



## Sustainability Plan

2009

Rutgers University Facilities and Capital Planning



THE STATE UNIVERSITY  
OF NEW JERSEY

**RUTGERS FACILITIES & CAPITAL PLANNING  
SUSTAINABILITY PLAN**

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## RUTGERS FACILITIES & CAPITAL PLANNING SUSTAINABILITY PLAN

### INTRODUCTION

The office of the Vice President of Facilities and Capital Planning charged each of its units to document present and future sustainable practices and initiatives. This document coalesces and memorializes those efforts.

In the 1987 report of the UN Commission on Environment and Development, *Our Common Future*, “sustainable development” (sustainability) is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Colleges and Universities are in a unique position to fashion the behavior of future generations through the policies and practices they enact. To do so, they must not only ask that the student population adopt a sustainable philosophy, but emulate these behaviors through the ways in which they run their Facilities and Capital Planning Department.

The Rutgers University Facilities and Capital Planning Department has begun efforts to document current sustainability practices and plans for the future in the pages that follow. It is hoped that this document will be a “living” document that will change as new practices and developments advance, and that it will serve as a model for other university departments, so that they might work in synergy toward the common goal of sustainability.

All of the departments in the Facilities and Capital Planning Group have been working with sustainable practices in mind. As such, Facilities and Capital Planning are at the forefront in leading Rutgers University in its quest to be a model sustainable campus. Throughout the whole process of the construction and habitation of buildings and grounds, the university Facilities and Capital Planning Department have incorporated green practices whenever possible.

Below are some of our efforts.

### **Rutgers University Energy Conservation and Sustainable Practices**

#### **Energy Conservation Efforts:**

- Retrofits of lighting in university buildings on Camden, Newark, New Brunswick/Piscataway campuses over 5 years at a cost of \$18.7million.
  - This will reduce Rutgers’s energy consumption by 42,500,000 kWh@ cost of \$5.5million and reduce CO<sub>2</sub> emissions by 23,333 tons.
  - Building audits have been completed at Camden, Newark, New Brunswick and Piscataway Campuses.
  - There are plans to present a 5 year replacement program by June 2009



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- Replacement of High Temperature Hot Water underground lines over four years. The insulation on the lines has deteriorated with significant heat loss.
  - This will reduce Rutgers's energy consumption by 2,500,000 therms of natural gas and reduce our emissions by 2,285 tons of CO<sub>2</sub>.
  - Phase 1 is complete and phase 2 is 90% complete
  - Phase 1 savings is \$252,000 F/Y 2006-07
  - Phase 2 savings is \$882,000 F/Y 2007-08
  - Phase 3 savings is \$1,386,000 F/Y 2008-09 projections
  - Phase 4 savings is \$2,520,000 F/Y 2009-10 projections
- Motors and Transformers – Project has been completed and is in the close out stage. We will reduce Rutgers's electric usage by 2,186,953 kWh and realize a \$284,564.00 reduction in electrical costs. This will reduce our CO<sub>2</sub> emissions by 1,983 tons

### **Renewable Energy Efforts Underway:**

- Solar (photovoltaic) installation - Board of Public Utilities approval for a core rebate of \$5 million
  - Installing a 1.4MW system on the Livingston Campus (10% of Livingston's Campus power needs) and is expected to reduce Rutgers's electrical usage by 1.6 million kWh. This will reduce the CO<sub>2</sub> output by 1,216 tons
  - Total Cost is \$9.4 million dollars, with a \$5.1 million dollar rebate from the BPU, \$4.3 million dollar investment from Rutgers University
  - A yearly savings of seven hundred twenty thousand dollars (\$720,000) is expected from electric cost reduction and solar renewable energy credits

### **Sustainable Practices (Greening Initiatives):**

- Purchasing only 100% recyclable carpet made with 25% recycled content and recycling 100% of all removed carpeting from Rutgers New Brunswick/Piscataway
- Purchasing only 100% recyclable ceiling tiles made with recycled material and recycling of all recyclable ceiling tiles
- All new construction projects will require all waste on site that is recyclable to be recycled as part of contractual obligations
- Awards won for Recycling: U.S. EPA Partner of the Year Award 2007, U.S. EPA Gold Achievement Award, Recycle Mania- Gorilla Prize 2007 and 2008, and Recycle mania- Food Organics Prize for 2007 and 2008



