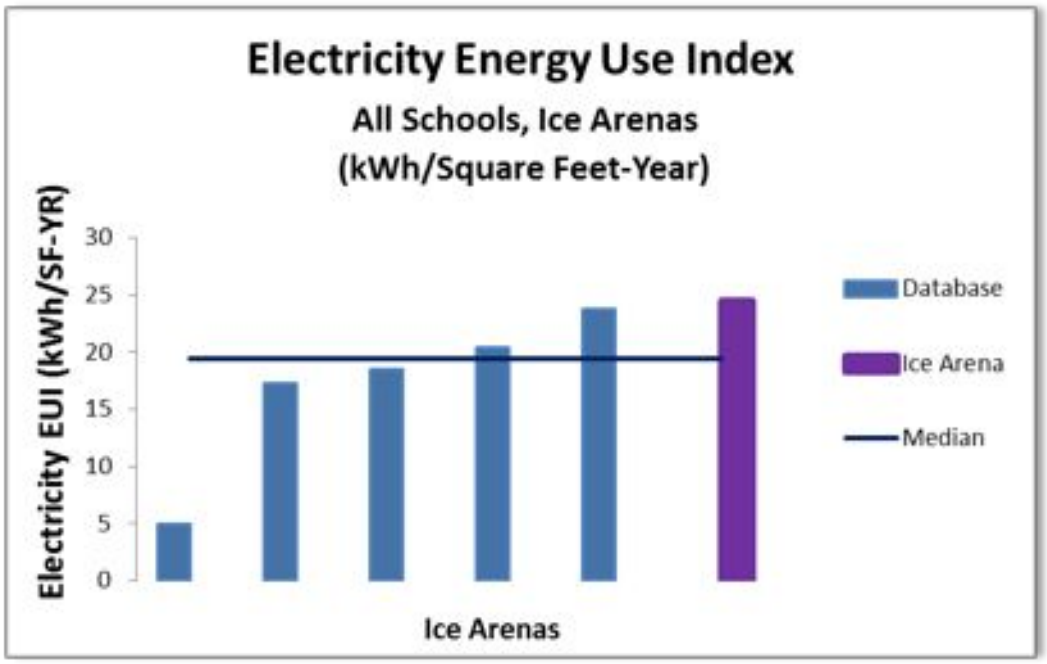
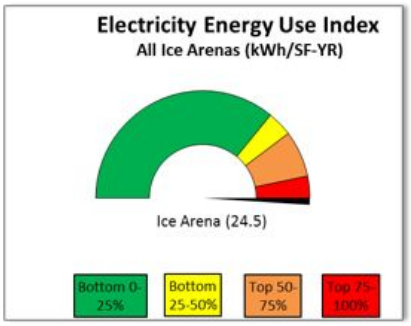



Chart 41 Electric Energy Use Index for the PSU Ice Arenas relative to its peers




Charts 42 Electricity Energy Use Index for PSU Ice Arena relative to peers

# RETROCOMMISSIONING SCOPE OF WORK

## RESPONSIBILITIES

The Retrocommissioning (RCx) Agent is responsible for evaluating the existing building(s) for both major systems upgrades including the development of scope of work documents as well as developing and implementing retrocommissioning plans.

Upon project completion, one retrocommissioning manual will be completed for each building consisting of both post retrocommissioning and systems upgrades retrocommissioning plans, including information such as sequence of operation, temperature set-points etc.

The RCx Agent has cradle-to-grave responsibility for ensuring that, upon completion of improvements, all operational improvements and systems upgrades meet energy efficiency performance and specifications per approved recommendations. RCx agent will also provide operator training for building improvements before acceptance of the retrocommissioning plan and manual.

## APPROACH

The California Commissioning Guide for Existing Buildings defines retrocommissioning as "the application of the commissioning process to existing buildings. Retrocommissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, retrocommissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life. In all, retrocommissioning improves a building's operations and maintenance procedures to enhance overall building performance." Additionally, any system upgrades that will improve the energy efficiency of the building will be evaluated and incorporated into final report and incorporated into a diagnostic monitoring plan.

The primary objective of the initial retrocommissioning projects is to reduce energy consumption and costs. Secondary objectives include the following:

- Bring equipment to its proper operational state
- Reduce temperature imbalances
- Increase equipment life
- Improve indoor air quality

Each site will likely have identified savings opportunities in each of the following categories: operational improvements, low cost/no cost improvements, and medium to high cost improvements. Each site will also likely have operations and maintenance measures and deferred maintenance measures identified. A description of each of these categories follows.

| Category | Description |
|---|---|
| Operational Improvement Measures (to be designated RCx - #) | Recommendations resulting from analysis of the facility that can be implemented by vendors using existing operable equipment such as operational and setpoint changes. In general, this category is expected to be the primary source of savings from the retrocommissioning process. |
| Low Cost/ No Cost Summary Table (to be designated RCx - #) | Some recommendations will likely require repair or replacement of existing equipment. Such activity is generally expected to result in additional savings and costs beyond the basic retrocommissioning package. The criteria for such changes are measures with a cost of $5,000 or less, |
| Measures Requiring Further Investigation (to be designated FI - #) | Projects that meet approved NPV thresholds set by Owner will be required to have Scope of Work documents completed by RCx agent and submitted with final report. |
| O&M Measures (to be designated OM - #) | Recommendations for repairs and adjustments that do not generate appreciable savings. These measures will be evaluated for non-energy program funding. |
| Deferred Maintenance initiatives (to be designated DM - #) | Items which should be corrected through deferred maintenance. Describe their effect of current condition on energy consumption. |

Many of Owner's facilities are aging, and the varying levels of maintenance condition in many of the systems can result in energy savings. Accordingly, the primary focus of the retrocommissioning effort will be to first focus on energy savings opportunities using the capabilities of existing infrastructure.

The retrocommissioning process may also identify areas that require additional preventive maintenance activities. Areas requiring normal maintenance will be reported to the Facility Representative during the retrocommissioning process. We assume that such preventive maintenance needs will be remedied prior to completion of the retrocommissioning process. For example, filters may need to be replaced to reduce energy costs and excess wear on equipment. Neither costs nor savings from such an activity are expected to be tracked as part of the retrocommissioning process.

RCx agent's approach will closely follow the retrocommissioning processes outlined in the California Commissioning Guide. RCx agent will also utilize energy efficiency programs currently being offered by the local gas and electric utilities.

# RETROCOMMISSIONING SCOPE & TASKS

The retrocommissioning process will primarily concentrate on the investigation and evaluation of HVAC equipment, systems and their operation. However, other opportunities such as lighting and building envelope system efficiency improvements, process load improvements such as autoclave operation etc. will be evaluated for potential energy savings opportunities.

The intent is to 1) identify opportunities to improve the building system performance, 2) work with Owner's operations staff and subcontractors to modify system operations and control strategies to improve building performance, 3) verify the system modifications are beneficial to system operations and that the building is performing efficiently and as expected, and 4) develop projects that Owner can implement that upgrade to systems and infrastructure.

Diagnostics testing and verification of operational sequences will primarily be directed towards areas with energy savings potential. As a result, the following systems will be the primary areas included in the evaluation:

1. Chiller plant and/or other cooling systems
2. Heating System(s)
3. Air handler units
4. Variable Frequency Drives and motors
5. Economizer operation and other forms of ventilation optimization
6. Distribution systems, to include potential conversion and/or elimination of steam or other systems.
7. Heat recovery systems
8. Heat exchange systems
9. Building Envelope including air sealing, insulation, windows and doors.
10. Domestic Hot water systems
11. Water Consuming devices
12. Control Systems, Energy Management Systems and Building Monitoring
13. Process loads including kitchen, research devices, etc.
14. Lighting and expanded use of lighting occupancy and daylighting sensors.
15. Renewable Energy Opportunities

This process will consist of the following five (5) steps (aka phases) as outlined in the California Commissioning Guide. This process is presented in the flow chart shown in Figure 1 on the following page.

**Figure 1**

**Retrocommissioning Project Process Overview**

| | |
|---|---|
| **Step 1** - Planning | Obtain, verify, and document building operating requirements. Identify site-specific team members. Collect available data. Develop retrocommissioning site-specific plan. Hold project kick-off meeting. |
| **Step 2** - Investigation | Review facility documentation and perform diagnostic monitoring. Perform functional tests and perform simple repairs. Develop list of findings. Prioritize and select operational improvements. |
| **Step 3** – Implementation | Implement selected operational improvements. Verify results and review diagnostic monitoring. |
| **Step 4** – Documentation | Document findings, set-points, and operational improvements. Provide training and hold close-out meeting. |
| **Step 5** – Continuous Monitoring | Develop Monitoring and Evaluation Manual to enable periodic evaluation and re-commissioning to system equipment, operations and maintenance to maintain building energy performance |

**Detailed description of steps/phases:** Further breakdown of tasks within each phase follows. Tasks to be performed by RCx agent during each phase will include, at a minimum:

## Task 1: Planning

This set of tasks is designed to provide each project team with a clear plan and well-defined objectives for performing retrocommissioning in the facility.

a) Provide Owner a proposed schedule for investigative work that includes access request and report delivery dates.
b) Collect available data, perform a site walk-through and interview building operators to become familiar with each building and the main energy-consuming equipment. Any previously completed energy audits reports will be used to expedite this data collection task. Owner can provide energy use by building, where available.
c) Document building operating requirements. RCx agent will work with Owner's team to identify each facility's current operating requirements. These requirements will provide RCx agent with an understanding of the building schedules, functions and processes that must be considered as we develop the retrocommissioning plan and diagnostic monitoring plan.
d) Develop site-specific retrocommissioning plan. This plan will provide the project team with a guideline for the retrocommissioning process including project objectives, scope, schedule, documentation requirements and team member roles and responsibilities.
e) Hold a kick off meeting. This meeting will include key participants to a successful retrocommissioning project. RCx agent will organize and facilitate the meeting. In addition to Owner representatives, RCx agent will engage existing contractors familiar with the building and its systems included in the retrocommissioning program. These may include controls contractors, test-adjust-balance contractors, or other consulting engineers working or having worked in the building.

## Task 2: Investigation

This set of tasks is designed to a) provide a systematic analysis of the building's existing performance compared to the building operating requirements, and b) document a list of opportunities for improvements.

a) Review facility documentation. RCx agent will request and/or examine the following documents and information from each site: previous commissioning reports or energy audits, original design documentation, equipment lists with nameplate information, drawings for the building's energy-consuming systems and equipment, control system documentation, operation and maintenance manuals, test, adjusting and balancing reports, trouble tickets for past 12 months, and energy/water/sewer consumption information (monthly and, if available, interval data).
b) Sub-contract all support work related to their investigation including but not limited to a Owner approved Controls contractor. Detail the cost of any sub-contracts in the proposal.
c) Interview and/or utilize Owner trade personnel to gain knowledge of the facility's history and operation. While Brown trade personnel represent an added cost to the project, involvement of trades will enhance implementation and longevity of measures and is

encouraged. While the cost of trades are not carried in the proposal, the expected hours of support required must be included in the proposal, broken down by shop.

d) Perform diagnostic monitoring. This task will gather current data on how the systems are operating. Depending on the facility, RCx agent will use a combination of building automation systems trend data, monitoring with portable data loggers, and on-site measurements. All large motors powering equipment 10 hp and larger) and a sampling of smaller equipment, as appropriate, will be spot metered to determine loading. Listing of equipment and readings obtained will be included in site visit reports and RCx reports.

e) If utility or campus submetering data is not available, RCx agent will use portable meters (electric and/or BTU) to measure energy use and then create a baseline from which a Baseline Energy Use Index can be generated. Data obtained will be summarized in graphs, and both raw and processed data files will be passed to Owner.

f) Perform functional tests. In some instances, it may not be possible to observe the system or equipment performance using only diagnostic monitoring. In those instances, RCx agent will develop a functional performance test protocol for Owner and their contractors to use to measure performance under forced conditions.

g) Identify and document with Owner simple repairs to be performed by Owner or its subcontractors as the investigation progresses. Take digital photos and describe the situation and corrective actions needed so these can be conveyed easily to the respective Operations personnel or subcontractors.

h) Provide site visit reports for Owner review.

i) Develop a list of opportunities along with potential energy impacts and implementation costs. RCx agent will use engineering calculations or simple simulation models to estimate potential energy impacts. RCx agent will also develop and document preliminary cost estimates for implementation.

j) Prepare draft report with recommended operational improvements and measures. The initial draft report after the first season of analysis will contain all heating or cooling measures found along with any non-seasonal measures.

k) A final draft will be prepared after the alternate season of analysis is completed. If the initial draft covers heating measures, the final draft will include those heating and non-seasonal measures (updated as appropriate) and all cooling measures.

l) Draft and final reports should contain, at a minimum:

    1. Executive summary with summary of measures
    2. Facility Description with general configuration of equipment
    3. Tables with detailed equipment data
    4. Energy analysis including energy use index and end-use reconciliation
    5. Detailed description of measures including existing conditions, recommendations for modifications and probable savings/costs
    6. Appendices containing existing equipment data, trend reports, site visit reports, energy savings calculations and cost estimates

m) For measures selected for implementation, provide information needed to apply for utility incentives.

n) Prepare scope statements for use in obtaining bids for the work recommended in the study.

o) Attend the engineering review meeting(s) for the project (one for heating and one for cooling if needed). Once measures are selected for implementation or further

investigation by the Engineering Review Team, prepare a proposal for the work described in tasks contained in Steps 3, 4 and 5 below.

## Task 3: Implementation

a) Respond to questions and work with Owner operators, controls subcontractors and others as the specific measures selected during the investigation are implemented.
b) Assist Owner in the bidding out measures for implementation. This may include refining scope of work for measures, recommending vendors, and examining proposals.
c) Provide Construction Supervision services to include review of submittals, attendance at construction progress meeting, review and approval of monthly invoicing, resolution of issues related to scope, creation and administration of punch lists, etc.
d) Perform diagnostic monitoring and perform functional tests and verify that the planned improvements have successfully been made. RCx agent will monitor progress of each measure until implementation is complete. When all measures selected for implementation have been completed, RCx agent will perform diagnostic monitoring similar to that outlined in Task 2 d.

## Task 4: Documentation

a) Prepare a final report with information on the final implemented measures, including functional performance data, energy savings, implementation costs and payback calculations.
b) Provide all documentation and a walk-through as required by utility representatives to finalize payment of gas and electric incentives.
c) Provide Owner facility operators with in-house training to review the operational and equipment changes and new requirements for ongoing maintenance and monitoring.

## Task 5: Continuous Monitoring (M&V)

a) Develop Monitoring and Verification Manual including functional test requirements and operational monitoring and verification plan.

# TEAM MEMBERS

It is intended that the retrocommissioning process will represent collaboration between Owner and RCx agent. Input and contributions from a variety of team members will be required from the following:

| ROLE | DESCRIPTION |
|---|---|
| **RCX- Agent Retrocommissioning Lead** | RCx agent will be the technical lead for the project. Activities will include coordination of meetings, development and execution of the retrocommissioning plan and oversight of the testing and improvement processes. Will work with the property manager and facility manager to discuss and approve improvements. |
| **Owner Engineering** | Support project and provide overall project supervision. Provides access to facility personnel and contractors/vendors. Approves the choice of improvements to implement. Attends meetings as necessary. |
| **Project Management Representative** | Provides access to available drawings and attends meetings as necessary. Authorize Payments, Manage document Reviews, arrange Kick off meetings. Write Purchase Orders and Change Orders. Coordinate Access to facilities. |
| **Facility Service Representative (if assigned)** | Representative from facilities such as facility operations engineer or other individual responsible for day-to-day operation of facility. Provides input into assessment. Attends meetings as necessary. |
| **Controls Vendor** | By direction of the Project Management Representative, assists the Retrocommissioning Agent in identifying and understanding control sequences and limitations. Assists in executing functional tests and in executing approved improvements. |
| **Test and Balance Vendor** | By direction of the Project Management Representative, assists the Retrocommissioning Lead by installing monitoring equipment and performing functional and diagnostic testing. May also be responsible for executing approved improvements. |
| **Mechanical Service and Maintenance Vendor** | By direction of the Project Management Representative, assists the Retrocommissioning Lead in understanding how the systems have been operated and maintained. May also be responsible for executing approved improvements. |

# SOLAR ROOFTOP ANALYSIS

This document provides a discussion of the potential for developing rooftop solar photovoltaic (PV) systems on the Plymouth State University campus and outlines some of the incentives, programs, and rebates available to help finance renewable energy projects in New Hampshire.

## On-Campus Solar Potential

This section outlines potential sites and generating capacity for solar PV projects.

### Identified Sites

An evaluation of Plymouth State's campus using the In By Back Yard (IMBY) tool developed by the National Renewable Energy Laboratory (NREL) identified 6 locations on campus for potential rooftop solar PV arrays. 3 academic buildings and 3 residences halls were deemed to have enough flat roof space to accommodate a solar project. These buildings would have to be evaluated on engineering and structural grounds to determine the feasibility of a solar project, but in terms of roof area they seem the most compelling locations for investigation.

### Potential Generation Capacity

The IMBY tool was used to simulate annual electricity generation at each of the potential sites identified on campus. All of the identified buildings can house more than one solar array; the individual configuration and size of the arrays is detailed in the accompanying Excel spreadsheet. A summary of the total results by building are collected in the table below:

| Location | # of Arrays | Total Size (kW) | Total Annual Output (kWh) |
|---|---|---|---|
| Sliver Center for the Arts | 2 | 115.49 | 141,453 |
| Physical Education Center | 3 | 258.04 | 316,051 |
| Herbert H Lamson Library | 2 | 127.17 | 155,759 |
| Grafton Residence Hall | 2 | 51.1 | 62,586 |
| Belknap Residence Hall | 2 | 44.16 | 54,086 |
| Pemigewasset Residence Hall | 2 | 36.79 | 45,061 |
| **CAMPUS TOTAL** | **13** | **632.75** | **774,996** |

If all projects were installed, the estimated total annual electricity production on campus is approximately 775 MWh.

### Renewable Energy Credit (REC) Creation Potential

New solar PV projects are generally eligible to participate in the various markets for renewable energy or carbon offsets. New Hampshire has an active market for Renewable Energy Credits (RECs) created by the state's Renewable Portfolio Standard (RPS), which

mandates a specific portion of the electricity generated in the state is from renewable sources. More detail on the NH RPS is included in the Financial Incentives section below.

Plymouth State University would have the option to sell the RECs associated with the solar PV projects described above. Doing so would allow the university to use any electricity generated on campus, but would bar the university from making any claims about using renewable or "green" energy – as those attributes of the generation project would be surrendered to the purchaser of the RECs.

