

University of Pennsylvania

CLIMATE ACTION PLAN PROGRESS REPORT 2011



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The launch of the *Climate Action Plan* in September 2009 set Penn's goals and strategies for incorporating sustainability into academic coursework, strategic investment, capital planning, and outreach and engagement at the University. At the heart of our efforts, though, are continued leadership in research, academics, and teaching, to best prepare Penn students for the challenges of the 21st Century. Penn's approach to sustainability continues to be holistic, incorporating initiatives in clean power, energy conservation, green buildings, waste reduction, and sustainable campus operations.

Participation in cutting-edge research, for graduate and undergraduate students alike, has long been a hallmark of a Penn education, and the *Climate Action Plan* highlights and incorporates these opportunities:

- Undergraduate students participate in the new Vagelos Integrated Program in Energy Research (VIPER) to learn about emerging alternative energy technology and are fully aware that Penn is the leading purchaser of wind power among all North American colleges and universities;
- Graduate students in the Master in Environmental Building Design program at the School of Design can look to any one of Penn's five LEED buildings to examine first-hand state-of-the-art design and construction technology;
- Penn's campus-wide remote metering effort, which will provide a financially-based approach to energy conservation and efficiency, has benefited greatly from consultation with faculty and students in the T.C. Chan Center for Building Simulation and Energy Studies, a research partnership between Penn Design and Tsinghua University in Beijing;
- Extra-curricular activities, ranging from a week-long engagement with the region's sustainability leaders during the freshmen pre-orientation program Penn Green, to the Penn Vegan's focus on the impact of global food systems, are supported by campus outreach and engagement programs such as the Eco-Reps and the Penn Sustainability Office.

The initiatives noted above touch on a few of the programs described more fully in the following document. This report demonstrates Penn's commitment to sustainability and environmental awareness, and how the *Climate Action Plan* goals are woven into our University mission. Penn is setting precedents for how a living and learning environment can respond to global climate change. As we look back on the progress made since 2009, we are energized and excited for the future of sustainability at Penn.

AMY GUTMANN
President

Climate Action Plan Timeline

September 2009

All Dining Hall and cafes on campus start composting food waste

Metering project initiated

Climate Action Plan launched

Student Eco-Reps program pilot

Green Fund inaugural round

New undergraduate minor in Sustainability and Environmental Management



2010

The Music Building opens, Penn's first LEED Gold building



Energy Reduction Fund established

Penn expands recycling options to include plastics 1-7

Staff and Faculty Eco-Reps Program launched

President Gutmann signs the ISCN-GULF Sustainable Campus Charter

Penn designated a Tree Campus USA

Climate Action Research grants awarded

New Masters in Environmental Building Design

Year of Water

Green Campus Partnership Student Association created

2011

Preferred Parking for Hybrid and Electric Vehicles

The Morris Arboretum Horticultural Center receives LEED Platinum certification

Creating Canopy event with Philadelphia Department of Parks and Recreation



Penn Park opens

Shoemaker Green breaks ground

Zero-Waste Basketball Game as a part of RecycleMania

Cost-allocation model team's first meeting

PennMOVES, student move out drive

Student Eco-Reps program expanded to all 12 college houses, Hillel and Greek community

M.I. (Move - In) Green launched

Power Down Challenge



January 2012

Progress report submitted to the ACUPCC



As the first Ivy League signatory of the American College and University Presidents' Climate Commitment, the University of Pennsylvania launched a *Climate Action Plan* in September 2009, and has become a leading voice in higher education addressing environmental sustainability. The result of our efforts over the last two years is a clear evolution of our campus culture and our approach to how we think, behave, and conduct business – an evolution that can be expected to continue on the trajectory that has been established. From the establishment of a new undergraduate program in energy research and expansion of the Eco-Reps program for outreach and engagement, to the development of the Penn Green Fund which finances cutting edge sustainability projects and the long-anticipated completion of the 24 acre Penn Park, it is clear that sustainability has become integrated into the everyday fabric of this university.

Since 2009, the University has made significant progress in its drive to improve sustainability efforts in all aspects of campus life and operations:

Academics: Penn now offers over 160 new and existing classes related to environmental sustainability in departments ranging from Environmental Studies to Public Health. The Vagelos Integrated Program in Energy Research, the Master in Environmental Building Design, and the Sustainability & Environmental Management minor provide various avenues for students to engage with sustainability through research and coursework.

Utilities and Operations: There has been a 0.12% decrease in electric usage and a 6.89% increase in steam usage in FY12 year-to-date in comparison to the FY07 baseline. The increase in energy usage can be partially attributed to the campus' 108,000 SF growth, the occupancy of five new campus buildings since 2007 (Skirkanich Hall, Hill Pavilion, Annenberg Public Policy Center, Music Building, and Weiss Pavilion)

and the recent historic weather conditions. When normalized for weather, utilities data for total energy usage indicates a 9.5% decrease (12.1% decrease in electric; 8.0% increase in steam) in comparison to the FY07 baseline.

A few key actions to reduce energy use moving forward include: the development of a centralized system to help identify unusual steam consumption; continuation of the Energy Reduction Fund to assist Schools and Centers with funding for energy conservation projects; and completion of smart meter installations and an information database to provide real-time building level energy data for benchmarking, analysis, and feedback.

Furthermore, as a result of recent negotiations with its steam provider, the University will benefit from the utility company's replacement of aging oil-fired boilers with new rapid-fire, dual fuel boilers. The upgrade is expected to reduce emissions from steam usage by 10 percent for all of their regional customers, which translates to a reduction of approximately 2 percent of Penn's overall emissions.

Penn will also continue supporting the development of renewable energy through REC purchases.

Physical Environment: The completion of Penn Park increased campus open space by 20 percent, and Weiss Pavilion became the fifth Penn building to receive LEED certification from the U.S. Green Building Council since 2009, following the highest accolades of Platinum certification for the Morris Arboretum Horticulture Center. In 2012, Penn Law's new Golkin Hall will target LEED Silver certification; Shoemaker Green will continue to serve as a pilot for the Sustainable SITES, a new set of guidelines and performance benchmarks for the sustainable design, construction and maintenance of landscapes; and a comprehensive stormwater management master plan will be completed.

Transportation: A more livable campus, with easy access to public and alternative transit is being realized through Penn Transit's new bi-fuel transit vehicles; the expansion of car-sharing programs and electric car charging stations; and the accommodation and increase of bicycle and pedestrian commuters. New bicycle racks, with the capacity to park over 150 bikes, were installed in convenient locations throughout campus; increasing the bicycle capacity of campus to 2750 individual bike parking spots.

Waste Minimization: The campus recycling rate increased from 20 percent in 2008 to approximately 31 percent in 2011, reflecting individual and departmental behavior change spurred by ongoing efforts such as RecycleMania, PennMOVES, and new composting initiatives by Penn Dining. Moving forward, the campus will see additions to its list of recyclable materials, an increase in more conveniently placed indoor and outdoor recycling bins, and a gradual transition to single-stream labeling and signage.

Outreach & Engagement: The Penn Eco-Reps program has successfully connected grassroots sustainability advocates to policy-makers and influenced real change at the University. In addition to the 100-plus students who are members of the College House, Greek Chapter, and Hillel Eco-Reps programs, over 80 representatives from buildings and departments across campus now volunteer as Staff/Faculty Eco-Reps. Seven Penn Schools and Centers have designated their own Sustainability Coordinators, and Green Fund grants were awarded to develop 36 innovative sustainability projects that were conceived by members of the Penn community.

Communications: Comprehensive marketing and communications strategies have developed the identity of the Penn Green Sustainability Office and raised awareness of the broad range of sustainability efforts and initiatives across the campus via an active website with an average 100 visitors daily; a campus wide e-newsletter with over 5,200 subscribers; dozens of promotional events held in various Schools and Centers; and nearly 500 sustainability stories generated by local, regional and national media outlets.

Since the establishment of the 2007 baseline, carbon emissions at Penn have been flat – a total variation of about 2%. FY11 is the first year since 2007 that emissions have risen, principally due to the growth of the campus (108,000 SF growth in campus buildings) and the effects of a colder winter and warmer summer over the 12-month recording period. Compared to the FY07 baseline of 290,204 MTCDE (Metric Tons

of Carbon Dioxide Equivalent), Penn increased its carbon emissions by 4,004 MTCDE (1.4%) in FY11. During this same time period the University increased its purchase of wind RECS to 200,000; offsetting the equivalent of over 29% of Penn's carbon footprint, up from the FY 2007 baseline of 22%.

Penn has identified the year 2042 as an aspirational goal for achieving climate neutrality. Conservation through capital investment and behavior change strategies, improved low-carbon energy sourcing, and the purchase of RECs and offsets will be among the strategies employed in meeting this ambitious goal. The following progress report summarizes the broad array of initiatives taken by Penn that have emerged from the 2009 *Climate Action Plan*, and outlines the goals, metrics, and key actions for the Penn community moving forward.



TWO YEARS OF PROGRESS

Purpose of Report

As a signatory to the American College & University Presidents Climate Commitment (ACUPCC), the University of Pennsylvania launched its *Climate Action Plan* in September 2009. The Plan serves as a roadmap to reducing the University's carbon footprint and enhancing overall sustainability. The *Climate Action Plan Progress Report* is an overview of the implementation to date of the University's *Climate Action Plan*, submitted in fulfillment of ACUPCC requirements.

The report is organized by the following initiatives: *Academics, Utilities & Operations, Physical Environment, Transportation, Waste Minimization & Recycling, Outreach & Engagement and Communications*. Each section includes a uniform format, listing Goals, Metrics, and Key Actions.

This report is intended to summarize the broad array of initiatives taken by Penn that have emerged from our 2009 *Climate Action Plan*, and to further engaged the entire Penn community in the future of our growing culture of sustainability.

Climate Action Plan Leadership and Recognition

Since the launch of Penn's *Climate Action Plan* in 2009, the University has received internal and external recognition for its sustainability efforts.

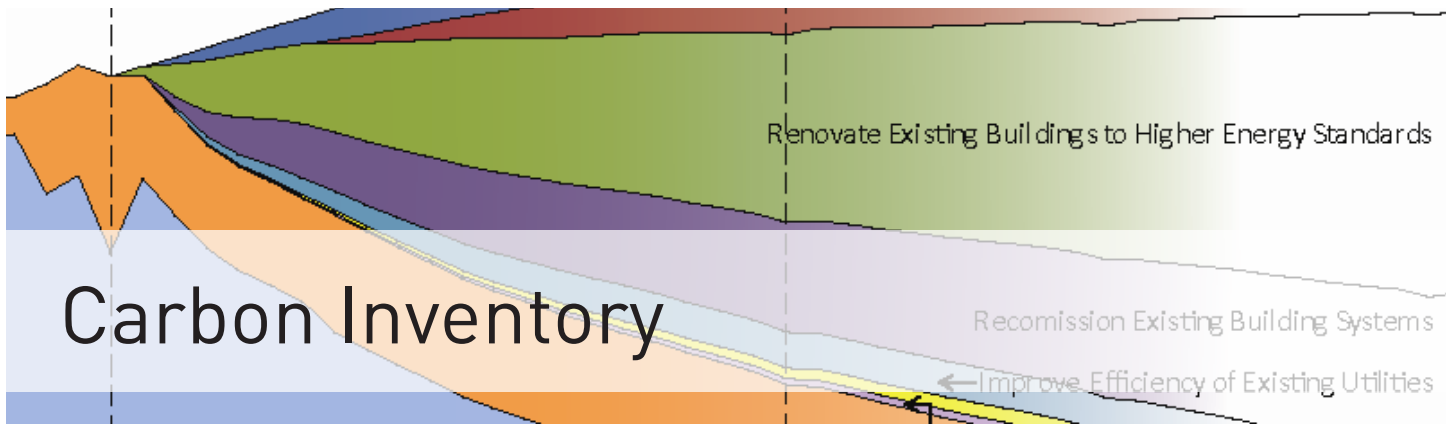
- Penn was honored in April 2010 for its commitment to building a healthy urban forest by the Arbor Day Foundation and Tree Campus USA. Penn was part of the inaugural class of Tree Campus USA schools. To celebrate, students, faculty and staff gathered to plant 47 trees on campus as part of the award ceremony. Penn was designated a Tree Campus USA again in 2011.
- The Sustainable Endowments Institute awarded Penn an A- on its College Sustainability Report Card in 2009 and 2010.
- In Spring 2011, Penn partnered with the City of Philadelphia's Department of Parks and Recreation to give away trees to Penn faculty and staff in support of the Mayor's goal of planting 300,000 new trees by 2015. During this event, *Creating Canopy*, the University distributed 300 trees to the Penn community and plans to hold this give away annually. Penn also has plans to plant more than 1,700 new trees on campus by 2015.
- In October 2010, Penn received a Climate Leadership Award from Second Nature in the Doctorate Granting – Private Institution category. Penn was chosen because of its *Climate Action Plan* implementation efforts within the ACUPCC community.
- Sierra Club Cool Schools ranked Penn in the Top 25 greenest campuses in America in 2010 and 2011. Penn received special attention for its Green Fund, a loan fund created to seed innovative sustainability projects on campus.
- Penn continues to be ranked number one of college and university purchasers of green power by the EPA Green Power Partnership. In the National Top 50, Penn was ranked 20th among Fortune 500 companies, local and state governments, and institutions of higher education in 2010 and 2011.
- Penn was highlighted in the Princeton Review's *Guide to 311 Green Colleges in 2011*. The Guide called out Penn's renewable energy purchase policies and commitment to green buildings on campus.

- In January 2011, the US Department of Energy awarded \$129 million to the Greater Philadelphia Innovation Cluster for Energy Efficient Buildings (GPIC). The University of Pennsylvania is one of the institutions of higher education that comprise the GPIC, along with private laboratories, industry leaders, and regional economic development agencies.

Internal Reporting

With the 2009 launch of the *Climate Action Plan*, a new model of reporting was created monitor implementation milestones. Sustainability reports containing metrics on seven sustainability indicators are submitted quarterly.

The Environmental Sustainability Advisory Committee (ESAC), which created Penn's *Climate Action Plan* and which includes faculty, staff and student representation, continues in a new role after its launch - meeting once per semester to discuss current work, challenges, and achievements in each of the plan's six initiatives. The Committee meetings provide an opportunity to strengthen Penn's initiatives through regular communication and collaboration.



Carbon Footprint Composition & Energy Calculations

The carbon footprint of Penn’s main campus was developed using the conventions and assumptions of the World Resources Institute, as modified by Penn’s TC Chan Center for Energy and Simulation to account for the specific energy sources used by the University. The Carbon Inventory includes only the emissions of the main academic campus in West Philadelphia.

