# Sustainability on campus: comparing RPI to AASHE's standards

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### Abstract

Colleges and universities are large institutions that use many resources and have the power to prepare and teach students for future careers. Sustainability is one aspect that they can focus on; to do this, sustainability audits can be done in preparation for future projects. Rensselaer Polytechnic Institute is a STEM-oriented college in upstate New York. The author used a modified version of the Association for Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment & Rating System to conduct a sustainability audit of Rensselaer. The percentage of points garnered by RPI placed the institution below the lowest level, Bronze, for the STARS rating system. In order to increase sustainability at RPI, a central sustainability office and comprehensive plan are needed. The result of RPI being more sustainable would benefit not only the environment now, but also in the future as RPI's scientists and engineers make crucial decisions in their projects and research as graduates.

### Background

Colleges and universities are usually large institutions that use a great deal of resources. Additionally, they teach students who will become engineers, architects, scientists, and programmers of tomorrow. "If we are to achieve a sustainable future, institutions of higher education must provide the awareness, knowledge, skills, and values that equip individuals to pursue life goals in a manner that enhances and sustains human and non-human well-being." (James & Card, 2012)

Colleges are like cities and towns in miniature, which enables students to learn real-life applications through their work on sustainability. "As an institutional setting, colleges and universities have standing policies and practices, which mimic corporate entities, cities, and towns. By tradition, the hierarchical administrative structure follows the model of corporate organization in which lines of report and accountability shape decision making at every level. By virtue of curricular structure, however, many programs and departments within that hierarchy have considerable latitude in decision making and day-to-day educational function. The independence and entrepreneurial initiative that grows from such distributed curricular responsibility mimics the distributed structure of initiative and contribution that can be made by the citizens of towns and cities." (Koester, 2013) This is especially true at RPI, whose Student Union is completely student-run. Students are able to see how greening their campus will be directly relevant to greening the world in their future.

Universities conduct sustainability audits to assess where they need to make the most changes and where they are doing well. Outside organizations may also look at

different universities' sustainability-related characteristics to determine how universities differ in terms of sustainability and why those differences exist; for example, the design and materials used in buildings and the campus's energy use (Jamaludin, Mahmood, Keumala, Ariffin, & Hussein, 2013) (Matthews, Rottle, Toland, & Way, 2012). These audits can take a wide range of forms, from all-inclusive, comprehensive ones like AASHE's STARS program to smaller-scale programs focused on just a few factors. Small-scale, focused audits can range from bike and pedestrian infrastructure (Horacek et al., 2012) to waste (Baldwin & Dripps, 2012) (Smyth, Fredeen, & Booth, 2010) to campus bus infrastructure (Hashim, Haron, Mohamad, & Hassan, 2013). Audits can tell universities where they need to focus on in order to make their campus more sustainable. What is learned from a sustainability audit may be more than simply changing out light bulbs or sealing buildings; cultural changes might be necessary, too. "Lessons [from sustainability audits] include: the need to overcome important barriers of cost, fear of adverse publicity, and fear of potential legal problems associated with campus environmental auditing; the important role that inter-personal relationships within the university plays in the successful implementation of any environmental auditing program; and the major influence on students of teachers who incorporate campus environmental auditing projects into their curriculum." (Bardati, 2006)

Students sometimes conduct sustainability audits or other campus greening efforts as part of a class. For example, at Bishop's University in Canada, an environmental audit program began with as a student's thesis project (Bardati, 2006). At Macalester College in Minnesota, a carbon offset audit was done in the context of a course to meet ACUPCC requirements (Wells et al., 2009). This teaches the student about how to conduct such efforts, applicable to the world at large.