This has the potential for generating revenue from the sale of the RECs in addition to any cost savings from the offset of electricity purchases. In 2012, RECs from solar project sold for $168.13/MWh in the New Hampshire market. With the total potential generating capacity of the campus at ~775 MWh this could yield annual revenue of $130,300.

## Financial Incentives for Solar Project Development

This section outlines some of the incentive programs available to Plymouth State University that could help offset the capital costs of installing rooftop solar arrays on campus.

### General Resources

These sites contain an overview of the available options:

- New Hampshire Office of Energy & Planning, Renewable Energy Incentives – http://www.nh.gov/oep/programs/energy/RenewableEnergyIncentives.htm
- DSIRE – Database of State Incentives for Renewables & Efficiency, New Hampshire – http://www.dsireusa.org/incentives/index.cfm?state=NH

### Local Incentives

**Renewable Energy Property Tax Exemption:** The Town of Plymouth offers a Solar Energy Exemption under NH RSA 72:61-72. However, as an educational institution, Plymouth State may be exempted from local property tax and may be ineligible for the program. Consultation with Town officials would be necessary to determine eligibility.

### State Incentives

- **Renewable Energy Generation Incentive Program:** NH and the Public Utilities Commission (PUC), have a rebate program for small-scale renewable generation. The program provides rebates for solar electric and thermal systems that are 100 kW D/C (or equivalent) or smaller. The incentive for PV systems is $0.80 per Watt, up to $50,000. Non-profits, public entities, and other non-residential entities are eligible for the program, so it should be applicable to Plymouth State. http://www.puc.nh.gov/Sustainable%20Energy/RenewableEnergyRebates-CI.html

- **Net Metering:** New Hampshire allows for net metering, so these projects may be able to take advantage of sales of surplus electricity: http://www.puc.nh.gov/Regulatory/Rules/PUC900.pdf

### Federal Incentives

**USDA Rural Energy For America Program:** This program offers grants, guaranteed loans, or a combination of the two to agricultural producers and small businesses in rural areas. In New Hampshire, all communities would be eligible except Manchester, Nashua and any communities sharing a border with these cities, so Plymouth would be considered a rural area under the program. The program is aimed at farmers, ranchers and rural small businesses, so consultation with the program administrators would be necessary to determine if Plymouth State could be considered a small business.
The grants cover up to 25% of total project costs. Grants are limited to $500,000 for renewable energy systems. At least 20% of the grant funds awarded must be for grants of $20,000 or less.
http://www.rurdev.usda.gov/rbs/busp/9006grant.htm

### Utility Incentives

Plymouth State purchases electricity from the New Hampshire Electric Co-Op. There are many efficiency incentives from the Co-Op but currently no renewable programs.

### Renewable Energy Markets

New Hampshire has an active market for Renewable Energy Credits (RECs) to meet the state Renewable Portfolio Standard (RPS) known as “25 by 25” (25% renewable energy generation by 2025). New solar projects are designated as Class II RECs which sold for $168.13/MWh in 2012. The Public Utilities Commission determines eligibility for the program:
http://www.puc.nh.gov/Regulatory/Rules/Puc2500.pdf

The following is intended to supplement the solar rooftop analysis in place of the aforementioned spreadsheet.
The pictures below show the potential buildings where solar panels could be installed on the rooftops.

**Sliver Center for the Arts**


| Size (kW) | Annual Output (kWh) |
|---|---|
| 88.01 | 107,795 |
| 27.48 | 33,658 |
| **115.49** | **141,453** |

**Physical Education Center**


| | Size (kW) | Annual Output (kWh) |
|---|---|---|
| 1 | 63.15 | 77,348 |
| 2 | 92.37 | 113,136 |
| 3 | 102.52 | 125,567 |
| **Total** | **258.04** | **316,051** |

**Herbert H Lamson Library**


| | | Size (kW) | Annual Output (kWh) |
|---|---|---|---|
| | 1 | 69.73 | 85,406 |
| | 2 | 57.44 | 70,353 |
| **Total** | | **127.17** | **155,759** |

**Grafton Residence Hall**


| | | Size (kW) | Annual Output (kWh) |
|---|---|---|---|
| | 1 | 25.55 | 31,293 |
| | 2 | 25.55 | 31,293 |
| **Total** | | **51.1** | **62,586** |

**Belknap Residence Hall**


| | | Size (kW) | Annual Output (kWh) |
|---|---|---|---|
| | 1 | 22.08 | 27,043 |
| | 2 | 22.08 | 27,043 |
| **Total** | | **44.16** | **54,086** |

**Pemigewasset Residence Hall**


| | | Size (kW) | Annual Output (kWh) |
|---|---|---|---|
| | 1 | 15.06 | 18,445 |
| | 2 | 21.73 | 26,616 |
| **Total** | | **36.79** | **45,061** |

July 18, 2012

# Qualified Energy Conservation Bond (QECB) Update: New Guidance from the U.S. Department of Treasury and the Internal Revenue Service

Qualified Energy Conservation Bonds (QECBs) are federally-subsidized bonds that enable state, tribal, and local government issuers to borrow money to fund a range of energy conservation projects at very attractive borrowing rates over long contract terms. In June 2012, the U.S. Department of the Treasury (Treasury) and the Internal Revenue Service (IRS) published a notice to clarify what constitutes a qualified project for potential issuers of the approximately $2.5 billion of remaining QECB issuance capacity. The guidance addresses two qualified uses of QECB proceeds—how issuers should measure energy use reductions in publicly-owned buildings and what constitutes a green community program.

## QECB Basics

A QECB is a bond that enables qualified state, tribal and local government issuers to borrow money at attractive rates to fund qualified energy conservation projects.[1] QECBs were initially, established by the Energy Improvement and Extension Act of 2008 and issuance capacity was expanded from $800 million to $3.2 billion by the American Recovery and Reinvestment Act of 2009. It is estimated that approximately 20 percent of this issuance capacity has been used, leaving approximately $2.5 billion available to state, local, and tribal governments.[2] A QECB is among the lowest-cost public financing tools available because the Treasury subsidizes the issuer's borrowing costs. Issuers may choose between structuring QECBs as tax credit bonds (i.e., bond investors receive federal tax credits in lieu of—or in addition to—interest payments) or as direct subsidy bonds (i.e., bond issuers receive cash rebates from the Treasury to subsidize their interest payments). Both tax credit and direct payment bonds subsidize borrowing costs; thus far, most QECBs have been issued as direct subsidy bonds, due to lack of investor appetite for tax credit bonds.

*This paper is part of the LBNL Clean Energy Financing Policy Brief series. These working papers highlight emerging financing models, important issues that financing programs face, and how these issues are being addressed. To join the email list to receive these policy briefs, please click HERE. The work described in this Policy Brief was funded by the Department of Energy Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program under Contract No. DE-AC02-05CH11231. Please direct questions or comments to Mark Zimring (mzimring@lbl.gov). The information in this policy brief is for informational purposes only—potential issuers should consult the U.S. Department of Treasury's QECB guidance and their bond counsels.*

[1] A full list of eligible projects available here: http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/QECB.html
[2] Overview of QECB issuances available here: http://www.energyprograms.org/wp-content/uploads/2012/03/QECB_Memo_6-8-2.pdf

## Compliance Uncertainty a Barrier to Broader QECB Deployment

Federal legislators intended that state, tribal, and local governments be given wide discretion in methods to conserve energy that may be financed with QECBs:

> *The [U.S. House of Representatives conference] committee [for the Energy Improvement and Extension Act of 2008] believes that local officials should have the flexibility to develop their own approaches to energy conservation. Therefore, the Committee believes that it is appropriate to empower State and local governments by providing them with access to subsidized financing to help promote energy-efficient policies tailored to the needs of local communities.*[3]

Despite the legislative intent that QECB rules be interpreted broadly, the lack of specificity in the previously issued Federal guidance has led to uncertainty among potential issuers about whether specific projects comply with QECB regulations and are thus eligible for the Federal interest rate subsidy or tax credit. This uncertainty has been one of the major challenges to more widespread QECB deployment. To reduce this uncertainty, the Treasury and the IRS published additional guidance in June 2012 (2012 Guidance) that provides details on how issuers can comply with QECB regulations for two popular qualified conservation purposes: reducing energy use in public buildings by at least 20 percent and implementing green community programs.

## Reducing Energy Use in Publicly-Owned Buildings

QECBs can be used to fund energy conservation projects that reduce energy use in public buildings by at least 20 percent (the 20 percent test).[4] The updated 2012 Guidance provides clarity on key issues about how energy savings should be measured and options for meeting the 20% savings target (e.g., either for individual facilities or major end uses or over a portfolio of facilities).

- **Expected project energy savings can be determined using a "reasonable expectation standard" and do not necessitate ongoing energy use monitoring.**[5]

QECB issuers may now confidently rely on several methodologies for estimating that expected public building energy savings from QECB-funded capital expenditures will meet the 20 percent test threshold:

1. Issuers may rely on an independent, licensed professional engineer or other expert to certify the expectation of savings.[6]

2. Issuers may use energy savings estimation tools including an American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Level III audit,[7] or simulation

[3] Source: House Report No. 110-658 that accompanied H.R. 6049 (Energy Improvement and Extension Act of 2008).
[4] Technically, QECBs can only be used to fund **capital expenditures** that reduce energy use in public buildings by at least 20 percent. The 2012 guidance clarifies that a "capital expenditure" is any cost of a type that is properly chargeable to capital account (e.g. administrative costs do not qualify—although there is an allowance for issuance costs up to two percent of bond size).
[5] While there is no requirement of subsequent measurement of energy savings for QECB compliance purposes, the guidance encourages project developers to use ENERGY STAR© Portfolio Manager (or other energy management and monitoring practices) to establish energy use baselines and track upgrade performance.
[6] A sample certification is attached to the Treasury/IRS guidance in the Appendix, available here: http://www.irs.gov/pub/irs-drop/n-12-44.pdf
[7] More information on ASHRAE Level III audits available here: http://www.ashrae.org/

techniques and estimating software, including the DOE2 Quick Energy Simulation Tool (eQUEST®), [8] other qualified software for calculating commercial building energy and power cost savings that meet federal tax incentive requirements as listed by the U.S. Department of Energy,[9] or other tools that use reasonable and consistently applied methods.

- **Energy savings can be measured in a single building, across a portfolio of buildings, or within certain building system components**

The 2012 Guidance also provides potential issuers flexibility in meeting the 20 percent energy use reduction test. Beyond reducing a single building's energy use by at least 20 percent (a conservative standard that many past issuers have used), the guidance clarifies that issuers can pass the test by achieving an average of 20 percent savings across a portfolio of buildings. This updated guidance will overcome eligibility uncertainty faced by a number of issuers, including the City of Philadelphia, in which projects in some buildings were expected to achieve less than 20 percent savings while projects in other buildings were expected to achieve well above 20 percent savings for a portfolio-wide average well above 20 percent.[10] Importantly, the new guidance also indicates that issuers can meet the 20 percent test by reducing energy use in one or more building system components (in a single building or across multiple buildings) rather than reducing overall building(s) energy use by 20 percent. These building system components include heating, ventilation and air conditioning (HVAC); hot water; lighting; building plug loads; and building envelope. For example, a lighting upgrade that reduces lighting energy consumption by greater than 20 percent but only reduces overall building energy use by 5 percent qualifies as a project eligible for QECB funding.

## Promoting Energy Conservation Creativity through Green Community Programs

Green community programs (GCPs) are another eligible use of QECB proceeds, but were t undefined in Federal authorizing legislation. The 2012 Guidance provides additional guidance on the broad range of programs that can qualify under the GCP designation, specifying that GCPs must meet two requirements:

1. Programs must promote, "energy conservation, energy efficiency or environmental conservation initiatives relating to energy consumption, broadly construed;" and

2. Programs must also involve property that is available for general public use or involve a loan or grant program that is broadly available to members of the general public.[11]

The guidance provides examples of eligible initiatives including:

- Retrofitting initiatives for heating, cooling, lighting, water-saving, storm-water reducing or other efficiency measures;

[8] eQUEST® is a free whole building energy performance design tool. More information available here: http://apps1.eere.energy.gov/buildings/tools_directory/software.cfm/ID=575/pagename=alpha_list
[9] List of eligible software tools available here: http://apps1.eere.energhy.gov/buildings/tools_directory/
[10] The city funded just two of four building upgrades with QECBs because, while the suite of upgrades achieved, on average, savings of greater than 20 percent across the four buildings, two buildings were expected to reduce energy use by less than 20 percent. For more information on Philadelphia's QECB issuance, visit LBNL's Philadelphia QECB case study: http://financing.lbl.gov/reports/public-building-qecb.pdf.
[11] GCPs need not be open to a jurisdiction's entire geography nor all of the residents and/or businesses in the jurisdiction, provided that the program broadly benefits the general public.

- Distributed generation initiatives;
- Transportation initiatives that conserve energy and/or support alternative fuel infrastructure (e.g. improvements to public bicycle paths or mass transit systems);
- Improvements to public infrastructure that enhance proximity and connectivity between community assets and public transit to reduce motor vehicle use; and
- Public street lighting upgrades.[12]

## Additional Resources

For additional QECB resources, visit:

- DOE's QECB Resources Web Page:
  http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/qecb.html
- LBNL's QECB Resources Web Page:

  http://financing.lbl.gov

  To request technical assistance on QECBs, send an email to:

  TechnicalAssistanceProgram@ee.doe.gov

[12] For more information on QECB-funded street lighting projects, visit LBNL's San Diego QECB case study: http://financing.lbl.gov/reports/street-lighting-qecb.pdf

# NEW HAMPSHIRE

## Incentives/Policies for Renewables & Efficiency





## Renewables Portfolio Standard



*Last DSIRE Review: 01/11/2013*

**Program Overview:**

| | |
|---|---|
| **State:** | New Hampshire |
| **Incentive Type:** | Renewables Portfolio Standard |
| **Eligible Renewable/Other Technologies:** | Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Renewable Fuels, Biodiesel, Fuel Cells using Renewable Fuels, Microturbines |
| **Applicable Sectors:** | Investor-Owned Utility, Rural Electric Cooperative, Retail Supplier, (All electricity suppliers, except municipal suppliers) |
| **Standard:** | 24.8% by 2025 |
| **Technology Minimum:** | New Renewables (including thermal energy): 15% by 2025<br>New Solar-Electric: 0.3% by 2014<br>Existing Biomass: 8% by 2015<br>Existing Hydro: 1.5% by 2015 |
| **Credit Trading:** | Yes (NEPOOL-GIS) |
| **Web Site:** | http://www.puc.state.nh.us/Sustainable%20Energy/Renewable_Portfol... |
| **Authority 1:**<br>**Date Enacted:**<br>**Date Effective:** | New Hampshire Statutes, Chapter 362-F<br>5/11/2007<br>7/10/2007 |
| **Authority 2:**<br>**Date Effective:** | N.H. Admin. Rules, Puc 2500<br>6/3/2008 |
| **Authority 3:**<br>**Date Enacted:**<br>**Date Effective:** | S.B. 218<br>06/19/2012<br>06/19/2012 |

**Summary:**

New Hampshire's renewable portfolio standard (RPS), established in May 2007, requires the state's electricity providers -- with the exception of municipal utilities -- to acquire by 2025 renewable energy certificates (RECs) equivalent to 24.8% of retail electricity sold to end-use customers. The RPS includes four distinct standards for different types of energy resources; these are classified as Class I, Class II, Class III and Class IV.

**Class I - New Renewable Energy.** This class addresses electricity or "useful thermal energy" generated by any of the following resources, provided the generator began operation after January 1, 2006, except as

noted below:

- Wind energy;
- Hydrogen derived from biomass fuels or landfill gas;
- Ocean thermal, wave, current or tidal energy;
- Methane gas;
- Geothermal systems that begin producing thermal energy after January 1, 2013;
- Solar-thermal systems that begin producing thermal energy after January 1, 2013;
- Eligible biomass fuels (including the biomass share of certain generators co-fired with fossil fuels);
- Eligible biomass generators that meet emissions criteria begin producing thermal energy after January 1, 2013;
- Solar-electric energy not used to meet Class II;
- The incremental new production of electricity in any year from an eligible biomass, eligible methane source, or hydroelectric generating facility of any capacity, over its historical generation baseline;
- The production of electricity from Class III or IV sources that have been upgraded or re-powered through significant investment; and
- "Useful thermal energy," defined as renewable energy delivered from Class I sources that can be metered and for which fuel or electricity would otherwise be consumed.

**Class II - New Solar.** This class addresses electricity generated by solar technologies, provided the generator began operation after January 1, 2006.

**Class III - Existing Biomass/Methane.** This class addresses electricity generated by eligible biomass systems up to 25 megawatts (MW), and methane gas, provided the generator began operation before January 1, 2006.

**Class IV - Existing Small Hydroelectric.** This class addresses electricity generated by hydro facilities up to 5 MW, provided the generator began operation before January 1, 2006, and complies with certain environmental protection criteria; and hydro facilities up to 1 MW that comply with FERC fish-passage requirements and are interconnected to the distribution grid in New Hampshire.

Electric providers must meet the standard according to the following compliance schedule:

| Resource | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2025 |
|---|---|---|---|---|---|---|---|---|---|
| Class I | 0.0% | 0.5% | 1.0% | 2.0% | 3.0% | 4.0% | 5.0% | 6.0% | 15.0% |
| Class II | 0.0% | 0.0% | 0.04% | 0.08% | 0.15% | 0.2% | 0.3% | 0.3% | 0.3% |
| Class III | 3.5% | 4.5% | 5.5% | 6.5% | 6.5% | 6.5% | 7% | 8% | 8% |
| Class IV | 0.5% | 1% | 1% | 1% | 1% | 1.3% | 1.4% | 1.5% | 1.5% |

Class I increases an additional 0.9% per year from 2015 through 2025. Of the Class I requirement, qualifying renewables producing useful thermal energy must account for 0.2% in 2013 and 0.4% in 2014; the share increases annually by 0.2% from 2015 through 2025.

The New Hampshire Public Utilities Commission (PUC) has established a renewable energy certificate (REC) program utilizing the regional generation information system (GIS) of energy certificates administered by ISO-New England and the New England Power Pool (NEPOOL). RECs from customer-sited sources are assigned to the system owner, and behind-the-meter generation located in New Hampshire is eligible to participate in the RPS. Unused RECs from the prior two years may be used to meet up to 30% of a given year's compliance targets. Electric utilities may request to enter into multi-year contracts for RECs or electricity bundled with RECs to meet the RPS. Rural electric cooperatives may enter into multi-year contracts without PUC approval.