The Carbon Inventories include institutional greenhouse gas (GHG) emissions examined divided by scope:

- Scope 1 includes all sources of emissions that are released directly by the institution, such as natural gas and fuel oil combusted on campus, refrigerant leakage, and University-owned vehicles.
- Scope 2 includes indirect sources of emissions from the purchase of electricity and steam.
- Scope 3 includes all other indirect sources of emissions that may result from the activities of the University, but that occur from sources owned or controlled by other entities; including commuter travel, solid waste disposal, and institutionally sponsored air travel.

The emissions calculations of all three scopes include examination of each of the forms of energy consumed by the campus and are recorded in the standard emissions unit of Metric Tons of Carbon Dioxide Emissions (MTCDE) for comparable analysis.

Penn’s first campus carbon footprint was calculated in 2007 and serves as the baseline for the reductions outlined in the *Climate Action Plan*.

Overall Carbon Emissions Highlights

Since the establishment of the 2007 baseline, carbon emissions at Penn have been flat – a total variation of about 2%. FY11 is the first year since 2007 that emissions have risen, principally due to the growth of square footage on campus, 108,000 SF growth in campus buildings and 14 acre growth in campus footprint, and the effects of a colder winter and warmer summer over the 12 month recording period.

Compared to the 2007 baseline of 290,204 MTCDE:

- FY08: Penn decreased its carbon emissions by 2,086 MTCDE or a 0.72% decrease.
- FY09: Penn decreased its carbon emissions by 3,354 MTCDE or a 1.2% decrease.
- FY10: Penn decreased its carbon emissions by 1,259 MTCDE or a 0.43% decrease.
- FY11: Penn increased its carbon emissions by 4,004 MTCDE or a 1.4% increase.

A more detailed assessment of the FY11 data reveals the following:

- Campus steam emissions have increased 6.5%.
- Campus electrical emissions have decreased 2.2%.
- Scope 3 emissions have contributed to the overall increase of emissions due to an increase in University sponsored air travel of approximately 23.5%.

Overall, the University of Pennsylvania’s carbon emissions per capita on campus (includes all student population, staff, and faculty) have remained the same despite the growth of campus. In FY11 the

MTCDE per capita on campus was 6.5 in comparison to FY07 in which the MTCDE per capita was 6.6.

Climate Neutrality

The University of Pennsylvania has identified the year 2042 as an aspirational goal for achieving climate neutrality. Since completing its *Climate Action Plan* in September 2009, Penn continues to make significant progress in its drive to improve efficiency, reduce energy consumption, conserve resources, and minimize waste. We have instituted a quarterly “dashboard” that reports energy use to University Leadership, as well as progress in the metrics we have developed for multiple environmental sustainability measures.

Penn’s emissions reduction goals are supported by several key internal strategies:

- An Energy Reduction Fund, which directs resources towards capital investments that reduce utility use and wherever possible generated savings to replenish the fund;
- A commissioning process, targeting a minimum of eight high-energy-use buildings annually;
- Campus wide infrastructural improvements that address steam line inefficiencies and distribution system energy loss.
- An accelerated metering installation program to measure energy consumption at the building scale, which will enable the development of financial incentives for energy reduction within Penn’s distributed financial structure; and
- Robust behavior change and education programs for students, staff, and faculty.

To address the efficiency of the utilities upon which Penn relies for energy supply – particularly from our off-campus private steam supplier – the University has worked aggressively to negotiate for the use of lower-carbon emitting production technologies. As a consequence of our most recent negotiations, our steam provider will be installing new rapid-fire, dual fuel boilers at the regional co-generation plant to replace its aging oil-fired units. This upgrade will reduce by 10% the carbon emissions associated with the steam delivered to all of the plant’s 400+ client institutions, and will reduce Penn’s overall emissions by approximately 2%.

As an urban research institution, however, with little opportunity for onsite renewable energy generation, Penn’s strategies to reduce energy consumption to zero are limited. The operation of technology-dependent research laboratories, for example, and one of the region’s largest medical schools, will continue to demand substantial amounts of electrical energy, cooling, and steam for heating, hot water, and sterilization.

As Penn continues to reduce the energy intensity of our campus, we recognize that reaching carbon neutrality will not be possible through conservation projects alone. We will therefore continue to evaluate options for cleaner energy supply and the use of offsets and Renewable Energy Credits (RECs) to decrease our carbon emissions. Penn is currently North America’s number one purchaser of national wind power RECs among universities. In FY11, Penn offset the equivalent of over 29% of its carbon footprint. Such offsets are likely to continue to be a component of Penn’s overall energy reduction strategy.

With electricity deregulation in Pennsylvania, Penn opted to register with the Commonwealth as a Load Serving Entity provider (LSE), which allows the University to purchase electricity on the wholesale market. This designation also obligates Penn to meet the state’s Alternative Energy Portfolio Standard (AEPS) requirements, putting Penn in the market for annual solar Renewable Energy Credit (s-RECs). As an LSE, Penn now has a stakeholder role in articulating the need for greater availability of utility-scale solar power in Pennsylvania, and as a partner with the City of Philadelphia, has an advocacy role to ensure the development of clean power in our region.

The University is proud of its commitment to environmental sustainability, and will continue to evaluate our progress towards climate neutrality in the coming decades. Conservation through capital investment and behavior change strategies, improved low-carbon energy sourcing, and (finally), the purchase of RECs and offsets will all be among the strategies employed in meeting this ambitious goal.

Summary of Emissions (MTCDE)

Scope 1 Emissions	916
Scope 2 Emissions	238,343
Scope 3 Emissions	50,945
Total Emissions (Scopes 1+2)	239,260
Gross Emissions (Scope 1+2+3)	290,204
Net Emissions (Minus RECs)	224,656

Scope 1 Emissions (MTCDE)

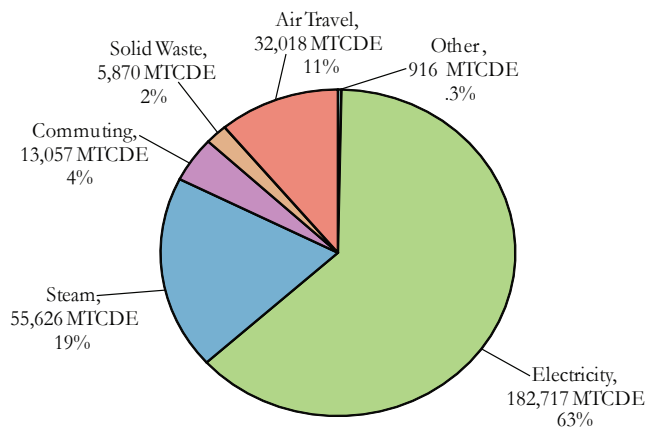
Agriculture	0
Emissions from Natural Gas	588
Emissions from #2 Oil	65
Emissions from Refrigerants	n/a
Emissions from Fleet	263
Scope 1 Total	916

Scope 2 Emissions (MTCDE)

Emissions from Electricity	182,717
Emissions from Steam	55,626
Scope 2 Total	238,343

Scope 3 Emissions (MTCDE)

Emissions from Commuting	13,057
Emissions from Solid Waste	5,870
Emissions from Air Travel	32,018
Scope 3 Total	50,945

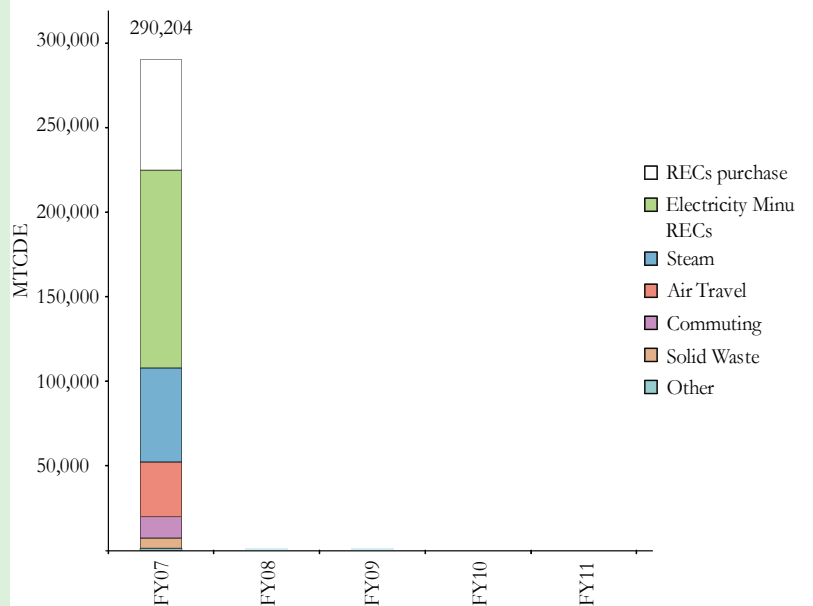


Scope 1, 2 & 3 Emissions by Source

FY07 At a Glance:

- President Amy Gutmann signed the American College & University Presidents Climate Commitment (ACUPCC)
- Start of Aircuity pilot program for energy conservation in Penn labs
- Start of Harnwell College House Utility Project for measuring daily residence hall energy usage
- Start of the Light Bulb Exchange Program to replace incandescent bulbs in residence halls with compact fluorescent bulbs
- Start of the Transportation study “Campus Circulation: A Study of Multi-Modal Access”

Total Campus Emissions Over Time



Summary of Emissions (MTCDE)

Scope 1 Emissions	983
Scope 2 Emissions	238,608
Scope 3 Emissions	48,528
Total Emissions (Scopes 1+2)	239,591
Gross Emissions (Scope 1+2+3)	288,118
Net Emissions (Minus RECs)	182,844

Scope 1 Emissions (MTCDE)

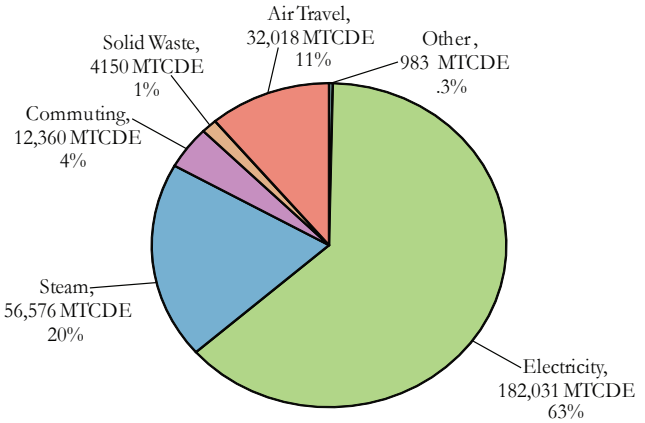
Agriculture	0
Emissions from Natural Gas	652
Emissions from #2 Oil	66
Emissions from Refrigerants	n/a
Emissions from Fleet	265
Scope 1 Total	983

Scope 2 Emissions (MTCDE)

Emissions from Electricity	182,031
Emissions from Steam	56,576
Scope 2 Total	238,608

Scope 3 Emissions (MTCDE)

Emissions from Commuting	12,360
Emissions from Solid Waste	4,150
Emissions from Air Travel	32,018
Scope 3 Total	48,528

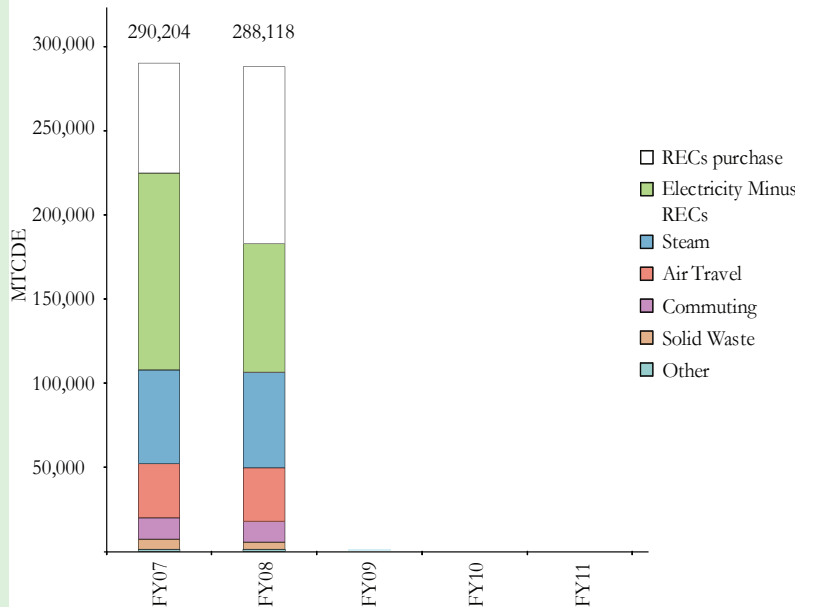


Scope 1, 2 & 3 Emissions by Source

FY08 At a Glance:

- University appoints its first Environmental Sustainability Coordinator
- Start of RecycleMania, a competition among colleges and universities nationwide to have the highest recycling rate
- Pilot for a potential City of Philadelphia bike sharing program
- Completion of the first campus green-roof atop Kings Court /English House

Total Campus Emissions Over Time



Summary of Emissions (MTCDE)

Scope 1 Emissions	939
Scope 2 Emissions	234,478
Scope 3 Emissions	51,434
Total Emissions (Scopes 1+2)	235,417
Gross Emissions (Scope 1+2+3)	286,850
Net Emissions (Minus RECs)	181,576

Scope 1 Emissions (MTCDE)

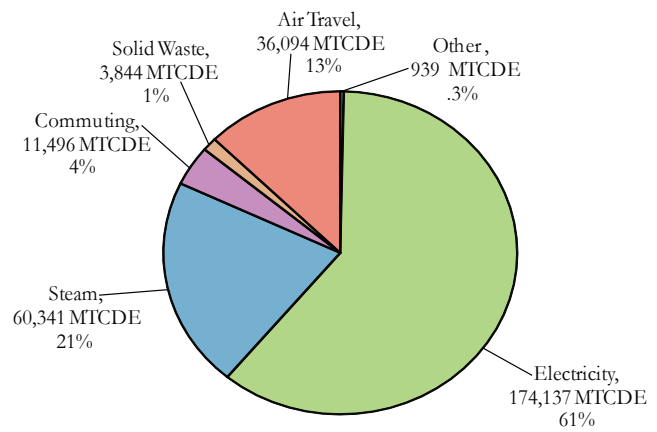
Agriculture	0
Emissions from Natural Gas	615
Emissions from #2 Oil	66
Emissions from Refrigerants	n/a
Emissions from Fleet	258
Scope 1 Total	939

