Developing an Annual Sustainability Report for WPI

Submitted to the Faculty of

Worcester Polytechnic Institute

An Interactive Qualifying Project

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Abstract

Sustainability reporting is a common practice of many large companies and, more recently, many universities. The purpose of a sustainability report is to create a snapshot of an organization's sustainability performance in a truthful and practical manner. This serves the dual purpose of educating the public about its sustainability efforts and helps to prompt action from the leadership by pointing out areas that require attention. This project created an initial sustainability report for WPI by working with a number of faculty, staff and campus groups to gather relevant information about the campus's operations, the university's academic programs and its interactions with its worldwide communities. All of this is presented in a document that is concise and can be recreated annually.

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1.0 Introduction

As human population and over-consumption of resources continue to rise, it becomes more and more important to manage resources responsibly, to minimize waste and to make the limited resource available to the most people possible (Meadows, 1992). At the same time, voters, experts and consumers urge governments and businesses to strive toward socially responsible practices that provide stability and promote equality, so as to create a social environment conducive to equity and the preservation of the natural environment (United Nations, 1992). These are the primary motives driving the sustainability movement.

In order to have future leaders who are conscious of this aspiration, colleges endeavor to educate their students in methods to minimize the impact of stretching the world's resources to their limits and in the social and economic implications of conservation policy. One way to educate is to implement the sustainability practices they seek to teach within the university. It is easy and inspirational to set the implementation of these practices as a goal, but it is difficult to fully realize these aspirations; not only because of the initial expenses that can be incurred, but because it is difficult to assess priorities when so many areas demand attention (Blackburn, 2007). To address this challenge, several universities have created offices or committees to focus on sustainability and coordinate efforts to track their performance.

Colleges all over the United States and other countries have made great strides in the field of sustainability. Many universities have developed their own sustainability programs that run a large number of operations on their campuses, including recycling programs and reporting on their progress to their stakeholders. These individual campus efforts have been accompanied by the development of large organizations whose sole purpose is to promote sustainable practices and establish a commitment to a sustainable future. These organizations, such as the Association for the Advancement of Sustainability in Higher Education (AASHE) and Association of University Leaders for a Sustainable Future (ULSF), include as members dozens of colleges and universities (AASHE, 2010) (USLF, 2009). The experiences of these pioneering universities and organizations can be an invaluable asset to colleges that have only recently begun their own programs.

Worcester Polytechnic Institute (WPI) has decided to embrace the concept of sustainable development and to adopt the academic, social, financial and building operations standards associated with the sustainability movement. To this end, President Berkey created the President's Task Force on Sustainability which coordinates efforts and helps the WPI community to be more responsible for its impact on the environment.

On its website, the Task Force has presented its purpose, suggestions on how to live a sustainable life and events happening at WPI that are related to sustainability (WPI, 2009). The Task Force has also organized campus-wide initiatives such as Recyclemania, a nation-wide competition between colleges which encourages students to recycle as much as possible. They have also presented WPI's accomplishments to the public by using reporting methods such as the Sustainability Tracking, Assessment & Rating System (STARS) and the Green Report Card released by the Sustainable

Endowment Institute (Sustainable Endowment Institute, 2009) (AASHE, 2010). However, the results of these reports were scores that, while useful for tracking progress, gave little information on the context or reasoning for the ratings.

Prior to this project the Task Force had not attempted to draft a single, comprehensive document that reports its status in relation to its long-term sustainability goals to the general public, students, faculty, and the local community. To get this information out to these people, WPI had to consider other potential reporting options.

The goal of this project was to develop a transparent annual sustainability report and a framework to continue its development in future years. The team interviewed members of various departments to collect data ranging from energy use to social responsibility. These data were then more precisely categorized, analyzed and put into appropriate sections of the sustainability report. The team also stored the collected dataset to make it available for future iterations of the report. At the end of this project, recommendations based on our analysis were given to the Task Force or any interested groups to consider. This report is the first of its kind at WPI and allows readers to see how WPI attempts to address the varied and complicated obstacles in achieving sustainability.

2.0 Background

There has been a vast effort within the past several decades to move society in the direction of a more sustainable future. However, the increased interest has sparked debate throughout the world on the meaning of sustainability and how it pertains to individuals as well as corporations. In this section we explore the concept of sustainability on a global and local scale as well as common practices and methods of sustainability reporting.

2.1 Conceptualizing Sustainability

Sustainability is a term with a definition that is constantly in flux. The term on which it is based, sustainable development, was first put into popular use in the Brundtland Report, also known as *Our Common Future* from the United Nations' World Commission on Environment and Development, where it was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987, p. 41). The economic and social aspects of this definition are self-evident. But it is important to remember that it also applies to conservation of the environment and natural resources; that is, "the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" must be considered when shaping development policy (United Nations, 1987).

Only two years after this definition was published, nearly 140 different or modified definitions were adopted. It has even been estimated that almost 300 definitions exist today that are in common usage (Johnston, Everard, Santillo, & Robèrt, 2007). With so many adaptations, it becomes more difficult to set a clear standard for what constitutes sustainable development. To track progress we must first decide on a clear definition of sustainability. Therefore, we propose to use the original definition from the Brundtland Report.

Because this is a general definition that applies to the world as a whole, it is necessary to relate the definition to WPI without altering the underlying concepts. It is important to explore some key aspects of the Brundtland definition; namely that the current state of social organization, even at the local level, may limit the environment's ability to support the community's needs. Also, if resources are to be fairly distributed over time among current and future generations, they should also be fairly distributed among people within the current generation.

One can then apply these points to different aspects of WPI's and the community's current needs, their future needs, the social equity that must accompany balance between these and their environmental implications. First, WPI strives to be able to support itself economically through fiscal responsibility and practices that create long-term financial stability in ways that are consistent with its stated mission. Second, WPI as a whole strives to work to reduce its use of important or scarce resources while continuing to promote environmentally sound practices such as recycling and the use of local food. If WPI can create opportunities for students and the community to become involved in the process, it will ensure the public's ability to take responsibility and help future generations support themselves.

2.2 Sustainability Reporting and the Ethics of Transparency

A key aspect of the sustainability movement as it applies to large organizations is the demonstration of socially responsible and honest practices through reports that are available to stakeholders and the public at large. To this end many corporations not only report on their financial performance, but also on their performance in relation to many aspects of sustainability. The selection of topics on which to report could create a problem; when an organization chooses to report only on positive aspects, they risk appearing as though they are trying to hide their problems and failures. The appearance of dishonesty thus hurts a company's image even more than the positive-only report can help, or an honest and transparent report can harm (Blackburn, 2007).

Transparent reporting that shows both improvement in some areas and underperformance in others is used to show the public that the company is aware of unsolved issues and is attempting, with some success, to address them. Simultaneously these reports serve to motivate management and employees by recognizing the good work of some and communicating how their success can be replicated. Areas that are found to lag behind others receive pressure to improve performance and added assistance from management, which is eager to show progress on the next report or follow-up evaluation. To this end several corporations adopt standards in reporting and have their data verified by other agencies and organizations (Blackburn, 2007).

2.3 Common Sustainability Reporting Practices and Guidelines

Some of the first organizations to embrace sustainability reporting were those that received harsh criticism in the 1990s for the environmental damage they had caused (e.g. Exxon-Mobil) or for irresponsible hiring practices and treatment of employees (e.g. Nike, Wal-Mart). Others adopted reports and exposed internal issues themselves to prevent scandal or public outrage and to show they were capable of solving their own problems (e.g. Shell, Dow). Since then, hundreds of firms in the mining, coal, petroleum and textile industries have periodically reported on sustainability issues. Many of these corporations eventually adopted reporting standards such as the Global Reporting Initiative's guidelines for transparent reporting and consistently submit their reports for independent review (Blackburn, 2007).

Academic institutions face challenges that are somewhat different; they educate, inform and instill values in the future decision-makers of large organizations and nations. This means that it is paramount for schools to integrate sustainability into their operations, their curriculum and their business practices, to set an example for future leaders and the community around them.

Eager as they are to reduce cost, mitigate environmental impact and improve relations with the public, many institutions find the actual task daunting. Since sustainability is so inclusive, it is very difficult to determine where to start, how to proceed, how to track progress accurately and how to hold people accountable. One way to focus the time and energy of management and staff is to perform an audit of the school's performance in various fields of sustainability, and to compile a periodic report that both showcases progress and candidly discusses areas in need of improvement (Blackburn, 2007).

When planning a sustainability report, organizations take into account a few important details such as size, scope and structure. The length of the report can affect how it is perceived by the reader. It has been determined that lengthy reports, consisting of 50 or more pages, are rarely read completely (Pleon Kohtes Klewe GmbH, 2005). In terms of scope, it should be clear what time frame and operations will be covered early in the report. The structure of the report should follow a general format that is accepted by a majority of organizations.

2.4 Analysis of the Global Reporting Initiative G3 Reporting Framework

The G3 Reporting Framework published by the Global Reporting Initiative (GRI) is a system that was created to assist companies in the development of sustainability reports. The system includes six indicator protocols which function much like a rating system. The indicators categories are economics, the environment, labor, human rights, product responsibility and society. Within each category there is a set of core indicators which help to focus data collection and drive the formation of the report (Global Reporting Initiative, 2006).

To the extent that a college runs like a business, the G3 guidelines are very helpful in developing a sustainability report. Some indicators translate well, while others are more difficult to implement. For example, it is unlikely that there are any severe human rights violations that will need to be included in the report and because WPI does not manufacture products, it is not necessary to focus on product responsibility.

The G3 framework also contains a set of reporting guidelines that help developers cover a wide range of topics while ensuring that the quality of the report is kept to a high standard. The guidelines help to determine topics of discussion by focusing on four major qualities, the content of the report, the inclusion of stakeholders' ideas and expectations, the context of sustainability in the report and the overall completeness of the report.

To ensure a high quality report, GRI suggests that the following guidelines are taken into consideration. A balance of positive and negative aspects must be presented in order for the report to be taken seriously. A report that only focuses on good things is generally seen as less trustworthy than a report that focuses on areas that need improvement as well. It is also advised that the subject material is chosen so that changes can be assessed over time. The data must also be accurate and the source of the information should be made clear to the reader. Reports should be released on a set schedule to keep production consistent. Information should be presented in a way that is not confusing. For example, large tables of data are generally less effective than a graph which can show trends. Finally, the data must be reliable and verifiable by an outside examiner (Global Reporting Initiative, 2006).

The G3 reporting framework is a very comprehensive system that covers a large amount of information succinctly. Since it is mainly for corporate reporting, its application to universities is slightly strained, but many of the indicators can be translated. Published alongside the framework is a set of "Sector Supplements" which can assist businesses in picking appropriate indicators based on the company's focus. Such a supplement does not exist for universities, but a similar method could be applied in determining appropriate indicators for them.

2.5 Evaluation of STARS

In 2008, members of the President's Task Force on Sustainability completed the Sustainability Tracking, Assessment & Rating System (STARS) 0.5 rubric developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). STARS is a credit-based evaluation system that rates universities' progress in terms of various indicators. Through these indicators, institutions are able to keep track of their accomplishments on sustainability as well as aspects that need improvement. WPI scored 58% comparing to the 40.3% average overall score of the 37 national participating universities (Martinelle, 2009).

However, STARS's extremely specific categorized layout and credit base make it difficult for the public to appreciate; scores are easy to understand, but provide little context or details on specific concerns or efforts. While the STARS score is an excellent indication of progress when compared against previous results, WPI also needs a more understandable and summarized report to present its current achievements and future goals to the public.

As a whole, STARS presents a wide variety of information about different aspects of university sustainability (Bedford, Belanger, Boudreau, & Scott, 2009). STARS has a set of metrics that should be considered when creating a sustainability report. However, the complete report presents much more information than is necessary to the public and WPI stakeholders and is not appropriate to present as an annual report to these groups. WPI has committed to continue to use STARS annually to track its progress, however, it would also be beneficial to supplement this with an annual report that contains more in depth analysis of specific indicators.

3.0 Methodology

3.1 Mission Statement and Objectives

The purpose of this project was to create WPI's first annual sustainability report. This report will aid the President's Task Force on Sustainability in its goal: to lead the campus in engaging the local community and reducing our environmental impact through education of current and future students. The IQP team worked closely with organizations on campus with related objectives and reviewed and analyzed WPI's accomplishments to develop the report and the framework on which to build future reports.

In order to create said report, we accomplished the following objectives, each of we discuss below:

- Analyzed existing models for sustainability reports to develop a framework for WPI's report
- Met with Task Force and other groups and individuals to gather data on WPI's sustainability initiatives and gain insight on report structure and development process
- Categorized and assessed these data in sections that are presented in the report
- Developed a well-structured report for WPI that can be used as a flexible template for future years

3.2 Analysis of Existing Report Models

Sustainability reporting is carried out in various ways by different organizations. Major organizations often create their reports using a set of standards set by external groups, such as the Global Reporting Initiative (GRI). The GRI in particular developed a reporting framework called G3 which was discussed in Section 2.4. These reports are checked for accountability and credibility by third-party groups.

For universities, the model is a little different since they often aren't held accountable for the same information as large corporations. To account for this, reporting systems such as STARS (Section 2.5) were developed to rate and track a university's progress over the course of several years. While this is a very effective tracking system, the results are more difficult to interpret.

On the other hand, many universities have also adopted a more free-form system of reporting which presents indicators that are commonly reported in both STARS and reports like G3. These reports allow for more individual analysis and are more appealing and understandable for the general public. For this reason, the sustainability report that was generated as part of this project followed this pattern.

To structure this report we first examined how various universities wrote their own sustainability reports. We examined the report structures and key features of reports that we thought were particularly effective from nine different universities (Appendix A).

Report Structures

Most reports consisted of twenty to fifty pages of mainly environmental data complemented by pictures and graphs. The numbers of indicators varied widely. Most reports had about twenty indicators that covered broad topics, but Michigan State University, for example, featured 88 separate metrics in all conceivable areas of sustainability. Most reports were divided into distinct categories, such as "Energy" or "Community Outreach". All of them had information on their energy use, water use, waste and

recycling. Some reports included detailed and lengthy information on their communities' income, health care costs, diversity and even OSHA-reportable injuries.

In general, reports first introduce their school's sustainability program, complete with a letter from a university representative such as a president or sustainability office director. This is followed by the report proper, which introduces the topics, presents the relevant data and discusses its origins and implications. Often the author presents a discussion of the school's goals and makes recommendations at the end of each section or at the end of the report.

Key Features

These reports share some features that allow them to better convey information. Clark University, University of California Berkeley and MacQuarie University all had brief highlights which described award winning people and the school's accomplishments in relation to sustainability. Another supplement to the main body of text was the use of callout boxes, which provided useful explanations, interesting anecdotes, or defined terms used in the report.

Nearly every report used pictures extensively throughout ranging from large full-page spreads to smaller pictures of specific items. The shortest reports focused almost entirely on the environment, making them less *sustainability* reports and more *environmental* reports. The longer reports, on the other hand have a more holistic approach to sustainability that includes social and economic aspects of sustainability.

Overall Summary

It is clear that visual appeal is a major factor in a report's ability to keep the reader interested in the subject at hand. Brief reports excel at the presentation of data because the reader does not feel overwhelmed by the numbers and charts. A feature that is common among all nine reports is the clarity of their writing, which allows them to deliver the information effectively.