Generators must be sited within the New England control area, unless the source is located in a control area adjacent to the New England control area and the energy produced by the source is actually delivered into the New England control area for consumption by New England customers.

Compliance reports are due to the PUC by July 1 of each year from each electricity provider. In lieu of meeting the portfolio requirements, an electricity provider may make payments into a renewable energy fund. Class II moneys will only be used to support solar energy in New Hampshire. The rates for each megawatt-hour (MWh) not met for a given class obligation through the acquisition of RECs are:

- Class I: $55.00/MWh in 2013
- Class I Thermal: $25.00/MWh in 2013
- Class II: $55.00/MWh in 2013
- Class III: $31.50/MWh in 2013
- Class IV: $26.50/MWh n 2013

The PUC adjusts these rates annually by January 31 using the federal Consumer Price Index. The PUC is authorized to fine a supplier that violates RPS requirements, to revoke its registration, or to prevent it from doing business in the state. The PUC may accelerate or delay by up to one year any given year's incremental increase in Class I or II RPS requirement for good cause, and it may modify the Class III and IV requirements for calendar years beginning in 2012.

The PUC must conduct a review of the RPS program and report of its findings to the legislature in 2011, 2018 and 2025, and include any recommendations for changes to the class requirements or other aspects of the RPS.

**Contact:**

**Barbara Bernstein**
New Hampshire Public Utilities Commission
21 South Fruit Street
Suite 10
Concord, NH 03301
**Phone:** (603) 271-6011
**E-Mail:** barbara.bernstein@puc.nh.gov

# CAPACITY BUILDING

As PSU works towards its campus sustainability goals and implements the projects identified in this plan, it will be critical to invest in the supporting structures, programs and policies that foster campus-wide success.

| CATEGORY | TACTIC | EXAMPLES |
|---|---|---|
| Financial resources | PSU will need to dedicate substantial financial resources to climate action and sustainability, and will need to guarantee this funding over an extended period of time to clarify the financial environment and provide certainty within long-term projects. | State & federal rebates/incentives |
| | | Partnerships (e.g. power purchasing agreements) |
| | | Donor fundraising |
| | | Campus fees |
| | | Capturing savings (e.g. revolving loan fund) |
| | | Direct billing |
| Human resources | To ensure successful project execution, PSU needs to assess the ability/capacity of staff and faculty to address climate action and sustainability on campus. PSU will likely need explicitly integrate sustainability into job descriptions/evaluations, hire additional sustainability staff, and provide ongoing training to staff and faculty. | Sustainability literacy & continuing education for staff & faculty members |
| | | Intra-departmental sustainability staff (e.g. environmental officers within departments) |
| | | Inter-departmental sustainability office/staff (e.g. campus-wide office & director) |
| | | Sustainability in job descriptions/evaluations |
| | | Identifying sustainability stakeholders, advisors and contributors |
| Campus Policy | Building on commitments like the ACUPCC, PSU should establish campus-wide and sectoral policies and commitments that clearly state and mandate sustainable practices. | Low-impact transportation policy |
| | | Green purchasing policy |
| | | Public commitments to reducing resource consumption |
| | | Green office/lab policy |
| | | High-performance building standards |
| Campus awareness & engagement | PSU should continue and expand campus awareness and engagement programs that contribute to PSU's role as an educational institution, ensure that infrastructural improvements are supported by users, and that create an informed campus body that can meaningfully contribute to sustainability efforts. | Reward/recognition programs |
| | | Strategic communications plan |
| | | Linking users and operators (e.g. campus/facilities tours, focus groups) |
| | | Public reporting of key metrics |
| | | Strategic signage |
| Behavior change | Changing behavior at PSU helps to ensure that infrastructural improvements are supported or maximized by user behavior, addresses resource use that is driven primarily by behavior, and helps to expand PSU's impact beyond the immediate campus by generating life-long habits in the student body. | Target transition periods (e.g. sustainability orientation/training for new staff, faculty and students) |
| | | Modeling (PSU leaders demonstrate sustainable practices) |
| | | Normalize sustainable living |
| Campus living laboratory | As a university, PSU is fundamentally an *educational institution*. This means that climate action or sustainability initiatives (infrastructural or otherwise) should also be educational initiatives – accessible and transparent to the student body. | Demonstration projects |
| | | Educational signage (e.g. campus sustainability walking tour) |
| | | Public testing of sustainable products |
| | | Campus sustainability internships |
| | | Sustainability in learning outcomes |
| Monitoring, reporting & verification | In order to measure, report, and verify progress towards climate action goals and projects, PSU should (a) identify key metrics, (b) detail a process for regularly measuring these metrics (including responsible parties), (c) detail a system for documenting, organizing, and storing/displaying these metrics over time, and (d) articulate a standardized process for ongoing evaluation. | Clear, regular data collection methodology |
| | | Clear, regular assessment/evaluation methodology |
| | | Forum for collecting/documenting ideas or challenges |
| | | Publically publishing data |

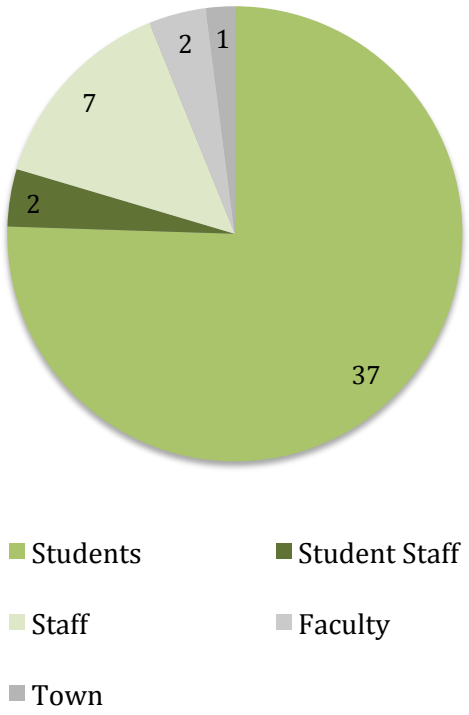
# PLYMOUTH STATE UNIVERISTY DROP-IN SESSION REPORT

Wednesday, March 6, 2013 11:30 am-1:30 pm Pawsway (Hartman Union Building)

## Ideation Session Summary

In collaboration with select stakeholders from PSU and as a part of the larger master planning process, GreenerU identified four topic areas to explore with the PSU campus. Because of their importance to the overall success of climate action planning and sustainability at PSU, these topic areas included (1) energy, (2) waste and recycling, (3) engagement, and (4) communication. For each topic area, GreenerU identified 2-3 questions or practices, each of which were then displayed on 1 of 10 posters and presented to the PSU campus from 11:30 to 1:30 pm on March 6th. Students, staff, and faculty passing by were offered the opportunity to give feedback on these questions or practices by placing colored stickers on scales or in boxes to "visually" answer questions or respond to practices in an "ideation". In order to better track participation, Students were given red or green stickers, staff were offered blue stickers, and faculty were given yellow stickers. Participants additionally had the opportunity to write and place sticky notes on posters with additional comments. Although the only incentives offered were lollipops, a total of 49 participants voluntarily offered their input during the 2-hour session. Participants were not required to answer every question. The questions or practices that were presented, along with the results, are displayed by topic in more depth in the following pages.

**Number of Participants by Position at PSU**




Although the findings from this ideation session are preliminary and merit further investigation, participants revealed especially strong support for reward/recognition programs related to campus sustainability, discounted CFLs/LEDs, and the use of reusable water bottles, which suggests expanding these programs at PSU. Participants also demonstrated some support for discounted power strips, a yearlong internship program for which students receive credit to learn about sustainability, and a monthly newsletter covering climate action/sustainability-related events, while participants' support for electronic course materials was considerably more varied. Other posters revealed a need for clearer signage around waste and recycling bins, supported expanding PSU's sustainability presence in email and social media, and indicated that participants are motivated by campaigns that save them money and/or make PSU a more sustainable campus.

## Energy

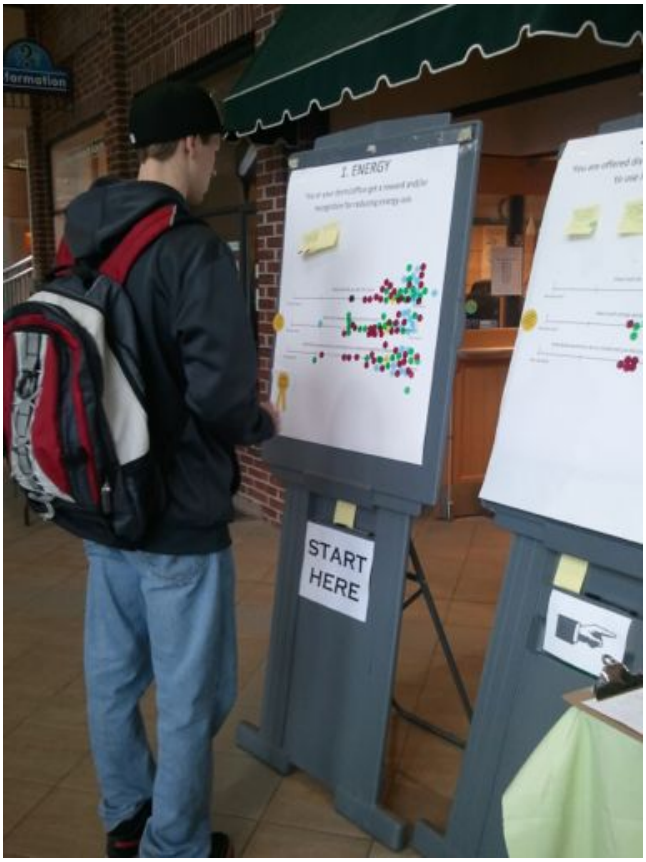
### Poster 1

**Content:** Poster 1 offered a practice to participants: "You or your dorm/office get a reward and/or recognition for reducing energy use." It then asked participants three questions, and presented 3 corresponding scales for them to place their stickers on:

1. How much do you like this idea? (On a scale of "1 – not very much" to "5 – very much")
2. How much energy would this practice save? (On a scale of "1 – not very much" to "5 – very much")
3. How likely would you be to participate in a reward/recognition program? (On a scale of "1 – not very likely" to "5 – very likely")

**Results:** Participants responded largely positively to all 3 questions; they liked the idea, thought it would save a lot of energy, and self-identified as being very likely to participate.

**Application:** The level of interest and support demonstrated by participants suggests that PSU could help further energy conservation on campus by expanding reward and recognition programs. While individual monitoring of energy use (thermal, electric, etc.) is likely unrealistic, metering buildings/offices, making data publicly available (public recognition), and providing rewards/targeted recognition to the lowest energy-users could promote energy conservation. Currently, PSU posts energy usage for buildings on a monthly basis (with data from the last 3 years for comparison). Increasing the visibility of these building-level reports, or rewarding building users for reductions could help further this initiative. Rewards or recognition could also be offered for projects or participation rather than metered drops in energy use. For example, offices or individuals could participate in pledge drives wherein all participants who sign a pledge to undertake "action x" are publically recognized/thanked or entered into a raffle.




*Above: A participating student reads poster 1 and determines where to place his stickers.*

PSU could build on existing green office and residential audit programs by drawing on examples of reward/recognition programs including:

- The Warren Wilson College Sustainability Recognition Program, which "recognizes up to three projects per academic year that deepen the understanding and the practice of the College's Sustainability Commitment."[1]
- The University of Michigan Sustainable Lab Recognition Program, which presents labs with formal recognition as a UM Sustainable Laboratory and presents them with a decal for their door.[2]
- The University of Colorado, Boulder, holds an annual ceremony to "recognize outstanding individuals and departments who demonstrate a sincere commitment to reducing the burden that CU-Boulder places on the environment."[3]
- The University of Massachusetts, Amherst, runs a green office program wherein offices participate for bronze, silver, gold or green rankings. Recognition is offered for every level, both with a congratulatory certificate and acknowledgement in publications.[4]

## Poster 2

**Content:** Poster 2 also offered a practice to participants: "You are offered discounted (by at least 50%) CFLs/LEDs to use in your office/dorm." It then asked participants three questions, and presented 3 corresponding scales for them to place their stickers on:

1. How much do you like this idea? (On a scale of "1 – not very much" to "5 – very much")
2. How much energy would this practice save? (On a scale of "1 – not very much" to "5 – very much")
3. How likely would you be to install and use discounted CFLs/LEDs in your office/dorm? (On a scale of "1 – not very likely" to "5 – very likely")

**Results:** Again, participants responded largely positively to all 3 questions; they liked the idea, thought it would save a lot of energy, and self-identified as being very likely to install and use discounted CFLs/LEDs.

**Application:** This is a practice in which PSU has already engaged, and the results here support both continuing and expanding this program (PSU is giving away CFLs for free as part of a grant-funded program). Supplementing giveaways with broader engagement programs, online pledges and educational campaigns (like Energy Star's[5]) that support CFLs/LEDs as well as a wider array of energy-efficient appliances could maximize the impact of giveaways.

## Poster 3

**Content:** Much like Poster 2, Poster 3 offered a similar practice of discounting energy-saving equipment to participants: "You are offered discounted (by at least 50%) surge protectors/power strips to use in your office/dorm." Participants were also asked three questions here, and presented 3 corresponding scale:

1. How much do you like this idea? (On a scale of "1 – not very much" to "5 – very much")

[1] http://www.warren-wilson.edu/~elc/sustainability/Sustainability%20Recognition%20Program%201%2024%2011.pdf
[2] http://www.ocs.umich.edu/labs.html
[3] http://ecenter.colorado.edu/greening-cu/campus-sustainability-awards
[4] http://www.umass.edu/livesustainably/green-office
[5] See the Energy Star pledge at https://www.energystar.gov/index.cfm?fuseaction=globalwarming.showPledge

2. How much energy would this practice save? (On a scale of "1 – not very much" to "5 – very much")
3. How likely would you be to install and use discounted surge protectors/power strips in your office/dorm? (On a scale of "1 – not very likely" to "5 – very likely")

**Results:** Although still fairly positive, the reception of discounted surge protectors/power strips, when compared to CFLs/LEDs, was much more varied. Most participants appeared to like the idea (though less than CFLs/LEDs), while very few though that it would save any considerable amount of energy (most stickers were placed between 1 and 3 on the scale). Most participants also reported that they would likely install/use power strips, but the stickers were less concentrated between 4 and 5 on the scale, with 8 participants reporting a 3 or below.

**Application:** Although collecting more information could help clarify results here, deprioritizing less favorable programs will help to focus resources on projects that are more likely to elicit favorable results. However, Mass Save and the U.S. Department of Energy estimate that "phantom loads" (the energy that plugged in electronics continue to use, even when turned off) totals approximately 5 to 10 percent of annual energy costs.[6] Offering discounted smart/advanced power strips and surge protectors as part of an educational or outreach program could help the PSU campus understand and reduce these phantom loads.

## Waste & Recycling

### Poster 4

**Content:** Poster 4 asked participants a question: "When you throw something away on campus that could be recycled, what do you think?" Participants were asked to place a single sticker in one of 4 boxes:

1. I don't know if it is recyclable or not.
2. The recycling bin is too far away.
3. I don't know where the recycling bin is.
4. It doesn't matter if I recycle it.

**Results:** Participants placed the most stickers (22) in the box labeled "I don't know if it is recyclable or not." "I don't know where the recycling bin is" and "it doesn't matter if I recycled" each received 6 stickers, while "the recycling bin is too far away" received 4.

**Implementation:** The results from this poster suggest that the key challenge in increasing recycling rates at PSU is an informational/educational one (as opposed to infrastructural, i.e. adding additional waste/recycling bins). In order to increase awareness and understanding, broader general outreach/awareness campaigns could be combined with targeted signage efforts. More or improved signage for waste, recycling, and composting was additionally suggested during the

[6] Learn more at http://www.masssave.com/residential/lighting-and-appliances/home-electronics/advanced-power-strips

facilitated session at PSU on March 6th. Participants at this session identified that color-coding and pictures would help address waste and recycling confusion.

## Poster 5

**Content:** Poster 5 displayed a practice: "PSU provides electronic course materials." Participants were then asked to answer three questions by placing their stickers along 3, associated scales:

1. How much do you like the idea of using electronic course materials? (On a scale of "1 – not very much" to "5 – very much")
2. How much waste do you think could be averted by using electronic course materials? (On a scale of "1 – not very much" to "5 – very much")
3. How likely would you be to use electronic course materials instead of printed materials? (On a scale of "1 – not very likely" to "5 – very likely)

**Results:** Of the questions asked/practices proposed, this poster demonstrates the most varied, disparate results. While most participants responded with a 3 or above for question 2, their answers varied widely for 1 and 3.

**Implementation:** The mixed results from the poster indicate that electronic course materials are currently unlikely to be voluntarily implemented at a large scale, while forced programs that require electronic-only materials will likely direct negative attention to sustainability efforts. However, because using electronic materials is an important part of source reduction, several options are listed below that may help advance PSU's ongoing transition to electronic course materials:

- As a first step, it may be important to build a **conversation and collect information** on attitudes towards electronic course materials using surveys, workshops, or other tools. Why are people opposed to transitioning to electronic materials? How can PSU address these barriers? This investigation phase can also build awareness and encourage engagement.
- As a complimentary or secondary step, PSU can offer faculty the opportunity to take a "**Paper Pledge**" in which they commit to posting electronic materials and/or accepting assignments electronically. Rewarding and/or positively recognizing pledges could bolster buy-in, support, and additional pledges. Pledges that are made public can also help students identify courses/faculty that utilize electronic course materials or accept electronic submissions.
- A transition can additionally be supported by **incentive/disincentive programs** that allow people to choose electronic or hardcopy materials, but that reward those that select electronic materials and/or disincentivize those that select to print. Charging staff, faculty, and students for printing is one way to do this.
- Introducing and providing training on **software** that facilitates the use of electronic materials or online assignment submission may also help ease the transition to electronic materials. Software like Turnitin has been successfully adopted at a number of schools across the US.[7]

[7] Learn more and see testimonials/participating schools at http://turnitin.com/

## Poster 6

**Content:** Poster 6 offers suggests a practice; "using a reusable water bottle instead of a disposable water bottle." Participants were then asked to answer three questions along with 3 associated scales, which they were asked to place stickers along.

1. How much do you like the idea of using a reusable water bottle? (On scale of "1-Not very much" to "5-Very much")
2. How much waste do you think could be averted by using a reusable water bottle? (On scale of "1-Not very much" to "5-Very Much")
3. How likely would you be to use a reusable water bottle? (On a scale of "1-Not very likely" to "5-Very likely")

**Results:** On all three questions, most people responded positively. The results indicate that people both like the idea of reusable water bottles and are inclined to personally use them. The responses additionally show that the PSU public understands the positive impact on the waste stream that eliminating single-use plastic water bottles could have.