Scope 2 Emissions (MTCDE)

Emissions from Electricity	174,137
Emissions from Steam	60,341
Scope 2 Total	234,478

Scope 3 Emissions (MTCDE)

Emissions from Commuting	11,496
Emissions from Solid Waste	3,844
Emissions from Air Travel	36,094
Scope 3 Total	51,434

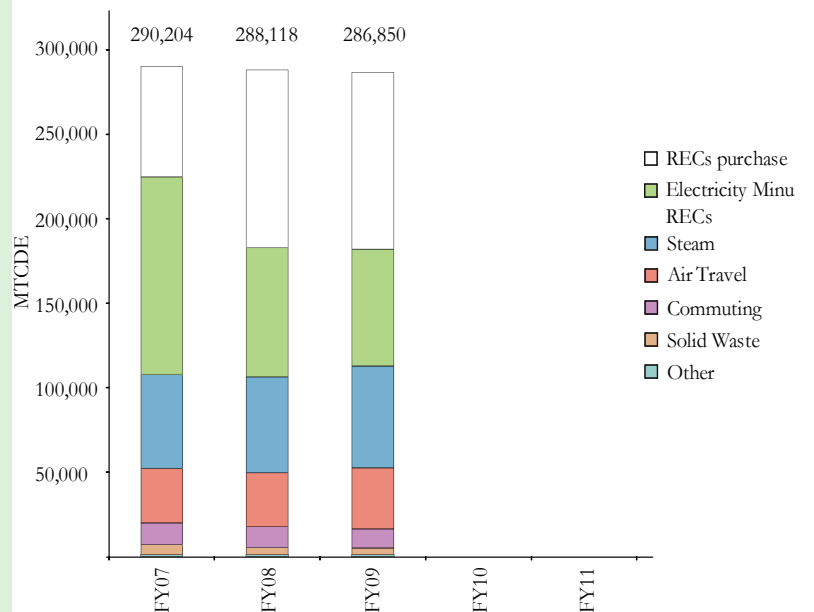


Scope 1, 2 & 3 Emissions by Source

FY09 At a Glance:

- Completion and launch of the Climate Action Plan
- Installation of Aircuity lab ventilation monitoring system in Fisher Translational Research Center
- Launch of the Green Fund, a sustainability project financing program
- Completed optimization of 9 campus buildings including: CRB, Van Pelt Library, Dietrich Library, Harnwell, Houston Hall, Huntsman Hall, Carolyn Lynch Laboratory, McNeil, and Shattner.

Total Campus Emissions Over Time



Summary of Emissions (MTCDE)

Scope 1 Emissions	985
Scope 2 Emissions	237,789
Scope 3 Emissions	50,172
Total Emissions (Scopes 1+2)	238,774
Gross Emissions (Scope 1+2+3)	288,946
Net Emissions (Minus RECs)	183,671

Scope 1 Emissions (MTCDE)

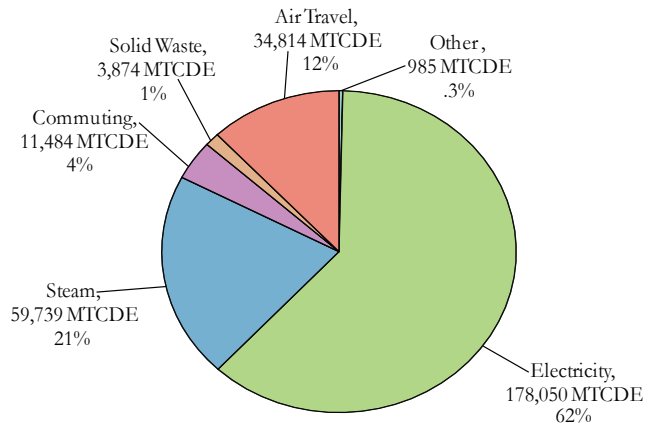
Agriculture	0
Emissions from Natural Gas	661
Emissions from #2 Oil	66
Emissions from Refrigerants	n/a
Emissions from Fleet	257
Scope 1 Total	985

Scope 2 Emissions (MTCDE)

Emissions from Electricity	178,050
Emissions from Steam	59,739
Scope 2 Total	237,789

Scope 3 Emissions (MTCDE)

Emissions from Commuting	11,484
Emissions from Solid Waste	3,874
Emissions from Air Travel	34,814
Scope 3 Emissions	50,172

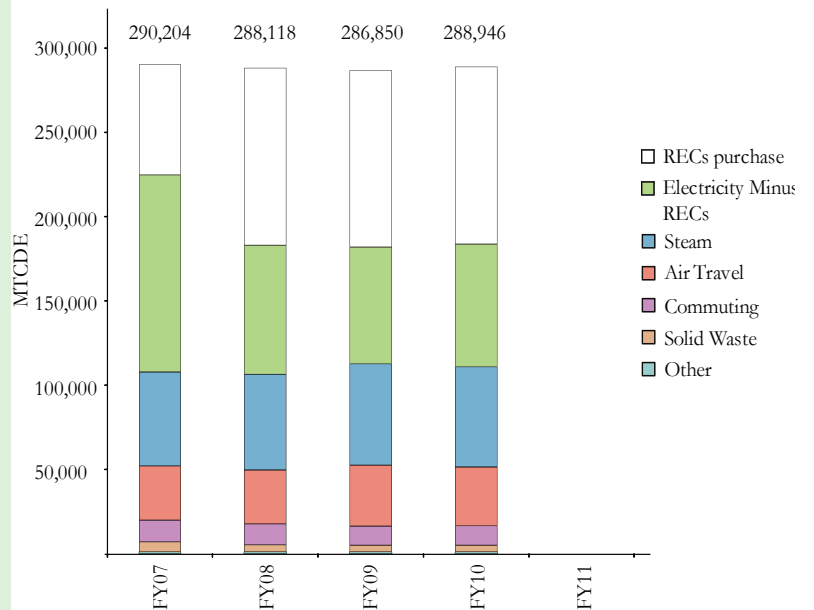


Scope 1, 2 & 3 Emissions by Source

FY10 At a Glance:

- Development and launch of the Energy Reduction Fund (ERF) as a mechanism to prioritize, and fund energy conservation projects across campus
- Three LEED buildings were completed: Weiss Pavilion, Music Building, and Morris Arboretum Horticultural Center
- The first LEED CI pilot was completed for Towne Building, to serve as a basis for the development of university-wide Green Renovation Guidelines

Total Campus Emissions Over Time



Summary of Emissions (MTCDE)

Scope 1 Emissions	825
Scope 2 Emissions	237,943
Scope 3 Emissions	55,441
Total Emissions (Scopes 1+2)	238,767
Gross Emissions (Scope 1+2+3)	294,209
Net Emissions (Minus RECs)	184,962

Scope 1 Emissions (MTCDE)

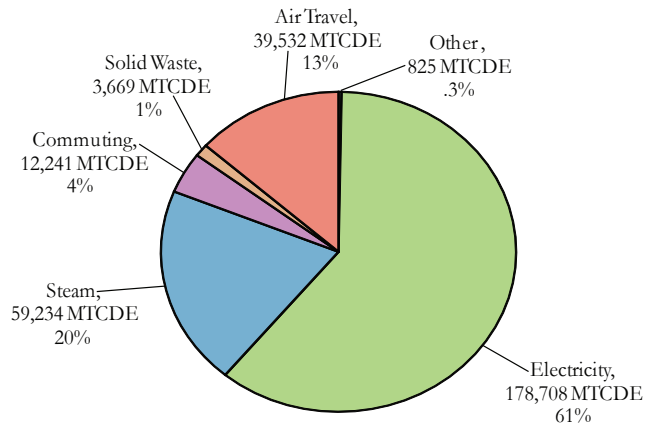
Agriculture	0
Emissions from Natural Gas	467
Emissions from #2 Oil	66
Emissions from Refrigerants	n/a
Emissions from Fleet	292
Scope 1 Total	825

Scope 2 Emissions (MTCDE)

Emissions from Electricity	178,708
Emissions from Steam	59,234
Scope 2 Total	237,943

Scope 3 Emissions (MTCDE)

Emissions from Commuting	12,241
Emissions from Solid Waste	3,669
Emissions from Air Travel	39,532
Scope 3 Emissions	55,441

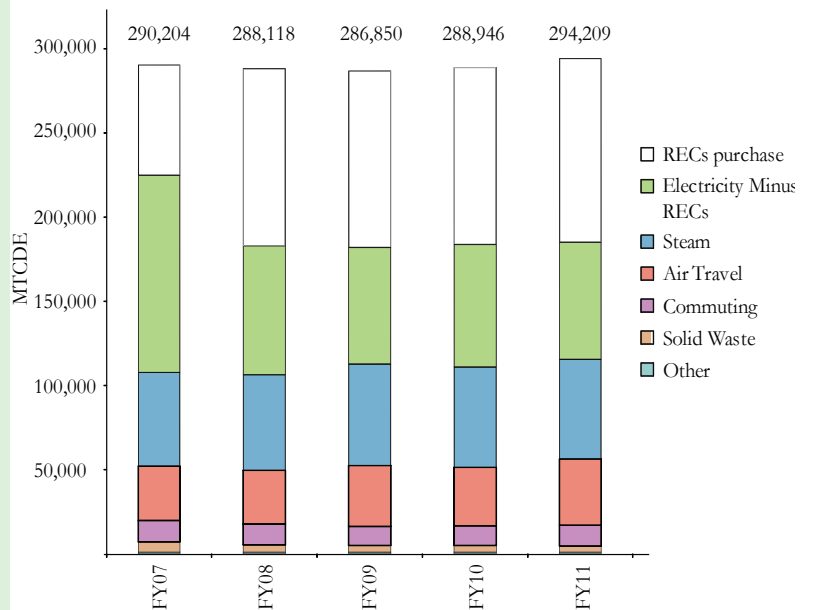


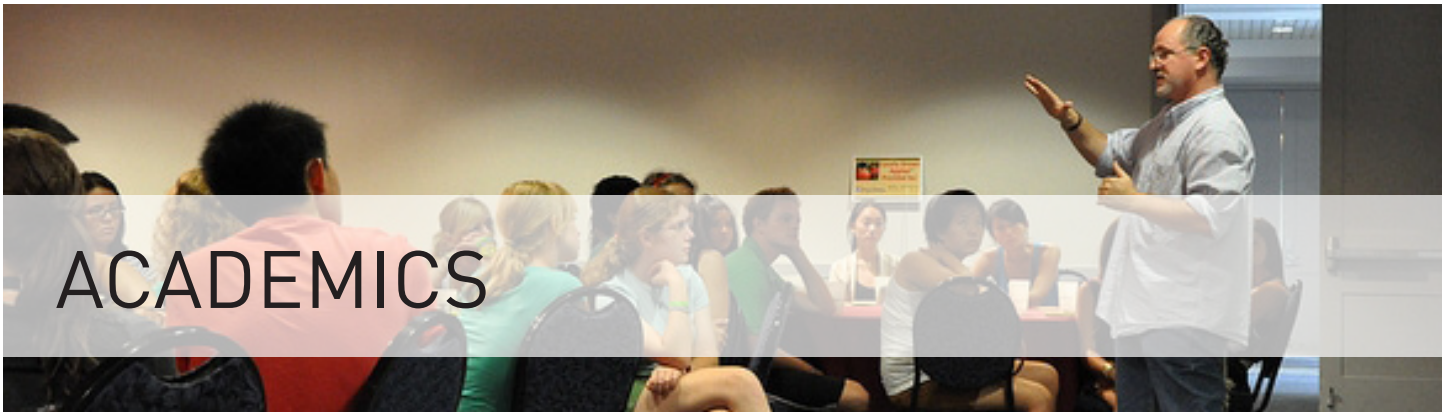
Scope 1, 2 & 3 Emissions by Source

FY11 At a Glance:

- Penn was honored with Second Nature's Climate Leadership Award
- LEED Gold certifications were awarded to the Music Building and to Joe's Café, an addition to Wharton's Steinberg-Dietrich Hall
- A LEED Platinum certification was awarded to the Morris Arboretum Horticultural Center
- Penn Ranked in Top 25 on Sierra Club's List of 'America's 100 Greenest Schools'

Total Campus Emissions Over Time





ACADEMICS

Climate Action Plan Goal

“Make climate change and sustainability part of the curriculum and educational experience available to all students and the larger Penn community.”

Metrics

Number of Sustainability-related courses offered: Penn offers more than 160 new and existing classes related to sustainability, in departments ranging from Environmental Studies to Public Health.

Key Actions

Vagelos Integrated Program in Energy Research

The Vagelos Integrated Program in Energy Research (VIPER), established in Fall 2011, is an innovative dual-degree undergraduate program offered by the School of Arts and Sciences and the School of Engineering and Applied Science. The program focuses on alternative and energy efficient energy sources through interdisciplinary coursework. The Penn Center for Energy Innovation will be a partner with VIPER, providing faculty mentors to students as well as providing opportunities for students to participate in cutting-edge research on topics such as solar energy, chemical fuels, and energy-efficient electronics and materials.

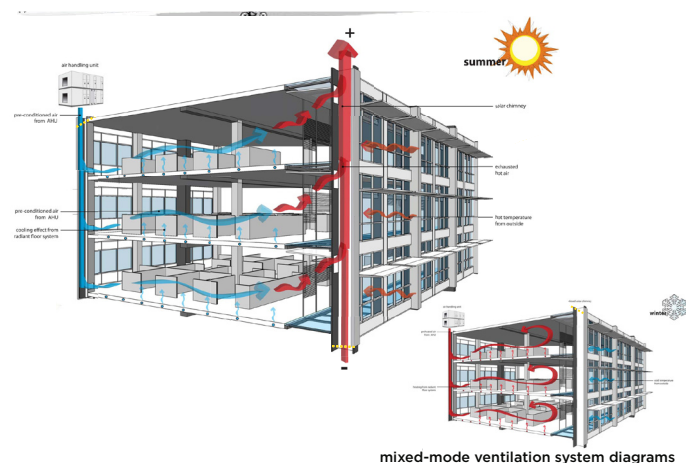
Master in Environmental Building Design

The Master in Environmental Building Design in the School of Design, established in 2010, is a specialized, post-professional degree developed to train architects in the new skills and knowledge required for environmental design, especially in the design techniques with which those skills must be integrated into the practice of architecture. The one-year course of study includes coursework on building performance simulation, integrated building design,

building envelopes and systems, lighting, daylighting, and the theory and practice of environmental design. Coursework is complemented and extended by a Performance Design Workshop and then explored in depth in an intensive Environmental Design Laboratory in the early summer.