3.3 Interviews and Other Personal Contacts

We interviewed several key members of WPI's sustainability effort. These were faculty and staff who were either part of the Task Force, or played major roles in areas of interest. We asked each of them to direct us to or provide us with any data for use in the report. They provided their insight into WPI's sustainability programs and the current state of the institute in relation to sustainability. Finally, some of them provided us with the names of people we should contact for more information. Before each interview, a set of questions was prepared and the interviewee was notified of the types of things that would be asked (Appendix B).The people who were interviewed were (chronologically):

- Elizabeth Tomaszewski: Facilities System Manager & Sustainability Coordinator
    - Ms. Tomaszewski provided us with most of the data in the Operations section. She also directed us to William Grudzinski, Robert Krueger, David Messier and Christopher Salter; and answered questions regarding WPI's policies and future plans. She also helped with the Report's revision process.
- Emily Perlow: Associate Director of Student Activities and Greek Life Programs

    - Ms. Perlow shared information about community service and major changes in community service and charity on campus.
- William Grudzinski: Chief Engineer at the Power Plant
    - Mr. Grudzinski provided us with Tighe and Bond Reports, which have information about WPI's emissions and oil and gas consumption. He also explained who provides WPI's electricity and explained that no policy exists regarding alternative energy.
- Joseph Kraskouskas: Chartwells Resident District Manager
    - Mr. Kraskouskas listed and explained all of Chartwells's sustainability programs and provided information about local food purchasing and food waste recycling
- Prof. Robert Krueger: Assistant Professor of Geography, Director of Worcester Community Project Center and of the Environmental Studies Program
    - Prof. Krueger mostly talked about the overall sustainability movement and a few projects he had been involved with which relate to sustainability. He also provided insight into what the Report itself should try to accomplish and helped with the revision process.

Each interview was recorded with a Sony ICD-UX71 Digital Audio Recorder from the Academic Technology Center (ATC). These recordings were summarized and the summaries were sent to the interviewees for an accuracy check (Appendix C).

Others provided data but were never interviewed or met in person, instead they were contacted via email:

- Christopher Salter: Facilities Director of Project Mgmt. & Eng.
    - Mr. Salter provided information regarding construction waste management from the renovation of Goddard Hall
- David Messier: Manager of Environmental & Occupational Safety
    - Mr. Messier provided hazardous waste data
- Marylou Horanzy: Financial Resource Coordinator
    - Ms. Horanzy forwarded all data for Ms. Tomaszweski and provided us with the electricity and water bills from 2007 to 2009 that we used to gather data.

In addition to interviews and electronic correspondence, we also attended four Task Force meetings to introduce our project to the Task Force and receive input. All but one meeting were previously arranged with Provost Orr, the Task Force Chairman. For the first meeting, team members introduced themselves to the Task Force and observed the meeting. At the second meeting team members presented the project's goals and details and asked for assistance. At the third meeting, the team presented a complete page of the annual report and asked for the members' opinions about the page's appearance and layout. Finally the team presented a nearly complete draft of the Report and requested help with the "Highlights" and "Areas for Improvement" sections of the report.

3.4 Data Collection and Analysis

All the data presented in the Sustainability Report came from various sources as shown in Table 1: Data Sources and Contacts. In the table, "N/A" signifies that the data source or contact was not determined. For example, The Power House works with Tighe & Bond Inc. to develop annual reports from subjects including fuel consumption and pollutant emissions. This information was collected through an interview with William Grudzinski.

Table 1: Data Sources and Contacts

Indicators	***Data Source***	***Contact Person***
Heat	Tighe & Bond Report	William Grudzinski, Chief Engineer, Department of Facilities, Power House
Electricity Use	National Grid Invoice	Marylou Horanzy, Financial Resource Coordinator, Department of Facilities
Water	City of Worcester Water Invoice	Marylou Horanzy, Financial Resource Coordinator, Department of Facilities
Waste		
Solid waste	Waste Management Inc.	Elizabeth Tomaszewski, Facilities Systems Manager, Department of Facilities
Recycled waste	Institutional Recycling Network	
Hazard Waste	N/A	David H. Messier, EOS Manager, Department of Facilities
Construction Waste	Tracking Report	Blake Currier & Christopher Salter, Project Engineer, Consigli Construction Co., Inc
Pollutant Emissions	Tighe & Bond Report	William Grudzinski, Chief Engineer, Department of Facilities, Power House
Built Environment		
LEED Certified Square Footage	Green Report Card 2009	Elizabeth Tomaszewski, Facilities Systems Manager, Department of Facilities
Full Time Students Population	Student Fact Book 2006 - 2009, Office of Institutional Research	N/A
Community	Administrative records	Emily Perlow, Associate Director, Student Activities Office
Sustainable Focused/Related Courses	WPI2008- 2009 Undergraduate Catalog	N/A

Some recent operations data, such as energy use and water use, were recorded in spreadsheets by Facilities Services. However, this information is only available from the 2007-2008 fiscal year and on. Any earlier data was collected from archived invoices going back to January 2007.

We were able to calculate the estimated CO_2 emissions from 2008 back to 1996 using the Clean Air Cool Planet carbon emissions calculator from their website (Clean Air Cool Planet, 2010). There is such a large amount of data for this indicator because there was a previous IQP that focused on WPI's CO_2 emissions calculation and reduction (Haines, Lawton, & Steacy, 2007). Other data sets contain information dating back five years or less.

Fortunately, all data sets are updated to at least 2008 or 2009. There is some discrepancy since some data are collected from external organizations which may take a few months to sum up the most recent results. For example, the Tighe & Bond report for 2009 was not published before April of 2010 so the energy section only contains information up to 2008.

For the Academics section, we investigated courses at WPI for their sustainability content by reviewing the Undergraduate Catalog. We determined whether they were sustainability-focused or related based on their description and the definitions of sustainability-focused and related courses adopted from AASHE (AASHE, 2010). In addition, a questionnaire was sent out to department heads to allow them to add any courses to this list or provide any comments on how sustainability was taught within their departments. The definitions of sustainability related and focused courses as well as the questionnaire can be found in Appendix E.

4.0 Report Design Considerations

In this section, we address the construction of the sustainability report shown in Appendix F. The primary considerations for this report were the breakdown of the report into three major sections and the structure of each indicator section. Formatting the report was also a major consideration. Creating the report's look was among the first things we worked on in developing the report.

4.1 The Report Style

Report Layout

We divided our data into the three categories that we determined, with the assistance of the Task Force, were the most important regarding sustainability at WPI: Academics, Operations and Community. The Academics section covers sustainability related coursework, projects and research. We put a heavy focus on the projects program since this is an area in which WPI excels. The Operations section covers primarily environmental concerns such as energy use and water use and is the most data-heavy section of the report. The Community section focuses on community outreach programs at WPI through student involvement in community service.

The report itself begins with a brief introduction of sustainability, followed by a description of the report itself: what it is and what we hope that it will accomplish. Each major section is introduced by a few paragraphs describing the goals of that section. We felt that as a university, WPI is first responsible for its students and then its campus. We organized the three sections in the way we feel best reflects this with Academics first and Operations second. The major sections are then broken down into indicator sections which introduce and summarize the indicators.

Each indicator section is separated into 4 major areas: an introduction, a data section, areas for improvement and highlights. The introduction explains the indicator and describes the rationale for its inclusion. The data section presents and analyzes the data as described in Section 4.2. These data are then supplemented in some sections by recent student projects that are relevant to that indicator. The "Areas for Improvement" section discusses how WPI's performance in each area could be improved either by implementing new policies or increasing general awareness. Finally, the "Highlights" section focuses on people and events that made specific contributions in regards to the indicator in the past year.

Report Formatting

The first decision we made with respect to the report was the intended viewing method, a document accessible through the Internet. This choice influenced nearly all of our decisions regarding page layout and formatting. For ease of viewing and the maximization of screen space, the report has a landscape orientation. Along the same lines, we decreased the border size and made the report two columns to reduce the amount of white space.

Pictures were used to break up large amounts of text and to fill empty spaces. All pictures were obtained from the WPI Department of Marketing and Communications' Cumulus picture database which gave us permission to use the pictures and avoid copyright conflicts. Pictures were selected by their

relevance to the indicator and their overall visual appeal. We limited the report to under 30 pages since we determined that a lengthy report was unlikely to be read. To do this, we had to make sure that graphs and tables fit into the document. The entire report follows the same color theme which uses shades of red and grey.

4.2 The Data

Through interviews and communication with WPI staff, we collected a large amount of data; these data were assembled and processed for use in the Report. All the data that were provided by the faculty and staff were uploaded to the IQP's SharePoint site and were assembled in a spreadsheet (Appendix D) containing all of the indicators which are to be handed off to the Task Force for use in the development of later reports. How these data were analyzed, interpreted and represented in the Report is discussed below.

One consideration when looking at the data was WPI's growing student population (10% increase in five years); the full-time student population from 2003 to 2009 was used to normalize nearly all data. This normalization does not account for the impact of faculty, staff or part-time students or factor in the difference in impact of students who live on-campus versus those who live off-campus. On the other hand, full-time students make up the majority of the campus population and have experienced the most change in the last few years, meaning they have the most significant impact on many aspects of campus sustainability.

One of the major objectives of a sustainability report is to identify trends within the different aspects of sustainability and to identify the origin of observed changes, such as the addition of large new buildings. The year-to-year change for each indicator was calculated and represented as a percentage. It is presented as a percentage to maintain perspective given the widely differing units such as gallons, millions of kilowatt hours and tons. For more details see the report in Appendix F and raw data tables in Appendix D.

Since the report was meant to be simple, short, clean and precise, only the data that we found to be most relevant and telling were presented within it. These data were presented in ways that can be understood easily yet accurately illustrate the state and direction of each aspect of sustainability at WPI. Most data were expressed in graphs and a table, which were explained or referenced by the text. Below are examples of how data were represented and the rationale for specific representations:

- Bar graphs show each year's data as discrete bars whose heights are easy to compare; in a graph such as Figure 1, which has data from several years, it is easy to see the recent upward trend. These graphs were made only as large as was necessary to convey their message; this allowed the Report to remain brief yet informative.

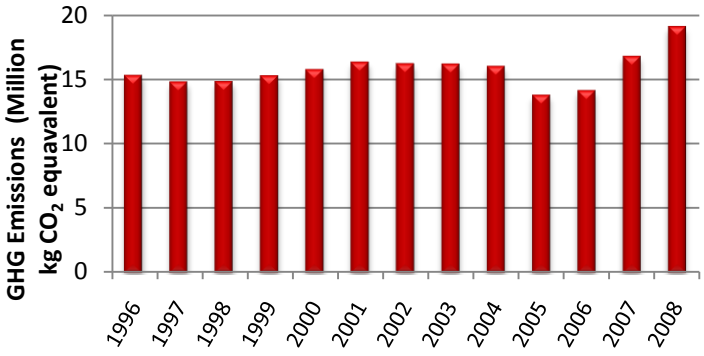

Figure 1: Equivalent CO_2 Emissions

- When two indicators, such as recycled waste and solid (non-recycled) waste can be combined into another indicator (total waste), we used a stacked column bar graph (Figure 2). The advantage of this is that the reader can see several trends and relationships; the individual components' trends, the overall sum trend and the changing proportion of one component to another.

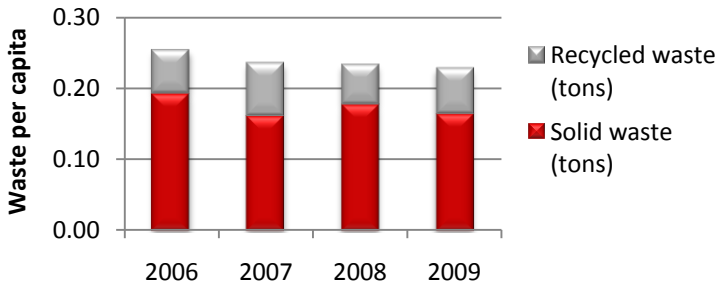

Figure 2: Per Student Waste Production

- One pie chart (Figure 3) was used in the report to show the relative composition of WPI's waste for 2009. The pie chart immediately impresses upon the reader the relative size of the categories. At a glance, the reader can see that non-recyclable materials constitute almost three fourths of all waste (73%) and that hazardous waste represents an infinitesimal amount of the total waste (0.3%).

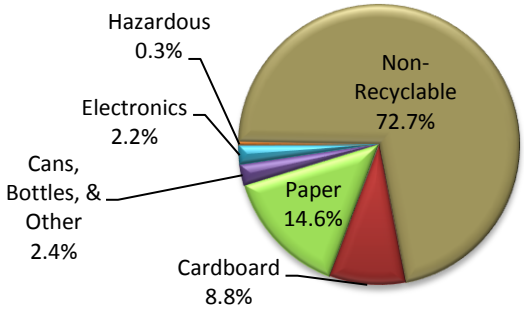

Figure 3: Breakdown of Waste in 2009

5.0 Conclusions and Recommendations

In this section, we explain obstacles that we encountered throughout the course of our project and provide recommendations to the Task Force and future developers of the Sustainability Report for improvements to future reports and for WPI sustainability in general. This section consists of four areas: Sustainability Reporting and Policy, Operations, Academics and Community. The first section deals specifically with future reports while the other three contain specific recommendations for WPI based on the information we collected. Each section is divided into a series of findings which are then discussed with specific examples and concluded with recommendations for improvement.

5.1 Sustainability Reporting and Policy

Finding Rep-1 – The sustainability initiatives of other universities provide examples of good practices and costly errors that WPI can learn from.

> **Discussion** – Numerous academic institutions throughout the world have started their drive toward greater sustainability; some have sustainability programs dating back to the 1990s. WPI can use the data that was assembled by the Report to compare its overall performance to that of similar schools over the course of several years. Similar schools have about the same number of students or comparable endowments and therefore face similar challenges.
>
> **Recommendation** – In addition to publishing its own reports, WPI should try to keep up to date with other universities' programs. WPI can then see in which areas these schools have excelled and investigate the practices that have led to improvement. Aspects in which other schools have not performed as well as WPI can be investigated to find and avoid the cause of their apparent underperformance.
>
> Schools that have accomplished outstanding feats of waste or energy reduction, or that demonstrate exceptional engagement to the community, but are not similar to WPI, also serve as useful case studies. These institutions have achieved significant results through clever and novel programs that merit consideration by the administration. One useful practice found in other schools that WPI is attempting to adopt is the publication of sustainability reports.

Finding Rep-2 – A sustainability report has the ability to encourage the administration to take action on areas in need of improvement and to reward improvement with recognition (Blackburn, 2007).

> **Discussion** – Organizations with sustainability reports have the ability to set goals each year because they know the condition of their sustainability programs. For example, UC Berkeley has been able to set itself the goal of reduction in greenhouse gas emissions to 1990 levels by 2014. This is because they knew 1990 levels and have analyzed opportunities for improvements based on more recent information.
>
> Publishing the report periodically will help encourage people and programs that are making progress and motivate others to try to make progress in time for the next publication. This would be similar to the motivational effect the SEI Green Report Card had on WPI; the very first

attempt resulted in a D minus, which motivated the Task Force to act quickly and achieve a B plus within two years.