**Implementation:** Continuing to support reusable water bottles through accessible and additional filtered water stations and the sale/giveaway of reusable water bottles will allow the PSU campus to bolster the effect of what already appears to be considerable public support for reusable water bottles.

---

# Engagement

---

## Poster 7

**Content:** Poster 7 offers the idea of "A yearlong internship program for which students receive credit to learn about sustainability as well as design and implement a project on campus that makes PSU more sustainable." It then asks two questions along with associated scales, which participants are asked to place stickers along.

1. How much do you like this idea? (On a scale of "1-Not very much" to 5-Very Much")
2. How likely would you be to participate (as a student or supporting staff/faculty)? (On a scale of "1-Not very likely" to "5-Very likely")

**Results:** Participants responded positively to the idea of an internship program, with nearly all responses falling between the 3 and 5 on the scale. However, participants' responses were more varied when asked about their personal participation in such a program, with several responses on the lower end of the range.

**Implementation:** Structured courses/internships that last throughout the academic year provide a more systemic, institutionalized way for students to engage with campus sustainability as well as expand and *apply* their accumulated knowledge (which is often harder in shorter programs). However, as the participants' responses reflect, such programs often have varied participation rates because of the time commitment required. Since there already appears to be public support,

launching an initial pilot of a year-long (or less) internship program with a small, core group of students could help build momentum for a longer, larger program in the future.

*At right: Participants make their way down the line of 10 ideation posters displayed on easels in the PSU Pawsway at lunchtime.*


## Poster 8

**Content:** Poster 8 asks the question "When are you most likely to participate in a project, event, or program related to climate action/sustainability at PSU?" Participants were then asked to place a sticker in one of 6 boxes:

1. When it helps PSU to become a more sustainable campus.
2. When it saves me money.
3. When it helps me academically.
4. When it helps me professionally.
5. When there's a reward involved.
6. When its part of a competition or challenge.

**Results:** A majority of participants responded in the boxes "When it helps PSU to become a more sustainable campus" and "When it saves me money." The other boxes having significantly fewer stickers.

**Implementation:** This poster was intended to help clarify marketing strategy for sustainability programs and events at PSU. The results suggest that because many campus occupants are motivated by practices/activities that help the university become a more sustainable campus, clearly advertising what efforts/activities makes PSU a more sustainable campus and when should be a part of sustainability marketing strategy. Similarly, identifying programs that involve cost-savings or promoting the cost-savings aspects of activities/practices could help encourage campus engagement.

## Communication

### Poster 9

**Content:** Poster 9 asks the question "If we want to tell you about a project, event, or program related to climate action/sustainability at PSY, what is the best way to reach you?" Participants were then asked to place a sticker in one of 6 boxes:

1. Class announcements
2. Fliers/posters around campus
3. Campus newspapers/magazines
4. Email
5. Call/Text
6. Social Media (e.g. Facebook, Twitter)

**Results:** Most stickers were placed in the "Email" and "Social media" boxes, with a few stickers in Fliers/Posters. Call and text had only three stickers while class announcements had none.

**Implementation:** This poster asked one part of a series of important questions to ask when developing a communication strategy for sustainability. While the results suggest that continuing and expanding the PSU sustainability presence via email and in social media could support efforts and raise awareness, participants "preferred" means of communication should not be equated with the most *effective* means of communication. Next steps here could include testing response rates for different forms of communication.

### Poster 10

**Content:** Poster 10 poses the statement "PSU releases a monthly newsletter covering projects, event, programs, or other news related to climate action/sustainability on campus." Participants were then asked to answer three questions along with 3 associated scales, which they were asked to place stickers along.

1. How much do you like this idea? (On a scale of "1-Not very much" to "5-Very much.")
2. How much do you think this would raise awareness of climate action/sustainability news at PSU? (On a scale of "1-Not very much" to "5-Very Much")
3. How likely would you be to read a newsletter every month? (On a scale of "1-Not very likely" to "5-very likely")

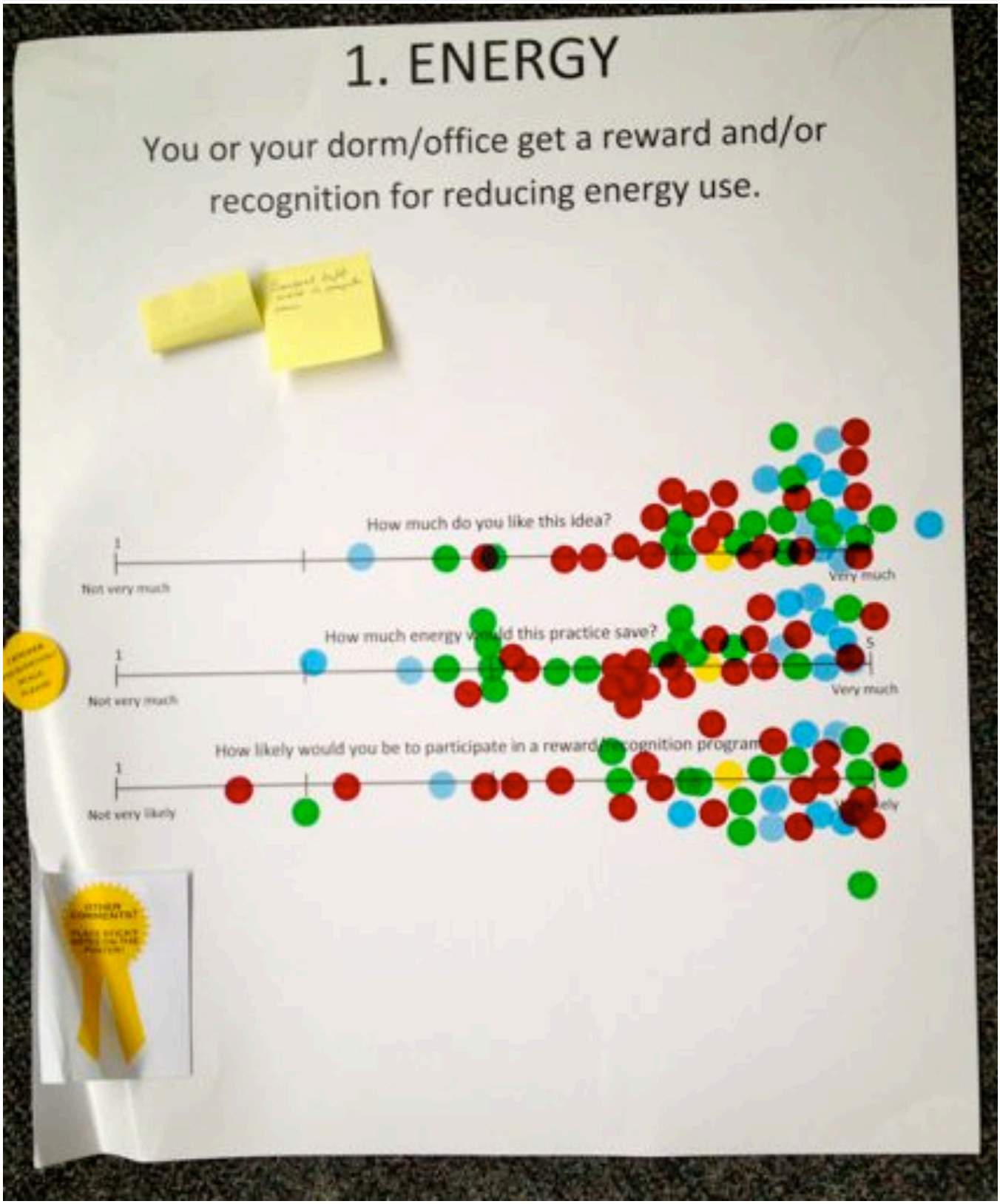
**Results:** Participants in general seemed to like the idea, with the stickers mainly placed in the central to high end of the scale. Participants also seemed to think this would raise awareness, but were less convinced. However, participants placed stickers on the lower end of the scale for how likely they would be to actually read a newsletter every month.

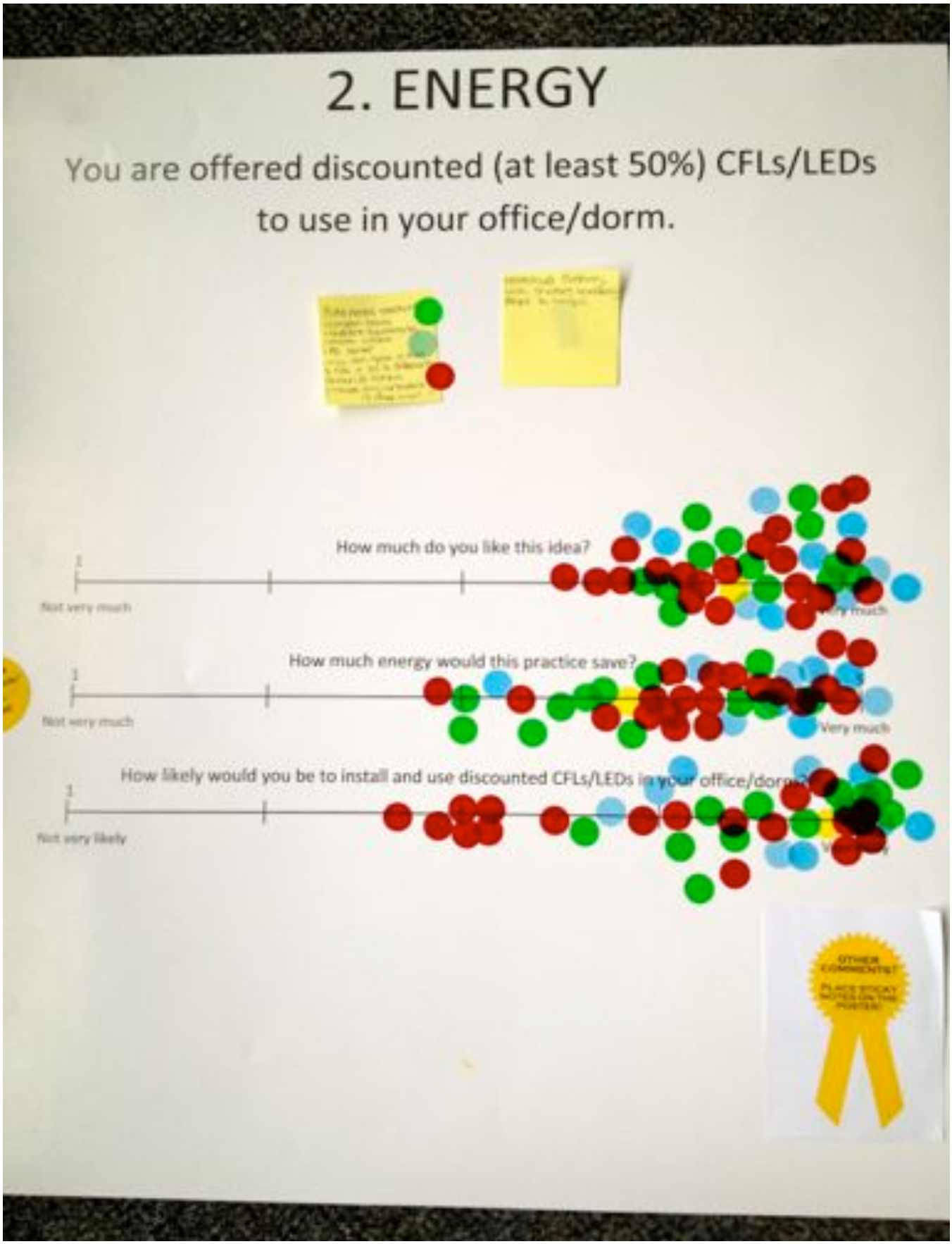
**Implementation**: Although monthly newsletters can be a great way to regularly release information and access students on campus without flooding inboxes, reaching targeted readership

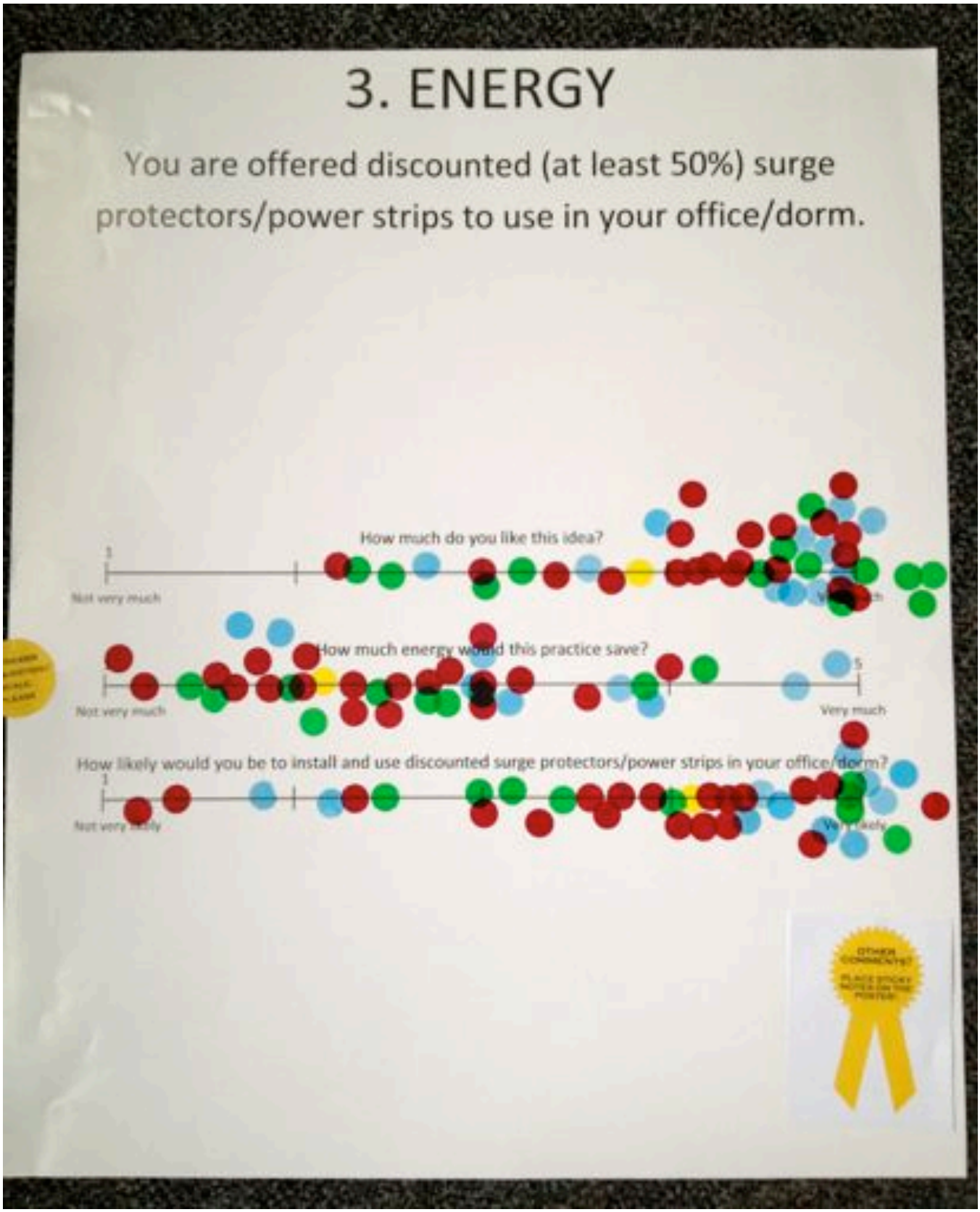
can be difficult, as the results of this poster indicate. Some general guidelines for communications best practices include:

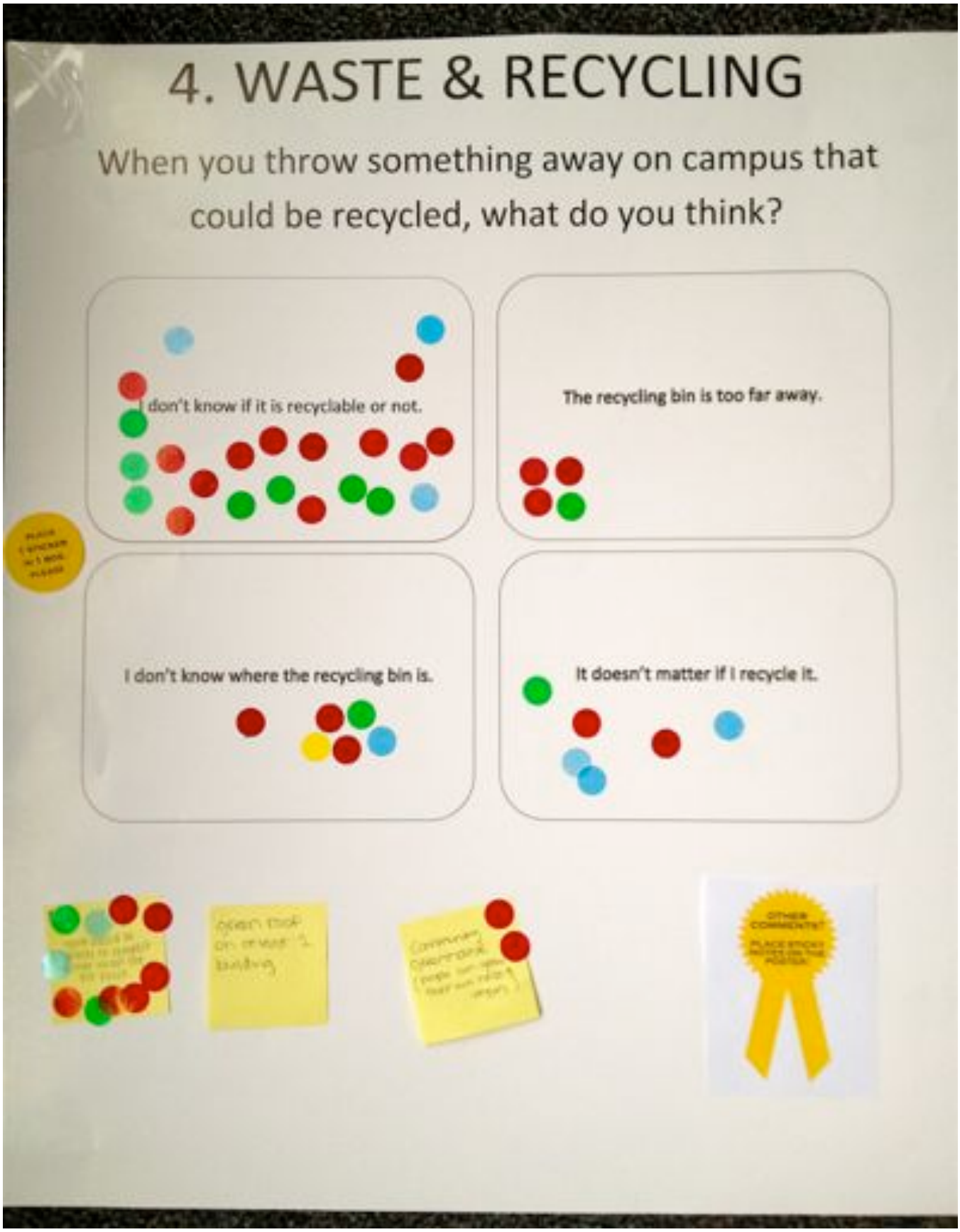
- Determine the right frequency for messages
- Develop a unifying brand or identity for sustainability efforts
- Adapt slogans/catch phrases to campus culture
- Engage campus occupants at the points of access/decision (e.g. entrances to parking lots and garages, light switches in buildings, faucets in bathrooms and kitchens, computer login screens, inside buses, laundry rooms in residence halls, thermostats in buildings etc.)
- Make efforts/information personal