Sustainability & Environmental Management Minor

In 2009, Penn established the *Sustainability and Environmental Management Minor*, a recommendation of the University’s *Climate Action Plan* as a partnership between the School of Arts and Sciences, the Wharton School, and the School of Engineering and Applied Science. The minor provides undergraduates from these three schools with a recognized opportunity to focus on sustainability as part of their coursework at Penn. The minor requires six approved courses, with at least three in earth science, to prepare students for the environmental challenges of the 21st Century, regardless of the field that they go into. Other key issues that the minor is designed to address include environmental risk assessment and change management associated with sustainability initiatives.



Master in Environmental Building Design student project

Course Design Grants

The Benjamin Franklin Scholars Course Design Grants provide funding for faculty to develop and launch new undergraduate seminar programs, targeted to a select cohort of scholars each year. Four new seminars are launched each year by the Provost. Since the launch of the *Climate Action Plan*, at least one of the four seminars has been focused on environmental sustainability. The funding (\$5000 to \$7500 per grant) is used to pay undergraduate and graduate students to help develop the course theme, syllabus, and reading list. Interdisciplinary courses are preferred.

Climate Action Plan Research Grants

Climate Action Plan Research Grants enable selected undergraduates to participate in summer research projects with doctoral candidates in sustainability field work. Past research project topics ranged from nonprofit sustainability management models to the study of relative sea level on the Georgia coast. In the past two years, a total of twelve grants were awarded.

Academically Based Community Service Courses

Academically Based Community Service (ABCS) courses involve hands-on, real-world problem solving by undergraduate students, and foster civic engagement in the student body through community service projects throughout Philadelphia. Several new ABCS courses focus on sustainability, among them:

- Dr. Mark Alan Hughes, Distinguished Senior Fellow at the School of Design (former Director of Sustainability for the City of Philadelphia) teaches *Sustainability in Action*. The course uses *Greenworks*, the City of Philadelphia's sustainability plan, as the organizing framework to address local environmental challenges.
- *Lead in West Philadelphia* is taught by former Director of the EPA Region III's Office of Strategic Planning, Richard Pepino, and focuses on the epidemiology of lead poisoning, the pathways of exposure, and methods for community outreach and education. Penn undergraduate students collaborate with middle school and high school teachers in West Philadelphia to engage children in exercises that apply environmental research relating to lead poisoning to their homes and neighborhoods.

- *The Urban Asthma Epidemic*, taught by Region III EPA Public Affairs Director Mick Kulik, exposes Penn undergraduates to the epidemiology of urban asthma, the debate about the probable causes of the current asthma crisis, and the nature and distribution of environmental triggers of asthma episodes. Penn students collaborate with the Children's Hospital of Philadelphia (CHOP) on a clinical research study and, with CHOP parent educators, co-teach asthma classes at community centers in Southwest, West, and North Philadelphia.
- Howard Neukrug, commissioner of the Philadelphia Water Department, teaches *Clean Water-Green Cities: An ABCS Approach To Using Water Science To Create A Sustainable Philadelphia*. The course provides an overview of the cross-disciplinary fields of civil engineering, environmental sciences, urban hydrology, landscape architecture, green building, public outreach and politics. Students conduct field investigations, review scientific data and create indicator reports, work with stakeholders and present results at an annual symposium. This ABCS class defines the current issues of the urban ecosystem and how we move toward managing this system in a sustainable manner.
- The Department of Chemistry will offer *Chemistry of the Environment* taught by Professor Marsha Lester. The course aims to teach chemical content and principles in the context of significant environmental issues. The topics covered will include: composition of the atmosphere; protecting the ozone layer; chemistry of global warming; traditional hydrocarbon fuels and energy utilization; water supply, its contaminants, and waste water treatment; acid rain; nuclear energy; and new energy sources.

Academic Theme Year and Sustainability

Academic theme years were created to offer common learning experiences across Penn's Schools and Centers. The Penn Reading Project, the kickoff of the academic theme year, is read by all incoming undergraduate students. Discussion groups are held during New Student Orientation to analyze the text. Throughout the year, the Office of the Provost hosts interdisciplinary lectures, conferences, discussions, tours and exhibits focused around the academic theme year.

The University-wide 2010-11 academic theme year was designated the Year of Water, which provided a perfect way to weave sustainability into the many discussions happening across campus. The Penn Reading Project was *The Big Necessity: The Unmentionable World of Human Waste and Why It Matters* by Rose George. Penn held six volunteer clean-up sessions of the Schuylkill River and Delaware River waterways as service events tied to the academic theme year. A total of 631 tons of trash was collected and removed from these watersheds.

The 2011 - 2012 academic theme year is the Year of Games. Symposia, exhibits, performances, etc. spotlights the role of games, and "gamification" as a strategy to effect behavior change and to make work more rewarding. The Penn Sustainability Office will build on the Year of Games activities through the Power Down Challenge, a college house energy competition, and RecycleMania, a nationwide recycling competition.



United by Blue River clean up as a part of the Year of Water

Partnering with the Student Committee on Undergraduate Education (SCUE) to highlight courses on sustainability

The Office of the Provost works closely with SCUE to promote new sustainability initiatives and programs amongst the student body and faculty. For example, in October 2010, SCUE sponsored the first of a series of faculty discussions on "teaching sustainability," attended by over a dozen faculty from across several disciplines at the University.

Penn Sustainability Office Internships

Penn's Division of Facilities and Real Estate Services offers several sustainability internship positions for undergraduate and graduate students each Summer, as it has since 2007. Summer 2011 interns' projects included:

- Writing a campus-wide sustainable catering guide,
- Planning the expansion of the student Eco-Reps program,
- Developing a student energy competition between different College House residences,
- Researching the USGBC's LEED programs to continue to refine the best fit for greening Penn's campus buildings,
- Developing a Green Office program.

Students gain experience working in a University setting and provide invaluable student perspectives to the Penn Sustainability Office's initiatives.



Richard Pepino presents his ABCS class

SNAPSHOT: LOCAL FOOD

On average, twenty percent of the food served in residential dining facilities at Penn is produced within 100 miles of campus. The University also supports local farms with a farm-to-institution program and hosts a weekly on-campus farmers market where students may purchase items using their dining plan. There are three farmers' markets located on campus and in the surrounding University City neighborhood.

Penn's decision to retain Bon Appétit in 2009 was influenced by the company's industry - leading practices in sustainability which align perfectly with the goals of the University's Climate Action Plan. Highlights of the sustainability commitments of Bon Appétit at Penn Dining include:

- **Eat Local Challenge:** Within each dining hall, there is at least one designated station highlighting a lunch option made with ingredients from within 150 miles of Penn (The only exception is salt). At Kings Court café and Hill, 100 percent of the food served during the Challenge was made from local ingredients.
- **Low Carbon Diet Day:** Low Carbon Diet Day encouraged diners to be mindful of their food choices and to eat less meat and dairy products, reducing carbon emission associated with food production.
- **Food Week:** This program featured daily lectures on sustainable and socially responsible food choices and drew large numbers of students.
- **All seafood complies with Monterey Bay Aquarium's Seafood Watch guidelines for sustainability.**
- **All milk provided to students is free of artificial bovine growth hormones.**
- **Turkey and chicken are raised without antibiotics as a routine feed additive. Hamburgers are made from natural beef.**
- **All eggs are Certified Humane and cage-free.**



UTILITIES & OPERATIONS

CLIMATE ACTION PLAN GOAL

“Seventeen-percent reduction in energy consumption from FY10 to 2014 relative to the FY07 baseline.”

METRICS

Total Electric and Steam usage in comparison to baseline

Total electric and steam use for FY12 Q1 and FY07 were converted to KBTUs as a standard unit of energy consumption, and compared with utility data through September 2011. There has been a 2.42% increase in overall usage in FY12 year to date in comparison to the FY07 baseline.

Electric usage

There has been a 0.12% decrease in electric usage in FY12 year to date in comparison to the FY07 baseline.

Steam usage

There has been a 6.89% increase in steam usage in FY12 year to date in comparison to the FY07 baseline.

This increase in steam usage can be partially attributed to factors including:

Inefficient Preheat Valves: A campus wide assessment was performed against a selection of buildings with an equal distribution between old and new. This assessment determined that there were a multitude of issues in both old and new buildings indicating suboptimal performance of campus air handling units. Generally, these deficiencies lead to simultaneous heating and cooling operations. This assessment led directly to a recognition of the need for improved preventive maintenance and calibration programs.

Heat/Cool Effect: Over the last few years, summer set-points in many campus buildings were changed from 72 degrees to 78 degrees, to save energy by reducing the cooling load. However, because many campus building systems use cooling to reduce indoor humidity, raising the set points has inadvertently increased the use of steam to re-heat delivery air. The result of the higher set point was an overall increase in steam use.

Campus Expansion: Three new buildings were not included in the FY07 baseline. There is no metered usage data available for these buildings yet, but due to their relatively small size their impact on utility use is minor.

- *Annenberg Public Policy Center:* This building accounts for 54,896 SF, which equates to .4% of the total campus.
- *The Music Building Addition:* The new construction accounts for approximately 12,000 SF which equates to .1% of the total campus.
- *Weiss Pavilion:* This building does not factor into “new” campus square footage because it was built within the façade of Franklin Field Stadium, but it is considered 52,122 SF of new usable space, which equates to .41% of the total campus.

In addition, two large laboratory and vivarium spaces were occupied since FY07: Skirkanich Hall and the Hill Pavilion & Vivarium. Because of the heavy steam use in lab and vivarium spaces for sterilization and cage washing, the occupancy of these buildings likely results in a significant but unmeasured increase in steam use.

Normalized Data: Due to the increase in campus square footage and extreme weather conditions, it is helpful to normalize energy usage data for these two elements.

Normalized utilities data for total energy usage indicates a 9.5% decrease in comparison to the FY07 baseline.

Normalized electricity usage indicates a 12.1% decrease in comparison to the FY07 baseline.

Normalized utility data for steam indicates a 8.0% increase in comparison to the FY07 baseline.

KEY ACTIONS

OCC Steam Targets

Facilities and Real Estate Services is developing a model to help identify unusual steam consumption. The model is based on a statistical analysis of three years of steam usage. The intent is to provide the model as a decisional support tool at the Operations Control Center (OCC). This tool provides the utility operators a display showing current steam consumption along with an upper and lower bound as determined by the historical data analysis. The system will be programmed to alert the operators if the current steam consumption falls outside of the specified range. This will enable the operators to quickly determine if the current steam usage appears to be unusual and take the necessary steps to investigate and correct.

Metered Buildings Steam Analysis

As part of an on-going effort to better understand how steam is used on campus, data from 20 newly installed campus steam meters is being monitored and analyzed. The analysis consists of an examination of the trends from each of the individual building meter's readings for consistency and reliability. This analysis provides a general check among individual buildings and campus-wide usage. This preliminary analysis will help ensure that sub-metering data will be accurate moving forward as the metering program expands campus-wide.

Recommissioning

With the launch of the *Climate Action Plan*, Penn committed to recommissioning the largest 80 buildings on campus at an average rate of eight buildings per year. To date, recommissioning has

been completed in 22 buildings and is in progress in 10 buildings. An additional nine buildings are proposed for FY12. At the completion of FY12, Penn will have recommissioned over fifty percent of the buildings targeted for its ten year cycle.

Penn's effort uses ASHRAE's *Procedures for Commercial Building Energy Audits* as a guideline for its recommissioning and energy audit program. The goal is to develop a consistent approach to auditing Penn buildings and standardize how information is reported, whether internally or by consultants, and use building modeling to estimate savings.

Penn has also begun to develop campus-wide initiatives to address common Energy Savings Opportunities (ESOs) that are a recurring theme among completed the energy audits. These initiatives target not only the eighty largest buildings, but all campus buildings. Some of these initiatives include:

- Discharge air temperature reset on air handling units,
- Adjustment of ventilation rates to current standards,
- Installing occupancy sensors,
- Implementing lighting conversions from t12 to t8,
- Inspecting and repairing insulation on steam piping in manholes and in mechanical rooms, and
- Using removable insulation on equipment requiring more frequent service.

Penn's recommissioning program ties in closely with our Energy Reduction Fund (ERF) program which picks up where the recommissioning effort leaves off.

Metering

The campus-wide initiative to install meters in every campus building, growing out of the *Climate Action Plan*, is key to efforts to better manage energy usage at the individual building level, providing the essential engineering data as well as setting up the possibility of new financial incentives for Schools and Centers.

The metering effort consists of two major components. The first is the installation of chilled water, steam and electric meters in the majority of campus buildings (approximately 118). The second component is the development of a single database to store information

that will be used for visualization and analysis of the metered energy data. The two components are being implemented simultaneously.

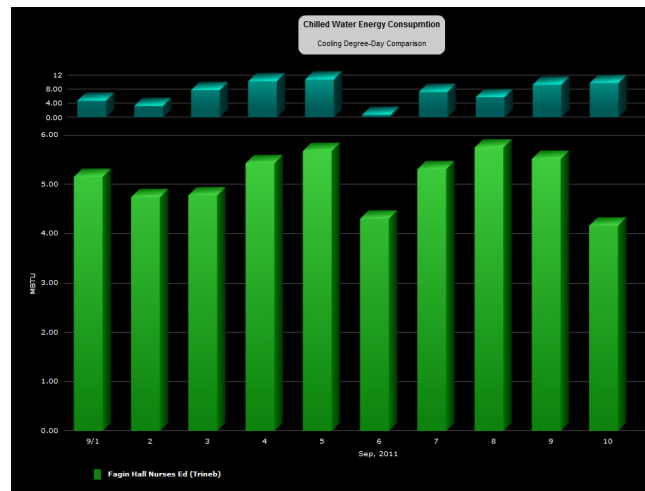
The overarching goal of the metering effort is to have building level energy data available in real-time to use for measurement, verification and feedback to building occupants. The data will be used to benchmark and monitor building performance, confirm energy reduction results associated with on-going energy conservation efforts and support incentives that will promote behavior change.

Monitoring building performance provides a detailed picture of the energy use at the building level at any given time, which will be used to aid in building operations. As unusual energy consumption is flagged, appropriate investigation and corrective action can be taken more quickly than is possible today. By providing end users on campus with their building usage and appropriate education and incentives related to consumption reduction, Penn can leverage more investment in energy reduction projects and thereby improve overall building efficiencies. Campus-wide meters will enable the creation of financial incentives for energy reduction that do not currently exist. Ultimately, this new information will also be used to promote behavior change initiatives for the building occupants.