Other times, students are paid to perform sustainability audits and other projects. "Furman University has an engaged living and learning program called the Environmental Community of Students (ECOS) in which fifteen first-year students live together in a residence hall, and as a cohort take an introductory environmental science course during the Fall semester and a freshmen seminar about the sustainability of natural resources during the Spring semester. As part of that program, students receive a small stipend to conduct 3–5 h per week of environmental service and outreach on campus." (Baldwin & Dripps, 2012)

Rensselaer Polytechnic Institute (RPI) in Troy, NY is a STEM-focused college. Around half of the student body is in the School of Engineering. Over 5000 undergraduate students go to RPI (Facts & Figures, 2014). Freshmen and sophomores must live on campus, though sophomores in approved Greek houses can live in their fraternity/sorority house.

During summer 2008, several RPI students created a Sustainability Report that looked at many different aspects of sustainability. This report was used by students in the Student

Sustainability Task Force (SSTF) to work towards greater sustainability at RPI. Students also cited the report for class projects. The author realized that an up-to-date report would be very useful for SSTF, other groups working on sustainability at RPI, and students at RPI and other schools comparing or writing about RPI's sustainability efforts as well as various energy, water, and sustainability indicator data.

Over the course of the last six years, some things have changed. RPI has a new Sustainability Studies major, started in fall 2011 (Smith, 2012). Student club involvement has ebbed and flowed. New programs have been created, and some older programs are no longer in existence or as widely known about. During that time, global climate change and the inherent finiteness of fossil fuels have become concerns more people know and worry about.

### Methods

The Association for Advancement of Sustainability in Higher Education (AASHE) is a non-profit "helping to create a brighter future of opportunity for all by advancing sustainability in higher education" (About AASHE, 2013). Colleges can become a member of AASHE, though RPI is not a member.

AASHE has created the Sustainability Tracking, Assessment & Rating System (STARS) for colleges to use to discover where they "stand in the higher education sustainability landscape" (STARS Home, 2013). I used the STARS 2.0 questions for my Sustainability Report with a few changes. STARS is very comprehensive and includes many aspects of sustainability, which are divided into credits. Credits range from greenhouse gas emissions to sustainability inclusion in student and staff orientations to landscaping. Points are given for how well a college meets a particular credit. These criteria range from sustainability-focused courses to greenhouse gas emissions. The points given for each credit vary according to impact rather than difficulty (Stars Technical Manual: Version 2.0, 2014, 10). There is a section at the end where colleges can report their innovative projects that do not fit anywhere in the STARS program. A college's score is credits earned divided by total credits applicable.

For every credit, the STARS Technical Manual (Stars Technical Manual: Version 2.0, 2014) asks for:

> An affirmation that the submitted information is accurate to the best of a responsible party's knowledge and contact information for the responsible party. The responsible party should be a staff member, faculty member, or administrator who can respond to questions regarding the data once submitted and available to the public.

Because this report was not officially submitted to AASHE, this step was skipped. Getting the affirmations would require a great deal more time, effort, and overall campus support than just doing the report. SSTF intends to use the report to complete sustainability projects. Having data in the same format as other colleges will help greatly with benchmarking.

Other changes were made from the STARS process to keep the report within a one-semester time frame yet still show how RPI is doing sustainability-wise in various aspects. Sustainability research was included for Credit AC 9, but not as a percentage value. Instead, sustainability research programs were written about in terms of how they operate and the research that has come out of it, a more qualitative approach. Given that RPI has a great deal of research programs, auditing them in the time frame given for sustainability content and finding an accurate quantitative result would have taken too long. RPI does have many highlights in terms of research, including Darrin Fresh Water Institute, which holds a semester-long program for undergraduate students in the fall as well as other programs; Lighting Research Center; and many others.

Additionally, some of the Operations credits were not included, based mainly on employee, workplace, and investment policies. Information for these would have likely been much more difficult to obtain

### Results

In total, RPI had 24.29 out of 149 possible points.