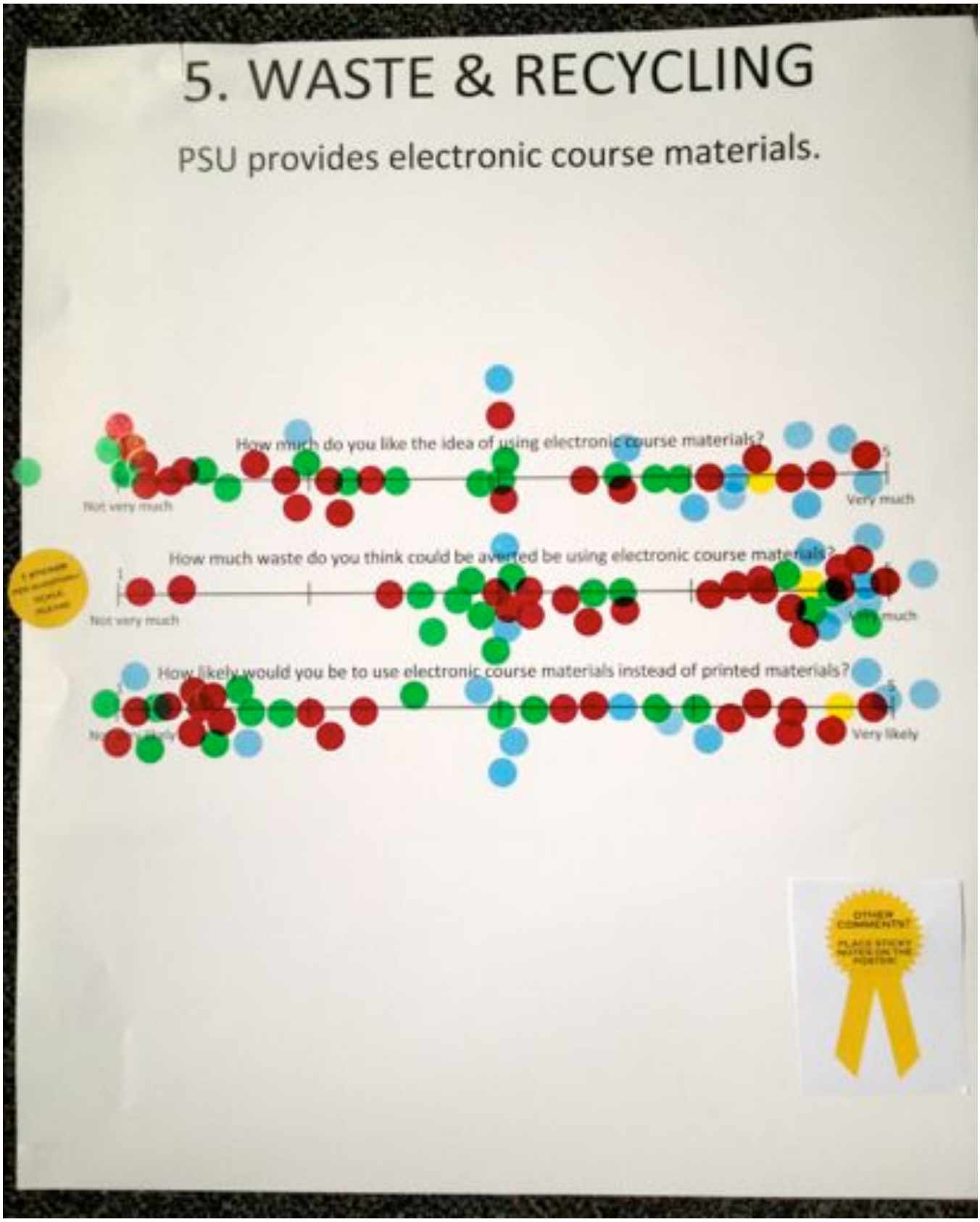
## Poster Photographs

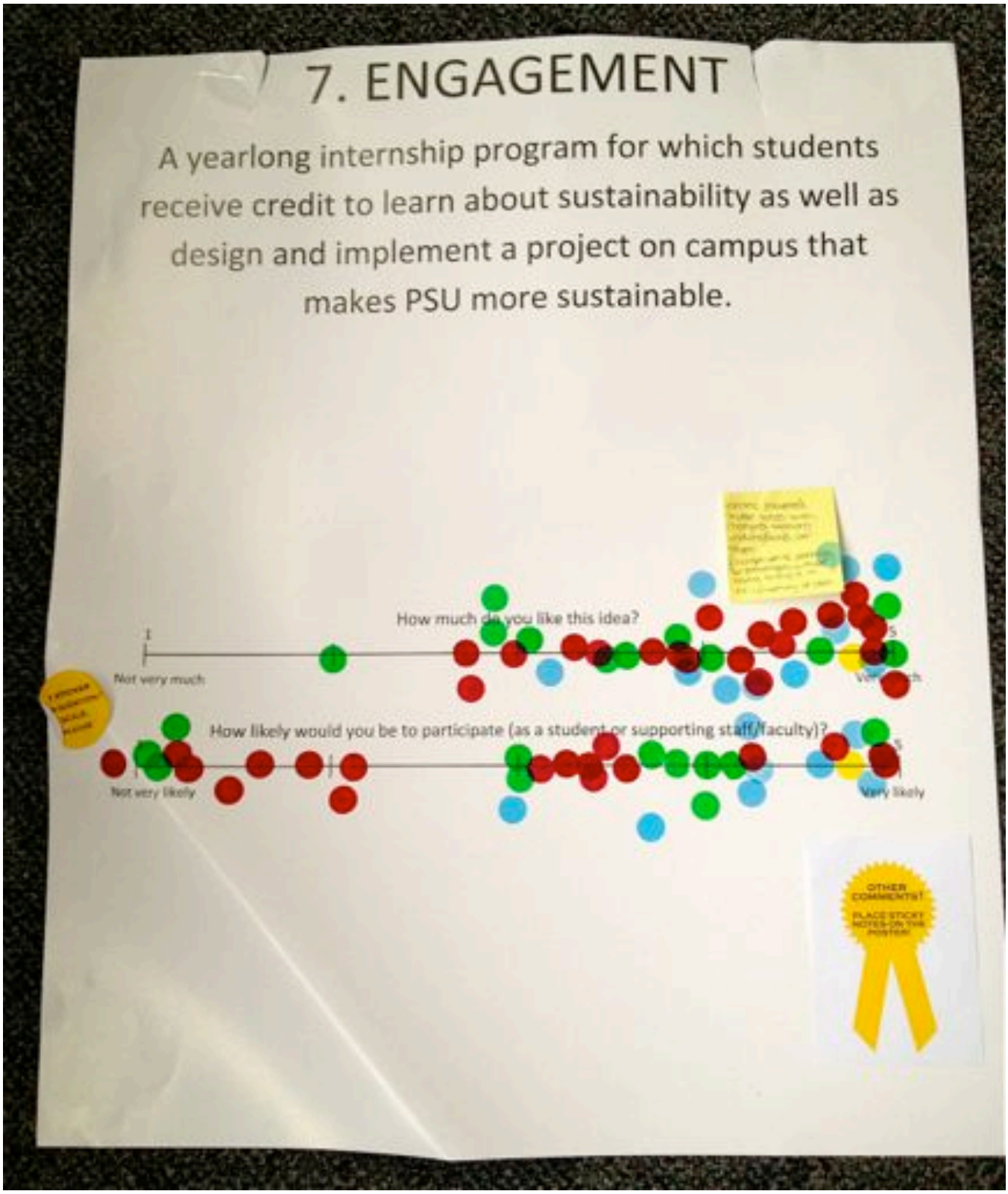


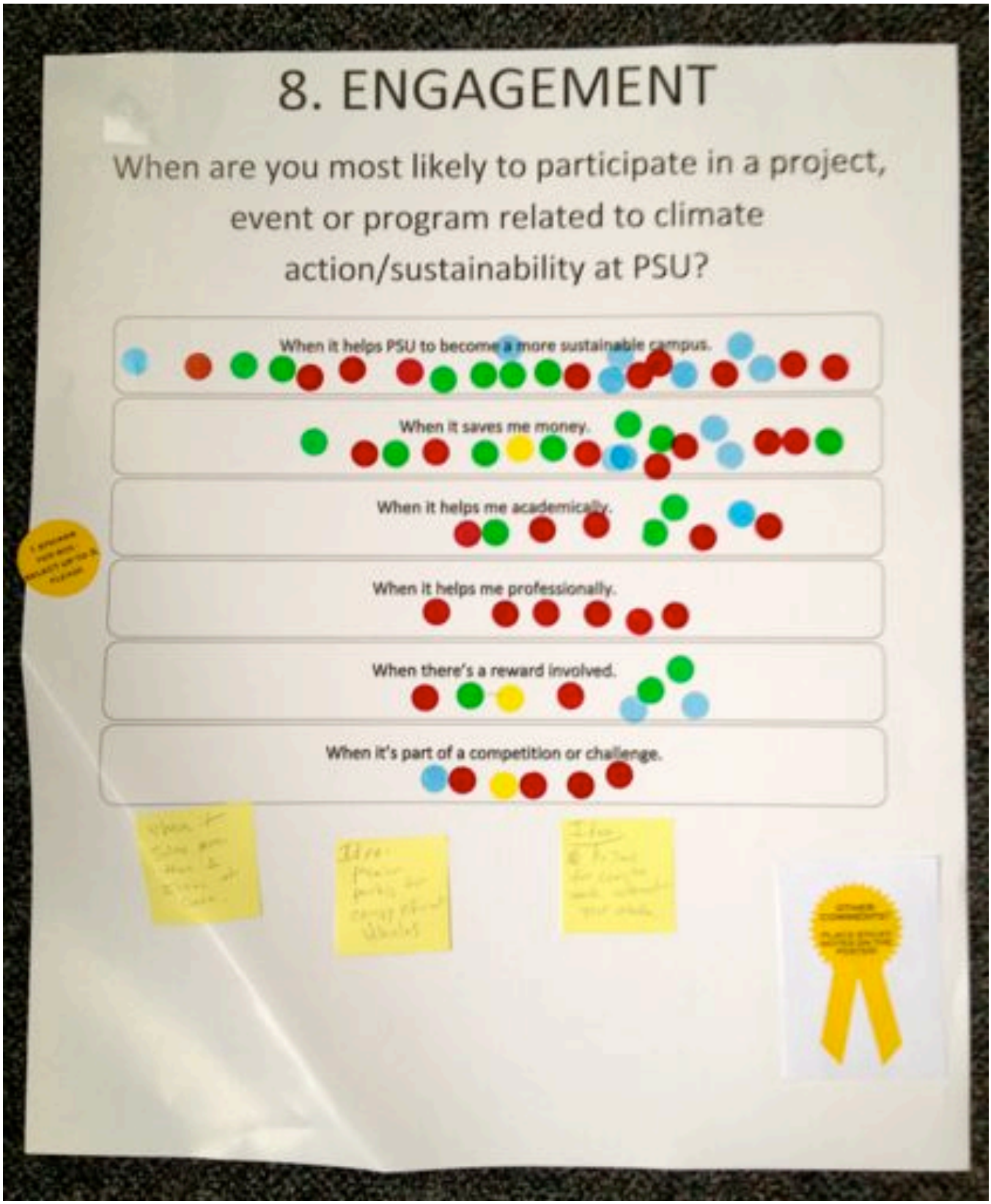

2. ENERGY
You are offered discounted (at least 50%) CFLs/LEDs to use in your office/dorm.
How much do you like this idea?
1
Not very much
How much energy would this practice save?
1
Not very much
Very much
How likely would you be to install and use discounted CFLs/LEDs in your office/dorm?
1
Not very likely

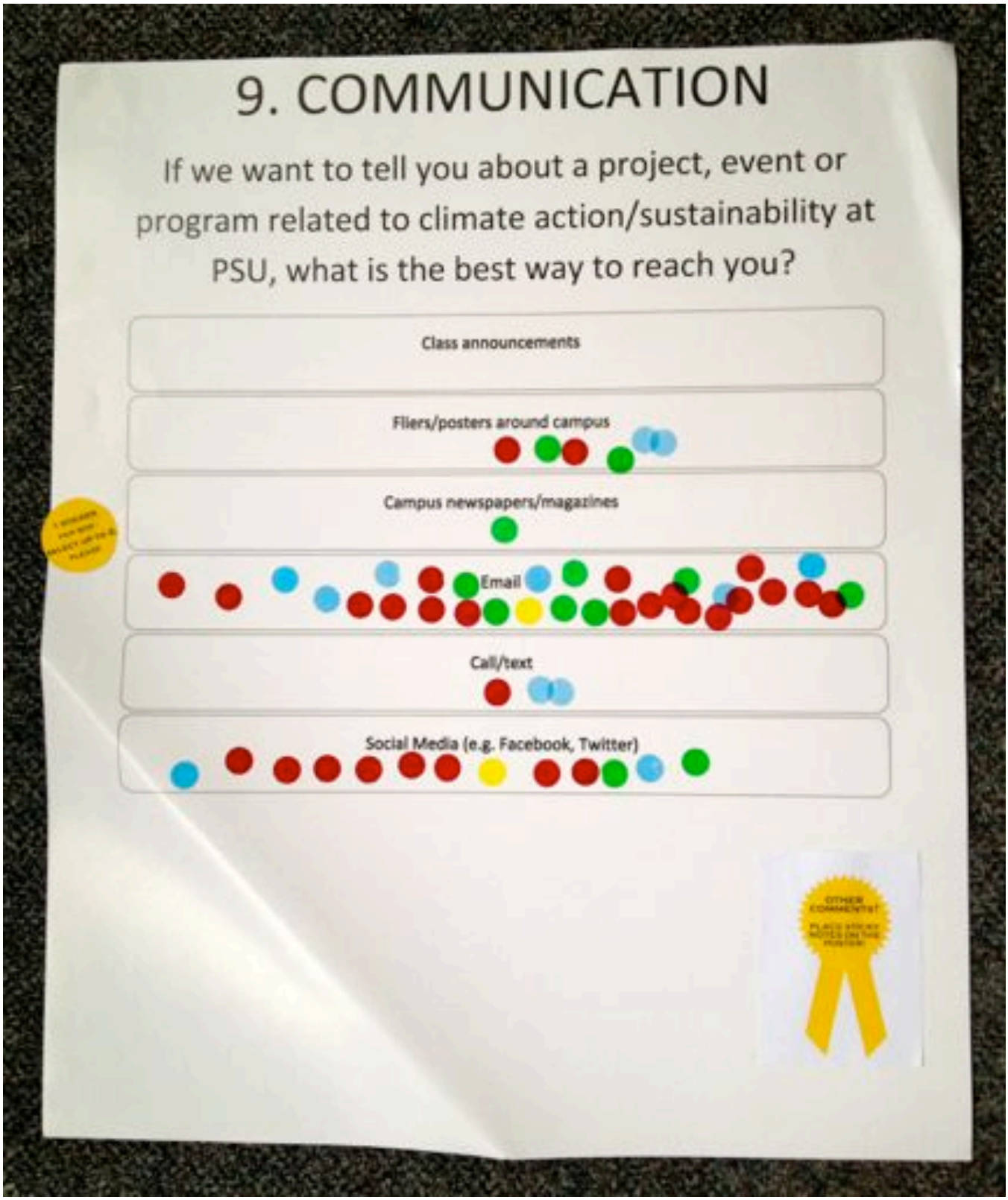

3. ENERGY
You are offered discounted (at least 50%) surge protectors/power strips to use in your office/dorm.
How much do you like this idea?
1
Not very much
How much energy would this practice save?
5
Not very much
Very much
How likely would you be to install and use discounted surge protectors/power strips in your office/dorm?
1
Not very likely

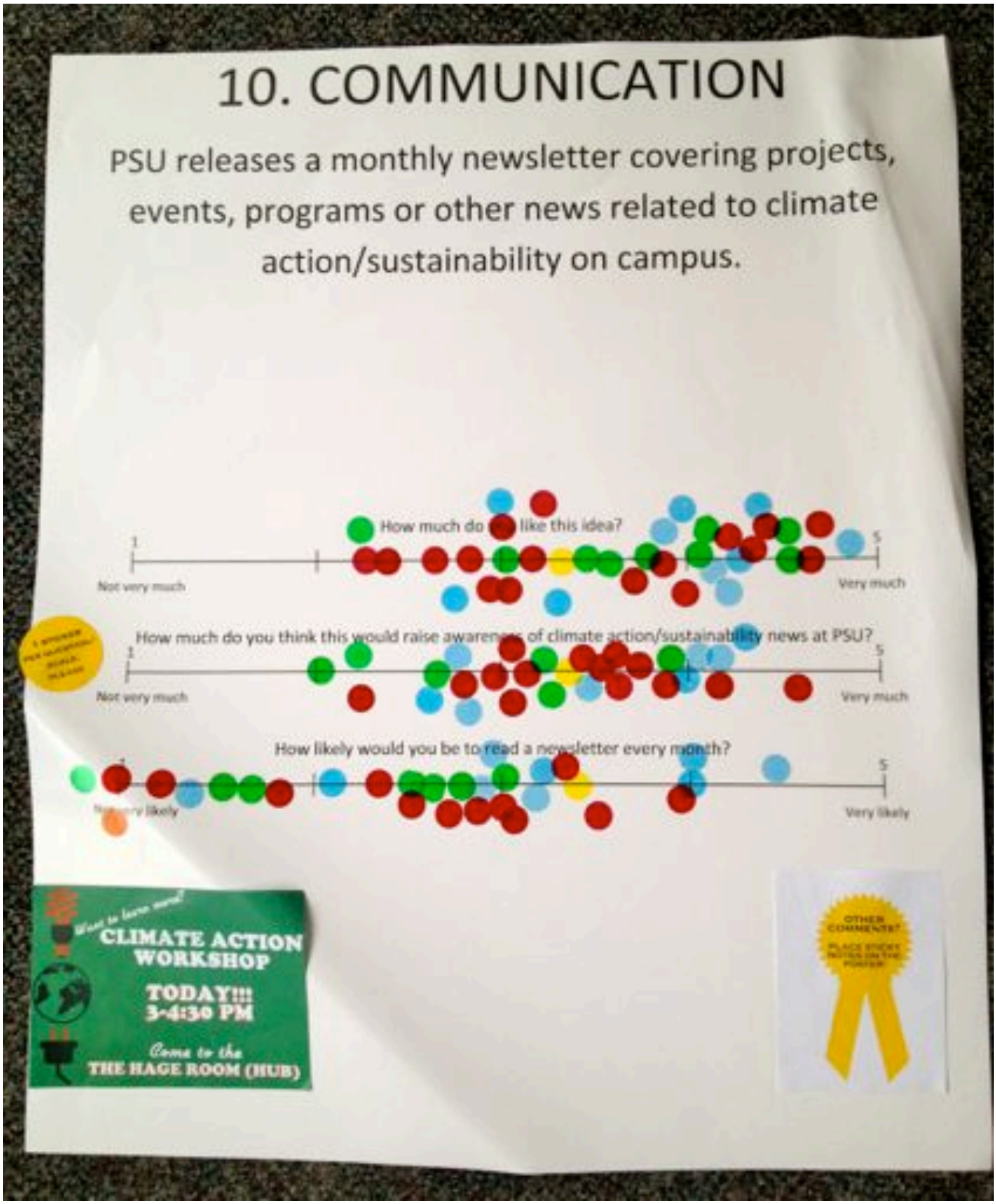

4. WASTE & RECYCLING
When you throw something away on campus that could be recycled, what do you think?
I don't know if it is recyclable or not.
The recycling bin is too far away.
I don't know where the recycling bin is.
It doesn't matter if I recycle it.