Recommendations – Publish this first WPI Sustainability Report and continue to make and publish a new report each year and use the information from these to set new goals and policies.

Finding Rep-3 – The information needed to make an Annual Report is spread across many offices and departments, making it difficult and time-consuming to gather data, analyze performance and prepare reports.

Discussion – Information gathering for the Report constituted the bulk of the team's effort, as each person who had data or information had to be identified, then tracked down and interviewed individually. Though much of the operations data had already been gathered by the Sustainability Coordinator, some had to be gathered from old, disorganized water and electricity bills. The bills required hours of attention for just one year's data. Fortunately, all operations data for future years are now tracked by Facilities for use in STARS and other reports.

Qualitative information, the hallmark of the Academics and Community sections, is even more challenging to find and analyze. This is something that is scattered in myriad news articles or can only be learned by talking to the relevant people. Much information on the status quo has already been gathered, therefore the next step for the authors of the next Report will be to identify and analyze changes that have occurred since the last report and increase the depth of these sections.

Recommendation – WPI should create a central system into which the responsible parties can input data with minimal effort to facilitate speedy and accurate data collection for Task Force use. These data can be uploaded to a Sustainability Report SharePoint site, which can be viewed and modified by the Task Force. The Student Activities Office can then upload their community service and charitable donation information to this SharePoint. Other offices and individuals who have information relevant to future Reports could likewise access the site and readily input their data.

Finding Rep-4 – There are not enough people focused on promoting and implementing sustainability initiatives at WPI.

Discussion – Ms. Tomaszewski Sustainability Coordinator and System Manager of Facilities is the only staff member that is employed by WPI for the purpose of promoting sustainability. Unfortunately, promoting sustainability is only a portion of her job since she has many other roles to balance. Since 2008 she has only had one work-study student that assists her with a focus on sustainability.

The President's Task Force has several members from various departments who directly influence the sustainability movement on campus. However, each of the members has many other responsibilities that demand their attention.

The Green Team, an unofficial student organization that aims to foster environmental awareness at WPI, was founded in September 2009. As a student organization, the Green Team can aid in raising awareness, however they do not have the authority to actively make changes.

As a result, WPI lacks the manpower and time commitment to push the sustainability movement forward.

Recommendations – A full-time sustainability coordinator at WPI would greatly benefit the school's sustainability program because they would be able to afford the time and they would have the power to influence changes. This person could also be responsible for leading the Task Force in writing the sustainability report each year.

5.2 Operations

Finding Op-1 – WPI has not yet created policies or goals with respect to most facets of environmental sustainability.

Discussion – There is currently little collection or analysis of data related to environmental practices at WPI. Without a comprehensive understanding of WPI's current and past status, any future plans or policies that are developed may not fully address the issue. However, WPI needs attainable goals to motivate people.

WPI has seen large increases in the amount of electricity, heat and greenhouse gases since 2006. Waste has changed little over time; there was less than a 4% decrease per student since 2006. Water use has not significantly changed for the two years which it is available. With a lack of policy these trends are unlikely to change, energy use will continue to increase with the expanding campus size and population.

Recommendations – The President's Task Force on Sustainability should continue to publish the Sustainability Report and use the findings to establish new policies.

Finding Op-2 – WPI's commitments regarding green buildings and food waste reduction have shown encouraging results, but potential for improvements still exists.

Discussions – WPI has pledged to make every new building LEED certifiable with the new athletics facility planned to achieve at least LEED silver certification. Chartwells has also made significant contributions to sustainability at WPI with a food recycling program in Morgan Commons which donates nearly 400 lbs of discarded food each day to a local pig farm as well as providing more local food to students through external groups which connect Chartwells to local farmers.

Recommendations – Chartwells should explore the feasibility of introducing its food recycling program in its other locations at the Campus Center and Founders Hall.

In addition to aiming for LEED certification in new construction, WPI should also focus on attaining high levels of environmental performance and certification for renovation projects.

5.3 Academics

Finding Ac-1 – The projects program at WPI has a very strong link to sustainability.

Discussion – A large number of projects are related to sustainability. Most projects in the Global Perspectives Program and a large number of on-campus projects are related to sustainability in some significant way. The recently established Great Problems Seminars, a set of project-based classes for first-year students, are focused entirely on issues facing the world today that are sustainability-focused by their nature.

Recommendations – WPI should continue to promote sustainability through project work and new sustainability-themed global project centers. WPI should also continue programs such as the sustainability poster competition, an event sponsored by the Environmental Studies program that was established last year to allow students who completed a sustainability-themed IQP, MQP or GPS project to present their work.

In addition, students' work and findings could greatly assist the Task Force in promoting and executing novel sustainability initiatives. Members of the Task Force should investigate completed projects to determine which could be applied at WPI. In addition, the Task Force should encourage students and faculty to take up projects to investigate key sustainability issues for WPI.

Finding Ac-2 – Sustainability is approached in much greater detail in projects and not as much in the classroom.

Discussion – In our review of the course catalog we found that only 3.5% of courses could be counted as sustainability-related and only 1.7% as sustainability-focused. This finding, combined with a very low response from our departmental inquiry (Appendix E) suggests that sustainability taught in the classroom is not a major area of focus.

Students that graduate from WPI are involved in major industries in science and engineering. It is important that WPI students learn the impact of their decisions as they relate to sustainability for them to be effective employees and leaders.

Recommendations – Sustainability should be addressed in more courses. It may not be feasible to create many more sustainability-focused courses, but it would be greatly beneficial to make more courses sustainability-related. Students will then be more aware of WPI's initiatives and industry practices regarding sustainability.

In addition, to garner a greater response from the departmental inquiry, the Task Force should send out the questionnaire and remind the department heads periodically. This will help to obtain more informative responses from this inquiry.

5.4 Community

Finding Com-1 –WPI students are actively involved in community service.

Discussion – A large number of WPI students frequently participate in community service programs and organizations. New groups are occasionally formed which address specific local or global problems. Since 2006, community service and the amount of money that is donated by the WPI community have increased by 140% and 340%, respectively. This was in part due to an improvement in the reporting system as well as the establishment of campus-wide charity events, most importantly Relay for Life.

A lot of service is done by Greek Life programs as well. A large number of major fundraisers and many community service programs are initiated by students involved in sororities and fraternities. Since WPI is the only college in Worcester that offers Greek Life, students and the community benefit greatly from their service.

Recommendations – WPI should continue to promote participation in community service. There should also be a greater push or an incentive to encourage students to report their contributed hours so that there can be a more accurate measurement of student involvement.

Finding Com-2 – The Community section of the Sustainability Report does not contain enough information.

Discussion – Currently, the Community section of the Report focuses on two primary indicators: hours of community service and the amount of money donated to charitable organizations. To get a better picture of how WPI affects it communities in Worcester and abroad, there needs to be indicators that show this.

Recommendations – Future authors of the sustainability report should attempt to find other indicators of WPI community contribution that could fit in this section.

One possibility may be breaking the Projects section into two parts, the academic and social aspects. The social focus of the Projects Program would be appropriate for the community section and could include specific instances in the past year where WPI students helped those in need over the course of their project.

Another consideration may be to merge the Academics and Community sections to show how people at, and around, WPI are affected by WPI's sustainability initiatives.

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Appendix A. **Individual Sustainability Report Reviews**

A.1 University of California, Berkeley, 2009 (McNeilly, 2009)

35 pages, 9 pictures, 8 graphs, 7 tables

This is UC Berkeley's third Sustainability Report, though it is the first to use the name "Sustainability Report", the 2005 and 2008 reports were "Sustainability Assessments". This report uses its 35 pages to discuss the University's environmental impact and the involvement of Berkeley's community in its sustainability initiatives. There are about twenty indicators of Berkeley's performance in terms of energy, water use, waste generation, greenhouse gas emissions and LEED certification of its buildings. The last sections of the report deal with academics as they relate to sustainability and the awards the University has won for its work in sustainability.

After the executive summary, the report introduces its major areas of focus and UC Berkeley's Sustainability Plan. At the beginning of each section the data is presented in a table, often it is accompanied by a graph. The discussion of the data is brief; it reports what the status of the indicator is and why it has changed very plainly and without much detail. After presenting the data, the report discusses UC Berkeley's sustainability achievements, its goals and its plans to meet these goals or create new ones.

Early on in the report, the authors present a table of metrics with data from 1990, 1995, 2000, 2006, 2007 and 2008; pieces of this table are presented again with a little more detail at the beginning of each individual section. This table allows readers to reference the data easily without having to search out the individual sections they're looking for and presents a brief summary of performance to compare against the previous reports. Another noteworthy feature is the "Highlights" summary at the end of every section; this consists of descriptions of award or grant-winning people or programs and other interesting people and initiatives from Berkeley.

UC Berkeley's report appears to consist almost entirely of good news; this might lead one to question the transparency of this report (though, doubtless no sinister efforts at deliberate misinformation have been made). The writing style makes this report rather approachable, it is brief and to the point and uses as little jargon as possible without condescending to the audience. Visually, this report is lacking, the use of pictures and the appearance of its tables and graphs lack the sophistication of other reports and are generally unappealing. The report does organize the information quite well; the format of the sections is consistent throughout the report and most charts present relevant information effectively. The "Highlights" help the report showcase how the community is ultimately responsible for any changes in the environment and helps break up the data-heavy sections of the report. The indicators are numerous enough to provide an impressive level of detail without overwhelming the reader with excessive amounts of data.

A.2 Clark University, 2007 (Clark University, 2007)

21 pages, 15 authors, 12 pictures, 9 bar graphs, 2 pie charts, 1 visualization

The Clark University Sustainability Report for 2007 is the first sustainability report from Clark University. It is 21 pages long. It was written by the fifteen members of the 2006-2007 Environmental Sustainability Task Force to report on the progress of the previous three years (2004-2006). The report focuses almost entirely on the environmental impact of Clark University in four major topics; energy use, greenhouse gas emissions, waste and recycling and paper use. The fifth section of the report is a brief overview of Clark's curriculum as it relates to sustainability. At the end of the Energy, Waste and Curriculum sections the authors inserted short articles discussing interesting initiatives and programs that relate to the section.

The report is visually appealing; it makes extensive use of Clark's color scheme and color photography, as well as several accessible tables and graphs. Callout boxes are used several times to explain terms like LEED or add details that would be inappropriate in the main text. Throughout most of the report the authors use straightforward language to state and demonstrate the data and explain terms that are used frequently throughout the report. The information is stated plainly, concisely and in relatively short sections that allow the reader to pause without interrupting the flow of the report.

Each section is highly organized, and most of them follow the same pattern; background information is presented, the data is presented and explained and goals for future performance and recommendations for achieving these are proposed. The Curriculum section does not follow this pattern; instead it lists all majors, courses, graduate programs and some notable research institutes that are part of Clark. At the very end of the report there is a short section about alumni who pursue environmental careers, including a testimonial from one alumnus.

One of the greatest strengths of this report is its style; it is very simple and accessible and presents a great deal of information concisely and in relatively few pages. The stories of interest at the end of some sections also help the reader gain further insight into Clark's efforts and what the reader could conceivably do to help. The report does, however, make conclusions and recommendations based on a very limited data set. It is an *environmental* sustainability report, which means it provides little insight on how to manage other aspects of sustainability. The report does, however, show a strong example of an organization scheme for the individual sections of the report.

A.3 Dartmouth College, 2006 (Dartmouth College, 2006)

Report Structure

This report is purely data from as early as 1995 to 2005. The report is 24 pages long and contains three major sections: inputs, outputs and monthly energy footprint. The Inputs section describes things that are brought into the system such as purchased electricity and oil. The Outputs section covers emissions and waste. The Monthly Energy Footprint is a measure of how much land would be required to sequester CO_2 produced from the consumption of energy.

The data in this report is presented very well, but unfortunately there is no discussion of the data. It would be useful to know what programs or initiatives helped to influence these changes so that they can be improved in the long run.

Key Features

Monthly Energy Footprint – This value is determined by a simple multiplication of presented energy values, such as energy use in kWh or oil burned in 1000 gal/Degree Day, by factors called "footprint factors." Footprint factors represent the amount of land, in acres, to isolate the carbon dioxide produced based on the type of energy burned.

Overall Summary

This report would be a very useful reference for anyone that needed to view all the appropriate data related to sustainability at Dartmouth College. Unfortunately, this data is not analyzed and is merely presented to the reader. It's one thing to see a decrease in energy consumption, but another entirely if it's shown that this reduction was a direct result of an initiative put forth by the university.

The Monthly Energy Footprint seems to be a useful indicator. It's not immediately clear exactly how these calculations were made which makes the value seem arbitrary. An appendix or other attachment that shows footprint factors or why this number is relevant may have been useful to include with this document.

A.4 Indiana University, 2008 (University of Indiana at Bloomington, 2008)

Report Structure

The 2008 report from Indiana University is a 122 page non-annual summary of Indiana's initiatives, accomplishments and objectives in the field of sustainability. This report includes a lengthy description of each section which range from the administrative objectives to their sustainable food program. Since this report is not an annual report, there is significantly more detail than most of the other reports that we have researched.

Key Features

The main thing that stands out about this report is its Recommendations section. Most reports simply present data and suggest programs that have influenced their data. If recommendations are made they are usually fairly short or faintly outlined in the introduction. Since Indiana University will most likely not be publishing another report for a couple years, their recommendations sections contain a lot of significant goals to be implemented in the short term and in the long term. In a few years, the University can look back on this report to see which goals they were able to accomplish and which require more work.

Overall Summary

This report is very effective in getting across its message. However, its length makes it more of a reference document than anything else. It's very hard to read this report all the way through and even then, not all of the information gets across the first time. In providing recommendations, the report also provides a number of paths that the University can take.

Since our report will be an annual report, length is an important consideration. We want anyone who picks up our report to be able to read a substantial portion and get a feel for WPI's objectives without laying them out entirely. We aim to be succinct and still provide the reader with the data and ideally a

fair amount of analysis so the reader can see where the numbers are coming from. It would be beneficial to mimic the recommendations sections of this report. The recommendations we would provide would be more short-term, but would help guide our progress.

A.5 MacQuarie University, 2008 (Derby, 2009)

Report Structure

This report covers three major sections which are labeled as People, Planet and Participation. These sections contain indicators adapted from the Global Reporting Initiative's G3 framework and from the Campus Sustainability Assessment Framework. Each section contains a list of goals and a list of objectives that will help work toward those goals.

The primary feature in each section is the actual table of indicators. This table has 5 columns the first of which is "Theme." Theme represents the primary focus of the rows it covers. These themes include things such as water and Energy & Emissions. The second column titled "Indicators" cites the specific data that will be collected within each theme. The next two columns are the current values and the 2014 target. These are followed by a Performance column which contains a small picture of a face. The face is smiling if the reported values are good, neutral when there is little change and frowning if they need improvement. The Performance column gives little information, but allows someone who is browsing the report to get a cursory glance and brings focus to areas of great accomplishment and areas that need greater focus.

Key Features

Highlights – At the conclusion of each section is a list of significant accomplishments that were completed in that year followed by a list of future accomplishments.

Spotlights – These brief boxes described specific accomplishments within each section. They are similar to highlights, but contain a little more detail.

Challenges and Opportunities – This section is a large list of challenges that will be faced by the Sustainability program at MacQuarie in years to come as well as opportunities that can help face some of these challenges.