| Credit | Title | Total Points | RPI's points | Notes |
|--------|-------|--------------|--------------|-------|
| AC 1 | Academic Courses | 14 | 5.9 | |
| AC 2 | Learning Outcomes* | 8 | 2 | |
| AC 3 | Undergraduate Program* | 3 | 3 | |
| AC 4 | Graduate Program* | 3 | 3 | |
| AC 5 | Immersive Experience* | 2 | 0 | N/A |
| AC 6 | Sustainability Literacy Assessment | 4 | 0 | |
| AC 7 | Incentives for Developing Courses | 2 | 0 | |
| AC 8 | Campus as a Living Laboratory* | 4 | 2.8 | |
| AC 9 | Academic Research* | 12 | 0 | N/A |
| AC 10 | Support for Research* | 4 | 0 | |
| AC 11 | Access to Research | 2 | 0 | |
| EN 1 | Student Educators | 4 | 0 | |

| | Program | | | |
|---|---|---|---|---|
| EN 2 | Student Orientation* | 2 | .09 | |
| EN 3 | Student Life | 2 | 2 | |
| EN 4 | Outreach Materials and Publications | 2 | 1.25 | |
| EN 5 | Outreach Campaign | 4 | 0 | |
| EN 6 | Employee Educators Program | 3 | 0 | |
| EN 7 | Employee Orientation | 1 | 0 | |
| EN 8 | Staff Professional Development | 2 | 0 | |
| EN 9 | Community Partnerships | 3 | 0 | |
| EN 10 | Inter-Campus Collaboration | 2 | 0 | |
| EN 11 | Continuing Education* | 5 | 0 | N/A |
| EN 12 | Community Service | 5 | 0 | |
| EN 13 | Community Stakeholder Engagement | 2 | 0 | |
| EN 14 | Participation in Public Policy | 2 | 0 | |
| EN 15 | Trademark Licensing* | 2 | 0 | |
| EN 16 | Hospital Network* | 1 | 0 | N/A |
| OP 1 | Greenhouse Gas Emissions | 10 | 0 | |
| OP 2 | Outdoor Air Quality | 1 | 0 | |
| OP 3 | Building Operations and Maintenance* | 4 | 1.5 | |
| OP 4 | Building Design and Construction* | 3 | 0 | N/A |
| OP 5 | Indoor Air | 1 | 0 | |

| | | | | |
|---|---|---|---|---|
| | Quality | | | |
| OP 6 | Food and Beverage Purchasing* | 4 | 0 | Sodexo does not keep track |
| OP 7 | Low Impact Dining* | 3 | 0 | Sodexo does not keep track for the data relevant to Part 1 |
| OP 8 | Building Energy Consumption | 6 | 0 | |
| OP 9 | Clean and Renewable Energy | 4 | 0 | |
| OP 10 | Landscape Management* | 2 | 0 | |
| OP 11 | Biodiversity* | 1-2 | 0 | |
| OP 12 | Electronics Purchasing | 1 | 0 | |
| OP 13 | Cleaning Product Purchasing | 1 | 0 | |
| OP 14 | Office Paper Purchasing | 1 | 0 | |
| OP 15 | Inclusive and Local Purchasing | 1 | .25 | |
| OP 16 | Life Cycle Cost Analysis | 1 | 0 | |
| OP 17 | Guidelines for Business Partners | 1 | 0 | |
| OP 18 | Campus Fleet* | 1 | 0 | |
| OP 19 | Student Commute Modal Split* | 2 | 0 | No data |
| OP 20 | Employee Commute Modal Split | 2 | 0 | No data |
| OP 21 | Support for Sustainable Transportation | 2 | .5 | |
| OP 22 | Waste Minimization | 5 | 0 | |
| OP 23 | Waste Diversion | 3 | 0 | |
| OP 24 | Construction and | 1 | 0 | N/A |