5. WASTE & RECYCLING
PSU provides electronic course materials.
How much do you like the idea of using electronic course materials?
Not very much
Very much
How much waste do you think could be averted be using electronic course materials?
Not very much
How likely would you be to use electronic course materials instead of printed materials?
Very likely


7. ENGAGEMENT
A yearlong internship program for which students receive credit to learn about sustainability as well as design and implement a project on campus that makes PSU more sustainable.
How much do you like this idea?
1
5
Not very much
How likely would you be to participate (as a student or supporting staff/faculty)?
1
5
Not very likely
Very likely
OTHER COMMENTS?
PLACE STICKY NOTES ON THE POSTER!


8. ENGAGEMENT
When are you most likely to participate in a project, event or program related to climate action/sustainability at PSU?
When it helps PSU to become a more sustainable campus.
When it saves me money.
When it helps me academically.
When it helps me professionally.
When there's a reward involved.
When it's part of a competition or challenge.


9. COMMUNICATION
If we want to tell you about a project, event or program related to climate action/sustainability at PSU, what is the best way to reach you?
Class announcements
Fliers/posters around campus
Campus newspapers/magazines
Email
Call/text
Social Media (e.g. Facebook, Twitter)


10. COMMUNICATION
PSU releases a monthly newsletter covering projects, events, programs or other news related to climate action/sustainability on campus.
How much do you like this idea?
1
5
Not very much
Very much
How much do you think this would raise awareness of climate action/sustainability news at PSU?
1
5
Not very much
Very much
How likely would you be to read a newsletter every month?
5
Very likely
Want to learn more?
CLIMATE ACTION WORKSHOP
TODAY!!!
3-4:30 PM
Come to the
THE HAGE ROOM (HUB)
OTHER COMMENTS?

# PLYMOUTH STATE UNIVERISTY FACILITATED SESSION REPORT

Wednesday, March 6, 2013 3:00 pm-4:30 pm Hage Room (Hartman Union Building)

## Facilitated Session Summary

**Introduction to the Session:** In collaboration with select stakeholders from Plymouth State University (PSU) and as a part of the larger master planning process, GreenerU hosted a workshop on Wednesday, March 6th in order to collect input from the PSU public on barriers to and opportunities for climate action/campus sustainability in the areas of energy, waste and recycling, and engagement. To facilitate this discussion, the larger group was divided into 4 smaller discussion groups of 5-6 and sent to 1 of 4 tables where a table anchor/moderator was assigned. In round 1, each of the 4 groups was given 15 minutes to discuss barriers to (5 minutes) and opportunities for (10 minutes) energy conservation at PSU while their respective table moderators both guided and took notes on the conversation. Participants were then asked to transition to a new table before entering into round 2, wherein they discussed barriers to and opportunities for reducing the waste stream on campus. After a final transition, groups entered into round 3 to discuss barriers to and opportunities for engagement in climate action/campus sustainability. Moderators were given note-taking sheets to help structure their records. At the end of the session, all participants were entered into a raffle to win a solar messenger bag. A total of 25 participants joined the 90-minute workshop.

**Results:** During the session, participants identified a number of barriers to energy conservation at PSU. Broadly summarized, these included infrastructural barriers (such as old, inefficient buildings), resource barriers (high initial costs, lack of human resources and time), and educational or informational barriers (training new fresh-men, overcoming ignorance of energy sources and impacts). Conversely, opp-ortunities that participants identified included infrastructural improvements (e.g. conversion to biomass), potential re-sources (such as a student "green fee"), expanded educational/training programs (with RAs, CAs, and RDs), and targeted signage (in each room). For waste and recycling, participants stressed ignorance about what to recycle and limited signage, among other barriers, while identifying opportunities including expanded educational programs, improved signage, and electronic course materials/assignment submission. In terms of engagement, participants touched on barriers such as too few resources dedicated to sustainability, limited opportunities for graduate engagement, a lack of interdisciplinary engagement and promotion around sustainability. However, they also identified

*Above: Participants work around tables in smaller groups to generate ideas based on topics and questions for each round.*

opportunities such as partnering courses with sustainability events or other initiatives and increasing coverage of climate action/sustainability in campus media (such as the Stall Saint Journal, The Clock).

**Next Steps:** This report recommends using the opportunities briefly summarized above and the many others listed in the following pages to continue the conversation around sustainability beyond the March 6th session. Allowing participants from the session, as well as from the greater PSU campus, to rank and prioritize the large list of opportunities generated is recommended as a next step.

**Below: "World Cloud" generated from the session**


## Round 1: Energy

**Talking points:** In round 1, participants were given the first 5 minutes to list key barriers to reducing energy use at PSU. In the following 10 minutes of the round, participants were asked to list ways to address these barriers to reducing energy use at PSU (i.e. opportunities for energy conservation).

**Results:** The barriers and opportunities that were generated at all 4 tables during round 1 have been consolidated, refined, and organized below.[1]

[1] For the purposes of this report, the notes that were collected from the table moderators have been amended. If you are interested in seeing a direct transcription of moderator notes, please contact Gretchen.e@greeneru.com.

## Barriers

- Lack of consideration of long-term costs
- High costs
- Capital financing
- Lack of human resources/time
- Lack of passion/motivation
- Fear of change
- Open windows and fan use in dorms
- Broken equipment
- Old, inefficient buildings
- Lack of motion-sensors for lights (especially in older dorms)
- No individual control of heat in dorms
- Consistency across buildings
- Training new freshmen
- Ignorance regarding where energy comes from or the importance of conservation

## Opportunities

- Develop short- and long-term plans
- Expand the number of sustainability staff/sustainability fellows
- Student "green fee" to fund pilots and experiments
- Apply for targeted grants for sustainability projects
- Dress appropriately for the season
- Install timers on lights
- Install motion-sensors on lights
- Upgrade to energy-efficient lighting (i.e. LEDs)
- Replace/retrofit older structures
- Provide power strips to each room
- Convert to biomass
- Install solar panels
- Better market campus energy conservation/green initiatives
- Design/implement an energy conservation/sustainability orientation (or include as a component of orientation/initial training)
- Engage surrounding towns and schools in energy conservation efforts
- Place flyers or stickers in each room reminding occupants to unplug or turn off appliances
- Teach occupants about heating/cooling systems
- Continue/expand educational contests (e.g. Do it in the Dark)
- Expand social media covering environmental activities at PSU
- Develop educational/outreach programs that emphasize monetary savings/pay backs from energy conservation measures
- Provide targeted sustainability training to RAs, CAs and RDs
- Host more forums for people to share ideas
- Encourage carpooling
- Raise on and off-campus parking prices to discourage single-occupancy vehicles

## Round 2: Waste & Recycling

**Talking points:** In round 2, participants were given the first 5 minutes to list key barriers to reducing the waste stream at PSU. In the following 10 minutes of the round, participants were asked to list ways to address these barriers to reducing the waste stream at PSU (i.e. opportunities for waste diversion/reduction).

**Results:** The barriers and opportunities that were generated at all 4 tables during round 2 have been consolidated, refined, and organized below.[2]

### Barriers

- Large amount of waste generated
- Faculty's expectations for assignments (e.g. hard copies, double spaced, single-sided, 1-inch margins)
- Apathy
- Lack of composting/compost facilities on campus
- Not all landlords have recycling
- Many buildings don't have filtered water options
- Ignorance of what/when to recycle
- Ignorance of where waste/recycling goes
- Limited signage
- Signage isn't working
- No long-term understanding of waste impacts
- Bin openings do not allow for all the right items to fit where they belong
- Contamination of recycling
- Printers not set for double-sided printing
- Cleaning staff not recycling

### Opportunities

- Shift the social norm around waste generation/disposal
- Increase the number of competitions related to waste and recycling
- Implement dorm-controlled (limited) trash bag distribution
- Change faculty expectations/policies around submitting assignments
- Provide electronic course materials
- Allow electronic assignment submission
- Offer "sustainability credits" or require hours for sustainability efforts
- Adopt a point system for food waste within the meal plan options
- Add composting bins
- Use compost in community gardens
- Add more, clarified signage around waste/recycling/compost
- Emphasize reuse or using less in educational programs
- Use European standardized symbols for recycling in signage
- Use pictures instead of words on signage for waste/recycling/compost

[2] For the purposes of this report, the notes that were collected from the table moderators have been amended. If you are interested in seeing a direct transcription of moderator notes, please contact Gretchen.e@greeneru.com.

- Color coordinate waste/recycling/compost bins where possible
- Report/disseminate information on how much money recycling saves/generates for PSU
- Develop/hand out "What to recycle" magnets
- Encourage use of reusable rags/towels
- Connect with local farms/gardens re. compost/food waste
- Implement "Pay as you throw" systems for waste
- Grade products in terms of their waste/recycling impact
- Add water refill stations around campus
- Host clothing (or other goods) swaps
- More strategic placement of recycling receptacles

## Round 3: Engagement

**Talking points:** In round 3, participants were given the first 5 minutes to list key barriers to faculty, staff, and student engagement in sustainability at PSU. In the following 10 minutes of the round, participants were asked to list ways to address the barriers to faculty, staff, and student engagement in sustainability at PSU (i.e. opportunities for engagement).

Engagement here was clarified to include curricular programs (e.g. Campus living laboratory, applied learning/service learning opportunities), co-curricular activities (e.g. eco-rep programs, peer-to-peer education), and communication/outreach

**Results:** The barriers and opportunities that were generated at all 4 tables during round 3 have been consolidated, refined, and organized below.[3]

### Barriers

- General lack of student engagement
- Apathy
- Lack of awareness
- Lack of interdisciplinary engagement/opportunities in sustainability/climate action programming
- Lack of sustainability-related internships
- Poor town-gown relations around sustainability
- Lack of promotion around sustainability lectures
- Not enough resources dedicated to sustainability efforts
- No structures for engagement at the graduate level
- Lack of opportunities for students that are not *already* interested/environmentally conscious
- Staff/faculty/student time limits
- No incentives for faculty to integrate sustainability into the curriculum

### Opportunities

- Partner courses/classrooms with sustainability events or other initiatives
- Access new/incoming students early on

[3] For the purposes of this report, the notes that were collected from the table moderators have been amended. If you are interested in seeing a direct transcription of moderator notes, please contact Gretchen.e@greeneru.com.

- Increase coverage of sustainability in *The Clock*
- Increasing CA and RA involvement with sustainability initiatives
- Increase fundraisers for/fun evens promoting student involvement in sustainable practices
- Increase coverage of sustainability in the Stall Saint Journal
- Release monthly newsletters that track/rank campus consumption
- Revamp the sustainability website
- Increase/expand events like "Do it in the Dark" and "Recyclemania"
- Designate sustainability ambassadors for each department
- Create more local and sustainability-related internships/workshops (i.e. at D'Acres)
- Establish a community service requirement for students
- Offer environmental service-learning opportunities for credit
- Increase the visibility of sustainability-related lectures and make them more interactive
- Personalize information to target individual practices/impacts
- Draw a connection between sustainability savings and lower tuition/food costs for students

## Next Steps

While facilitated discussions like the one summarized in this report can promote immediate (albeit limited) information, campus engagement, awareness and buy-in, GreenerU recommends "continuing the conversation" and identifying practical, implementable actions as a next step. A useful exercise for sustainability stakeholders at PSU might include the following:

1. Using the "opportunities" lists (included above) generated from the session, narrow the list by eliminating opportunities that are already in operation.
2. Create "action items" for identified opportunities that are not clearly defined/implementable – i.e. clarify *what could be done* for each identified opportunity.
3. Distribute action items/opportunities to workshop participants (and/or the rest of campus) and ask them to rank each based on a predetermined set of criteria (Survey Monkey can be used for these purposes).
    a. E.g. Have participants rank "using pictures instead of words on signage for waste/recycling/compost" based on the following scales:
        i. Preference: How much do you like this idea? (Please rank on a scale from 1, "not very much," to 5, "very much")
        ii. Cost: How expensive do you think this would be? (Please rank on a scale from 1, "very expensive," to 5, "very inexpensive")
        iii. Time: How much (staff) time do you think this idea would take to implement? (Please rank on a scale from 1, "very much," to 5, "not very much")
        iv. Impact: How much do you think this would increase recycling? (Please rank on a scale from 1, "not very much," to 5, "very much")
4. Total the rankings (using the scales above, higher numbers are "better") and use the results to help support, prioritize, and/or determine next steps.

## Appendix 1: Attendees

| Name | Email |
|---|---|
| Alex Herbst | arherbst@plymouth.edu |
| Amanda Hollenbech | alhollenbech@plymouth.edu |
| Angel Ekstrom | aekstrom@plymouth.edu |
| Ann-Marie Keeney | akeeney@plymouth.edu |
| Brandon Lehman | blehman@plymouth.edu |
| Brandon Pierre | btpierre@plymouth.edu |
| Catherine Amidon | camidon@plymouth.edu |
| Chester Trundy | cmtrundy@plymouth.edu |
| Chris Mongeon | cmongeon@plymouth.edu |
| Christina Schaefer | caschaefer@plymouth.edu |
| Elizabeth Kelly | eakelly1@plymouth.edu |
| Janelle Emerson | jeemerson@plymouth.edu |
| Kate Donahue | kdonahue@plymouth.edu |
| Kellie Walsh | kcwalsh@plymouth.edu |
| Kent Dunlevy | kjdunlevy@plymouth.edu |
| Matt Bartley | mbartley@plymouth.edu |
| Matt Lancto | mclancto@plymouth.edu |
| Ryan Parkes | rbparkes@plymouth.edu |
| Sam Durfee | scdurfee@plymouth.edu |
| Sara Patterson | spatterson3@plymouth.edu |
| Sean Carney | spcarney@plymouth.edu |
| Steve Taksar | sjtaksar@mail.plymouth.edu |
| Steve Whitman | swwhitman@plymouth.edu |
| Thaddeus Guldbrandsen | tcguldbrandsen@plymouth.edu |
| Tyler Booth | tpbooth@plymouth.edu |

# PLYMOUTH STATE UNIVERISTY
# SUMMARY OF THE "RANKING IDEAS & ACTIONS FOR CAMPUS SUSTAINABILITY" SURVEY RESULTS

Survey respondents (those who participated in the public facilitated session on March 6th) were asked to "rank each idea below based on 5 components. One (1) is the least desirable, while five (5) is the most desirable." Their responses are summarized below (numbers are by percent).