Overall Summary

This is MacQuarie's first attempt at a Sustainability report and astonishingly good one as well. The report is eye-catching, but perhaps a little busy. There is a lot of very small text that is difficult to read and the report is cluttered with pictures. The data is presented in a very orderly fashion and is compared against future goals, but not against past data. It's possible that past data is not available, so it's possible this will be reported on in future reports.

The Highlights and Spotlights sections were very useful to show specific accomplishments and help to explain the story behind the numbers very briefly.

A.6 Michigan State University, 2007 (Link, 2008)

104 pages, 60 scatter plots, 58 pictures, 29 bar graphs, 3 maps, 1 Venn diagram

Michigan State University's second sustainability report comes four years after the first. The report covers a wide array of issues and represents a holistic approach to sustainability akin to the Triple Bottom Line philosophy of sustainability. The report uses 88 different indicators, most of which are quantitative, to track its progress. At 104 pages long this report is exceedingly long; it would take hours to read through the entire report and its numerous charts and graphs. The sheer amount of information is overwhelming, though this report is doubtless an invaluable administrative tool; at the very end it presents clear and achievable goals for the university. The written elements are clear enough in their presentation of the information, but the charts lack polish, especially the scatter plots that provide little information due to scaling issues.

The key feature of this report is that it covers nearly every conceivable metric for sustainability, from the University's use of electricity to its use of land to the economic situation of its students and the wages of its employees. The detail of the data is both admirable and superfluous; most readers would likely simply skip the details in search of what it all means. One of the features that set this report apart from the rest is the specific recommendations and goals it presents for each and every indicator. These goals typically include what should be accomplished within the next year, within the next five years and within the next ten years.

Despite the use of very specific indicators and seemingly narrow focus on each, this report represents a holistic view of sustainability. Indeed, the authors encourage readers to think about how most indicators are inextricably linked, and that change in one area leads to change in another. This, and the apparent accuracy and consistency of its data, are the greatest strengths of this report. The report is far too long and visually unrefined to serve as an adequate model of an accessible report for the entire community.

A.7 UNC Chapel Hill, 2005 (Elfland, 2006)

Structure and Data Presentation

The report is 28 pages long and divided into various parts based on different perspectives. Besides the Academics section, the rest of its indicators can be categorized together as operation. The whole report contains two charts. Data are spread though paragraphs and there are not very many of them.

Key Features

This report's appearance is very attractive: plenty of high quality pictures, pleasant color combinations and clearly labeled sections and subsections. Putting academics in the first place and further divide it emphasized the basic of an educational institution.

Overall summary

The writing of this report is elegant. Putting matching pictures in each section definitely eased the reading. We would like to see more tables with valid data, so that the report will have more credibility.

A.8 University of Florida, August 2001 (Newport & Chesnes, 2001)

Structure and Data Presentation

This report starts with a detailed profile of UF, followed by an executive summary, the university's vision and policies regarding sustainability. Then a section called Performance Indicators takes place of the majority percentage of the report. This report is 48 pages long. Over 20 pages of it contain column and/or pie charts, which are basically the only format with which this report represents its data. Most of the data lack straightforward explanations of what the data means or how it is related to sustainability.

Key Features

The Performance Indicators contains abundant indicators that might be inspiring to our report.

Overall summary

This report is developed in accordance with The Global Reporting Initiative G3 Guidelines, which makes it a bit different from other college sustainability reports. The indicators do not necessarily suit in a university setting. There are no further explanations of why UF chose those indicators and data to be part of the sustainability factor. General audiences may easily get lost.

Expect the front and back cover, the entire report is in black and white, even the charts. No pictures involved. This report is not designed to attract people's attention toward sustainability.

A.9 University of Maryland, 2008 (University of Maryland, 2009)

Structure and Data Presentation

The report is 44 pages long and covers indicators among operation, community and education. It used two pie charts and several column charts, which in our opinion is not enough. The rest of the data are spread though the paragraphs, making it hard to compare to others.

Key Features

Visually appealing. Great pictures and the layout is neatly arranged. Writing flows well, easy to read and follow. The "call-out section" on the right side of the page is a good way to highlight important information.

Overall summary

The use of green heading and green paragraphs are not very fitting and kind of too obvious. Some of the charts are not properly scaled so the changes they suggest are not very comparable. We were expecting more content on education and research. Community outreach should not be place between them.

Appendix B. **Sample Interview Questions**

What is your role at WPI?

How do you feel WPI is doing in its efforts to become more sustainable?

What information would you want to see in an annual sustainability report?

For the report, we will need to collect a large amount of data. Areas include energy use, water use and waste management among others. Do you know someone who could provide us with the appropriate data?

Where do you think has WPI improved the most? What areas need more improvement?

What is it you do?

- Misc Questions
    - Does WPI have a policy regarding renewable energy? Purchasing offsets\generating?
    - Where does our energy come from?
    - Where is the heating energy generated and how?
    - Who handles recycling and waste disposal for WPI?
    - Where does WPI get its water?

Negatives

- In order to maintain transparency in the report we need to talk about what WPI is doing well and in what areas it needs improvement. Are there any areas of concern that WPI will need to address in the coming years?

Appendix C. **Interview Summaries**

C.1 Elizabeth Tomaszewski, 1st Meeting

Question From Liz

Why are we (students) doing this project, why are we interested? She has wanted to do something of this sort, but sustainability is only part of her work.

- Professors' idea, we were very interested in this idea, to bring this information to the public

- Bring all information together into big picture

- First ever, it is a challenge

Liz agreed that this is a challenge, similar to challenges she faced coming up with first STARS project, which was the Coordinator's first sustainability effort. Liz assumed responsibility for sustainability on Sept. of 2008, there was no one previously. At the time she was told she would oversee a student sustainability coordinator (**Carol Okumura**) who would report to her. She ended up completing two major surveys, tens of hours each, after finding out November 2008 that STARS was due at the end of December 2008.

Academics

Regarding Academics section: Is Fred Hart working on definition of sustainable courses?

Part of STARS 1.0 states that we need at least 3 faculty members and others of WPI's choice to define what sustainability-focused and sustainability-related courses are. Last year's STARS's section on academics had no faculty input, new STARS requires greater effort and consistency.

Liz asked **Fred Hart** and **Rob Krueger** if the process above could be defined soon. She was told Fred would oversee this soon.

Operations

Regarding Operations:

Is it feasible to divide information by building?

WPI is new at collecting all this data; as the need to combine information to report electrical, oil, gas, water, etc arose, it became apparent how daunting this is. Liz's office has been working with **Systems** to collect data more systematically than collecting every invoice.

At this point Liz shows us a spreadsheet of electrical consumption data for most campus buildings, all the main buildings, the apartments, other peripherals. Some of these buildings are aggregated, such as the main campus.

Originally this spreadsheet was created as a means of paying the bills in a coordinated and timely manner by the Financial Resources Coordinator, who pays the utility bills for the campus. This records

the dollar amount and the kWh by month. Similar spreadsheets exist for other utilities dating back to the end of 2008.

Are there sources from previous years?

There are charts and tables of indeterminate origin. Also, GHG emission data for some years may be inconsistent, but it is a start.

Waste and Recycling
There is increasing interest in waste management, how to minimize it, how to increase recycling. **Carol** has been attempting to gather information on waste from 2006 to 2009, the actual numbers are available, including per capita waste.

Waste at WPI is handled primarily by two groups, **Waste Management** and **Institutional Recycling Network (IRN)**. Since 2006, each group has supplied WPI with information about the waste that is taken from WPI and presents this data in reports that are submitted monthly. IRN reports are precise and contain a variety of information. The layouts of the reports are very good and present the data numerical and graphically for the reader's benefit. The Waste Management reports are a bit less precise. All the data is presented numerically. There was even an instance where there was missing data that Liz and Carol inquired about to no avail. Overall, the system needs a bit of work, but it is a drastic improvement over what was in place just a few years ago.

Liz also informed us that we have waste records from **Gilbane**, the company was in charge of construction of East Hall. Information of this nature is something that we intend to report on. Since the Goddard Hall renovations occurred in the past year the waste statistics would make a good highlight in the report. For more information on this, Liz suggested we talk to **Chris Salter** who was in charge of the renovations.

Liz also informed us that there is also data on chemical, radioactive and biomedical waste. She also brought to our attention a program that allows members of the WPI community to recycle electronic waste. Surprisingly, not many students know about this program and therefore it is not currently used very much.

Transportation
Liz mentioned that it would be interesting to present the mileage on the Zipcars in the report. This would give us an idea about the success of the program. In addition, once the carpooling program gets up and running, this would be another interesting statistic to track. Currently, we track the mileage on Campus Police vehicles including the SNAP vans and the cruisers. This is also the first year in which the mileage on Facilities vehicles is being tracked.

Utilities
The power plant at WPI supplies some of the required power and all of the heating to the main campus. This used to be done by burning oil, but WPI has recently switched to 100% natural gas. To heat the campus, the plant is started in mid to late October. Other WPI owned buildings off-campus are heated individually by burning oil or natural gas.

Liz suggested that we might talk to **Bill Grudzinski** who runs the power plant and could provide us with more information about its operation. In addition, Bill has worked on a number of projects that may be interesting to look into. Bill has been working with **Citizens Energy** which recently did an energy efficiency audit on WPI's facilities. Those results are not yet available, but would be very useful for the report. Citizens Energy was also looking into putting solar cells in various locations on campus. Bill would know more about that. In addition, he worked with Mechanology which proposed adding a generator to the steam line.

All of WPI's water comes from the City of Worcester. In the past, there was discussion about introducing a gray water system to the campus. This water would be mainly used for irrigation purposes. WPI's electricity is supplied by **National Grid**. Liz also mentioned that she doesn't believe that there are any concentrated efforts to introduce renewable energy sources. There has been discussion about solar cells and wind turbines, but there is no plan currently in place.

Community
Nick: talk to **Rob Krueger** and community service group on campus.

Liz: the community service groups definitely do a lot of work. The average number of hours per student contributed to community service is 18.1. 21,696 hours total through **APO** and other groups. Data provided by **Emily Perlow** from the Student Activities Office.

Community Council: over a year and half ago, Dr. Berkey asked Liz to reconstitute the Community Council. It represents various groups of people on campus. The council talks about issues that affect the quality of life on campus. Sustainability is a major contributor of quality of life and the council has discussed a large number of issues related to it. The suggestions come from everybody.

Shang: our report can highlight less well known organizations like the Community Council so that people will have a better knowledge of them.

Green Team: not an official club yet but is going to be one. 25-30 students and 15 of them are very active and involved. Combine **GAEA** with Green Team. Carol and **Ashik Gowdar** are the co-Presidents. There is a list of all the activities the Sustainability Task Force has done in 2009.

Areas for improvement
Liz was not very happy with recycling program. Not enough recycle bins on campus or in residence halls due to cost. Students are calling for more. Another problem is some students sabotage recycling, such as put food waste in recycle bins.

STARS 1.0
Liz has not heard back from President Berkey yet about signing off on STARS 1.0. However, if it becomes an issue, she will request a meeting with him. Liz believes STARS will be the preeminent sustainability measurement tool over and above Green Report Card. She wants WPI to participate and get the recognition for the work we do here.

C.2 Emily Perlow

After a brief introduction of our IQP by Nick, we asked Emily if she had a list of all the organizations that do any type of community service. Emily handed us a Community at WPI brochure and said it has listed all the service based organizations. The brochure also described ways in which people can get engaged with community service. It would be a good resource for us, said Emily.

She gave us the exact numbers of hours of community service reported each year and stated that people do more services than they actually report. Along with hours, incidences of services and money raised are also included. Incidences are counted by one student working for one agency. So, for example, if a student worked with Habitat for Humanity and participated in Work on Worcester, this would count as two separate instances.

The data cover the years of 2005-2006 to 2009-2010 that has been collected so far. The number has been going up over the years. This past year Emily had some trouble getting both individuals and groups to report their services, so the measure is lower than the real situation.

Currently, Relay for Life is the biggest event in terms of dollars raised. In terms of people participation, Work on Worcester is the biggest (250 to 300 people this year, about 225 people last year). Giving tree is very big too. The number of children adopted was 98, 124, 148, and this year 108 and counting.

We also asked Emily if there was anything in particular that she would like to see in the report. Since this is a sustainability report, she suggested that it would be beneficial to report on programs and groups, such as Recyclemania and the Green Team, that focus on environmental issues and are community oriented. She also suggested that we categorize the data that she has provided based on their value. The value could be based on the services' impact in areas of community service and green thinking and could be modified based on the number of students who participate in the program.

According to Emily, the amount of service has increased significantly in the past few years. She believes that this is due in part to the 15 hours of required community service for those receiving work study. It is likely that these students often continue doing service after the 15 hours are completed. Unfortunately, this may not be accurately measured because the extra service is not reported.

In addition, the types of service have been increasing as well with the introduction of several specific organizations to WPI. These groups include Invisible Children, Colleges Against Cancer, Amnesty International and Engineers Without Borders. These groups all must go through an application process in which they must draft a constitution and have 50 students sign off on the program to show that it has support. The groups then meet with SGA to gain approval and club status.

Community agencies that often contact the community, how many are sustainability related? For example, there is a project to teach construction skills and earn a GED while renovating houses to become "Green" with Worcester YouthBuild Partnership. Current lecture series organized by student activities office do not focus on sustainability; however, last year's Quadfest theme was "Going Green".

In terms of where WPI needs most improvement, education about sustainability issues is key. Currently the recycling program needs a lot of help in getting students to recycle correctly, particularly in keeping trash out of recycling containers. If people were better educated or motivated about this, waste and recycling data would change significantly.

Chartwells has adapted quickly and created myriad sustainability programs and policies, but there is still work to be done, with little things like take-out containers. There may be opportunities for improvement within each department; while there has been a significant reduction in paper use in some departments, others continue to operate as they have for many years. For example, the parents weekend letter was replaced by a simple postcard while the orientation package remains hefty.

It is true, as in any community, that some members simply do not care to do any service or get involved in activities. WPI students are not very politically engaged, the kind of student WPI attracts is not necessarily engaged in political issues. Teaching people very early on and continuing to create a culture where it is easy for the individual to be sustainable and it is socially unacceptable to be wasteful and conscientious. It would be of great benefit to have staff dedicated specifically to service and to continue increasing focus on recycling and conservation of resources.

C.3 Rob Krueger

To begin the meeting we asked Professor Krueger what he believes WPI is doing well on in its sustainability initiatives. He mentioned that so far we have done a very good job of meeting standards set by external organizations. Specifically, he mentioned LEED certification, AASHE's STARS and the Green Report Card. In each of these, we have greatly improved between years.

He also mentioned that there are a lot of opportunities for students to learn about the problems that are facing sustainable development through programs like Environmental Studies and through the Lecture Series. One major problem with this is unsuccessful attempts to increase student awareness and attendance. Making them a requirement for classes is one potential method, but he also mentioned that an Environmental Studies Facebook page may also be an option.

In terms of how the Task Force is approaching the subject, Krueger mentioned that the group understands the importance of the social and economic issues in addition to the environmental within the topic of sustainable development. He mentioned that while we are doing well with a number of our programs, it would be better to see a greater community engagement. When asked about how to approach the social justice aspect into our report, Krueger mentioned that we haven't really made an effort in this field outside of the people we've worked with already. Locally, the Worcester project center has been collaborating with the mayor to improve this. In terms of abroad IQPs in general, he mentioned that we unfortunately don't promote how positively the program affects communities that they're involved in well enough.