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- Green Cleaning Program utilizing bio based chemicals reducing GHGE's (Green House Gas Emissions) from manufacturing, reducing dependence on foreign oil and providing a safer work environment for Rutgers's employees
- Naturalizing 36 acres of turf, and putting a plan in place to allow more acres to return to their natural state in the future
- All diesel equipment owned by Rutgers utilizes bio diesel fuel
- Rutgers has purchased 15 natural gas vehicles and has its own natural gas pumping station
- All new construction and major renovations are required to meet a Silver LEED rating (LEED is a program sponsored by the US Green Building Council)
- The University has a University Sustainability Committee, a Facilities and Capital Planning Advisory Committee for Sustainability
- Facilities and Capital Planning have been actively engaging students and student groups in energy conservation and sustainable practices. An example of this is the annual Campus vs. Campus Electric Energy Reduction Competition, which will have its inaugural competition through out the month of March.

### **Energy conservation and Sustainable Organizations:**

- The University is a partner with the US EPA Energy Star program and a member of the US Green Building Council
- The University belongs to an array of peer organizational groups for sustainability such as NJHEPS (New Jersey Higher Education Partnership for Sustainability), and AASHE (Association for the Advancement of Sustainability in Higher Education)
- Currently pursuing a partnership with the Environmental Protection Agency
- The University is a partner in the High-Performance Commercial Green Building Partnership administered by the US Department of Energy

### **Service Vehicles – Alternative Fueled Vehicle Program (Compressed Natural Gas and Biodiesel)**

**History:** In 1990, the university had a fleet size of 880 vehicles, of which 3% were diesel powered, 96% were gas powered and 1% were powered by some other fuel. By the year 2000, the fleet size

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had shrunk to 800, of which 5% were diesel powered 92% were gasoline powered, and 3% were powered by other sources (electric, natural gas). In addition, over the past few years the university has made efforts to reduce the number of 8 cylinder vehicles and has added low-speed, low-emission vehicles to the fleet.

**Current Status:** In 2009, the university has 780 vehicles, of which 6% are powered by bio-diesel, 91% are gasoline powered, and the remaining 3% are powered by other sources (electric, natural gas). 287 of the 780 vehicles are utilized by the Facilities and Capital Planning groups, apportioned as needed. The average miles per gallon is approximately 12, due to the fact that most of the driving that is done is on campus, at speeds of less than 35 mph. The average age of the fleet is 12 years and most of the vehicle engines are V8.

**Projects Completed:** In 2005, a natural gas filling station was installed on site to facilitate the use of those vehicles that run on natural gas.

### Phased Goals and Strategies for Achievement:

**Three Years:** Within the next three years, as gasoline powered vehicles reach their full service life, the plan will be to replace these vehicles with alternative fueled vehicles, such that 15% of the fleet will be comprised of low emission and bio-diesel vehicles.

**Five Years:** Within the next five years, as more of the gasoline powered vehicles reach their full service life, the plan will continue to be to replace these vehicles with alternative fueled vehicles, such that 25% of the fleet will be comprised of low emission and bio-diesel vehicles.

**By 2020:** By the year 2020, all of the gasoline powered vehicles will likely have reached their full service life, and should be replaced with alternative fueled vehicles, such that 50% of the fleet will be comprised of low emission and bio-diesel vehicles.

**Additional Information:** In addition to motor vehicles, the university possesses a large amount of construction and small engine equipment. Current trends are to replace any gas operated equipment with low-emission engines.