| IDEA | | How much do you like this? | How much will this cost? | How quickly could this be implemented? | How much will this increase campus sustainability? | How likely would you be to participate in this? |
|---|---|---|---|---|---|---|
| **Student "green fee" to fund campus sustainability** | 1 | 36.4 | 12.5 | 12.5 | 42.9 | 28.6 |
| | 2 | 9.1 | 12.5 | 0 | 9 | 14.3 |
| | 3 | 9.1 | 12.5 | 37.5 | 9 | 0 |
| | 4 | 0 | 25 | 0 | 28.6 | 28.6 |
| | 5 | 45.4 | 37.7 | 50 | 28.6 | 28.6 |
| **Timers and/or occupancy sensors for all lights** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 16.7 | 14.2 | 14.3 | 0 |
| | 3 | 0 | 33.3 | 0 | 42.9 | 14.3 |
| | 4 | 9.1 | 33.3 | 42.9 | 14.3 | 14.3 |
| | 5 | 90.9 | 16.7 | 42.9 | 28.6 | 71.4 |
| **Energy-efficient upgrades for all lights** | 1 | 0 | 16.7 | 14.3 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 | 14.3 |
| | 3 | 0 | 33.3 | 28.6 | 37.5 | 0 |
| | 4 | 9.1 | 50 | 14.3 | 12.5 | 0 |
| | 5 | 90.9 | 0 | 42.9 | 50 | 85.7 |
| **Replaced/retrofitted older structures** | 1 | 0 | 100 | 85.7 | 0 | 33.3 |
| | 2 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 20 | 0 | 14.3 | 28.6 | 0 |
| | 4 | 20 | 0 | 0 | 14.3 | 0 |
| | 5 | 60 | 0 | 0 | 57.1 | 66.7 |
| **Smart power strips in offices/dorms** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 12.5 | 12.5 |
| | 3 | 9.1 | 14.3 | 14.3 | 25 | 0 |
| | 4 | 9.1 | 28.6 | 14.3 | 25 | 12.5 |
| | 5 | 81.8 | 57.1 | 71.4 | 37.5 | 75 |
| **Central plant converted** | 1 | 11.1 | 57.1 | 14.3 | 0 | 50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **to biomass** | 2 | 0 | 14.3 | 42.9 | 0 | 0 |
| | 3 | 11.1 | 14.3 | 14.3 | 0 | 0 |
| | 4 | 11.1 | 0 | 28.6 | 16.7 | 16.7 |
| | 5 | 66.7 | 14.3 | 0 | 83.3 | 33.3 |
| **Solar panels on campus** | 1 | 0 | 50 | 16.7 | 0 | 0 |
| | 2 | 0 | 50 | 0 | 0 | 0 |
| | 3 | 9.1 | 0 | 50 | 14.3 | 28.6 |
| | 4 | 9.1 | 0 | 16.7 | 0 | 0 |
| | 5 | 81.8 | 0 | 16.7 | 85.7 | 71.4 |
| **Sustainability orientation/training for employees and students** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 12.5 | 12.5 | 12.5 |
| | 3 | 9.1 | 0 | 12.5 | 12.5 | 0 |
| | 4 | 18.2 | 25 | 0 | 25 | 12.5 |
| | 5 | 72.7 | 75 | 75 | 50 | 75 |
| **Flyers/stickers in each room to remind users to turn off lights and devices** | 1 | 0 | 0 | 0 | 14.3 | 0 |
| | 2 | 0 | 0 | 0 | 14.3 | 0 |
| | 3 | 18.2 | 0 | 0 | 42.9 | 0 |
| | 4 | 18.2 | 14.3 | 0 | 0 | 14.3 |
| | 5 | 63.6 | 85.7 | 100 | 28.6 | 85.7 |
| **Expanded social media covering sustainability** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 33.3 | 16.7 |
| | 3 | 30 | 14.3 | 28.6 | 33.3 | 0 |
| | 4 | 20 | 0 | 14.3 | 0 | 16.7 |
| | 5 | 50 | 85.7 | 57.1 | 33.3 | 66.7 |
| **Sustainability training for RAs, CAs, and RDs** | 1 | 0 | 0 | 0 | 0 | 42.9 |
| | 2 | 0 | 0 | 12.5 | 0 | 0 |
| | 3 | 0 | 0 | 12.5 | 42.9 | 0 |
| | 4 | 10 | 37.5 | 0 | 14.3 | 14.3 |
| | 5 | 90 | 62.5 | 75 | 42.9 | 42.9 |
| **More hired sustainability staff/interns** | 1 | 0 | 0 | 0 | 0 | 12.5 |
| | 2 | 0 | 28.6 | 0 | 14.3 | 0 |
| | 3 | 18.2 | 57.1 | 28.6 | 28.6 | 25 |
| | 4 | 9.1 | 14.3 | 14.3 | 14.3 | 0 |
| | 5 | 72.7 | 0 | 57.1 | 42.9 | 62.5 |
| **Regular forums for idea-sharing** | 1 | 10 | 0 | 0 | 16.7 | 0 |
| | 2 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 20 | 28.6 | 42.9 | 33.3 | 0 |
| | 4 | 10 | 14.3 | 0 | 0 | 0 |
| | 5 | 60 | 57.1 | 57.1 | 50 | 100 |
| **Higher parking fees for** | 1 | 40 | 0 | 16.7 | 50 | 42.9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **single-occupancy vehicles** | 2 | 20 | 0 | 0 | 33.3 | 14.3 |
| | 3 | 40 | 50 | 16.7 | 0 | 42.9 |
| | 4 | 0 | 16.7 | 50 | 16.7 | 0 |
| | 5 | 0 | 33.3 | 16.7 | 0 | 0 |
| **Electronic course materials** | 1 | 0 | 0 | 16.7 | 16.7 | 14.3 |
| | 2 | 0 | 16.7 | 0 | 0 | 0 |
| | 3 | 20 | 16.7 | 33.3 | 16.7 | 0 |
| | 4 | 10 | 0 | 0 | 0 | 0 |
| | 5 | 70 | 66.7 | 50 | 66.7 | 85.7 |
| **Electronic assignment submission** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 14.3 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 28.6 | 16.7 | 0 |
| | 4 | 10 | 0 | 0 | 0 | 0 |
| | 5 | 90 | 85 | 71.4 | 66.7 | 100 |
| **Instructive pictures on all waste, recycling, and compost signs** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 33.3 | 0 |
| | 3 | 30 | 0 | 16.7 | 0 | 16.7 |
| | 4 | 10 | 33.3 | 16.7 | 16.7 | 0 |
| | 5 | 60 | 66.7 | 66.7 | 50 | 83.3 |
| **Free "What to recycle" magnets** | 1 | 10 | 0 | 0 | 16.7 | 0 |
| | 2 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 20 | 33.3 | 16.7 | 33.3 | 16.7 |
| | 4 | 10 | 16.7 | 16.7 | 0 | 0 |
| | 5 | 60 | 50 | 66.7 | 50 | 83.3 |
| **"Pay as you throw" systems for waste** | 1 | 40 | 0 | 40 | 40 | 25 |
| | 2 | 10 | 40 | 0 | 0 | 25 |
| | 3 | 30 | 40 | 60 | 60 | 25 |
| | 4 | 10 | 20 | 0 | 0 | 0 |
| | 5 | 10 | 0 | 0 | 0 | 25 |
| **Additional water refill stations on campus** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 28.6 | 14.3 | 0 | 14.3 |
| | 3 | 0 | 57.1 | 14.3 | 14.3 | 14.3 |
| | 4 | 18.2 | 0 | 57.1 | 42.9 | 14.3 |
| | 5 | 81.8 | 14.3 | 14.3 | 42.9 | 57.1 |
| **Used clothing/goods swaps** | 1 | 0 | 0 | 0 | 16.7 | 0 |
| | 2 | 0 | 0 | 0 | 16.7 | 16.7 |
| | 3 | 20 | 16.7 | 33.3 | 16.7 | 16.7 |
| | 4 | 20 | 33.3 | 0 | 16.7 | 0 |
| | 5 | 60 | 50 | 66.7 | 33.3 | 66.7 |
| **Increased sustainability** | 1 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **coverage in The Clock** | 2 | 0 | 0 | 12.5 | 28.6 | 0 |
| | 3 | 0 | 0 | 12.5 | 14.3 | 28.6 |
| | 4 | 30 | 12.5 | 12.5 | 57.1 | 14.3 |
| | 5 | 70 | 87.5 | 62.5 | 0 | 57.1 |
| **Increased sustainability coverage in the Stall Street Journal** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 14.3 | 0 |
| | 3 | 0 | 0 | 12.5 | 28.6 | 28.6 |
| | 4 | 18.2 | 0 | 12.5 | 57.1 | 14.3 |
| | 5 | 81.8 | 100 | 75 | 0 | 57.1 |
| **Expanded sustainability events/competitions (e.g. "Recyclemania," "Do it in the dark")** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 18.2 | 37.5 | 25 | 37.5 | 28.6 |
| | 4 | 18.2 | 0 | 37.5 | 37.5 | 14.3 |
| | 5 | 63.6 | 62.5 | 37.5 | 25 | 57.1 |
| **Revamped campus sustainability website** | 1 | 0 | 0 | 0 | 0 | 16.7 |
| | 2 | 0 | 0 | 0 | 50 | 16.7 |
| | 3 | 50 | 0 | 28.6 | 16.7 | 0 |
| | 4 | 0 | 28.6 | 28.6 | 0 | 0 |
| | 5 | 50 | 71.4 | 42.9 | 33.3 | 66.7 |
| **Sustainability ambassadors for each department** | 1 | 0 | 0 | 0 | 0 | 14.3 |
| | 2 | 9.1 | 14.3 | 14.3 | 0 | 0 |
| | 3 | 27.3 | 57.1 | 57.1 | 42.9 | 28.6 |
| | 4 | 9.1 | 0 | 0 | 28.6 | 14.3 |
| | 5 | 54.5 | 28.6 | 28.6 | 28.6 | 42.9 |
| **Increased visibility of sustainability-related lectures** | 1 | 10 | 0 | 0 | 0 | 0 |
| | 2 | 10 | 0 | 0 | 20 | 0 |
| | 3 | 0 | 40 | 20 | 60 | 20 |
| | 4 | 20 | 20 | 20 | 0 | 20 |
| | 5 | 60 | 40 | 60 | 20 | 60 |
| **Personalized information to target individual practices/impacts** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 10 | 0 | 0 | 33.3 | 0 |
| | 3 | 10 | 33.3 | 50 | 0 | 16.7 |
| | 4 | 30 | 33.3 | 16.7 | 16.7 | 33.3 |
| | 5 | 50 | 33.3 | 33.3 | 50 | 50 |
| **More sustainability-related internships/workshops** | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 14.2 | 0 | 0 | 0 |
| | 3 | 18.2 | 57.1 | 42.9 | 28.6 | 25 |
| | 4 | 27.3 | 0 | 28.6 | 57.1 | 37.5 |
| | 5 | 54.5 | 28.6 | 28.6 | 14.3 | 37.5 |

# PLYMOUTH STATE UNIVERISTY
# SUMMARY OF 2013 CAMPUS SURVEY RESULTS

### Number of Respondents:
147

### Self-Reported position at PSU:
**Graduate Students**: 14
**Undergraduate Students**: 87
**Adjunct Faculty**: 4
**Full-time Faculty**: 9
**Staff**: 20
**Not reported**: 13

### Self-Reported length of study at PSU:
**Less than 1 year**: 39
**1-2 years**: 27
**2+-3 years**: 17
**3+-4 years**: 16
**More than 4 years**: 4

### Self-Reported year of graduation:
**2013**: 16
**2014**: 32
**2015**: 28
**2016**: 24
**2018**: 2

### Self-Reported length of work at PSU:
**Less than 1 year**: 4
**1-3 years**: 4
**4-10 years**: 11
**10-20 years**: 7
**More than 20 years**: 5

### Self-Reported living location:
**On campus:** 64
**Off campus:** 69

1. When asked, "**How important are the following in your life?**" PSU respondents revealed that…

| Social Life | Frequency | Percent |
|---|---|---|
| Not at all important | 2 | 1.4 |
| Somewhat unimportant | 14 | 9.5 |
| **Somewhat important** | **68** | **46.3** |
| Very important | 63 | 42.9 |
| Total | 147 | 100.0 |

| Athletics | Frequency | Percent |
|---|---|---|
| Not at all important | 26 | 17.7 |
| Somewhat unimportant | 38 | 25.9 |
| **Somewhat important** | **57** | **38.8** |
| Very important | 26 | 17.7 |
| Total | 147 | 100.0 |

| Outdoor Recreation | Frequency | Percent |
|---|---|---|
| Not at all important | 7 | 4.8 |
| Somewhat unimportant | 15 | 10.2 |
| **Somewhat important** | **68** | **46.3** |
| Very important | 57 | 38.8 |
| Total | 147 | 100.0 |

| Academics | Frequency | Percent |
|---|---|---|
| Not at all important | 2 | 1.4 |
| Somewhat unimportant | 1 | .7 |
| Somewhat important | 22 | 15.0 |
| **Very important** | **122** | **83.0** |
| Total | 147 | 100.0 |

| Social Justice, Gender or Race Issues | Frequency | Percent |
|---|---|---|
| Not at all important | 7 | 4.8 |
| Somewhat unimportant | 20 | 13.6 |
| **Somewhat important** | **66** | **44.9** |
| Very important | 54 | 36.7 |
| Total | 147 | 100.0 |

| Animal Rights | Frequency | Percent |
|---|---|---|
| Not at all important | 7 | 4.8 |
| Somewhat unimportant | 22 | 15.0 |
| **Somewhat important** | **68** | **46.3** |
| Very important | 50 | 34.0 |
| Total | 147 | 100.0 |

| Student Government | Frequency | Percent |
|---|---|---|
| Not at all important | 22 | 15.0 |
| Somewhat unimportant | 49 | 33.3 |
| **Somewhat important** | **66** | **44.9** |
| Very important | 10 | 6.8 |
| Total | 147 | 100.0 |

| Volunteering/Community Work | Frequency | Percent |
|---|---|---|
| Not at all important | 3 | 2.0 |
| Somewhat unimportant | 23 | 15.6 |
| **Somewhat important** | **84** | **57.1** |
| Very important | 37 | 25.2 |

| | | |
|---|---|---|
| Total | 147 | 100.0 |

| Leadership Opportunities | Frequency | Percent |
|---|---|---|
| Not at all important | 5 | 3.4 |
| Somewhat unimportant | 30 | 20.4 |
| **Somewhat important** | **76** | **51.7** |
| Very important | 36 | 24.5 |
| Total | 147 | 100.0 |

| Sustainability | Frequency | Percent |
|---|---|---|
| Not at all important | 4 | 2.7 |
| Somewhat unimportant | 18 | 12.2 |
| Somewhat important | 52 | 35.4 |
| **Very important** | **73** | **49.7** |
| Total | 147 | 100.0 |

| Working/Getting a Job | Frequency | Percent |
|---|---|---|
| Not at all important | 0 | 0 |
| Somewhat unimportant | 7 | 4.8 |
| Somewhat important | 25 | 17.0 |
| **Very important** | **115** | **78.2** |
| Total | 147 | 100.0 |

| Conserving Resources | Frequency | Percent |
|---|---|---|
| Not at all important | 2 | 1.4 |
| Somewhat unimportant | 20 | 13.6 |
| Somewhat important | 52 | 35.4 |
| **Very important** | **73** | **49.7** |
| Total | 147 | 100.0 |

| Networking Opportunities | Frequency | Percent |
|---|---|---|
| Not at all important | 4 | 2.7 |
| Somewhat unimportant | 30 | 20.4 |
| **Somewhat important** | **61** | **41.5** |
| Very important | 52 | 35.4 |
| Total | 147 | 100.0 |

| Religion | Frequency | Percent |
|---|---|---|
| Not at all important | 38 | 25.9 |
| **Somewhat unimportant** | **50** | **34.0** |

| | | |
|---|---|---|
| Somewhat important | 40 | 27.2 |
| Very important | 19 | 12.9 |
| Total | 147 | 100.0 |

| Relationships | Frequency | Percent |
|---|---|---|
| Not at all important | 2 | 1.4 |
| Somewhat unimportant | 11 | 7.5 |
| Somewhat important | 54 | 36.7 |
| **Very important** | **80** | **54.4** |
| Total | 147 | 100.0 |

| The Environment | Frequency | Percent |
|---|---|---|
| Not at all important | 3 | 2.0 |
| Somewhat unimportant | 10 | 6.8 |
| Somewhat important | 46 | 31.3 |
| **Very important** | **88** | **59.9** |
| Total | 147 | 100.0 |

| Television/Movies | Frequency | Percent |
|---|---|---|
| Not at all important | 25 | 17.0 |
| Somewhat unimportant | 41 | 27.9 |
| **Somewhat important** | **68** | **46.3** |
| Very important | 13 | 8.8 |
| Total | 147 | 100.0 |

| Video Games | Frequency | Percent |
|---|---|---|
| **Not at all important** | **79** | **53.7** |
| Somewhat unimportant | 37 | 25.2 |
| Somewhat important | 26 | 17.7 |
| Very important | 5 | 3.4 |
| Total | 147 | 100.0 |

| The Internet | Frequency | Percent |
|---|---|---|
| Not at all important | 5 | 3.4 |
| Somewhat unimportant | 17 | 11.6 |
| **Somewhat important** | **70** | **47.6** |
| Very important | 55 | 37.4 |
| Total | 147 | 100.0 |

| The Economy | Frequency | Percent |
|---|---|---|
| Not at all important | 2 | 1.4 |
| Somewhat unimportant | 15 | 10.2 |
| **Somewhat important** | **70** | **47.6** |
| Very important | 60 | 40.8 |
| Total | 147 | 100.0 |

| Extracurricular Activities | Frequency | Percent |
|---|---|---|
| Not at all important | 7 | 4.8 |
| Somewhat unimportant | 23 | 15.6 |
| **Somewhat important** | **87** | **59.2** |
| Very important | 30 | 20.4 |
| Total | 147 | 100.0 |

| Personal Comfort | Frequency | Percent |
|---|---|---|
| Not at all important | 1 | .7 |
| Somewhat unimportant | 9 | 6.1 |
| Somewhat important | 60 | 40.8 |
| **Very important** | **77** | **52.4** |
| Total | 147 | 100.0 |

| National Politics | Frequency | Percent |
|---|---|---|
| Not at all important | 11 | 7.5 |
| Somewhat unimportant | 46 | 31.3 |
| **Somewhat important** | **64** | **43.5** |
| Very important | 26 | 17.7 |
| Total | 147 | 100.0 |

| Climate Change | Frequency | Percent |
|---|---|---|
| Not at all important | 8 | 5.4 |
| Somewhat unimportant | 25 | 17.0 |
| **Somewhat important** | **66** | **44.9** |
| Very important | 48 | 32.7 |
| Total | 147 | 100.0 |

2. When asked about PSU, participants thought that **"PSU…"**

| Is in the NCAA Division III | Frequency | Percent |
|---|---|---|
| **True** | **83** | **56.5** |
| False | 15 | 10.2 |
| Don't Know | 49 | 33.3 |
| Total | 147 | 100.0 |

| Recycles all types of paper, plastic, bottles and cans | Frequency | Percent |
|---|---|---|
| **True** | **128** | **87.1** |
| False | 14 | 9.5 |
| Don't Know | 5 | 3.4 |
| Total | 147 | 100.0 |

| Is in the NCAA Division II | Frequency | Percent |
|---|---|---|
| True | 18 | 12.2 |
| **False** | **77** | **52.4** |
| Don't Know | 52 | 35.4 |
| Total | 147 | 100.0 |

| Has green and white as its school colors | Frequency | Percent |
|---|---|---|
| **True** | **142** | **96.6** |
| False | 4 | 2.7 |
| Don't Know | 1 | .7 |
| Total | 147 | 100.0 |

| Is committed to reducing or mitigating 100% of its greenhouse gas emissions by 2050 | Frequency | Percent |
|---|---|---|
| **True** | **84** | **57.1** |
| False | 4 | 2.7 |
| Don't Know | 59 | 40.1 |
| Total | 147 | 100.0 |