Energy Reduction Fund

Since the launch of the *Climate Action Plan*, the University has concentrated on improving the performance of the most energy-intensive and highest carbon-emitting buildings on campus. One new initiative to improve existing buildings' energy performance was the establishment in FY10 of an Energy Reduction Fund (ERF). The ERF program is intended to be self-sustaining with ongoing funding coming from energy savings achieved with ERF project implementations.

The ERF program uses a data-based mechanism to propose, prioritize, and track energy saving projects for campus buildings, and includes a robust decision-making tool to assist in choosing the best from among a multitude of potential energy efficiency projects. The decision-making tool enables scoring and prioritizing projects in seven categories: Energy Reduction; Energy Payback (ROI); Carbon Reduction; Cost Avoidance; Shared Funding; Project Synergy; and Other Benefits and Immeasurable Impacts. The ERF Scoring Guide' was modeled after a similar project ranking system developed for the Architect of the U.S. Capitol, modified to fit the University of Pennsylvania's priorities.



Sample visualization report for monitoring building performance

Once a project is scored, the ERF database establishes project rankings and a prioritized project list containing detailed information about each project.

The prioritized energy project list can then be utilized to determine how available funding should be allocated, what projects are of higher priority, and to strike a balance between funding different project typologies such as utility infrastructure projects, existing building systems improvements, and existing building envelope improvements. The ERF database complements Penn's Facilities Renewal Fund, a deferred maintenance program that provides basic system repairs and infrastructure upgrades. Additionally, in April 2010 Penn launched the Matching Facilities Renewal Fund enabling Schools and Centers to apply for matching funds for such projects.

The ERF database combines Facilities Renewal Fund energy-driven projects, energy projects identified by Penn's multiple Schools and Centers, and projects identified during recommissioning in one database. With the capability to sort all of those types of projects in a variety of ways, Penn can leverage the information to make the best choices for investing limited funds.

The inaugural round of ERF energy projects in FY11 includes HVAC improvements, lighting and controls upgrades, variable air volume installations, Aircurity installations, and LED campus street-light installations.

Green Power Purchase

Committed to renewable energy, Penn currently purchases 200,000 wind RECs annually, and is the largest purchaser among all colleges and universities

in the US. Penn has been the largest purchaser of RECs among higher institutions in the US since 2008.

Improvements at Veolia Energy

In May 2010, Penn renewed their 2007 contract with Veolia Energy, the public utility that provides steam to the campus. As a direct result of the negotiations leading to this renewal, Veolia has committed to replace two 70-year-old oil-fired boilers with new rapid fire boilers, resulting in a much more efficient steam system that is expected to reduce Penn's emissions associated with steam by an estimated 10 percent (overall campus emissions are estimated to drop 2 percent). All of Veolia's 300 steam customers in Philadelphia will see a commensurate drop. This significant action will be realized in Penn's carbon footprint in FY13.

Act 129 and PECO's Smart Ideas Program

Pennsylvania Act 129, enacted in 2008, mandated that utility companies become more proactive about energy conservation within their service territories. Penn's service provider, PECO, established a program called "Smart Ideas," which provides rebates and other incentives to encourage its customers to become more energy efficient. The University of Pennsylvania is participating in the program and has received over \$230,000 in rebates to date for projects such as:

- Energy efficient walkway lighting upgrades,
- Interior lighting improvements in buildings,
- Upgrades to our central chiller plant, and
- Energy efficient electric motor and control upgrades.

Summer Conservation Strategies

To identify energy conservation opportunities across Penn's campus, all Schools and Centers were surveyed in May 2011. An analysis of the survey results identified a series of potential energy conservation initiatives that would result simply from operational changes. These initiatives are being developed for a pilot implementation in the Summer of 2012.

Cost-allocation Model

With the metering project described previously nearing completion, Penn Facilities and Real Estate Services (FRES) is beginning to accumulate sufficient data to evaluate the impact of billing Schools and Centers based on their actual building-specific energy usage instead of the long-standing engineering

calculation methodology which is based primarily on square footage and use type. This methodology will create, for the first time, financial incentives for energy conservation by the Schools and Centers. A team, with representatives from Facilities and Real Estate Services and the Office of Budget and Management Analysis, was established in January 2011 to facilitate a formal evaluation of new, real-time and energy internal costing. The intent is to institute a pilot of this new methodology by June 2012.



PHYSICAL ENVIRONMENT

Climate Action Plan Goal

“Create and maintain a sustainable campus by increasing green space, decreasing building energy consumption through design and renovations, improving the environmental quality of interior and outdoor spaces, and increasing education and awareness of sustainable design.”

Metrics

As put forth in the University’s *Climate Action Plan*, all new buildings and renovations on campus will be designed to achieve a LEED Silver Certification or higher. The following University buildings are registered with the US Green Building Council for LEED certification.

Completed:

- Music Building (Gold)
- Morris Arboretum Horticulture Center* (Platinum)
- Joe’s Café renovation and expansion in Steinberg Hall - Dietrich Hall (Gold)
- Perelman Center for Advanced Medicine* (Silver)
- Weiss Pavilion (Gold)

In Construction

- The Krishna P. Singh Nanotechnology Center (Silver)
- Translational Research Center (Silver)
- Golkin Hall, Penn Law (Silver)

Planned

- Steinberg Hall - Dietrich Hall Office and Classroom Expansion
- ARCH Building
- New College House at Hill Field
- Neurobehavioral Sciences Building

**These buildings do not contribute to Penn’s carbon footprint because they are not on the main campus or the campus utility distribution system.*

Key Actions

LEED Buildings

The restoration and addition to the Music Building was Penn’s first LEED Gold building. The building boasts a comprehensive recycling system, green cleaning practices, and the use of recycled or salvaged materials.

The Morris Arboretum Horticulture Center was awarded a LEED Platinum rating. The Horticulture Center’s energy efficient design, including solar panels and geothermal heating, paired with modest wind power purchases, ensure that the Center will be carbon neutral for the next 10 years.

The Perelman Center for Advanced Medicine, completed in 2008, houses the University of Pennsylvania Health System’s Abramson Cancer Center, radiation oncology, cardiovascular medicine and an outpatient surgical pavilion. The state-of-the-art center received a LEED Silver level from the U.S. Green Building Council.

Built within the arches and existing concourse of the historic Franklin Field, the Weiss Pavilion captures 52,000 square feet of usable space without increasing

the campus footprint. The pavilion provides high quality workout facilities at the Robert A. Fox Fitness Center as well as separate strength and conditioning space for Penn's intercollegiate teams and student study areas. The project was awarded LEED Gold certification.

The renovation of Steinberg Hall-Dietrich Hall was awarded LEED Gold for Commercial Interiors in 2011, Penn's first certification in this category. Joe's Café, an addition created as a major part of the project, offers sustainable food practices, recycling and composting, and chemical-free cleaning methods.

The Translational Research Center, a major research tower integral with the Perelman Center for Advanced Medicine, fosters cross-disciplinary clinical and research collaboration and care. The Center includes clinical/patient-oriented research facilities, imaging, offices and state of the art biomedical laboratories. The building is targeting LEED Silver certification.

Golkin Hall for Penn Law will provide flexible seminar and collaboration spaces, a 350-seat auditorium, and increased space for faculty offices, research centers, administrative offices, and student organizations. Golkin Hall's green roof will mitigate stormwater and advanced daylight harvesting systems will maximize interior natural light. Scheduled to open in January 2012, the building is targeting LEED Silver certification.

The Krishna P. Singh Nanotechnology Center will stand as a gateway to Penn's campus along Walnut Street when it opens in August 2013. The building will be a physical expression of Penn's commitment to interdisciplinary learning and research, as it will house departments from the School of Arts and Sciences and the School of Engineering and Applied Sciences. The building is targeting LEED Silver certification.

The ARCH (Arts, Research, and Culture House) at 36th and Locust Walk is in the design phase for a complete renovation of interior spaces and restoration of the exterior and historic architectural features. Plans include offices for student groups, lounge, gallery, conference and group study rooms with state of the art technology, expanded office space, an outdoor terrace, and an auditorium for lectures, performances, or receptions. The building is targeting LEED Silver certification.

Wharton's Steinberg Hall-Dietrich Hall has completed schematic design for a 26,000 square foot addition and renovation to its west entrance that will help

create a meaningful landmark along 37th Street. The project entails a four story new building addition with offices, conference rooms, classrooms, group study rooms, restrooms, and informal interaction areas. The building is targeting LEED Silver certification.

The New College House on Hill Field, in the planning/feasibility stage, will be sited at the key pedestrian entrance to the northeastern corner of the University. Public open space will enliven the center of this important residential quadrangle. The new 300-350 bed College House will also include residential advisors, faculty, and house master suites. The ground floor will feature public amenities such as retail, dining, and social spaces. The building is targeting LEED Silver certification.

LEED Pilots

The *Climate Action Plan* recommended two pilot projects to investigate the applicability across campus of LEED for Commercial Interiors (CI) and LEED for Existing Buildings Operations and Maintenance (EB/OM).

A LEED CI pilot was completed on the Towne Building in Spring 2010, in which a "typical" renovation project was evaluated to determine if the pursuit of LEED-CI would have improved its sustainability profile, and to evaluate the potential for applying lessons learned from these evaluations to campus renovations more broadly. As a result of this pilot, FRES is developing campus-wide Green Renovations Guidelines for renovation projects. Stakeholders from across the University have been involved in the creation of these guidelines which will address the majority of construction projects under \$5M. These guidelines complete a holistic approach to buildings on campus by addressing renovations as a complement to the LEED Silver certification required for new buildings.

The Wharton School's Huntsman Hall, a 324,000 square foot facility that opened in 2002, was selected in 2009 as the subject of a pilot study of the applicability of LEED EB/OM to the operation and maintenance of Penn's buildings. Almost two years of analysis and targeted interventions were at the core of this pilot, which collectively revealed that the building could not achieve nor sustain the energy reductions required to achieve LEED EB/OM certification. However, through its detailed assessment of Huntsman's operations, maintenance, recycling practices, cleaning techniques, and occupant behavior, the pilot as intended resulted in the richest analysis to date of maintenance and operational practices, and of opportunities to improve the

building's performance.

The results of the pilot are currently under study to determine lessons learned that are applicable not only to Huntsman itself but across campus as well. At the same time, Wharton and FRES continue to jointly refine the pilot findings, and to implement many of its recommendations.

Green Cleaning

Wharton received an Innovation Credit for Green Cleaning as part of the LEED Gold certification at Joe's Café. A Green Cleaning Manual and High Performance Green Cleaning Policy was created to guide both housekeeping staff and Bon Appétit, the café operator. Ionized water spray bottles and floor scrubbers are used in the café, eliminating the use of detergents or chemical cleaners for most cleaning tasks. When cleaning products are needed, they will be certified by either the Green Building Certification Institute or EPA's Environmentally Preferred Purchasing program. And, by purchasing concentrated cleaning products, products in bulk and products in refillable containers, Wharton will reduce packaging waste.

Sustainable Landscape Design

Penn Park opened in September 2011, adding 20% more green space to the campus. Penn Park is the

centerpiece of *Penn Connects*, the University's 2006 campus development master plan, which outlines a vision for an eastward expansion of the campus into formerly underused industrial land. Two synthetic turf sports fields, twelve tennis courts, a multipurpose softball field, and passive recreation space make up the 24 acres of Penn Park.

The park is designed to state-of-the-art levels of environmental sustainability:

- The park's underground stormwater cistern has a 300,000 gallon capacity and is projected to collect, and reuse, an average of 2,000,000 gallons of stormwater a year.
- LED pedestrian lighting and quick response fields lighting will conserve 300,000 watts of energy per hour, compared with conventional options.
- Specific native and adaptive plants are used throughout the site to reduce irrigation requirements.
- Retention ponds on site slow rain water infiltration back into the water table and divert stormwater from the Schuylkill River.



Penn Park



Perelman Center for Advanced Medicine



Music Building



Morris Arboretum Horticultural Center

- Recycled materials were used throughout the site including shredded bark mulch, asphalt millings and granite cobbles. Additionally, each of the playing fields is comprised of sustainable synthetic turf made from recycled products.
- In addition to Penn Park, another significant open space initiative is Shoemaker Green, a three acre site next to Franklin Field, which will serve as a new public commons for the Penn community when it opens in Fall 2012. Shoemaker Green was selected as a pilot for the Sustainable Sites Initiative (SITES), which when implemented will be the first rating system for green landscape design, construction and maintenance in the U.S. The design of Shoemaker Green utilizes native plants, best practices in stormwater management, a rain garden and porous pavement, making it a hallmark for environmental design on campus.

A Stormwater Management Plan is being developed for Penn's campus and is scheduled to be completed in FY12. The plan will include best practices in stormwater management and will provide Penn with an invaluable tool about future campus planning and development.

Penn manages its landscape with myriad sustainable landscape practices. In the winter, salt is not used on campus to de-ice pathways and sidewalks. Salt is caustic to the landscape and can sterilize soil. Instead, Penn uses a salt solution, Magic Salt, which is treated to neutralize the caustic elements of salt and is therefore better for soil health. Penn has also reduced the amount of chemical fertilizers used on campus through the use of compost tea. Compost tea is brewed with leaves and lawn clippings from campus, creating a closed loop system.



WASTE MINIMIZATION & RECYCLING

CLIMATE ACTION PLAN GOAL

“Increase Penn’s diversion rate of paper, cardboard, and commingled recyclables from 20 percent in 2008 to 40 percent by 2014.”

METRICS

Recycling rate: 31%

Recycling rate of paper, cardboard, and commingled recyclables: 28%, up 12% from the FY07 baseline.

Municipal Solid Waste Rate: 71%, an 11% decrease from the FY07 baseline.

KEY ACTIONS

Expanded Recycling and Recycling Access

As of August 2010, Penn recycles all plastics numbered 1-7. Penn’s recycler installed new equipment capable of sorting and recycling beyond #1 and #2 plastic to include #3 through #7 containers. This expansion of recycling options has raised Penn’s current recycling rate and made it easier for Penn’s communities to recycle in their dorms, offices, classrooms, labs, and at events.