### Recycling Program

**History:** The Rutgers recycling program began in the 1970's with aluminum, plastic, and glass. Recently, the university developed a written design standard for construction waste management on both new construction and renovation projects. Per the design standard, contractors are required to

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recycle applicable materials and to have documentation that materials were recycled. In the last three years, Rutgers has included the recycling of carpet, ceiling tiles, and trees. In addition, material services began recycling consumer electronics. Rutgers Environmental Health & Safety (REHS) also has a chemical exchange/reclamation program.

**Current Status:** The University recycled 62% of its solid waste, with the Piscataway/New Brunswick campus recycling 63% of its solid waste. The types of materials recycled include construction materials such as: concrete and asphalt, fluorescent lighting, scrap metal, carpeting, furniture, and ceiling tiles (See Appendix for additional details on individual components recycled).

**Projects Completed:** Examples of renovations and classroom projects recently using the recycling design standard in place. Those projects included: SERC & ASB, and projects completed in Murray Hall and the Art History building.

### Phased Goals and Strategies for Achievement:

**Three Years:** Within the next three years, the university should look to add polystyrene and textiles to the mix of recycling materials already included. All wood, including that with nails, should be recycled. Recycle rates should be increased by 2% and solid waste should be reduced by 5%.

**Five Years:** Within the next five years, recycle rates should be increased by 5% and solid waste generation rates should be further reduced by another 5%. If possible, include flooring tiles and sheetrock (presently this is not possible). Purchasing should be further engaged to continue to reduce packaging, use of paper for printing, and all toner and inkjet cartridges should be recycled.

**By 2020:** By the year 2020, the university should look to increase recycling percentages to 80%.

**Additional Information:** In 2006, the university won the U.S. EPA's Partner of the Year Award and the Governor's Award for Recycling. In 2007, the University won the U.S. EPA's Gold Achievement award. In both 2006 and 2007 the University won the Gorilla Prize (total overall tons) and Food Organics in the nationwide Recycle mania competition. The University is frequently asked to speak about their winning program to other institutions.

### Construction Recycling Design Standard

**History:** Until recently, most construction and renovation projects had no criteria for recycling. Now contractors on all new construction and renovations are required to recycle per Rutgers standards and document all recycling.



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**Current Status:** Contractors are required to meet university standards on recycling

**Projects Completed:** Several classroom projects have been completed. Biomedical Modular

### **Phased Goals and Strategies for Achievement:**

**Three Years:** Within the next three years, the university should recycle all wood from all projects. Any product that can be re-used (such as doors, counters, sinks, etc.) should be re-sold through Surplus

**Five Years:** Put in place a program to recycle all sheetrock at the university.

**By 2020:** By the year 2020, the university should recycle all building demolition materials that can be recycled.

**Additional Information:** All recycling at the university is documented.



### Facility Historical Designation

**History:** The University has been in existence since 1766.

**Current Status:** The University is currently looking at its historical building for energy and sustainability.

### Projects Completed:

**Phased Goals and Strategies for Achievement:** Begin energy conservation while maintaining the historical significance of the building

**Three Years:** audit and implement conservation of 25% of all historical buildings

**Five Years:** audit and implement conservation of 50% of all historical buildings

**By 2020:** audit and implement conservation of 100% of all historical buildings

**Additional Information:** A paper has been written by Elizabeth Reeves that shows the significance of energy conservation and sustainability in historical buildings

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### LEED Silver

**History:** Since 2000, the University has been striving to become more responsible stewards of the environment. In 2007, the design standards for construction at Rutgers were change to state that “All new buildings and major renovations are built to the United States Green Building Councils LEED Silver rating.

**Current Status:** New construction and major renovations are to be designed to LEED Silver; however, certification is not required. We use the rating as a benchmark to insure that the project is built to sustainable practices.

**Projects Completed:** The following projects have been built using sustainable principles. In 2004 the Smithers Hall Busch Campus Ground Floor Lab 119 was renovated and classrooms 020, 022, and 024 in Loree. Both renovations involved replacing T-12 lighting with T-8s and T-5s, and installing lighting controls. Low/No VOC paints were used and the ceiling tiles that were installed were of high recycled content. In Smithers Hall, the HVAC unit that was installed was equipped with energy efficient variable speed motors and pumps.