3. When asked, "**How much do you agree with the following statements?**" PSU respondents revealed that…

| I know who to contact if my room, office or building is too hot or cold. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 5 | 3.4 |
| Disagree | 24 | 16.3 |
| Neutral | 22 | 15.0 |
| **Agree** | **49** | **33.3** |
| Agree Strongly | 44 | 29.9 |
| Total | 144 | 98.0 |

| I can influence the amount of electricity that is used on campus. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 7 | 4.8 |
| Disagree | 10 | 6.8 |
| Neutral | 23 | 15.6 |
| **Agree** | **68** | **46.3** |
| Agree Strongly | 36 | 24.5 |
| Total | 144 | 98.0 |

| I turn lights off when they are not needed. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 1 | .7 |
| Disagree | 4 | 2.7 |
| Neutral | 10 | 6.8 |
| Agree | 51 | 34.7 |
| **Agree Strongly** | **78** | **53.1** |
| Total | 144 | 98.0 |

| I have control over the temperature in my room/office. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 22 | 15.0 |
| **Disagree** | **38** | **25.9** |
| Neutral | 30 | 20.4 |
| Agree | 34 | 23.1 |
| Agree Strongly | 20 | 13.6 |
| Total | 144 | 98.0 |

| My room/office/building is comfortable during the winter. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 5 | 3.4 |
| Disagree | 17 | 11.6 |
| Neutral | 42 | 28.6 |
| **Agree** | **60** | **40.8** |
| Agree Strongly | 20 | 13.6 |
| Total | 144 | 98.0 |

| I open the window when the heating is on. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 43 | 29.3 |
| **Disagree** | **45** | **30.6** |
| Neutral | 20 | 13.6 |
| Agree | 29 | 19.7 |
| Agree Strongly | 7 | 4.8 |
| Total | 144 | 98.0 |

| If my room is uncomfortable, I can contact Physical Plant and they will fix the issue in a timely manner. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 10 | 6.8 |
| Disagree | 15 | 10.2 |
| **Neutral** | **55** | **37.4** |
| Agree | 45 | 30.6 |
| Agree Strongly | 19 | 12.9 |
| Total | 144 | 98.0 |

| I wish I had more control over my heating and cooling. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 11 | 7.5 |
| Disagree | 9 | 6.1 |
| Neutral | 48 | 32.7 |
| **Agree** | **52** | **35.4** |
| Agree Strongly | 24 | 16.3 |
| Total | 144 | 98.0 |

| I feel that PSU cares about my comfort. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 2 | 1.4 |
| Disagree | 10 | 6.8 |
| Neutral | 39 | 26.5 |
| **Agree** | **72** | **49.0** |

| | | |
|---|---|---|
| Agree Strongly | 21 | 14.3 |
| Total | 144 | 98.0 |

4. When asked, "**How much do you agree with the following statements?"** PSU respondents revealed that…

| I know what/how to recycle on campus. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 0 | 0 |
| Disagree | 2 | 1.4 |
| Neutral | 8 | 5.4 |
| **Agree** | **73** | **49.7** |
| Agree Strongly | 59 | 40.1 |
| Total | 142 | 96.6 |

| I know where to look for information on recycling at PSU. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 1 | .7 |
| Disagree | 26 | 17.7 |
| Neutral | 37 | 25.2 |
| **Agree** | **47** | **32.0** |
| Agree Strongly | 31 | 21.1 |
| Total | 142 | 96.6 |

| PSU cares about recycling. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 1 | .7 |
| Disagree | 3 | 2.0 |
| Neutral | 8 | 5.4 |
| **Agree** | **74** | **50.3** |
| Agree Strongly | 56 | 38.1 |
| Total | 142 | 96.6 |

| PSU students care about recycling. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 3 | 2.0 |
| Disagree | 17 | 11.6 |
| Neutral | 46 | 31.3 |
| **Agree** | **66** | **44.9** |
| Agree Strongly | 10 | 6.8 |

| | | |
|---|---|---|
| Total | 142 | 96.6 |

| I care about producing less waste. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 0 | 0 |
| Disagree | 4 | 2.7 |
| Neutral | 16 | 10.9 |
| **Agree** | **68** | **46.3** |
| Agree Strongly | 54 | 36.7 |
| Total | 142 | 96.6 |

| I'd like to have access to more documents and class materials electronically. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 5 | 3.4 |
| Disagree | 12 | 8.2 |
| Neutral | 40 | 27.2 |
| **Agree** | **59** | **40.1** |
| Agree Strongly | 26 | 17.7 |
| Total | 142 | 96.6 |

| Having access to more electronic documents and class materials would reduce PSU's paper use. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 3 | 2.0 |
| Disagree | 7 | 4.8 |
| Neutral | 23 | 15.6 |
| **Agree** | **59** | **40.1** |
| Agree Strongly | 50 | 34.0 |
| Total | 142 | 96.6 |

| Reducing disposable bottle water use on campus is important for reducing waste. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 3 | 2.0 |
| Disagree | 3 | 2.0 |
| Neutral | 11 | 7.5 |
| Agree | 53 | 36.1 |
| **Agree Strongly** | **72** | **49.0** |
| Total | 142 | 96.6 |

| PSU faculty/staff care about recycling. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 1 | .7 |
| Disagree | 6 | 4.1 |

| | | |
|---|---|---|
| Neutral | 34 | 23.1 |
| **Agree** | **80** | **54.4** |
| Agree Strongly | 21 | 14.3 |
| Total | 142 | 96.6 |

| Double-side printing reduces costs and paper use. | Frequency | Percent |
|---|---|---|
| Disagree Strongly | 1 | .7 |
| Disagree | 3 | 2.0 |
| Neutral | 7 | 4.8 |
| **Agree** | **67** | **45.6** |
| Agree Strongly | 64 | 43.5 |
| Total | 142 | 96.6 |

5. When asked about their actions, participants responded that **"In the past year on campus I have..."**

| Regularly recycled | Frequency | Percent |
|---|---|---|
| Not at all | 3 | 2.0 |
| Rarely | 2 | 1.4 |
| When it was convenient | 12 | 8.2 |
| When I remembered | 24 | 16.3 |
| **Whenever I could** | **100** | **68.0** |
| Total | 141 | 95.9 |

| Attended a sustainability event | Frequency | Percent |
|---|---|---|
| **Not at all** | **55** | **37.4** |
| Rarely | 21 | 14.3 |
| When it was convenient | 27 | 18.4 |
| When I remembered | 17 | 11.6 |
| Whenever I could | 21 | 14.3 |
| Total | 141 | 95.9 |

| Composted | Frequency | Percent |
|---|---|---|
| **Not at all** | **78** | **53.1** |
| Rarely | 18 | 12.2 |
| When it was convenient | 12 | 8.2 |
| When I remembered | 15 | 10.2 |

| | | |
|---|---|---|
| Whenever I could | 18 | 12.2 |
| Total | 141 | 95.9 |

| Unplugged devices when not in use | Frequency | Percent |
|---|---|---|
| Not at all | 13 | 8.8 |
| Rarely | 27 | 18.4 |
| When it was convenient | 17 | 11.6 |
| When I remembered | 40 | 27.2 |
| **Whenever I could** | **44** | **29.9** |
| Total | 141 | 95.9 |

| Regularly turned off the lights when I left the room | Frequency | Percent |
|---|---|---|
| Not at all | 2 | 1.4 |
| Rarely | 2 | 1.4 |
| When it was convenient | 5 | 3.4 |
| When I remembered | 25 | 17.0 |
| **Whenever I could** | **107** | **72.8** |
| Total | 141 | 95.9 |

| Used a reusable water bottle | Frequency | Percent |
|---|---|---|
| Not at all | 7 | 4.8 |
| Rarely | 8 | 5.4 |
| When it was convenient | 17 | 11.6 |
| When I remembered | 22 | 15.0 |
| **Whenever I could** | **87** | **59.2** |
| Total | 141 | 95.9 |

| Used a reusable coffee/tea mug | Frequency | Percent |
|---|---|---|
| Not at all | 11 | 7.5 |
| Rarely | 6 | 4.1 |
| When it was convenient | 12 | 8.2 |
| When I remembered | 21 | 14.3 |
| **Whenever I could** | **91** | **61.9** |
| Total | 141 | 95.9 |

| Regularly biked/walked instead of using a car | Frequency | Percent |
|---|---|---|
| Not at all | 24 | 16.3 |
| Rarely | 16 | 10.9 |
| When it was convenient | 30 | 20.4 |

| | | |
|---|---|---|
| When I remembered | 15 | 10.2 |
| **Whenever I could** | **56** | **38.1** |
| Total | 141 | 95.9 |

6. When asked, "**How much do you agree with the following statements?"** PSU respondents revealed that…

| Climate change will be a defining issue in my lifetime. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 5 | 3.4 |
| Disagree | 9 | 6.1 |
| Neutral | 21 | 14.3 |
| Agree | 50 | 34.0 |
| **Strongly Agree** | **51** | **34.7** |
| Total | 136 | 92.5 |

| The impacts of climate change will be catastrophic during my lifetime unless humans take major action. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 6 | 4.1 |
| Disagree | 18 | 12.2 |
| Neutral | 32 | 21.8 |
| **Agree** | **41** | **27.9** |
| Strongly Agree | 39 | 26.5 |
| Total | 136 | 92.5 |

| Climate change is primarily caused by human activities. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 4 | 2.7 |
| Disagree | 11 | 7.5 |
| Neutral | 22 | 15.0 |
| **Agree** | **59** | **40.1** |
| Strongly Agree | 39 | 26.5 |
| Total | 135 | 91.8 |

| The potential impacts of climate change are exaggerated. | Frequency | Percent |
|---|---|---|

| | | |
|---|---|---|
| Strongly Disagree | 17 | 11.6 |
| **Disagree** | **45** | **30.6** |
| Neutral | 39 | 26.5 |
| Agree | 21 | 14.3 |
| Strongly Agree | 14 | 9.5 |
| Total | 136 | 92.5 |

| I can make choices that positively impact the environment. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 0 | 0 |
| Disagree | 4 | 2.7 |
| Neutral | 12 | 8.2 |
| **Agree** | **67** | **45.6** |
| Strongly Agree | 53 | 36.1 |
| Total | 136 | 92.5 |

| Humans cannot reverse climate change. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 16 | 10.9 |
| **Disagree** | **47** | **32.0** |
| Neutral | 45 | 30.6 |
| Agree | 21 | 14.3 |
| Strongly Agree | 6 | 4.1 |
| Total | 135 | 91.8 |

| Being involved with sustainability programming in college will make me more marketable when I start looking for a job. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 5 | 3.4 |
| Disagree | 8 | 5.4 |
| **Neutral** | **60** | **40.8** |
| Agree | 46 | 31.3 |
| Strongly Agree | 17 | 11.6 |
| Total | 136 | 92.5 |

| PSU is a leader in sustainability. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 2 | 1.4 |
| Disagree | 6 | 4.1 |
| Neutral | 54 | 36.7 |
| **Agree** | **57** | **38.8** |

| | | |
|---|---|---|
| Strongly Agree | 17 | 11.6 |
| Total | 136 | 92.5 |

| I know how to make choices that will positively impact the environment. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 0 | 0 |
| Disagree | 1 | .7 |
| Neutral | 14 | 9.5 |
| **Agree** | **93** | **63.3** |
| Strongly Agree | 27 | 18.4 |
| Total | 135 | 91.8 |

| My peers care about the environment. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 5 | 3.4 |
| Disagree | 9 | 6.1 |
| Neutral | 45 | 30.6 |
| **Agree** | **64** | **43.5** |
| Strongly Agree | 13 | 8.8 |
| Total | 136 | 92.5 |

| PSU cares about the environment. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 1 | .7 |
| Disagree | 4 | 2.7 |
| Neutral | 18 | 12.2 |
| **Agree** | **78** | **53.1** |
| Strongly Agree | 35 | 23.8 |
| Total | 136 | 92.5 |

| My choice to attend/work at PSU was influenced by the campus's commitment to sustainability. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 29 | 19.7 |
| **Disagree** | **39** | **26.5** |
| Neutral | 37 | 25.2 |
| Agree | 24 | 16.3 |
| Strongly Agree | 7 | 4.8 |
| Total | 136 | 92.5 |

| Most consumer products don't negatively impact our environment. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 34 | 23.1 |
| **Disagree** | **62** | **42.2** |
| Neutral | 26 | 17.7 |
| Agree | 11 | 7.5 |
| Strongly Agree | 2 | 1.4 |
| Total | 135 | 91.8 |

| PSU should be a leader in sustainability. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 2 | 1.4 |
| Disagree | 2 | 1.4 |
| Neutral | 15 | 10.2 |
| **Agree** | **60** | **40.8** |
| Strongly Agree | 54 | 36.7 |
| Total | 133 | 90.5 |

| PSU's regional location influenced my choice to attend/work here. | Frequency | Percent |
|---|---|---|
| Strongly Disagree | 12 | 8.2 |
| Disagree | 10 | 6.8 |
| Neutral | 24 | 16.3 |
| **Agree** | **45** | **30.6** |
| Strongly Agree | 44 | 29.9 |
| Total | 135 | 91.8 |

7. When asked, "**How much do you know about the following at PSU**?" PSU respondents revealed that…

| Office of Environmental Sustainability | Frequency | Percent |
|---|---|---|
| I know nothing about the program | 44 | 29.9 |
| **I have heard of the program** | **66** | **44.9** |
| I have attended an event related to the program | 19 | 12.9 |
| I have helped to plan an event related to the program | 7 | 4.8 |
| Total | 136 | 92.5 |

| RecycleMania | Frequency | Percent |
|---|---|---|
| I know nothing about the program | 46 | 31.3 |
| **I have heard of the program** | **61** | **41.5** |
| I have attended an event related to the program | 23 | 15.6 |
| I have helped to plan an event related to the program | 6 | 4.1 |
| Total | 136 | 92.5 |

| The Master Planning effort | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **83** | **56.5** |
| I have heard of the program | 32 | 21.8 |
| I have attended an event related to the program | 15 | 10.2 |
| I have helped to plan an event related to the program | 6 | 4.1 |
| Total | 136 | 92.5 |

| Climate Action Plan | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **94** | **63.9** |
| I have heard of the program | 32 | 21.8 |
| I have attended an event related to the program | 6 | 4.1 |
| I have helped to plan an event related to the program | 4 | 2.7 |
| Total | 136 | 92.5 |

| Common Ground (student organization) | Frequency | Percent |
|---|---|---|
| I know nothing about the program | 50 | 34.0 |
| **I have heard of the program** | **53** | **36.1** |
| I have attended an event related to the program | 24 | 16.3 |
| I have helped to plan an event related to the program | 9 | 6.1 |
| Total | 136 | 92.5 |

| Sustainability Fellow Program (outreach in residence halls) | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **63** | **42.9** |
| I have heard of the program | 61 | 41.5 |
| I have attended an event related to the program | 7 | 4.8 |

| | | |
|---|---|---|
| I have helped to plan an event related to the program | 5 | 3.4 |
| Total | 136 | 92.5 |

| The EcoHouse | Frequency | Percent |
|---|---|---|
| I know nothing about the program | 19 | 12.9 |
| **I have heard of the program** | **83** | **56.5** |
| I have attended an event related to the program | 23 | 15.6 |
| I have helped to plan an event related to the program | 11 | 7.5 |
| Total | 136 | 92.5 |

| Green Offices Program | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **83** | **56.5** |
| I have heard of the program | 46 | 31.3 |
| I have attended an event related to the program | 3 | 2.0 |
| I have helped to plan an event related to the program | 4 | 2.7 |
| Total | 136 | 92.5 |

| "Turn on, tap on, bottle out" (removing bottled water from campus) | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **62** | **42.2** |
| I have heard of the program | 48 | 32.7 |
| I have attended an event related to the program | 19 | 12.9 |
| I have helped to plan an event related to the program | 7 | 4.8 |
| Total | 136 | 92.5 |

| President's Commission on Environmental Sustainability | Frequency | Percent |
|---|---|---|
| **I know nothing about the program** | **78** | **53.1** |
| I have heard of the program | 42 | 28.6 |
| I have attended an event related to the program | 11 | 7.5 |
| I have helped to plan an event related to the program | 5 | 3.4 |
| Total | 136 | 92.5 |

8. When asked, "**Does PSU provide courses on or related to sustainability?"** PSU respondents answered…

| | Frequency | Percent |
|---|---|---|
| Other | 12 | 8.2 |
| Yes - many | 17 | 11.6 |
| **Yes - some** | **100** | **68.0** |
| No | 6 | 4.1 |
| Total | 135 | 91.8 |

9. When asked, "**Should sustainability be included in the learning outcomes as a part of the general education program?**" PSU respondents answered…

| | Frequency | Percent |
|---|---|---|
| **Yes** | **82** | **55.8** |
| No | 11 | 7.5 |
| Maybe | 42 | 28.6 |
| Total | 135 | 91.8 |

10. When asked, "**If PSU were to develop and offer an environmental sustainability major, how interested would you be?"** PSU respondents answered…

| | Frequency | Percent |
|---|---|---|
| **Not at all interested** | **56** | **38.1** |
| **Somewhat interested** | **56** | **38.1** |
| Very interested | 23 | 15.6 |
| Total | 135 | 91.8 |

11. When asked, "**How important do you think it is for PSU to pursue the following?**" PSU respondents revealed that…

| Accurately calculate and track PSU's carbon footprint | Frequency | Percent |
|---|---|---|
| I don't know | 7 | 4.8 |
| Not important | 10 | 6.8 |
| Somewhat important | 56 | 38.1 |
| **Very important** | **62** | **42.2** |
| Total | 135 | 91.8 |

| Meet the campus sustainability goals contained within PSU's Climate Action Plan | Frequency | Percent |
|---|---|---|
| I don't know | 7 | 4.8 |
| Not important | 7 | 4.8 |
| Somewhat important | 41 | 27.9 |
| **Very important** | **80** | **54.4** |
| Total | 135 | 91.8 |

| Help students reduce their individual carbon footprints | Frequency | Percent |
|---|---|---|
| I don't know | 3 | 2.0 |
| Not important | 5 | 3.4 |
| Somewhat important | 50 | 34.0 |
| **Very important** | **77** | **52.4** |
| Total | 135 | 91.8 |

| Reduce the carbon footprint of the PSU campus | Frequency | Percent |
|---|---|---|
| I don't know | 3 | 2.0 |
| Not important | 5 | 3.4 |
| Somewhat important | 47 | 32.0 |
| **Very important** | **80** | **54.4** |
| Total | 135 | 91.8 |

| Outreach to and inform the campus on sustainability goals, plans and projects | Frequency | Percent |
|---|---|---|
| I don't know | 4 | 2.7 |

| | | |
|---|---|---|
| Not important | 7 | 4.8 |
| Somewhat important | 43 | 29.3 |
| **Very important** | **81** | **55.1** |
| Total | 135 | 91.8 |