When asked about how WPI's global projects uniquely affect the communities around the world, Krueger said that Americans actually can do a better job, with fair trade coffee for example. WPI's food service Chartwells makes a commitment to use fair trade coffee. However, WPI also has a Dunkin Donuts on campus, which has a very limited but expensive selection of fair trade coffee products,

though their normal coffee is not. Krueger thinks the school should replace Dunkin Donuts with a local vendor to contribute back to the community. When asked if the café in library will be locally run, he replied that he did not know but would bring it up in the next Sustainability Task force meeting.

Krueger also shared his pride about a project WPI students are working on called AIDS Project Worcester. This project's goal is to create a community garden that will provide both nutritional and educational benefits for people have AIDS. Gardening is one of the most sustainable things for a community. Before World War II, a great majority of agriculture products in America were grown locally. Now it is only a very small portion. Community gardening saves the energy of long distance transportation; it's more organic; it also provides connections to the groups of people that society has overlooked.

Another project that concerns about environmental and social justice issues is called Ex Prisoners Organizing for Community Advancement (EPOCA). This is a group of people who were convicted of a felony and served time in jail. Though they may have been out of prison for many years, they are still discriminated against and cannot find jobs. The organization collects waste vegetable oil from vendors around Worcester and refines it into biodiesel. WPI project groups help them with designing the production process, business plan and fundraising. Krueger thinks that the Community Gardening Project and EPOCA Project capture the soul of sustainability. All three aspects of sustainability, environmental, social and economical, are included and equally represented.

When asked if students that work on sustainability projects are enthusiastic about sustainable development; he replied that the students are excited when they sign on but some enthusiasm wanes as the amount of work that needs to be done becomes apparent. The advisor helps them understand how to do this work effectively and accept that all this work is how the exciting things are made a reality. WPI students generally are more attracted to projects with tangible goals; these are also part of the project center.

This report needs to be honest about how some of the school's efforts are made to meet a standard set by others, to get a good rating. Other efforts, like projects, go beyond what is required. These projects encourage students to examine the broad implications of their work before, during and after they focus on their area of interest. Humility in this report is very important, it must reflect that sustainability is not just one thing or another thing; it is the optimization and interaction of economic, social and environmental concerns.

C.5 Joe Kraskouskas

In August, 2009 Chartwells began recycling post-consumer food from Morgan Dining Hall; about 400lbs/day are taken by a local pig farmer. The farmer gets the waste in exchange for taking it away Program started by sister branch in Worcester State, flowed nicely with the trayless initiative. There was a problem with the pig farmer but it has been resolved.

Trim Trax: Food prep scraps, food that is wasted when preparing food, gets thrown into a bucket, which creates a public visual representation of unnecessary food waste that motivates staff to waste less. The waste is weighed and tracked, eventually ending up with all the post-consumer waste. Data from this

program for a week, month or even year could be made available. This program is implemented in all Chartwells locations campus-wide and nation-wide.

Local Products: Significant expansion in 2009, in the summer, managers went to local farms and committed to purchase specific amounts of food. Sid Wainer and FreshPoint provide local produce, FreshPoint has very recently been added (fall 09).

One thing that is unique to FreshPoint was a program which was called Local Produce Day. This event, co-sponsored by Chartwells, brought in local farmers' fresh produce and sold it to WPI students. There were approximately 150 students that arrived and any food that was not bought was bought up by Chartwells to use in the dining hall. Between the two companies, Chartwells is leaning toward FreshPoint. Unlike Sid Wainer, FreshPoint is able to supply its customers with the source of all of its food.

There hasn't been a significant change in the amount of local products are being used in recent years because there was already a large portion that was bought locally. For example, Coca-Cola products are all bottled locally and milk is produced locally.

As part of this effort, they have also begun to work with a group known as Farm to School which partners local schools with local farmers. Through this group, Chartwells came into contact with another supplier, Acme Pre-Pak which currently supplies fresh produce for local K-12 schools.

Joe referred us to a series of sustainability posters outside of Morgan Dining Commons which detail a number of sustainability related purchases such as cage-free eggs and antibiotic-free chicken and pork. In addition, this type of information may soon be available on the locally run WPI Chartwells site, www.dineoncampus.com/wpi in the sustainability tab.

Joe also mentioned that there are a few recycling systems in place. One is through a man in the ATC, Bruce [Fiene], who reuses all the fryer oil. The other is through a separate dumpster for plastic containers and tin cans and another for cardboard.

When asked about possibilities for future improvements, Joe mentioned that there are a number of areas for potential improvements. One possibility is implementing the same food recycling program at the Goat's Head and the Campus Center Food Court though there would not be as much and it would be more difficult with three different locations to pick up from.

When asked if there is any data about electricity and water consumption involved in dining service, Joe said that he does not have any, but he did meet with Liz Tomaszewski about a year ago to seek the Sustainability Task Force's opinion about how to reduce usage. Since Morgan Hall has changed from doubles to triples, the average people per floor have increased to 96. The master water feed that comes in Morgan provides both the water usage of residents and Morgan Dining Hall.

Joe mentioned that prior to the initiative of food recycling, some food would go down the garbage disposal that were charged by tonnage. All the circumstances make it hard to come up with a simple number for energy usage, water consumption and food recycling. Joe thinks that there is definitely room

for improvements. He listed several examples such as bathroom lights; equipments that do not run all day can be shut off; fryer station and grills are always on and burning gas. Besides these, he thinks Chartwells is doing well.

In response to the areas that Chartwells needs to improve to become more sustainable, Joe said they are taking steps to replace old vending machine with energy-saving ones. He emphasized an ongoing program called Steps to a Smaller Footprint, which makes all the paper products Chartwells uses recyclable. In comparison to the nationwide Chartwells, WPI's is up to speed regarding sustainability and healthy food such as cage free eggs and no trans-fat oil. Chives that grow on East Hall's green roof are harvested for special dining events.

Appendix D. **Collected Data**

Heat	2005	2006	2007	2008
Gas used (therms)	778,761	609,592	582,622	1,446,233
Oil used (gallons)	390,945	248,137	309,503	10,424

Electricity Use	2003	2004	2005	2006	2007	2008	2009
Total (kWh)	17033280	18531600	17984320	18075920	22686047	24207031	26074251
Per Capita	5373	5870	5638	5501	6848	7010	7471

Water	2007	2008	2009
Water (cuft)	24,432	43,955	41,416

Waste	2006	2007	2008	2009
Total Waste (tons)	836.9105	779.44	804.55	795.38
per student	0.255	0.235	0.233	0.228
Solid waste (tons)	630.03	534.25	611.17	571.92
per student	0.192	0.161	0.177	0.164
Recycled waste (tons)	201.58	245.19	193.38	223.46
per student	0.061	0.074	0.056	0.064

Construction Waste	Goddard Hall Renovation
Waste (tons)	491.73
Waste Diverted (tons)	459.186

Pollutant Emissions	2005	2006	2007	2008
Total (tons)	41.4275	13.3812	13.5002	16.1545
Total Suspended Particulates	*1.7964*	*0.0373*		
Particulate Matter < 10µm	*0.4114*	*0.2453*	*0.2124*	*0.24*
Particulate Matter < 2.5µm	*0.1637*	*0.2143*	*0.1936*	*0.2388*
SOx	*23.2913*	*0.9396*	*0.5991*	*0.1714*
NOx	*11.5297*	*7.5325*	*7.3793*	*8.6515*
VOC	*0.2043*	*0.2598*	*0.3442*	*6.1756*
CO	*3.7685*	*3.9625*	*4.6068*	*0.5079*
Pb	*0.0006*			
NH3	*0.2616*	*0.1899*	*0.1648*	*0.1693*

Built environment	2006	2007	2008	2009
LEED certified sq ft	12,600	12,600	115,600	115,600

Student Population	FY 2006	FY 2007	FY 2008	FY 2009
Population (full time)	3286	3,313	3,453	3,490

Community	FY 2006	FY 2007	FY 2008	FY 2009
Community service hours (reported)	9,514	19,542	21,696	22,921.25
Money raised through programs	$19,182.42	$71,281.60	$99,690.30	$84,263.00

CO2 Emissions	1996	1997	1998	1999	2000	2001	2002
kg CO_2	15304915	14807228	14840774	15287045	15761602	16343023	16210136
		2003	2004	2005	2006	2007	2008
kg CO_2		16180494	16008183	13772556	14133892	16780613	19079980

Appendix E. **Department Questionnaire and Course List Review**

To: Department Heads

From: Provost Orr, Chair of the President's Task Force on Sustainability

Date: February 1st, 2010

Subject: As part of an initiative to develop WPI's first sustainability report, we are looking to collect information from all departments about their current course offering and policy on sustainability. The goal of this effort is to ascertain the extent to which social, economic and environmental sustainability problems facing the world today are being presented in our classrooms.

Please complete this form and send to wp-09sustreport@wpi.edu by February 12th, 2010. Any questions about this form may be directed to this address as well.

For the purposes of this document, **sustainability** is defined by the President's Task Force on Sustainability as an integrated, three-part approach for achieving the goals of environmental preservation, economic prosperity, and social equity for all members of society.

1. **In the past few years, has your department placed a greater emphasis on teaching sustainable topics? This can be the addition of new courses or greater focus within courses that already exist. Alternatively, have any such courses been removed from the catalog? Please explain:**

2. **Is there any new research within your department that contributes to sustainability?**

3. **Outside of academics and research, has the department as a whole made a contribution to WPI's sustainability efforts (i.e. using less printer paper, power, etc.)? Please Explain:**

4. **Attached to this form is a list of courses that have been deemed to be related or focused on the topics of sustainability based on their course description in the 2008-2009 Undergraduate Course Catalog. On this page, please list any courses in your department that you believe should be added or removed from the course list.**

Sustainability-focused

Sustainability-related

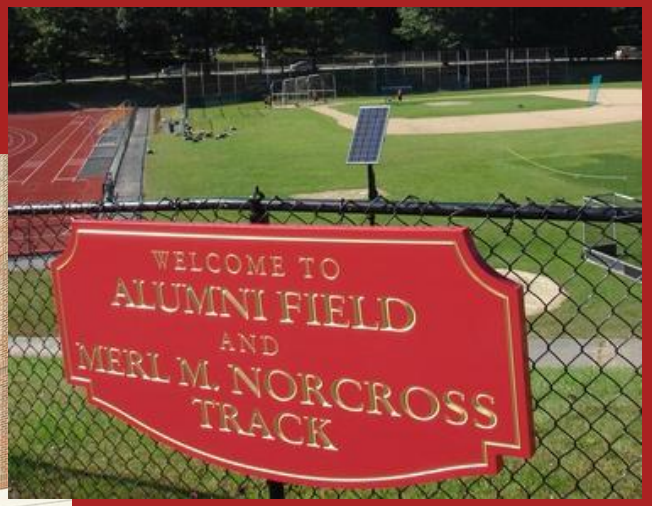
5. **Has there been any change in the number of sustainability focused IQPS or MQPs that faculty members in your department have advised?**

	Description	Focused\ Related
Biology		
BB 1002. Environmental Biology	This course focuses on teaching the fundamentals of environmental biology with major areas including biodiversity, pollution and environmental economics.	R
BB 1035. Introduction to Biotechnology	This course touches upon “green” engineering as one of its many topics of discussion.	R
BB 2002. Microbiology (see note)	This course focuses on unicellular organisms with special attention to those that have ecological relevance. NOTE: There are two courses titled Microbiology with the same course number that teach different fields of Microbiology. The course described here is the class taught in B term.	R
BB 2030. Plant Diversity	This course touches on environmentally important topics such as crop ecology.	R
BB 2040. Principles of Ecology	Ecology is primarily the study of how organisms interact with the environment and can also describe the function or study of ecosystems.	R
BB 2904. Ecology, Environment, and Animal Behavior	In this course, students are able to examine the negative impact from man’s actions on the environment through a series of experimental studies.	R
Chemical Engineering		
CHE 3910. Chemical and Environmental Technology	In this course, students tour various chemical plants to see how modern chemical plants run their environmental programs.	R
CHE 3920. Air Quality Management.	In this course, students learn about air quality control on the local, regional and global scale. The main focus of this course is on the design of air quality control systems and mentions the environmental concerns of air pollutants.	R
Civil Engineering		
CE 3059. Environmental Engineering	This course focuses on the environmental impact of engineering decisions as well as factors including population growth and environmental microbiology among others.	F
CE 3070. Urban and Environmental Planning	This course teaches the student about social, economical, political and environmental factors affecting population growth and distribution patterns. With this knowledge, the student can effectively learn how to modify infrastructure to support current and future growth patterns.	F
CE 3074. Environmental Analysis	This course focuses on teaching how to assess areas of natural environment to determine how suitable urban and resource based facilities would be. This is useful especially when it comes to land use planning and site design.	F
CE 3060. Water Treatment.	This course covers the major processes involved in water treatment. As a course, this is environmentally relevant, though there is little discussion about it.	R
CE 3061. Waste Water Treatment.	This course covers the major processes governing wastewater treatment. Like CE 3060, there is less discussion about the environmental implications due to a greater focus on the technical aspects.	R
CE 4060. Environmental Engineering Laboratory	This course focuses on water and wastewater treatment systems and how to deal with physical, chemical and biological treatment systems. The focus of this course is more on the technical aspect of wastewater management rather than the environmental concerns associated with it.	R
Engineering Sciences		
ES 2800. Environmental Impacts of Enginering Decisions	“Engineering decisions can affect the environment on local and global scales. This course will introduce students to concepts that will make them aware of the ramifications of their engineering decisions, and is intended for engineering students of all disciplines.”	F
Environmental Studies		
ENV 1100. Introduction to	Entirely focused on environmental issues and social and economic interactions with the environment.	F

Environmental Studies		
ENV 2200. Environmental Studies in the Various Disciplines	Interdisciplinary approach to environmental issues, including philosophy, history, biology and economics; the core of sustainability education.	F
ENV 2400. Environmental Problems and Human Behavior	This course deals with how people understand the environment and tries to provide the students with new knowledge and insight on the environment.	R
ENV 4400. Senior Seminar in Environmental Studies	This is the capstone seminar to the environmental studies program in which students discuss the relevance of their past projects including their IQP and MQP.	F
First Year Programs		
FY 1100. Great Problems Seminars	These programs introduce first year students to major social, economic and environmental problems facing the world today. These include the recent energy crisis and world hunger. These courses challenge students to create a project that address these issues on a local or even a global scale.	F
Humanities & Arts		
HI 2401. U.S. Environmental History.	"This course surveys the environmental history of North America from the time of Columbus until the present, exploring how the environment has shaped human culture, and how human activity and human ideas have shaped nature."	F
HI 3317. Topics in Environmental History.	"In this seminar course, students will explore one aspect of U.S. or global environmental history in more depth. Topics vary each year but may include environmental thought, environmental reform movements, comparative environmental movements, natural disasters, the history of ecology, built environments, environmental justice, New England environmental history, or the environmental history of South Asia or another region of the world. "	F
HI 3321. Topics in Modern European History.	"This seminar course examines topics in the cultural, socio-economic and political history of modern Europe, with a focus on Great Britain. Topics may vary each year among the following: nationalism, class and gender, political economy, environmental history, sport and society, film and history."	R
HI 3334. Topics in the History of American Science and Technology.	This course covers a wide range of topics from year to year which occasionally include topics concerning the environment.	R
HI 3343. Topics in Asian History.	"This seminar course examines topics in the cultural, socio-economic, religious and political history of East Asia. Topics vary each year and may include the following: nationalism and the writing of history, travel and exploration narratives, cross-cultural contact, the role of religion and ideology in political history, development and the environment in Asia, film and history, and the place of minorities and women in Asian societies"	R
EN 2237. American Literature and the Environment.	"This course will examine the many ways in which American essayists, novelists, dramatists, and poets have responded to the natural world, and especially to ecological concerns voiced in contemporary times."	R
Management		
ECON 2117. Environmental Economics	Course focuses on the interaction of human activity and the environment. "The course reviews efforts to measure the costs and benefits of improving environmental conditions and evaluates current and potential policies in terms of the costs of the environmental improvements they may yield."	F
BUS 2950. Business Law and Ethics.	This course mainly discusses modern law and public policy and how it affects today's businesses. There is a small part of this course which discusses environmental regulations..	R