| | | | | |
|---|---|---|---|---|
| | Demolition Waste Diversion* | | | |
| OP 25 | Hazardous Waste Management | 1 | .5 | |
| OP 26 2-6 | Water Use | 2-6 | 0 | Data in appropriate form not available |
| OP 27 | Rainwater Management | 2 | 0 | |
| OP 28 | Wastewater Management | 1 | 0 | |
| PA 1 | Sustainability Coordination | 1 | 0 | |
| PA 2 | Sustainability Planning | 4 | 0 | |
| PA 3 | Governance | 3 | | X |
| PA 4 | Diversity and Equity Coordination | 2 | | X |
| PA 5 | Assessing Diversity and Equity | 1 | | X |
| PA 6 | Support for Underrepresented Groups | 2 | | X |
| PA 7 | Support for Future Faculty Diversity | 1 | | X |
| PA 8 | Affordability and Access | 4 | | X |
| PA 9 | Employee Compensation | 3 | | X |
| PA 10 | Assessing Employee Satisfaction | 1 | | X |
| PA 11 | Wellness Program | 1 | 1 | |
| PA 12 | Workplace Health and Safety | 2 | | X |
| PA 13 | Committee on Investor Responsibility* | 2 | | X |
| PA 14 | Sustainable Investment* | 4 | | |

| PA 15 | Investment Disclosure* | 1 | | X |
|---|---|---|---|---|
| Total | | 143 | 24.29 | |

An asterisk indicates that the credit is not applicable to all schools.

In order to achieve the Bronze rating for STARS, a minimum of 25 percent of applicable points is needed. RPI's percentage is approximately 16.9 percent, far below the lowest rating. Data was not collected or found for some of the credits, so further analysis may find that RPI's percentage of points is increased or decreased. **Note: ran numbers 11/10/2014, found that 20.5 of the points had no data. Taking out these points leads to a percentage rating of 19.8 percent, still below Bronze.**

Among peer institutions, Boston University, Carnegie Mellon, Clarkson, Princeton, RIT, and University of Pennsylvania all have silver ratings (at least 45 percent of applicable points). Cornell, Georgia Institute of Technology, and Stanford have gold ratings (at least 65 percent of applicable points). Rice University did not reach the minimum 25 percent needed to achieve a rating. Other peer institutions have either not completed a report or are not part of the STARS program at all. Most of the institutions that have done the STARS report did it under version 1.2, however, not version 2.0—the latter was used for RPI's sustainability report. Platinum is the highest rating with a minimum of 85 percent of points.

### Discussion

RPI has many programs in place to advance sustainability, from sustainability majors to single-stream recycling to environmental clubs. This was not in the STARS criteria anywhere, but RPI's Student Union is completely student-run; funding for clubs and programs is decided on by students' peers rather than a group of staff members. RPI has specific programs to advance sustainability among students and on-campus. The Vasudha Living and Learning Community is a theme house dedicated to earth, energy, and the environment. Students in the program have the option of taking a core interdisciplinary humanities and social science course their first semester. The course has a service learning component that brings students to environmental clubs. The program also has trips, some affiliated with the class and some not, as well as speakers and social events, all of which are open to and publicized to upper-class Vasudha students as well as the freshmen. Vasudha shares a classroom and lounge in the freshman hall accessible by all upper-class Vasudha students as well as the freshmen.

RPI has multiple sustainability-focused majors: environmental science, sustainability studies, and environmental engineering. The graph below shows the numbers of students graduating from these programs in the last three years. Sustainability Studies became a major in fall 2011, so very few students have graduated from the program yet. It is in the School of Humanities and Social Sciences and it purposely designed to be easy to dual major with.
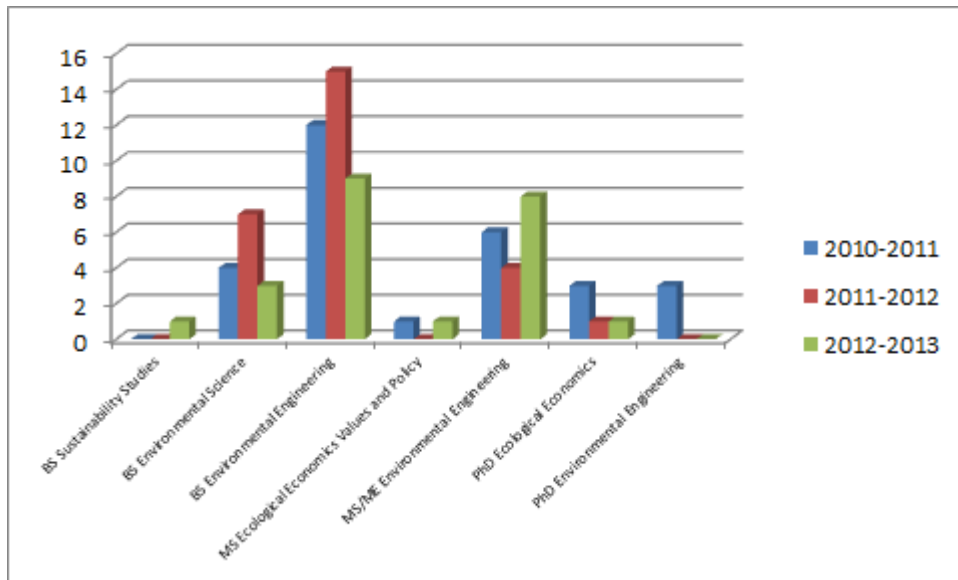
Single stream recycling is another program RPI has. Single stream recycling makes it easier for people to recycle, since they do not have to separate out different papers and plastics.