Three projects were conducted in 2005: the Janice Levin Building on the Busch Campus underwent an office renovation on the second floor that involved replacing T-12 lighting with T-8s and installing new ceiling tile made of high recycled content; the B120 Engineering Building on the Busch Campus installed new compact fluorescent lighting and controls to replace old incandescent fixtures. In addition, the American Walnut wood veneer was salvaged and restored; and on the Livingston Campus, A102 in Lucy Stone Hall also replaced older incandescent fixtures with new compact fluorescent lighting and controls.

Four projects were conducted in 2006 that focused on high efficiency plumbing in addition to lighting: ADA bathrooms at Willets Health Center at Cook Douglass, the ADA bathroom at the College Avenue Student Center, and the Lucy Stone ADA bathrooms all installed 1.6 GPF toilets, low flow lavatories, energy efficient lighting and lighting controls. The Nicholas Music Center Green Room also installed 1.6 GPF toilets and low flow lavatories, in addition to replacing lighting with compact fluorescents and implementing lighting controls, painting with low/no VOC paints, installing recycled carpet, and using bamboo for casework.

In 2007, the momentum continued with five projects: the Mable Smith Douglass Library, Murray Hall Writers House Ground Floor on the College Avenue Campus, the Facilities and Capital Planning Building on the Livingston Campus, the Housing Offices on the Livingston Campus and the 1<sup>st</sup> floor of the Housing Offices on the College Avenue Campus. These projects involved replacing the T-12 lighting with T-8s, using low/no VOC paints, installing recycled carpet, installing lighting controls, and in some of the projects, using harvested cork for some finishes, installing 100% recycled material



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window shades, a new ENERGY STAR HVAC unit and controls, and high recycled content ceiling tiles.

In 2008, the University spread the success it had experienced with prior year's projects to three more: PAL Housing Offices at Cook Douglass, Hickman Lecture Halls 101 and 138, and the Art History Lecture halls 100 and 200 all had old lighting replaced with more efficient T-5 lighting, and new low/no VOC paint. The PAL Housing Offices also installed a new ENERGY STAR HVAC unit.

2009 has begun in a similar vein as prior years, with the Lynton South Tower ADA bathroom, where existing plumbing fixtures were replaced with 1.6 GPF toilets and low flow lavatory faucet shower heads, installation of energy efficient T-8 compact fluorescents, and low/no VOC paint.

### **Phased Goals and Strategies for Achievement:**

**Three Years:** Within the next three years, of all new buildings will meet LEED Silver criteria and achieve 15% energy savings over ASHRAE 90.1

**Five Years:** Within the next five years, of all new buildings will meet LEED Silver Criteria and achieve a 20% energy savings over ASHRAE 90.1 2004

**By 2020:** By the year 2020, 100% of all new buildings will meet LEED Silver Criteria.

**Additional Information:** The University has already implemented a standard for high recycled content ceiling tile and carpeting. The University has a low/no VOC paint standard in effect. The University would like to extend the standard to non-major renovations as well. In 2009, the University plans to renovate both Tillett Hall Room 116 and Vorhees Hall 105 classrooms to LEED Silver standards.

## **ENERGY STAR Building Labels**

### **History:**

Rutgers University became an Energy Star Partner in 2008.

### **Current Status:**

Plans are being put in place to add all Rutgers buildings to the energy star portfolio

### **Projects Completed:**

Implementation of a study to meter the entire university is complete.

### **Phased Goals and Strategies for Achievement:**

**Three Years:** 50% of the university buildings will be rolled into Energy Star portfolio manager. A portion of Rutgers Buildings will be Energy Star Buildings.

**Five Years:** 100% of the university to be enrolled in the Energy Star portfolio manager

### **By 2020:**

**Additional Information:** We must be able to measure and compare buildings to optimize the solutions to reduce their energy usage.

### **Water Conservation – Irrigation Water:**

**History:** Irrigation has been used at the university but has moved toward drought resistant native plants.

**Current Status:** The University maintains 11 irrigation systems that utilize potable water. Athletic Fields and the Golf Course are not included here as they are not under the Facilities and Capital Planning Department.