Penn is in the midst of a campus-wide recycling and trash receptacle reorganization. To date, 51 single trash cans were removed from campus between 34th Street and 36th Street and replaced with 16 “triplets” (three-bin assemblies with places for paper, commingled plastic/glass/aluminum, and trash). The triplet bins have reduced contamination of recycling to near zero levels by increasing the convenience, transparency, and clarity of the recycling process in public spaces. Over the Summer of 2011, the remainder of campus was assessed.

An audit and analysis of recycling receptacles, signage, and layout in all 11 college houses and

residence halls were carried out by student volunteers in the Spring of 2011. Called the *Bin Blitz*, the intent was to inform future recycling recommendations in college houses. Based on the broader campus information gathered, King’s Court English College House’s (KCEH) recycling and waste infrastructure underwent a complete recycling audit in 2011. After a thorough analysis of the waste being produced in KCEH, new recycling bins and signage were deployed throughout the building in strategic locations. After the upgrade, recycling contamination was reduced by 22%. FRES is currently working to expand student dorm room recycling in Stouffer, Ware, and Rodin College Houses by purchasing room recycling bins for student use.

During the Summer of 2011, and during the five days of student move-in, Penn Student Agencies (a student-run dormitory retail services company) offered in-room recycling bins for sale. The program, launched with Facilities and Real Estate Services, was based on a student-run dormitory pilot carried out in 2010 that showed improved rates of recycling would be achieved if students had access to specific bins in their rooms. The bins were sold at wholesale prices to remove the cost barrier and over 90 bins were sold to incoming students.

In addition, Facilities and Real Estate Services implemented a construction-site recycling program in Spring 2011 for small, in-house projects executed with Penn staff, with a goal of diverting > 75% of the projects’ waste from landfills. From May to August 2011, 14.81 tons of material (over 78%) of the construction and demolition waste from these projects has been diverted from landfills.

Composting

All of Penn’s student dining halls collect kitchen food waste for composting at the Wilmington Organic Recycling Center in Delaware. About nine tons a week

is diverted from landfills. The University's landscape maintenance contractor purchases this compost from Wilmington for use on campus.

Several independent composting initiatives were started at Penn in 2010 and 2011:

- The Mayer Hall Student Residence Composting Program, a Green Fund project, was piloted in 10 rooms in the Spring 2011 semester, and expanded to the whole college house in Fall 2010. Students manage a system to safely collect food waste from residence kitchens and move it to outdoor bins, where after composting, it is used in the nearby student-run vegetable garden.
- The Annenberg Public Policy Center started a worm composting project in Spring 2010 to reduce the amount of food waste in the building and to educate staff about composting. The program was started by a Green Fund grant. To get buy-in to the program, messaging about food waste composting was sent out in the in-house newsletter to spread awareness about the program. Weekly collection of food scraps ranges from half a gallon to three-quarters of a gallon. The rich compost created as a result of this program is given to the adjacent Penn Women's Center Garden.
- Staff Eco-Reps at Penn Law saw an opportunity to decrease the amount of waste being produced. They instituted a composting program for the whole Law School complex in 2010, using a third party composting company that makes regular pick-ups at the school. Staff, faculty, and students now have the ability to compost their food waste, and the expanded recycling and composting options available in the building serve as a reminder to occupants and visitors of Penn's commitment to sustainability.

RecycleMania

Penn has participated in *RecycleMania*, a 10-week competition between over 600 colleges and universities in the United States and Canada, since 2008. Universities compete in different contests to see which institution can collect the largest amount of recyclables per capita, the largest amount of total recyclables, and to determine which has the least amount of trash per capita and the highest recycling rate. In the 2011 competition, Penn recycled approximately 28% of its waste stream. The campus

recycling rate has increased steadily since 2008, when Penn posted an 18% rate in its first year of participation in the national competition.

In 2011, departments and centers across campus were charged to start their own recycling initiatives as part of *RecycleMania*. Some of these initiatives included single stream recycling within offices, battery recycling programs within buildings, and electronic waste recycling drives.

Other efforts to reduce waste and boost recycling at Penn include:

- *Zero Waste Basketball Game*: As part of *RecycleMania*, a zero-waste basketball game was held at the Palestra in February 2011. Student volunteers were stationed at every recycling bin to speak with attendees about sustainability and the event and help them sort their waste. All food packaging sold at the basketball game was either compostable or recyclable. Beverages were sold in recyclable bottles and foil food packaging was replaced with compostable cardboard trays. Announcements were made during the game about zero waste and Penn Sustainability Office. This pilot demonstrated to the wider campus community that zero-waste events are possible at Penn and laid the groundwork for future events.
- *Green Product Delivery*: Business Services has implemented various green purchasing initiatives and continues to provide both vendors and consumers with information about sustainable products. Small office supply orders weighing less than 20 pounds are now being delivered in paper bags and transported in reusable delivery totes, reducing or eliminating disposable cardboard boxes. This initiative conserves resources and reduces Penn's solid waste.
- *Green Purchasing*: Telrose/Office Depot now provide Greener Supply choices automatically to departments purchasing items in the Penn Marketplace by showing a green banner with suggestions for environmentally preferred choices, allowing an easy comparison of product and price. Additionally, Penn Purchasing has instituted a \$25 minimum order for office supply orders, which will reduce 6000 purchase orders each year and eliminate over 3000 packages, reducing packaging waste, truck deliveries to campus and related carbon emissions.



- Ben's Attic Office Products Reuse website:* Launched in November 2010, Ben's Attic (named for Ben Franklin, Penn's founder) is an online resource that enables University departments to post usable surplus University-owned furniture and equipment for exchange with other departments.
- PennMOVES:* The fourth Annual PennMOVES Community Sale, held on June 4, 2011, raised over \$25,000 to support Goodwill's local employment training services for people with disabilities and other barriers to employment. By holding this sale, close to 90,000 pounds of usable items that students could not take with them when they left campus was diverted from local landfills. Faculty, staff, students, and the surrounding community came to a Penn-owned warehouse close to campus to take advantage of the sale items, which included televisions, refrigerators, printers and other small appliances, household and kitchen items, clothing, furniture, and school supplies.
- Sustainable/Recycled Paper Purchases:* Purchasing Services has partnered with the country's top paper supplier to institute a directed-buy paper program that enables us to promote sustainable paper selection while managing and controlling the cost of paper purchased for the University's commercial printing. With a directed-buy program in place, "preferred" print providers are required to purchase paper from a specific paper mill or merchant at a discounted price. All printers are provided the same price for paper, creating a more level playing field regarding the price for sustainable paper ("approved" providers are encouraged, but not required, to do so.)
- E-waste:* Penn has committed to expanding e-waste recycling options for the Penn community. A cross-campus e-waste working group was established in Fall 2009 to develop best practices for e-waste disposal and identify obstacles. Students can recycle cell phones, batteries, and mercury-containing bulbs in receptacles in the lobbies of all Penn's dormitories. Electronics can be sent back to the manufacturer for recycling via the campus' computer store, Computer Connection. A battery recycling program offered through the Computer Connection in collaboration with the Office of Environmental Health & Radiation Safety (EHRS) provides safe disposal and recycling of batteries from laptops, mobile phones and other devices using rechargeable batteries.
- Writing Instrument Brigade:* Penn has launched a writing instrument recycling program in partnership with Sandford, Office Depot, and Terracycle to recycle pens, mechanical pencils, markers, and highlighters. Terracycle's process, known as "upcycling," gives new life to the Penn community's worn out writing instruments by turning them into fun and innovative new products. For every writing instrument that Penn recycles, two cents (\$0.02) are designated to the Penn Green Fund.
- Recycling Animal Feed and Bedding:* Purchasing Services is working with Environmental Health and Radiation Safety, University Laboratory Animal Research and The Vet School to examine the feasibility of recycling feed and bedding used for animal research. Initial review will take place with the New Bolton Center and other select ULAR locations.

- *Solid Waste Management Plan*: In September 2011, FRES released an RFP for a comprehensive campus-wide Solid Waste Management Plan.
- *Toner Recycling*: Business Services Division has joined with Telrose Corporation and Office Depot to provide easy and convenient recycling programs for all used ink and toner cartridges. Rather than shipping these cartridges individually, Telrose is consolidating shipments for the entire University, thus reducing excess packaging and transportation emissions.
- *Laboratory equipment recycling*: Purchasing Services is working with Facilities and Real Estate Services, Environmental Health and Radiation Safety and Perelman School of Medicine on an initiative to have old laboratory freezers and other large laboratory equipment (and the associated Freon) recycled. This initiative was started through a Green Fund grant.



Climate Action Plan Goals

“More than 50% of the University population uses alternative transit in daily commuting.

Plan a quality pedestrian campus environment, encouraging the use of public transportation for commuting, and provide safe, efficient local transportation services for the University community.”

Metrics

A total of 2,836 individuals responded to the 2010 Penn Parking and Commuter Survey (15% faculty, 63% staff and 11% students):

- 1,403 respondents (50%) indicated that their primary mode of transportation was driving,
- 1,123 (40%) took public transportation, and
- 280 (10%) walked or biked.

Bicycle capacity includes 2750 individual bike parking spots on campus.

Key Actions

Bicycle Initiatives

Since 2009, Penn has invested in various campus improvements to enhance bicycle use and safety. New bicycle racks, with the capacity to park over 150 bikes, were installed in convenient locations throughout campus. Bike racks were installed on all Penn Buses, which serve the Penn community between 5pm and midnight, to encourage intermodal transportation.

Pedestrian Safety

As recommended by a traffic study conducted as a result of increased pedestrian movement eastward, the 34th Street Crosswalk (Smith Walk) on campus

was upgraded to increase pedestrian safety and the 33rd Street Crosswalk (Smith Walk) will be upgraded as part of the Shoemaker Green project.

Electric Car Charging Stations

Penn Parking was awarded a Green Fund grant in Fall 2010 for the installation of two electric car charging stations. Each charging station can charge two cars. These charging stations will be installed in January 2012 in partnership with PhillyCarShare. Two of PhillyCarShare’s newest electric vehicles will be parked at these spaces. These charging stations will add to the 21 charging stations in the Perelman Center for Advanced Medicine underground parking garage, building the capacity for a regional adoption of zero-emitting cars.

Hybrid/Electric Vehicles Preferred Parking

In January 2011, Penn Parking established preferred parking spaces for hybrid/electric vehicles, later expanding the program to include all vehicles designated as low emission (LEV) by Leadership in Energy & Environmental Design (LEED) standards. Designed to support the University’s *Climate Action Plan* goal of lowering Penn’s carbon footprint, the program will also help current and future University buildings achieve LEED certification.

Currently and as a result of this initiative, five percent of parking spaces in Penn garages are reserved for LEV vehicles. The spaces, approximately 5% across campus, are located near the entrance, exit or elevators, as required by the LEED designation program and are delineated by signage. They are available to qualifying low emission and/or fuel-efficient vehicles until 10 AM each day. After 10 AM, other permit holders or paying visitors can make use of these spaces. A list of qualifying vehicles is available on the Parking website.

Bi-Fuel Vehicles

Penn Transit has added four new low emission vans to its shuttle fleet. These vehicles join the four shuttles and four buses that were purchased last year, bringing the total of lower emission vehicles in the Penn Transit fleet to one dozen. A Propane Fueling station is being planned for Penn Transit's new location at 3401 Gray's Ferry with construction to begin in 2012.

Vanpool

As part of Penn's Sustainable Transportation Initiative, Penn Transportation and Parking has joined with VPSI, a national leader in vanpooling and sustainable transportation, to expand vanpooling options to Penn faculty and staff. The vans, which operate throughout the region, including New Jersey and Delaware, offer a reliable, affordable and sustainable way to commute to campus. Riders avoid the high cost of gasoline and the hassle of driving in rush hour traffic while easing congestion and lowering the University's carbon footprint.

Penn currently has three vanpools in operation, all using new, fuel efficient vans, which are now parked at the 34th and Chestnut Streets lot, with new signage to make this commuting option more visible.

Emergency Ride Home Program

Penn has joined with the Delaware Valley Regional Planning Commission to offer members of the University community the services of the Emergency Ride Home (ERH) Program. This service provides a "safety net" for commuters working in southeastern Pennsylvania who carpool, vanpool or use public transportation on a regular basis. In the event of an unexpected personal or family emergency or illness, unscheduled overtime, or if the regular ride home is not available, registered commuters are provided with a free ride either to their home, where their car is parked, or to the place of the emergency.

Carshare with PhillyCarShare and Zipcar

In September 2010, Penn expanded its car-sharing capabilities by partnering with a second local car-sharing program, Zipcar, which added an additional 44 carshare spaces on campus and in the surrounding neighborhood. Penn worked with PhillyCarShare to create special student rates to help provide easy access to occasional-use autos for the student community. Between the two companies, there are a total of 82 carshare locations on or around Penn's campus.

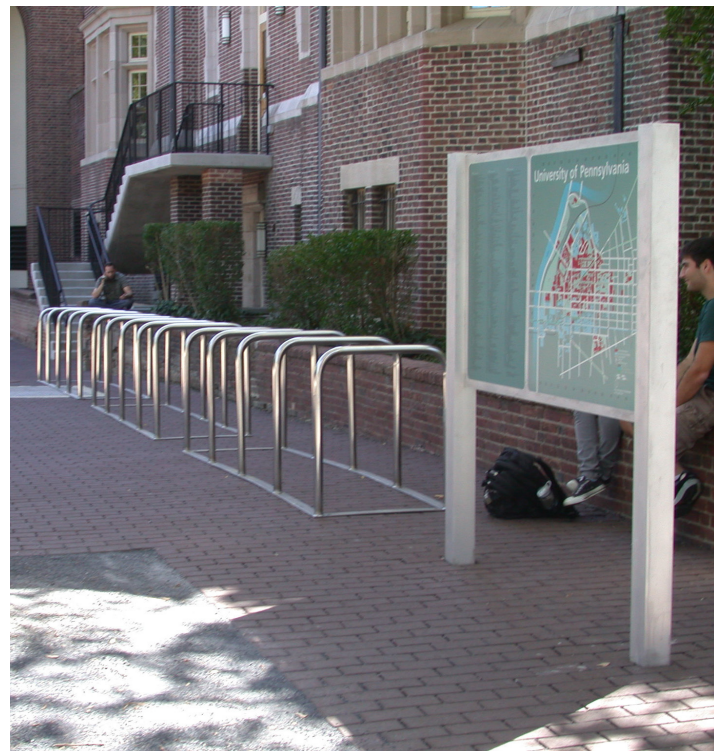
Expansion of Discounts for Public Transportation

Penn has historically supported the use of public transportation for the daily commuting of faculty and staff. The five percent discount that Penn has offered to SEPTA riders has now been expanded to include the same discount for Transitchek®, PATCO and New Jersey Transit users (pre-tax up to \$230 per month) on their monthly commuter purchases. In addition, faculty and staff now receive a pre-tax reimbursement for eligible parking expenses at SEPTA lots.