In order to do better in future Sustainability Reports, there are some first steps RPI should take. Some of them are easier than others. Easy steps include creating a repository for student research, recruiting for higher numbers in sustainability clubs, and further analysis and research on what buildings are increasing their energy use and why. Many students do research for independent studies, classes, pay, or experience, and having an online repository that at least other RPI students could access would help them to build off one another. The sustainability clubs could all use more members in order to be more effective, and advanced recruitment and work towards higher numbers could help these clubs get more projects done.

More in-depth steps that RPI can take to increase sustainability include requiring sustainability learning outcomes in more classes and majors, programs to get faculty and staff interest in and familiar with sustainability, working with Sodexo to green its food, and a greenhouse gas emissions inventory. As a top engineering school, RPI requiring sustainability learning outcomes could have large impacts on the environment in the future. Programs for faculty and staff about sustainability could increase their attitude and familiarity towards sustainability. Additionally, more collaboration between student groups and faculty/staff groups such as Science and Technology Studies Professor Kim Fortun's Sustainability Task Force could be extremely useful to both parties. Information on greenhouse gas emissions is not available since 2009; if an inventory has been done, that information is not publicly available. Doing an inventory would give both comparison data to the previous inventories and provide a baseline for future inventories. Freshmen and sophomores who live on campus must buy a meal plan; upper-class students may have to based on their residence hall or Resident Assistant status or may wish to for a variety of personal reasons. Greening campus dining would therefore have fairly significant effects on greening RPI.

Larger, very in-depth projects include a central sustainability office, funding for sustainability, and a comprehensive sustainability plan. Currently, campus greening projects are done by students who have limited time and resources. A central sustainability office with a

coordinator hired by the administration would be incredibly useful to these students.  A dedicated coordinator would have all the right contacts and be able to work seamlessly and in a guaranteed professional manner with staff and faculty.  Additionally, a coordinator could be hired for a period of years longer than four years, which is how long most student major programs are supposed to take. Some projects cost money, which is why funding is so important.  Funding could come in many forms, and, given that many environmentally-friendly projects are also economically-friendly, this funding could be some sort of revolving fund.  A comprehensive plan for sustainability would help ensure that, as RPI grows, it grows sustainably.  Additionally, relatively easy but environment and cost-saving renovations could be done as part of this plan.

**Conclusion**

Based on the low percentage of points that RPI got, a great deal more needs to be done to increase sustainability at RPI from greenhouse gas emissions inventories to a central sustainability office to required sustainability learning outcomes to working with other organizations and people to make operations greener.  Student clubs are already working hard on sustainability, but there is a lot more that needs to be done, especially related to the administration and faculty.  It is important to make sure sustainability and the need for it is understood among RPI's faculty, staff, and administration.  In addition, many students outside of the environmental clubs are not aware, nor do they care, a great deal about sustainability.  Solving all of this will take a long time and will not be easy, but it will result in RPI being a lot more sustainable.

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