ECON 1110 Introductory Microeconomics	Deals with the impact of resource distribution through market economics on the environment and society. Uses techniques learned to analyze issues that arise from the market system such as pollution, discrimination and poverty.	R
ECON 2125. Development Economics	Addresses the ways developing nations can increase their performance and the social impacts.	R
Social Science & Policy Studies		
GOV 1303. American Public Policy	Students may apply what they learn about public policy to specific topics like energy, social and environmental issues.	R
GOV 2311. Environmental Policy and Law	This course deals with the way government action can or does protect the environment and how individuals and groups can use the legal system to help the environment.	R
GOV 2312. International Environmental Policy	Similar to GOV 2311 but with a focus on international policy.	R
GOV 2320. Constitutional Law: Civil Rights and Liberties	This course touches on equal rights and discrimination issues that are commonly brought up as social sustainability concerns.	R
PY 2717. Philosophy and the Environment.	"This course will focus on the following questions: What is the scope of the current environmental crisis? What does this crisis reveal about the philosophical presuppositions and dominant values of our intellectual worldviews and social institutions? How can existing social theories help explain the environmental crisis? What implications does the crisis have for our sense of personal identity? What moral and spiritual resources can help us respond to it?"	R
PSY 2405. Environmental Problems and Human Cognition	Students taking this course learn about how the actions of people affect the environment and the way that people think about various environmental topics.	F
Mechanical Engineering		
ME 4832. Corrosion and Corrosion Control	This course briefly touches on the environmental hazards of different forms of corrosion.	R

Appendix F. **Sustainability Report**



Campus Sustainability Report 2010

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Picture of President Berkey here…

A Message from President Berkey

Sustainability Reporting

Sustainability at WPI

The President's Task Force on Sustainability was established in 2007 to encourage and support the sustainability movement at WPI. The Task Force defines sustainability as a three part approach toward environmental preservation, economic prosperity and social equity that places an academic focus on creative, but practical solutions to complex problems.

"The purpose of the President's Task Force on Sustainability is to provide leadership and coordination for WPI's campus-wide efforts in energy and resource conservation and reduction in the harmful environmental impacts of our operations, all directed toward enhancing the long-term sustainability of WPI's activities and the environment of which we are a part." Furthermore, because WPI is an educational institution, these goals correspond directly with the drive to pursue the teaching of sustainable design through coursework and research by students and faculty. For more information about the Task Force and sustainability at WPI, please visit www.wpi.edu/about/Sustainability/.

This Report

The 2010 Sustainability Report is the first of its kind at WPI. Sustainability reporting is a common practice by major industry leaders and recently a number of universities have followed suit and published reports. To track progress, **indicator** data are chosen that are most representative of the university's performance in specific areas such as energy use and water use.

By understanding the accomplishments that have been made and highlighting areas most in need of improvement, this report will help to direct further efforts toward sustainability at WPI. By presenting this information in the form of a series of indicators, the institution can visualize the data and make appropriate decisions regarding policy in each of these areas such as waste or energy use reduction.

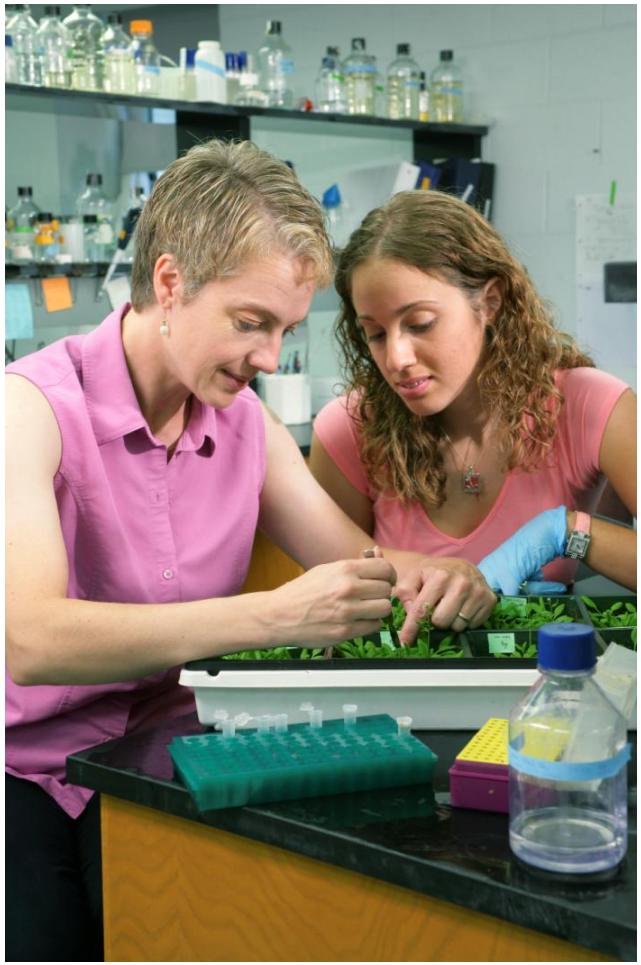
This report focuses primarily on three major areas, academics, operations and community engagement. The **Academics** section examines the role of sustainability education at WPI by reviewing the sustainability focus of coursework, student projects and scholarly research. The **Operations** section deals with physical data such as energy and water use. The **Community** section examines WPI's impact on its local and global communities. This section is made up of two indicators, reported community service by students and donations to charitable organizations.

This report was written as part of an Interactive Qualifying Project by Nicholas Alden (ChE, '10), Juan Gomez (BB, '11) and Shigeng Shang (ChE, '12) and revised by the President's Task Force on Sustainability.

Academics

Students gain knowledge at WPI through their coursework and also through real-world experiences. These experiences are achieved through the focus on projects that have tangible benefits and through physical learning tools such as the East Hall green roof or the small-scale wind turbine that was installed in the summer of 2008 on the roof of Atwater Kent.

In this section, we will examine how sustainability theory and practice are taught at WPI. A review of the current course offerings at WPI by examination of the course catalog as well as a departmental inquiry survey helped to determine the importance of sustainability in courses offered in the past year. The inquiry also revealed current sustainability-related research and projects.



WPI's Mission

WPI educates talented men and women in engineering, science, management, and humanities in preparation for careers of professional practice, civic contribution, and leadership, facilitated by active lifelong learning. This educational process is true to the founders' directive to create, to discover, and to convey knowledge at the frontiers of academic inquiry for the betterment of society. Knowledge is created and discovered in the scholarly activities of faculty and students ranging across educational methodology, professional practice, and basic research. Knowledge is conveyed through scholarly publication and instruction

Projects and Research

Theory and Practice

Projects at WPI provide students with a unique learning experience that sets WPI's curriculum apart from those of other universities. Two required projects, the Interactive Qualifying Project (IQP) and the Major Qualifying Project (MQP), not only teach students how to develop effective team dynamics, but also to solve real problems that the world is facing today. With the recent addition of the Great Problems Seminars for first-year students, which focus on problems such as world hunger and alternative energy, WPI students are engaged in learning about and addressing real-world problems throughout their undergraduate careers.

There are numerous MQPs and IQPs which focus on the environment, green energy or ecological studies to name a few. IQPs allow students to apply their knowledge to technical and societal problems around the world through the Global Perspective Program with sustainability focused project centers around the world including Namibia, Cape Town, Costa Rica and Washington D.C. to name a few.

Making a Difference

Each year, 5 IQPs that exemplify the goals of the program in their focus on the relation between science, technology and societal needs are nominated for the President's IQP award. This past year, 5 sustainability-focused IQPs were recognized:

- *Water and Sanitation in Monwabisi Park, Cape Town* by Christopher Lizewski, Marcella Granfone and Daniel Olecki. Advisors: Scott Jiusto and Robert Hersh; 1st place winner
- *Hydroponic Farming in Marhsarakham: Integrating Hydroponics into the Agricultural Curriculum While Introducing Entrepreneurial Skills* by Aubrey Ortiz, Hilary Rotatori, Elizabeth Schreiber and George con Roth. Advisors: Chrysanthe Demetry and Richard Vaz
- *Leicester Energy Study* by Christopher Gabrielson, Stephen Hanly and Laura Monville. Advisor: Fred Looft
- *Wind Generation on Nantucket* by Diana Berlo, Jennifer Hunt, Amanda Martori and Justin Skelly. Advisor: Michael Elmes
- *Mapping as a Foundation for Spatial Redevelopment in Monwabisi Park* by Debra-Ann Franck, William Mayo, Mathhew Tomasko and Yanxuan Xie. Advisors: Scott Jiusto and Robert Hersh

A list of other sustainability related projects from the past several years can be found at http://www.wpi.edu/about/Sustainability/wpiprojects.html.

Students Overlooking a Town in Namibia

Students Surveying Land in Thailand

Outside of projects, students and faculty do a large amount of research, a lot of which pertains to sustainability.

- The Civil and Environmental Engineering Department focuses on water and wastewater management as well as various aspects of environmental engineering.
- The Chemical Engineering Department researches alternative energy sources and the remediation of pollutants.
- The Biology and Biotechnology department works with bioremediation and biofuels.
- The IGSD professors actively participate in sustainability research including economic development as it pertains to sustainability, climate change strategies, new urban knowledge infrastructures, resource management, and experiential education.
- The Social Science Department examines policy and engages in research dealing with System Dynamics in regards to sustainability.

Areas for Improvement and Future Goals

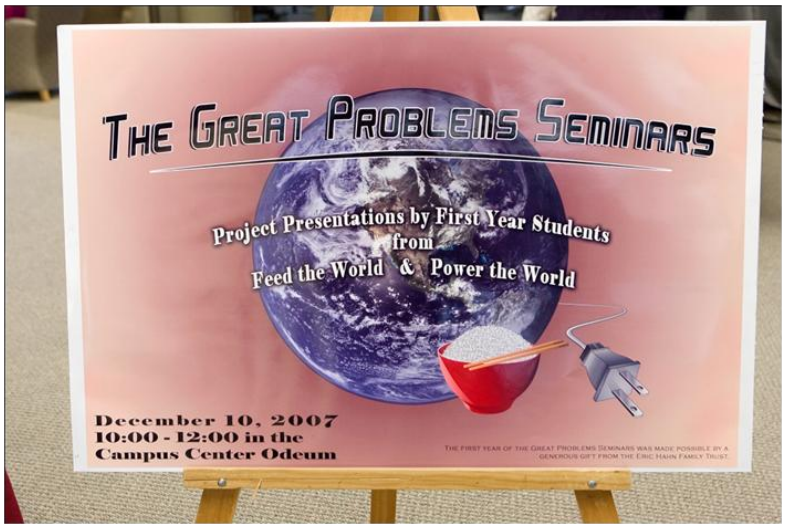
There are constant improvements and additions to the project program at WPI. This past year, a project center was opened in Santa Fe that will focus on water management, renewable energy and urban planning. More awareness about the sustainability focus of IQPs abroad would help further improve the IQP experience and impact. In addition, the Great Problems Seminars, despite their successful beginnings, are still in development and it will likely be a few years before they are well-established as part of the project experience at WPI.

2009 Highlights

Sustainable Metals Recovery and Recycling – In coordination with the Colorado School of Mines, WPI established a research center devoted to the development of technology to assist in the recovery and recycling of metals.

Professor Diran Apelian, Director of the Metal Processing Insitute at WPI and a Howmet Professor of Mechanical Engineering, was selected to chair a national blue ribbon panel on materials and energy with specific focus on sustainable choices such as energy efficiency and security. This panel will explore the role of material sciences in meeting the energy and climate challenges facing the country today.

The Great Problem Seminar Program went through its third year in the Fall of 2009, but it is already gaining recognition outside of WPI. During a poster presentation for the top projects, GE Foundation President and Chairman, Bob Corcoran, endorsed the program saying "I firmly believe that WPI's Great Problems Seminars should be part of the university's core curriculum."



Sustainability in Coursework

Training the Future Workforce

As a technical institution, WPI is in a strong position to teach future scientists and engineers effective leadership abilities in their workplace and communities and the impact of their decisions in their future careers. The environmental, social and economic impact of these decisions are of great interest in modern companies and teaching sustainability is one of many ways that WPI fulfills its Mission "to create, to discover, and to convey knowledge at the frontiers of academic inquiry for the betterment of society."

Departmental Inquiry

A review of the WPI undergraduate course catalog yielded a list of courses that were sustainability related or focused based on a set of definitions from the Association for the Advancement of Sustainability in Higher Education's (AASHE).

Sustainability-focused course concentrate on all aspects of sustainability as they relate to the specifics of the course while sustainability-related courses incorporate smaller aspects into the coursework or simply focus on one sustainability principle.

- **25 courses** were sustainability related and **12** were sustainability focused out of over **700 total**.
- The environmental studies program was established in the 08-09 academic year.

There is currently no policy to increase the number of sustainable courses within the next few years. Most of the departments' focus toward sustainability is through student projects and professors' research.

Areas for Improvement and Future Goals

The biggest problem with sustainability in the classroom is an inconsistency between departments about how sustainability is viewed. In a survey about sustainability sent to the department heads, only 5 responded and responses were varied.

2009 Highlights

Lectures – This year, WPI featured three major lectures from prominent figures in the sustainability movement.