SEPTA commuters can also purchase new 10 trip tickets and receive their discount and pre-tax benefits, providing savings and flexibility to individuals who don't need to come to campus every day.

Expansion of Campus Transit Services

The Campus Loop Bus, the University's first daytime transportation service, was launched September 15, 2011 in support of Penn Park and the eastward expansion of Penn's campus. The Bus operates from 8 AM to 6 PM Monday through Friday, from the Levy Pavilion in Penn Park to all transit stops on campus. Two additional shuttle vans have been added to the Penn Transit route in response to an anticipated increase in ridership due to the opening of Weiss Pavilion and the new Information Commons study center at Franklin Field. The additional shuttle will decrease wait times for riders.



New bike racks



CLIMATE ACTION PLAN GOAL

“Build a culture of sustainability that informs all constituents of University life.”

METRICS

Number of Student Eco-Reps: 140

Number of Staff Eco-Reps: 84

Number of Green Fund projects: 36

Number of Sustainability 101 attendees: 762

KEY ACTIONS

Student Eco-Reps

Penn’s Student Eco-Reps program was launched in the Fall of 2009 following the release of the University’s *Climate Action Plan*. The program was developed as a volunteer-based environmental leadership program aimed at fostering sustainable behavior across Penn’s residential communities.

During the first year, the program was piloted in three college houses, with 25 student participants. In 2010-11, the program was expanded to all 12 residential communities and Penn’s Greek chapters, with a total of 110 student participants. In the current 2011-12 academic year, Penn’s Eco-Reps program includes all 12 college houses, 28 Greek chapters, and the Hillel Jewish community center on campus, with 140 student participants.

The program includes twice-a-year environmental service events and monthly meetings to focus attention on successive program themes. For the first time in 2011-12, a student Executive Board will help govern the program in conjunction with Penn’s sustainability staff. Penn’s Eco-Reps kicked off the Fall 2011 semester by working with the Schuylkill River Development Corporation on river cleaning

and trail development on the Dupont Crescent of the Schuylkill River trail, a one-mile section of the East Coast Greenway bike trail.

Penn’s Eco-Reps program remains one of the largest in the country and serves as a leader in student engagement and community-based behavior change.

Staff & Faculty Eco-Reps

The Staff & Faculty Eco-Reps is a peer-education program that provides the tools to improve environmental sustainability in Penn offices and labs. Designed to increase environmental awareness and encourage behavior change, the program builds knowledge and leadership across Penn’s Schools and Centers by empowering individuals to champion the goals outlined in Penn’s *Climate Action Plan*.

Participating staff volunteers meet monthly to share best practices between departments and attend trainings by the Penn Sustainability Office on sustainability topics. Eco-Reps then implement change, spreading awareness of important sustainability issues and conservation strategies in their respective offices and departments through sustainability projects, events, and creative informational campaigns. Later in 2011/2012, the Eco-Reps will pilot Penn’s new Green Office Certification Program.

Penn participates in a program to reduce the University’s electric consumption during summertime periods of high demand. As the point persons on environmental initiatives for their offices, Staff & Faculty Eco-Reps receive an e-mail on days when the University’s electrical demand is expected to reach peak levels. By forwarding the e-mail throughout and around their offices and implementing energy conservation protocols, the Eco-Reps are a key component of and ambassadors for Penn’s demand response energy initiatives.

Forty-two Staff Eco-Reps have developed “Green Teams” in their offices or departments, engaging an additional 264 staff and faculty as “second tier” sustainability leaders. Green Teams support the work of the Eco-Reps around particular projects. In 2011, over 200 such projects were initiated and 73 have been completed to date. Projects include initiatives such as “turn out the light” campaigns, recycling of non-single-stream materials such as batteries or paper towels, food waste collection for composting, and replacing incandescent bulbs with CFLs.

Staff & Faculty Eco-Reps meet as subcommittees to address environmental issues of specific interest, focusing on topics such as Better Commuting, Waste & Recycling, and Home Energy Efficiency. Recent accomplishments by these subcommittees include a Green Events Guide.

School/Center Sustainability Coordinators

One indicator of the growth of Penn’s environmental commitment has been the appointment of School and Center sustainability coordinators. To date, seven School/Center sustainability coordinators have been appointed: Perelman School of Medicine, School of Engineering & Applied Science, School of Arts and Sciences, the School of Veterinary Medicine, The Wharton School, Department of Recreation and Intercollegiate Athletics, and Division of Business Services. This group of seven environmental professionals meets monthly with the University’s Environmental Sustainability Coordinator to discuss best practices and share new project ideas across Schools and Centers. Many of the prominent sustainability-related pilots have been led by these sustainability coordinators, such as deskside recycling, school- wide battery recycling, and the pilot effort to examine the benefit of applying LEED’s EB/OM protocols to an existing building.

Green Campus Partnership Student Association

Founded in 2010, the Green Campus Partnership Student Association (GCPSA) grew out of student recognition of the need for an umbrella group to coordinate the work of Penn’s various environmental student groups. GCPSA’s monthly meetings provide an opportunity to collaborate on initiatives and eliminate competition in scheduling and for staffing. In April 2011, GCPSA organized Green Week on campus, a week-long event focusing on environmental sustainability.

Green Fund

Since the launch of Penn’s Green Fund in 2009, 28 projects to enhance Penn’s sustainability have been funded. The Green Fund provides seed funding to innovative sustainability projects, and students, faculty and staff can apply for grants up to \$50,000. Preference is given to those projects that are innovative and demonstrate a financial savings, which are used to repay the grant over time. A Review Committee, made up of students, faculty and staff, selects projects each semester. Successful Green Fund projects have included:

- Enhanced lab glass and metal recycling at the Chemistry Department,
- Installation of occupancy sensors for heating and cooling in student residence rooms in college houses,
- Installation of energy-efficient windows into the Sigma Chi Fraternity campus chapter house,
- Installation of electric car charging stations and a partnership with a local carsharing company to bring zero-emissions vehicles onto Penn’s campus,
- Worm composting of food waste at the Annenberg Public Policy Center, and
- Environmental Kitchen at the Penn Women’s Center.

SNAPSHOT: PENN GARDEN

The Penn Garden is a great example of how the Penn Green Fund catalyzes sustainability activities across campus. As soon as the grant was awarded, the student applicants reached out to the University Landscape Architect for his assistance in the design of the garden and its drip irrigation system. Students spend several weeks in the Spring building the raised garden beds, working with Facilities staff to connect the garden irrigation to campus outdoor sprinkler network. At the same time, the student applicants worked with the Biology Department to grow seedlings in its greenhouse over the winter. The Penn Garden partnered with Bon Appétit during Food Week to host events and lectures about local food. Work days at the garden were scheduled throughout the year. Produce was brought to local food banks and to participating gardeners during harvest days.



Penn Green

Penn Green is a pre-orientation program centered on environmental sustainability. About 40 incoming freshmen are accepted into this program, which requires them to arrive on campus four days early to learn about Penn's *Climate Action Plan* and gain an insight into current work in sustainability in Philadelphia. This year, the students toured Penn Park, Penn's sustainable centerpiece to the *PennConnects* master plan, met with Penn's Environmental Sustainability Coordinator, and had lunch with leading sustainability faculty. In and around Philadelphia, the students toured materials recycling facilities, an industrial composting center, urban farms, and were acquainted with Philadelphia's extensive park system. Among the programs' highlights are a student-prepared dinner using locally grown foods and a guided camping and canoe trip.

M.I. Green

M.I. Green, a new outreach program introduced in September 2011, was developed by Penn's sustainability staff to educate students about environmental issues and Penn's sustainability initiatives during Fall Move-In. The program employs student volunteers, who engage with arriving freshmen and parents and explain opportunities for participation on campus. Student volunteers model sustainable behavior by helping sort recycling during move-in, and by distributing compact fluorescent bulbs. M.I. Green gives students a chance to work directly with Penn's sustainability staff and develop environmental leadership skills.

RA/GA Sustainability Training

Penn Sustainability Office held its first College House RA/GA Sustainability Training in the Fall of 2011. Twenty RAs and GAs attended this session to learn about green living on campus and ways to educate their resident students about

reducing their environmental impact. This session included an overview of the *Climate Action Plan*, information about ways to get involved with sustainability initiatives on campus, and various interactive techniques aimed at developing knowledge and leadership among the student residents. Participants received a door sticker to identify them as environmental resources to undergraduate College House residents.

Sustainability at New Student Orientation

During New Student Orientation, Penn's sustainability staff hold a preceptorial, where freshmen can learn about the University's *Climate Action Plan*, environmental course offerings from the undergraduate departments, and the Eco-Reps program. This session was offered for the first time at the beginning of the 2010 academic year and again in 2011. An average of 30 students attended the preceptorial session each year.

Additionally, SEPTA and Penn Transit sponsor a preceptorial, where freshmen receive an overview of Penn Transit and SEPTA services. Students take a tour on a Penn Bus and a SEPTA subway & streetcar. An average of 60 students attended the preceptorial session for the first two years.

Green Office Program

The Penn Green Office program is an employee roadmap to sustainability at Penn. It is linked to a growing repository of resources and best practices specific to sustainability in the Penn workplace, and is intended to engender friendly competition between the schools and centers for the highest number of certified green offices. All the initiatives of the Green Office program are linked to the goals of the *Climate Action Plan*.

The program is organized into four levels of certification, with 25-30 prerequisites. The first

level is made up of easily reachable items with the intent to get widespread buy-in from offices. Each successfully achieved level requires increasingly more sophisticated environmental practices, with Level 4, requiring a financial investment by the office administration. Offices from FRES, Wharton, SEAS, SAS, and BSD have participated in a pilot of the Level 1 standards to evaluate their feasibility.

Power Down Challenges

Since 2009, Penn has held four University-wide energy conservation competitions, known as Power Down Challenges. Two competitions were held over the 2009 and 2010 winter breaks within College House residences. College house residents were asked to sign a pledge to unplug their appliances, turn off their lights, and close their windows to conserve energy. During the competition, Student Eco-Reps educated fellow residents on a variety of conservation topics including phantom loads, energy efficient appliances, and daily tips to reduce energy usage.

Baseline electricity data was collected during the competition, in order to observe the energy reduction impact for future years. Pledge rates were calculated to determine which house achieved the highest percentage in relation to their house's overall population. The DuBois College House won the highest percentage of participation, with every resident in the house signing the Power Down Pledge.

On June 17, 2010, another Power Down Challenge was created to encourage the entire Penn community to conserve electricity over the course of two hours. This event coincided with regional electric grid operator's annual test of the Interruptible Load for Reliability (ILR) system -- the emergency load shedding system used to avoid blackouts.

By reducing electricity use during this defined, manageable span of time, members of the Penn community were able to identify areas to routinely save electricity. The Penn Sustainability Office worked with the Eco-Reps to communicate the Challenge and to organize mini-events in more than 50 offices across the University. Participants reported that the event empowered them to conserve energy and motivated many to begin looking for ways to reduce electricity use on an everyday basis. Results indicate that Penn reduced electricity usage by nearly 13 megawatts, 18% of the University's typical load, and roughly 25% of the reduction was attributed to behavior change actions.

Building off the success of the College House Winter Break Power Down and the single day campus-wide Power Down Challenge during one of the hottest days of the 2010 summer season, the Power Down Challenge was expanded with several energy-conservation initiatives targeted to staff, faculty and students in November 2011. Five buildings participated in a head-to-head energy reduction competition called the Campus Building Power Down Challenge. The Franklin Building won the competition with a 21% reduction in energy usage.

Different from previous years, the College House Power Down Challenge was held while students were residing on campus in November rather than while they are away on break. Led by the College House Eco-Reps, with the support of CHAS and the House Deans, houses competed for prizes for reducing energy use over the same three-week period coordinated for the Campus Building Power Down Challenge. With a 20% reduction, the Quad won the competition.

Sustainability 101 Presentations

Sustainability 101 presentations provide an overview of the *Climate Action Plan*, current sustainability initiatives, and ways to get involved with the Penn Sustainability Office. Schools, Centers, departments, and/or offices can request this presentation to gain more insight into Penn's sustainability efforts. This presentation is also given at New Employee Orientation. To date, Sustainability 101 presentations have reached 762 attendees with 29 presentations delivered through FY12 year to date. Attendees to date represent all 12 Schools at Penn and many of the organizational centers and departments.





COMMUNICATIONS

CLIMATE ACTION PLAN GOALS

“Create a campaign which communicates clear, concise and accurate public information that informs the broad internal Penn community and key external Penn stakeholders about Penn’s *Climate Action Plan*, and its goals.

Promote the Penn Sustainability Office as the organization of faculty, students and staff that oversee the implementation of the *Climate Action Plan*.

Educate and motivate the Penn community to help meet the goals of the *Climate Action Plan*.

Report progress on *the Climate Action Plan* regularly to build confidence and credibility among the Penn community.”

METRICS

Total Media Hits: 489

Total Penn Sustainability Office website visits: 31, 686

Penn Sustainability Office website visits per day: 80

On College Green e-newsletter subscribers: 5,234

Overall e-newsletter subscription: Over 150,000

KEY ACTIONS

Marketing and Communications Subcommittee

A Marketing and Communications subcommittee was formed in 2007 with representatives from across myriad offices of the University. Membership included those with technical and professional capacity to successfully shape and deliver the Penn narrative around the Penn Sustainability Office as an administrative entity, and the *Climate Action Plan* as the action plan enhancing our overall sustainability practices. Key internal stakeholders include: graduate

and undergraduate students (subdivided by living on or off campus); faculty; researchers, and staff. In addition, external stakeholders included the media, alumni, donors, and parents of students, elected officials, community leaders, and the local business community.

The Penn Sustainability Office Campaign

The Penn Sustainability Office campaign, developed in 2009, has educated and motivated Penn stakeholders to help meet the stated goals of the *Climate Action Plan* through individual participation. A goal of the campaign, which has critical importance to the entire effort, is generating a vehicle for regularly providing updates on the progress being made, so as to build confidence and credibility among the Penn community about its commitment to operating a sustainable institution.