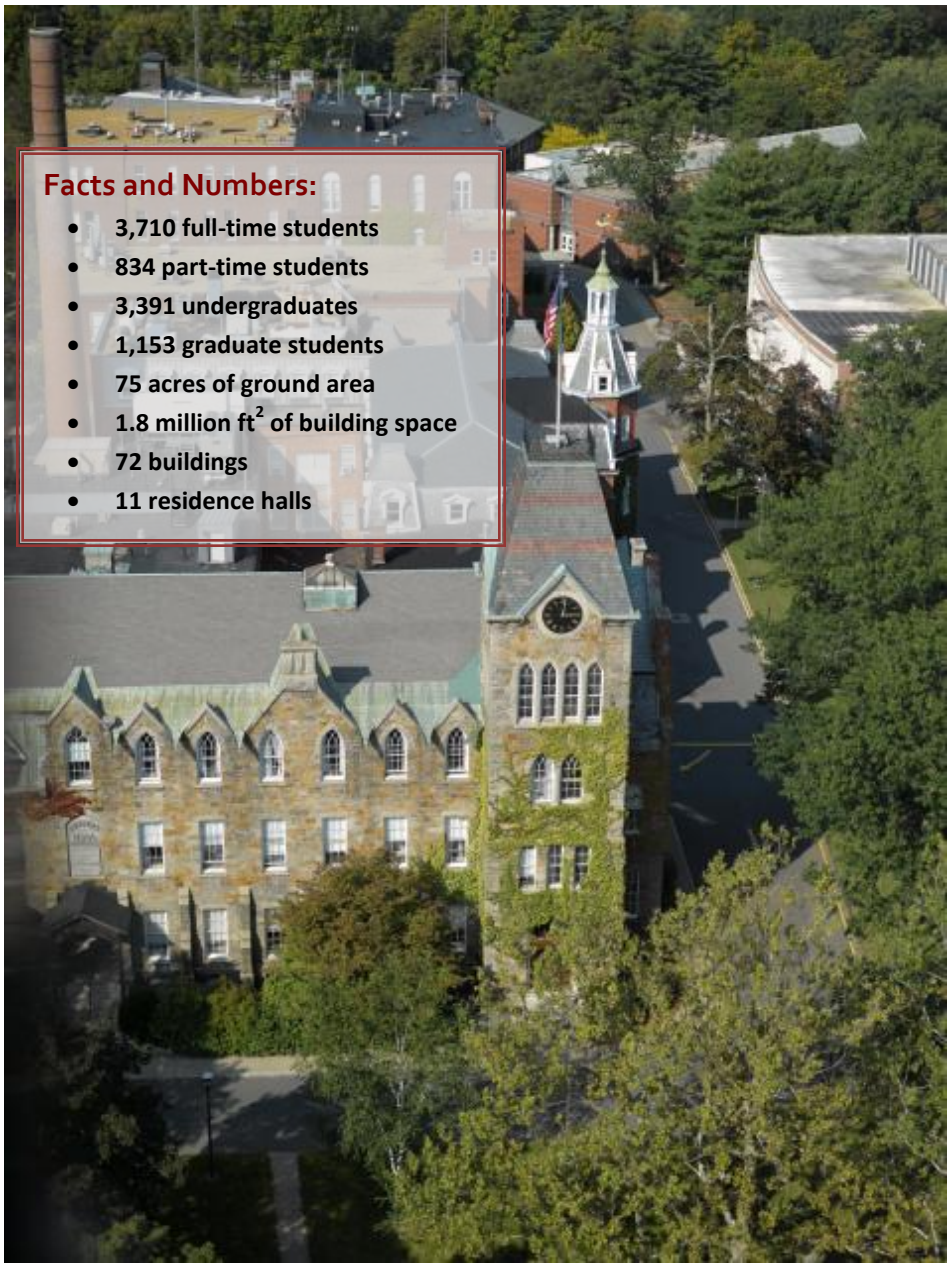
- Professor Julian Agyeman is the co-founder and co-editor of several international journals that focus on sustainability and environmental justice.
- ExxonMobil senior vice president and WPI graduate Michael Dolan who talked about future energy challenges.
- The third was Stephanie Pincetl from UCLA who spoke about urban sustainability.

CE591: Environmental Engineering Seminar – Introduced this year, this course focuses on environmental engineering decisions as they related to various aspects of sustainability including greenhouse gases, water reclamation and a sustainable community.

Operations

The WPI campus has an effect on the local environment similar to that of a town; it gets its own food, water and energy and produces waste. All of these activities can have an effect on the local environment and contribute to global environmental changes. The way the campus operates can also have a significant impact on the everyday lives of the people who work, learn and live in and around it. It can teach us how to apply sustainable practices in our daily routines and motivate us to find ways to improve the campus. Innovations in efficiency that are implemented on campus can inspire tomorrow's scientists and engineers to envision new sustainability breakthroughs.

In order to reduce its impact on the environment, WPI needs to track its use of resources, production of waste and greenhouse gases, recycling rates and how it treats the land on which it is built. The University has committed to reduce its environmental impact in several of the areas that are described in the following sections.



Facts and Numbers:

- **3,710 full-time students**
- **834 part-time students**
- **3,391 undergraduates**
- **1,153 graduate students**
- **75 acres of ground area**
- **1.8 million ft^2 of building space**
- **72 buildings**
- **11 residence halls**

Campus Environment

Building a Greener Campus

WPI maintains a skillfully landscaped campus consisting of numerous buildings and several fields. The way the university builds its campus and maintains its grounds impacts the local environment. The last five years have seen the construction of the Bartlett Center, Gateway Park, East Hall and the renovation of Goddard Hall. New buildings provide the opportunity to create highly efficient and environmentally friendly living and work spaces. Features that save water, energy and promote sustainability in new buildings are a hallmark of commitment to sustainability. WPI's green spaces need water and may call for the use of fertilizers and pesticides, but because pesticide and fertilizers can harm the local ecosystem, sustainable grounds maintenance minimizes their use.

Policies and Practices

Green Buildings

WPI has pledged to build all future buildings with sustainability features and achieve LEED certification; two such buildings, the Bartlett Center and East Hall, have already achieved LEED Certified and LEED Gold status. These two buildings account only for approximately 8% of the school's total built square footage. Though not LEED certified several buildings on the main campus and the Life Sciences and Bioengineering building at Gateway Park do incorporate several sustainability features.

What is LEED Certification?

- LEED stands for Leadership in Energy and Environment Design.
- Developed by the U.S. Green Building Council in 1998 as a system to rate green buildings
- Rating is based on credits such as water and energy efficiency.
- A building can earn "Certified", Silver, Gold or Platinum accreditation

Sustainable Grounds Keeping

In order to understand how WPI cares for its land, one must look to its grounds keeping practices. Pest control, water management and runoff prevention, landscaping waste reuse and recycling, as well as fertilization practices all show how WPI cares for its land and its neighbors' lands.

- WPI composts or mulches all of its grounds waste through an outside contractor this organic material is used in place of some of the fertilizer required to care for the grounds.
- Native plants are included in most campus gardens and lawns; these plants are well adapted to Worcester's precipitation patterns and local pests, so irrigation is less necessary and pest control is less intensive.

East Hall opened in 2008. It implements numerous sustainability features

Goddard Hall Renovation – The George I. Alden Center for Life Sciences

This past year saw the renovation of Goddard Hall that was made possible by a $6 million grant from the George I. Alden Trust. Goddard Hall now features 21,300 square feet of laboratory space and is now the main facility for biology, biotechnology, biomedical engineering, chemistry, biochemistry, and chemical engineering education. The renovation was done by Consigli Construction Company and the **93% of waste** from the project was either recycled or reused.

Related Student Projects

***Grounds Maintenance at Worcester Polytechnic Institute* (2006) by Michael Prestileo, Steven Furber and Ryan Flynn**

This project sought to organize and computerize WPI grounds information to assist in the analysis of lawn maintenance at WPI.

***Design of Recreation Center at WPI* (2009) by Charles Labbee, Jason Gray and Benjamin Erle**

This project investigated a number of design methods for the new recreational facility. These included support structures, foundations for the building and pool as well as an analysis of green building design options to obtain LEED silver accreditation.

***Green Engineering – A Life-Cycle Cost Analysis* (2009) by Mark Watkins**

This project examined the lifecycle cost differences when a building was raised to LEED silver equivalent status.

Areas for Improvement

East Hall's Green Roof absorbs sunlight to help cool the building in the summer; it also absorbs water to reduce runoff.

As WPI completes renovations of existing buildings, it is important to intentionally increase more sustainability features. There are a number of features in existing buildings than can be improved by simple additions such as motion sensors for lights and low-flow fixtures for sinks.

2009 Highlights

East Hall

WPI's newest residence hall is also its greenest building; East Hall incorporates many sustainable features that have garnered it awards from prestigious organizations and LEED Gold status. For more information about East Hall, please visit http://www.wpi.edu/about/Sustainability/eastha764.html

- Worcester's very first green roof.
- Hallway lights are motion-activated, they are only used when needed
- Heating and cooling systems deactivate when not needed and when windows are opened, to prevent wasteful heating or cooling
- It is estimated that East Hall uses 32% less energy than a normal building of the same size.
- Low-flow faucets and dual-flush toilets reduce water use by 31%
- Every room has recycling cans and trash and recycling is convenient
- East Hall can be more easily cleaned with environmentally-friendly products

Because of all of these measures, East Hall was awarded and recognized by several organizations:

- LEED Gold certification from the Green Building Council
- Green Building of America Award from Construction Communications
- Building Project of the Year Award from the Construction Management Association of America
- Green Judges' Choice Winner 2009 from Green Education Design Showcase

East Hall has been cited as an example of WPI and universities as a whole "going green" in *The New York Times* and twice in *US News & World Report.*

Waste Disposal & Recycling

A Cleaner Campus

Proper disposal of hazardous or recyclable materials is a key to reduce WPI's impact on the environment. Most garbage eventually finds its way to a landfill, where it decomposes and returns to the soil, air and groundwater, WPI's waste is no exception. If plastic containers or dangerous materials find their way to a landfill, however, they can pollute the land, water and air around them for years. WPI seeks to reduce both the amount of waste material it produces and to increase the portion of it that is recycled through campus-wide initiatives and events like Recyclemania.

Waste Facts and Figures

Total Waste:

Everything that people disposed of at WPI since 2006 is measured in tons here (Table 1). To account for WPI's considerable population growth, these totals are also presented as pounds per student (Figure 1).

- In 2009 WPI generated 798 tons of trash, approximately 350 pounds per-capita.
- While the total amount of trash produced only changed 5% since 2006, the per-capita amount has dropped by 11%.

Table 2: The amount of waste generated by WPI (in tons) since 2006 has decreased by 5%; it was accompanied by an 11% increase in recycled material.

Waste(tons)	2006	2007	2008	2009
Total	837	782	808	798
Non-Recyclable	630	534	611	572
Recycled	202	245	193	224
Hazardous	5.3	2.8	3.7	2.3

Recycled Waste:

- WPI recycles paper, cardboard, aluminum cans, glass and plastic bottles and miscellaneous materials though Waste Management and the Institutional Recycling Network.
- In 2009, WPI recycled 224 tons of trash, or about 98 pounds per student.
- The ratio of recycled waste to non-recycled waste was 24%; it has increased 15 % since 2006
- Per-capita, the amount of waste that is recycled increased 4% since 2006

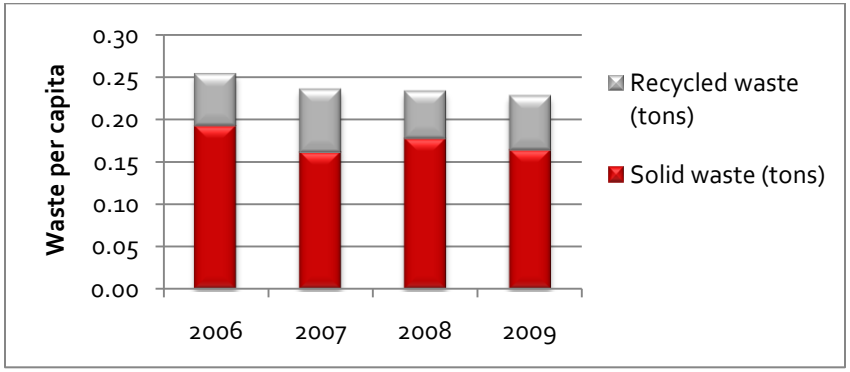


Figure 4: The per-capita amount of waste has steadily decreased since 2006, but recycling rates remain widely variable from year to year

Hazardous Waste:

Dangerous toxic, radioactive or contaminated materials are disposed of in accordance with all federal and state regulations. This waste makes up only 0.3% of WPI's waste output but is very dangerous and is incinerated, recycled, put in a landfill or reused depending on the type of waste.

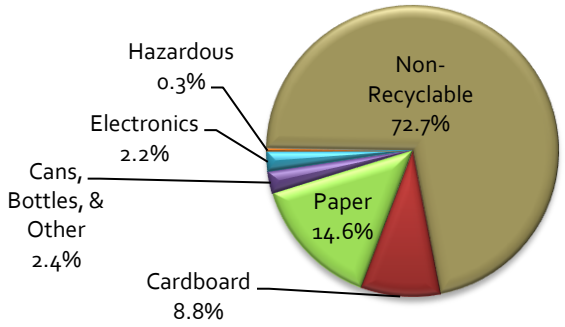


Figure 5: Breakdown of Waste in 2009

In 2009, WPI disposed of 2.3 tons of hazardous materials. There is wide variation in yearly hazardous waste disposal due to renovation of lab space.

Future Improvement

WPI will continue to reduce and recycle more waste; to do this, it will need the cooperation of students, faculty and staff. One of the largest problems the recycling program faces is the accidental and sometimes intentional contamination of recyclable materials. Clear guidelines for recycling and programs that discourage students from interfering with recycling efforts will be of great help.

Related Projects

The Ecological Impact of Composting and Incineration of Garden Waste in Denmark **by Nathan Webb, Elizabeth Clardy and Seth Chapman**

This project analyzed local and national recycling and waste disposal practices to find the most effective practices. These could be applied to WPI or presented to communities who are unaware of them and would greatly benefit from their use.

An Analysis of Local and National Recycling and Waste Policies **by Sidath Wijesooriya, Joe Thomas and Connor Rochford**

This project compared the environmental effects and greenhouse gas emissions of composting organic waste versus incinerating it to produce electricity. A thorough analysis showed that incineration was the superior alternative.

2009 Highlights

Recyclemania/ Precyclemania 2009

In 2009, WPI was one hundreds of universities that participated in Recyclemania; a nation-wide recycling contest that runs from January through March. WPI placed 63rd nationally and 7th in the state. WPI gathered nearly 30 tons of recycling material in that time.

To prepare for Recyclemania, WPI held a campus-wide Precyclemania competition that ran throughout B-Term. This competition had a cash prize for the winning team and encouraged students to recycle more in preparation for Recyclemania. Here are the winners:

- Residence Hall Bottles/Cans: 22Schussler
- Residence Hall Paper: Riley 2nd
- Greek House Bottles/Cans: Phi Sigma Kappa

For more information about Recyclemania, please visit www.recyclemania.org or WPI's sustainability site.

Energy

The Breakdown of Energy

As an institution that has dozens of buildings and thousands of people, WPI requires large amounts of electricity to power all of the lights, computers and other devices that make the campus work. WPI is committed to exploring the social and environmental impacts of its energy use and will attempt to replace some non-renewable energy sources with renewable ones. Active research into renewable energy is prevalent in several academic departments and small steps have been taken to achieve higher efficiency throughout the campus.

Electricity

WPI purchase its electricity from National Grid and distributes it through the Power House to the main campus, which is all the area within the boundary of Boynton Street, Institute Road, Park Avenue and Salisbury Street.

Heat

To ensure the regular operation of the campus, WPI's Power House provides heating from October to May. In 2008, the Power House switched its main fuel to natural gas in consideration of the environment and the cost of fuel, as shown in Figure 4. Newer buildings have superior insulation and climate control for optimal heating efficiency.