Components of the Campaign:

- *Executive Leadership:* University leaders regularly speak on the *Climate Action Plan* and the Penn Sustainability Office to faculty, students, and staff, and tour campus projects (buildings, classes, and research projects) to illustrate investment in sustainability as a core value of Penn.
- *Branding:* A Penn Sustainability Office graphic identity was created and applied to all relevant materials.
- *Messaging:* Messages and talking points were researched and developed to be used University-wide in collateral materials, web communications, media relations, and speeches/presentations, so that University spokespersons supported the institution with consistent direction.

- **Direct E-Mail Newsletter:** An e-newsletter was created, *On College Green*, which is distributed University-wide six times annually.
- **Print Collateral:** A signature piece of collateral was designed and produced serving as an executive summary of the *Climate Action Plan*, and is distributed regularly to key stakeholders.
- **Web Communications:** A Penn Sustainability Office website was produced and is a centralized repository for up-to-date, information as well as a vehicle for communicating broadly about Penn's goals.
- **Media Relations:** An aggressive media outreach effort has generated positive media coverage.
- **Events and Promotions:** Programs designed to bring attention to the goals of the *Climate Action Plan* and the Penn Sustainability Office in general.
- **Advertising:** Specific ads have been created for on campus media outlets (both print and online outlets) that brand the Penn Sustainability Office, promote the goals of the *Climate Action Plan*, and educate audiences about the critical role of personal behavior, while also driving audiences to the website, and to attend special events.

Penn Sustainability Office Branding

A branding effort created a broad banner for all of Penn's sustainability initiatives to fall under. The Penn Sustainability Office name and logo were applied to a highly focused campaign, beginning in September of 2009 till present, for the purpose of educating and motivating key stakeholders about Penn's commitment and administering of the Climate Action Plan. It was also designed to provide context that their own actions were integral to a partnership which is required to achieve success.

Penn Sustainability Office Website

The development of a signature website, www.upenn.edu/sustainability, that is a central repository for accurate and timely information, has been a highlight of the campaign. The site contains the full *Climate Action Plan*, and executive summary, news and information about the progress being made, links to media coverage and the *On College Green* Newsletter, and a comprehensive calendar of events across

campus. It is also a useful source of information guiding individuals on how they can improve their green initiatives. The Penn Sustainability Office has a social media strategy to build an audience base through social media networking, primarily on the platforms of Facebook (news and events), Twitter (news and event updates), YouTube (educational videos), and Flickr (public photo galleries of events and projects) to generate awareness about Penn's ongoing sustainability initiatives. Below is a summary of current social media metrics:

- 219 Facebook Fans
- 63 Twitter Followers
- 4 Flickr Photo Galleries
- 5 YouTube Videos and 9 YouTube Subscribers

Stakeholders have responded accordingly as web traffic to the Penn Sustainability Office website has grown to a total 31,686 visits, and as of this reporting the site is visited by 87 visitors daily with an average time spent on the site of 2:15. We have seen an increase in direct traffic, which supports that the majority of site visits derive from links in newsletters and emails, as well as referring sites and social media.



On College Green e-newsletter

The Penn Sustainability Office created a bi-monthly newsletter to provide the Penn community with facts and figures on our progress, as well as helpful tips on how to "green" Penn, and promote those individuals who demonstrating great success in meeting the goals of the *Climate Action Plan*. *The Red & Blue On College Green* is a popular and widely read source of *Climate Action Plan* information. Since its launch in 2009 it

has seen a 26% increase in number of subscribers. In addition, a 15% increase in newsletters opened indicates that it is a valued source.

Media Relations

Media Relations has been a successful vehicle for communicating broadly to all stakeholders about the Penn Sustainability Office and *Climate Action Plan*. In 2011 there were 145 media stories related to Penn's Initiatives with 34, or 23%, appearing in non-Penn Publications such as the local outlets of the *Philadelphia Inquirer*, *Philadelphia Daily News*, *Philadelphia Business Journal* (+others), and national outlets such as the *Associated Press*, *US News & World Report* and the *Architect's Newspaper*. In addition, several stories appeared on local television news broadcast *CBS3*, *NBC10*, and *ABC 6. 106*, or 73%, of the media hits were in Penn Publications demonstrating an effective method of communicating directly to the Penn Community. In 2011 Penn's Division of Communications issued 18 Press Releases / Media Advisories calling for press coverage. In 2011 news coverage was segmented by topic in the following ways:

- Physical Planning, Design, and the Environment (40%)
- General coverage on the Green Campus Partnership (20%)
- Waste & Recycling (16%)
- Energy Conservation (9%)
- Academics (6%)
- Transportation (6%)
- Local Foods (3%)

In 2010, the launch year, 344 media hits were recorded. 168 of these hits were from 4 or 5 stories that were picked up by the announcement of Penn's *Climate Action Plan* and circulated on national wire services. If these are subtracted from the total of 344, there were 176 stories unique stories with 37% in Non-Penn Publications and local outlets such as the *Philadelphia Inquirer*, *Philadelphia Daily News*, *Philadelphia Business Journal* (+others) and national outlets such as the website *Inside Higher Ed*, the *Washington Post* and the *Pittsburgh Post-Gazette*, not to mention the *AASHE Bulletin*. The remaining 63% of media hits were in Penn Publications including 54 stories in the *Daily Pennsylvanian*, the daily student paper.

In 2010 news coverage was segmented by topic in the following ways:

- General coverage on the Green Campus Partnership (38%)
- Physical Planning, Design and the Environment (21%)
- Waste & Recycling (14%)
- Academics (10%)
- Energy Conservation (10%)
- Local Foods (5%)
- Transportation (2%)

In conclusion, there have been 489 media hits about Penn Sustainability Office since September 2009, with strong interest from the national media, and effective coverage internally to the Penn community.

Collateral

An executive summary of the *Climate Action Plan* was produced in a small brochure of which 5000 were printed and have been distributed at information sessions around campus, as well in the information packets sent to prospective students. In addition, 5000 Branded Cups (Glow in the Dark) and 1000 Branded Water Bottles were produced to hand out to key stakeholders on campus to encourage a reduction in consuming plastic water bottles. In addition, 200 Penn Sustainability Office t-shirts were distributed at various events, and to date 200 Branded Recycling Bins have been handed out for stakeholders to use in their residence or office.

Promotions & Events

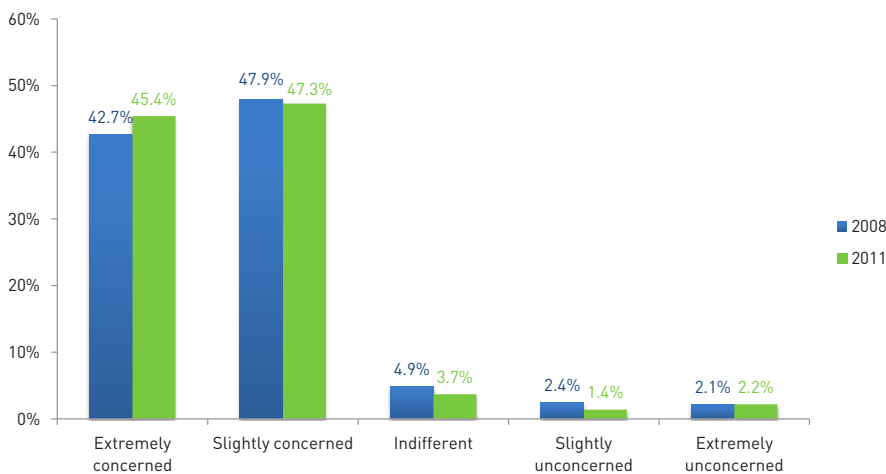
The Penn Sustainability Office hosts the annual RecycleMania competition, a 90 day national competition to increase awareness about recycling and improve rates, and Power Down Challenges in which the community is asked to reduce electricity usage for specific periods of time. In addition, there have been promotional events connected to Earth Day, and the creation of Earth Week programming, as well as on site promotions at Penn athletic events, and annual programs such as New Student Orientation.

Survey Results

In May 2011 an environmental sustainability survey was produced and distributed to all 20,000 Penn students, and a select sampling of university administrators (no faculty were surveyed). The results, as displayed in the following charts, indicate that in the two years awareness of Penn’s sustainable efforts has increased dramatically (especially with students) and it is this increased awareness that has driven some of the gains in sustainable practices.

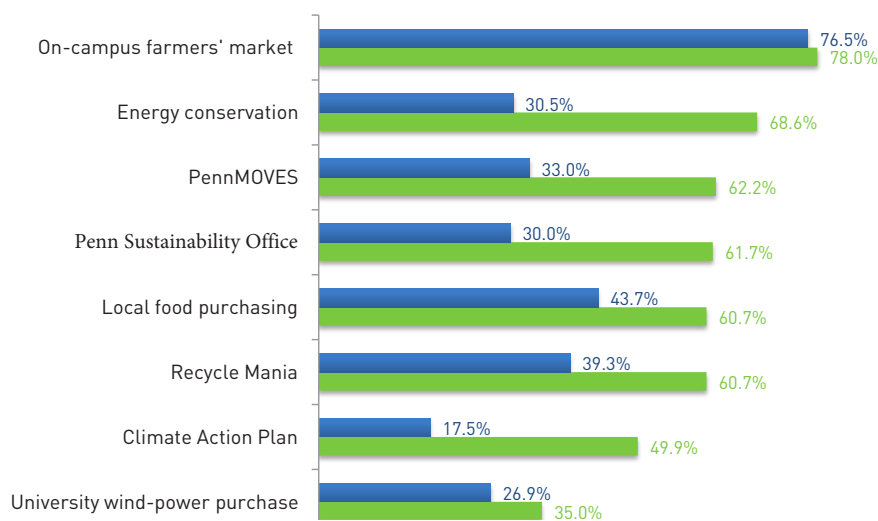
SUSTAINABILITY SURVEY HIGHLIGHTS

How would you rate your level of concern about climate change? (Staff & Students)



Rates of concern about climate change have continued to remain high from 2008-2011 with respondents exhibiting an even greater level of urgency in 2011.

Penn Activity Awareness (Staff & Students)



Students and Staff show a much greater awareness of Penn’s sustainable activities such as the on-campus farmers’ markets, energy conservation policy, and PennMOVES, from 2008-2011 with the most significant gains in awareness coming from students. This heightened awareness has led to a general increase in sustainable practices, exemplified in the areas of recycling and alternative transportation.



LOOKING FORWARD

Environmental concerns are facing a paradox in American culture. We have more knowledge than ever before about the state of our environment and greater understanding of how our actions impact our health and the natural world. And yet, Americans are more uncertain than ever about the priority of environmental action. As a country, we seem unwilling or unable to come together and take the steps necessary to reduce global carbon emissions or make comprehensive improvements to the environment.

Moving toward a more sustainable future will mean change, and will require a greater awareness of the impact of our actions. Without a unifying environmental campaign, action by institutions is all the more important. Higher education has a role to play to define the issues, build knowledge, and set an example of how to implement change in a complex, multi-stakeholder environment.

The University of Pennsylvania has a tradition of providing leadership in addressing our culture's most challenging issues. The stewardship of our immediate environment has been a shared concern for as long as the University has existed – and the results are evident in our beautiful urban campus. Penn's current academic focus on sustainability across the twelve schools represents a unique response to the environmental concerns of today.

The threat of global climate change has driven Penn, along with its peer schools, to focus attention on sustainability and to the development of the *Climate Action Plan*. This report reflects the remarkable progress made in the first year since its launch.

2011 marks a significant moment in the evolution of Penn's *Climate Action Plan*. In a short five-year period, the University has moved from completing its first assessment of its environmental impacts, completed by Penn's leading researchers at the TC Chan Center for Building Simulation and Energy Studies, signing a commitment to significantly reduce greenhouse gas emissions, to a robust and wide-ranging sustainability agenda:

- Penn's *Climate Action Plan* was written, vetted and endorsed by senior academic and administrative leadership, and approved by Penn's President Amy Gutmann;
- Enthusiastic support for the *Climate Action Plan* and outreach initiatives were embraced by the student body, both the 10,000+ undergraduate student body and the professional and academic graduate students;
- The Penn Sustainability Office umbrella group was created as the administrative structure to respond to the multiple environmental concerns and issues, and to provide a mechanism for executing new initiatives;
- An informed and active Environmental Sustainability Advisory Committee was formed from committed faculty, staff, and students, and continues to advise the GCP on the six primary areas of focus (Academics, Utilities & Operations, Physical Environment, Transportation, Waste Minimization and Recycling, and Communications);
- The establishment of the Sustainability & Environmental Management Minor, the Master in Environmental Building Design, and the Vagelos Integrated Program in Energy

Research provide innovative research and learning opportunities to Penn's students and faculty. Penn's participation in the Greater Philadelphia Innovation Cluster enriches these academic programs through real world problem solving and collaboration;

- An Eco-Reps program, extending support and engagement for students and staff, was piloted, and launched, resulting in active participants in conservation and stewardship efforts;
- Outreach efforts, such as the *On College Green* newsletter, the Penn Green Fund, the Power Down Challenge, RecycleMania, and the GCP Student Association have become embedded in Penn's campus life;
- The Strategic Energy Team, within the Division of Facilities and Real Estate Services, has registered Penn as a Load Serving Entity within the Commonwealth of Pennsylvania, negotiated energy reduction infrastructure changes with Penn's steam provider, created the Energy Reduction Fund, established on-going building re-commissioning, and has embarked on a comprehensive metering project to distribute actual utility costs to Penn's constituent Schools and Centers.

These initiatives have set the stage for increasing the efficiency of our campus operation and expanding the awareness and understanding of sustainability issues among Penn's population. The challenges before us, however, will require even greater commitment of effort and resources to meet the aggressive goals that we have set for ourselves. As of 2011, Penn's carbon emissions have remained stable, despite considerable expansion of campus area and buildings, and notwithstanding the severe weather over the past year. This is a significant accomplishment, of which our entire campus can be proud.

The years to come, however, will witness a transformational approach to energy use, conservation, and resource management at Penn. The aspirational goal of achieving carbon neutrality by 2042 will require significant annual reductions, even as Penn embarks on the second phase of our comprehensive master plan, *Penn Connects 2.0*. We know how we can achieve these goals, and the tools and strategies are in place. Energy savings on this scale will translate into significant financial savings,

which will be reinvested in further conservation programs.

Penn can be proud of its efforts, and its contributions toward a greener outlook for our city, region and country. We are doing our part to reduce emissions, and safeguard future generations from the effects of climate change. In doing so, Penn remains focused on our greatest mission: producing informed, engaged future leaders by providing an exceptional educational experience for our students; creating knowledge through interdisciplinary research on the most pressing issues of our time; providing leadership for our peers locally, regionally, and globally, through the example of sustainable management, operations, and administration.