Greenhouse Gases

Burning fuel to heat and make electricity produces greenhouse gases and other emissions. WPI students have completed numerous projects about keeping track of carbon dioxide and how to reduce it. Replace oil with natural gas cuts down emissions that would contribute to acid rain.

Energy Usage Data

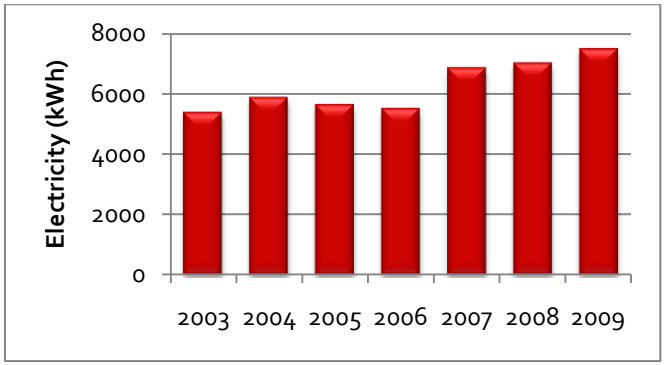


Figure 6: Electricity Use per capita

Unfortunately, despite energy-saving efforts in many buildings, such as shutting some lights off at night, electricity use per capita has increased 40% since 2003 and 6.5% since 2008 (Figure 6). This was primarily caused by the construction of the Bartlett Center, Gateway Park and East Hall.

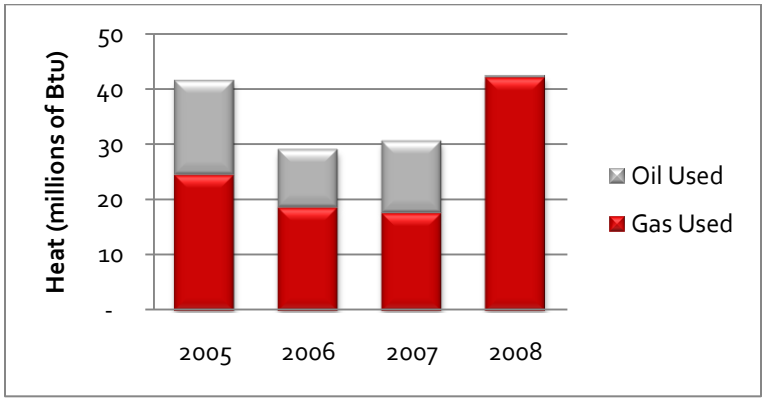


Figure 7: Heating fuel use per capita (2009 data unavailable)

Since 2008, WPI has exclusively used natural gas for the heating of most WPI owned buildings with a few off campus exceptions (Figure 7). Natural gas is a cleaner alternative to heating oil since it burns cleaner producing less toxic emissions.

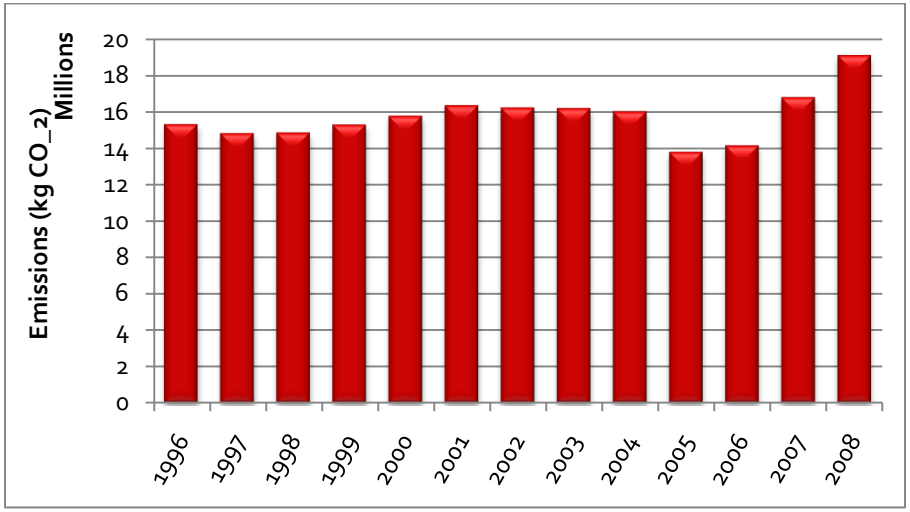


Figure 8: CO_2 emissions

CO_2 emissions (Figure 8) were calculated using the Clean Air Cool Planet Calculator using the heating and electricity data previously discussed. Like electricity, because of the new construction, the amount of emissions has sharply increased. Not taken into consideration for this calculation were student and faculty air travel and commuter miles.

Areas for Improvement and Future Goals

- It is difficult to determine the electricity usage trend since two high-use buildings were constructed within two years of each other. However, WPI should continue implement policies to reduce its energy output.
- The choice to switch from heating oil to natural gas was an economical one since the price of oil went up. However, this trend should continue even if the price of oil decreases significantly as long as natural gas remains near the same price.

2009 Highlights

Green transportation

- On December 11, 2009, the President's Task Force of Sustainability launched the Carpool World website to provide WPI community a more environmentally friendly option.
- Since September 2008, two self-service Zipcars – 2008 Honda Civic Hybrids- are available on campus.

Renewable energy

- Three solar powered walkway lights were installed at WPI's Alumni Field in early September, 2008.

Food Use

Food for Thought

Dining service on campus is convenient; there are multiple locations to choose from and the biggest one, Morgan Dining Hall, is all-you-can-eat. However, convenient dining and an all-you-can-eat atmosphere can be conducive to wasteful eating practices. Where our food comes from also matters, local food not only reduces emissions from transportation, but also supports the local economy. WPI's food provider, Chartwells, runs the cafeteria in Morgan Hall, the Campus Center food court and the Goat's Head Restaurant; in light of this they have taken the initiative. Chartwells has taken many significant steps toward greater sustainability, such as recycling food waste, buying local produce and reducing the water and energy consumption of its kitchens through clever programs.

Fresh and Local Foods

Chartwells at WPI has implemented all of the Corporation's nationwide initiatives over the past several years. In the dining hall, all trays were removed to reduce water use and waste per student. All paper products were replaced with recyclable alternatives. Chartwells at WPI buys most of its produce from local farmers and has pledged to buy certain sustainable food options such as cage-free eggs and antibiotic-free pork and chicken. Chartwells also tracks all waste leaving their kitchen through a program called Trim Trax.

This past year:

- Food waste was diverted from landfills through a partnership with a local pig farmer who takes away up to 400 lbs each day.
- Acquired a new local produce partner, FreshPoint
    - FreshPoint helped to sponsor the first Local Produce Day, a program held in Morgan Hall where students could buy their own local fresh produce.
- Chartwells joined another program, Farm to School, which connects local K-12 schools with local farmers

Areas for Improvement and Future Goals

Since the dining hall is open from 8:00 AM to 7:00 PM, there is a lot of energy spent keeping the food warm. The fryer station, grills and lights are also kept on during this period. To conserve energy, a number of these things could be turned down or turned off outside of peak hours. Refrigerated vending machines are kept on all day that could be replaced with more energy conservative machines.

2009 Highlights

Local Produce Day – 2009 saw the first implementation of this program, hosted by Chartwells and FreshPoint. Over 150 students and faculty attended to buy food that was supplied by local farms. The remainder of this food was bought up by Chartwells at the end of the program.

Be a Flexitarian –This program was introduced in the Campus Center food court to encourage students to consume fewer meat products to save money, improve student wellbeing while simultaneously helping the environment.

Water Use

The Most Important Resource

According to World Health Organization, almost one fifth of the world's population (about 1.2 billion people) lives in areas where water is scarce. Even though Worcester has no such concerns at the moment, it is our obligation to take future development into consideration. Efficient water management reduces not only the amount of water that has to be taken from local reservoirs but also the amount of water that has to be treated and returned to the environment. Another concern is runoff; rainwater washes contaminants such as road salt and motor oil away from the rooftops and streets and toward ponds and streams, where they can cause damage to local species.

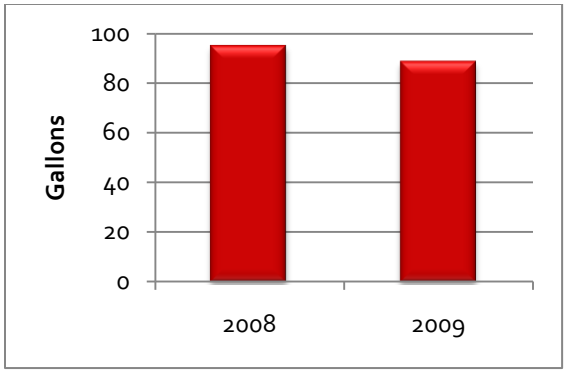


Figure 9: Water Use per Capita

Current Conditions

WPI purchases water from the City of Worcester, which has ten reservoirs around the city. The amount of water WPI used in 2008 and 2009, in gallons, is provided in this section.

- The total water usage for 2009 was 309,800 gallons, this is approximately the same as 2008, when WPI used 328,800 gallons
- Per-student water use for 2009 was 88 gallons. This is a small decrease since 2008's 95 gallons per student.

Areas for Improvement and Future Goals

WPI currently does not have policies for efficient water use. A lack of water data strongly suggests that the institution is in great need for a tracking system of water use, waste and recycling. Irrigation on campus uses potable tap water, which can be switched to grey water, which is the water used in locations like bathrooms, but still suitable for plants.

The city of Worcester provides clean, inexpensive water. This is a sustainable alternative to bottled water.

2009 Highlights

WPI students have been actively involved in projects that study and protect water. For instance, an IQP that was done in 2007 by Ting, Oakes and Fredette researched and analyzed water resource protection in Worcester. Similar projects are done every year concerning both local and global issues on water.

Community Engagement

Sustainability means much more than just fixing environmental issues. Maintaining equality amongst all members of a community is another major aspect. By interacting with its community in a positive way, WPI improves the lives of its students and local residents of Worcester and in other cities around the world where WPI operates.

Students and faculty are actively engaged in community service and philanthropy to help those in need. In addition, the 13 project centers situated in locations around the world contribute positively the well-being of people in those areas. For example, 2009 marked the 10 year anniversary of the Worcester Project Center and in that time, 65 projects have been completed and nearly 70,000 hours of labor have been donated.

Community Services

Dedication to Service

WPI has a large number of groups that actively participate in community service. Many of these groups, such as Amnesty International and Invisible Children, deal with widespread problems. Others actively help those in need such as Habitat for Humanity and Alpha Phi Omega or through programs like Relay for Life or focus on interpersonal topics through groups like Gay Straight Alliance and Active Minds. For more information about community service, or if you would like to get involved, please visit the Student Activities Office website.

All of these groups focus on social equality in some way. It's crucial to realize that while many of the issues that are commonly associated with sustainability are environmentally focused by nature, social justice and community improvement are important aspects too. Through service programs and organizations, and the direct interaction of many IQP groups with communities all over the world, WPI is demonstrating its responsibility to the communities in which it operates.

Students Cleaning Institute Park

A Charitable Donation

Community service at WPI is represented by two key indicators, students' reported hours of service and the amount of money donated to charitable organizations by all members of the WPI community. By their very nature, these indicators are not a perfect measure since it is likely that not all community service and donations are reported, but they do give a fairly good indication of progress.

Since 2006 the number of reported community service hours has increased drastically as seen in Figure 10.

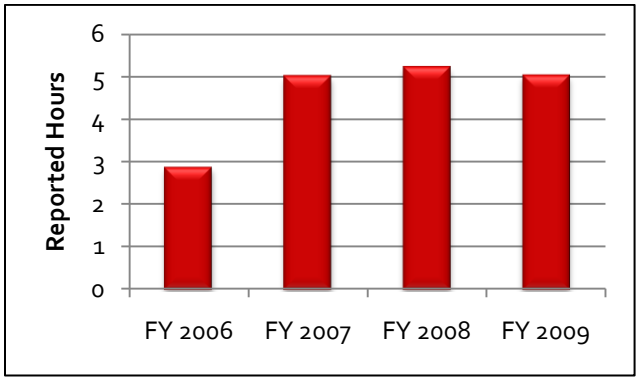


Figure 10: Reported Hours of Community Service per capita

Between 2006 and 2007, the number of hours reported nearly doubled as a result of two key changes. First, 2007 was the first year that students working for federal work study were required to complete and report 15 hours of community service to continue to receive compensation. In addition, that year also saw the implementation of a new system to make reporting community service a little easier. After this point, the amount of reported hours hovers around 5 hours per capita which held this past year as well. A similar trend was found with the amount of money donated to charitable organizations as shown in Figure 11.

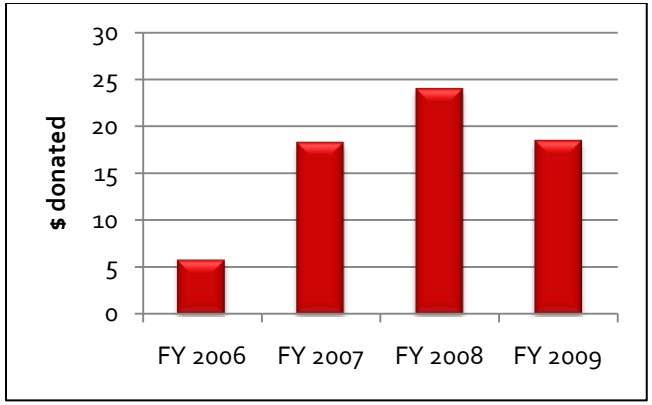


Figure 11: Dollars donated per capita

Similar to reported hours, there is a sharp increase in the dollars contributed between 2006 and 2007. This is directly the result of the introduction of Relay for Life to the campus as an annual program. Relay for Life is a program sponsored by the American Cancer Society to raise money toward cancer research. In its first year, this event received over $55,000 and the amount has steadily increased since.

2008 saw the creation of Up 'til Dawn a program to raise money for St. Jude's Children's Research Hospital which raised $16,000 in its first year. This past year, the amount of money donated dropped to fiscal year 2007 levels. This seems to have been caused by a number of smaller programs either not being held or not being reported. These small donations raised several hundred dollars individually, but their combined totals added up to almost $10,000 that was not reported in FY2009.

Areas for Improvement and Future Goals

Since there is currently no incentive for students to report their community service, a lot of service is done and is not reported, so the numbers presented above are not entirely accurate since WPI students do much more service than is reflected in this report.

A WPI Student Tutors Local Children

2009 Highlights

Lambda Chi Alpha Food Drive – This year, the Pi Zeta chapter of Lambda Chi Alpha donated nearly 70,000 pounds of food and $1,000 to the local Friendly House community center. The fraternity has been doing this program for 17 years and shows no signs of stopping.

National Outstanding Change Initiative Award – This past year, the WPI Greek community was recognized by the Association of Fraternity\Sorority Advisors for making tremendous strides toward building the Greek community at WPI. Last year alone, philanthropic fundraising was increased from $19,000 in 2005-2006 to $78,364 and there was an increase of over 4000 hours of community service.

Worcester Community Engagement Award – The Community Engagement Award given out by the Worcester Consortium, a collection of 12 local colleges, recognizes outstanding service to local communities by students within the Consortium. This year, the prize was given to a WPI IQP team that worked with the Worcester Art Museum to provide alternative energy to one of its exhibits.