### **Projects Completed:**

### **Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years 10% of irrigation water will come from harvested water or gray water. The University should seek to define opportunities for capturing and using non-potable water for use in street sweepers, any newly installed irrigation systems, irrigation trucks, power washing and vehicle cleaning stations. To do so, the University will need to meter and capture the current amount of potable water that is used in existing systems and processes that can be offset with non-potable water. Identify a cost-effective and readily available means of replacing the current water storage tank on site to begin the process of using non-potable water in its place.

**Five Years:** Within five years 20% of irrigation water will come from harvested water or gray water.

**By 2020:** By 2020 50% of irrigation water will come from harvested water or gray water.

**Additional Information:** We must maintain measures to reduce our usage of this precious resource.

### Water Conservation / ENERGY STAR appliances:

#### History:

**Current Status:** Busch and Livingston Campuses still utilize some water mains which were installed during Camp Kilmer era. College Ave contains mostly New Brunswick Water Mains with branch lines being operated by Rutgers. Cook Douglass is a split between New Brunswick and Rutgers. The University maintains 45 miles of water mains and three distribution pump houses, which also provides main containment as required by the NJDEP.

**Projects Completed:** The University has replaced approximately 4 miles of water main piping ranging from 6" – 16". There is also an ongoing project to replace 12,000 trench feet of high temperature hot water distribution piping.

**Phased Goals and Strategies for Achievement:** With ongoing maintenance to locate leaks and replacement of water and heating distribution, the water usage has dropped 30% in 11 years. Complete first phase of high temperature hot water piping. Replace transite water mains with polypipe to reduce costs.

**Three Years:** Within three years, 25% of all new appliances purchased and installed will meet the ENERGY STAR water saving criteria. Replace 75% of transite water mains on Livingston campus. Continue replacement of high temperature hot water piping of Busch and Livingston Campuses.

**Five Years:** Within five years, 50% of all new appliances purchased and installed will meet the ENERGY STAR water saving criteria. Replace of 80% of secondary domestic and dual temp systems on Busch and Livingston Campuses. Begin replacement on C.A.C. and C/D.

**By 2020:** By 2020, 100% of all new appliances purchased and installed will meet the ENERGY STAR water saving criteria. 100% of transite piping replaced and 80% of high temperature hot water piping replaced.

### Storm Water Practices:

**History:** In 2004, the State of New Jersey passed the Phase II storm water regulations as required in the federally mandated Clean Water Act. These regulations New Jersey enacted are some of the most stringent in the country. As a result, Rutgers University must increasingly manage both the quality and quantity of storm water runoff downstream. This storm water management entails developing measures to control erosion, improve water supply, and prevent storm water from flowing directly into a downstream receiving body. They also include incorporation of storm water management strategies that protect natural drainage features and vegetation, minimize impervious coverage, protect areas that provide water quality benefits and minimize land disturbance.

**Current Status:** These rules and regulations establish a comprehensive framework for addressing water quality, water quantity, and groundwater recharge impacts associated with existing and future storm water discharges. By utilizing low impact building techniques and low impact development-best management practices, Rutgers University is minimizing land disturbance, minimizing impervious cover and meeting the challenges of these very stringent regulations for all new major development projects.

### Projects Completed:

- Drainage improvements to one of the university's maintenance yards (4100 Compound). Project included a retrofit to the existing drainage system to contain and prevent oil and other contaminants from entering the local waterways
- Biomedical Engineering underground water detention facility
- 69 KV Substation underground water detention facility
- Endocrine Research Building underground water detention facility
- Stadium Expansion bioretention cells (two) for water quality treatment and an underground water detention facility
- Baseball Stadium Field Turf field underground water detention facility
- Recreation Field Field Turf field underground water detention facility
- Equine Science Center bioretention swale

**Phased Goals and Strategies for Achievement:** The University is committed to protecting its natural resources and developing innovative methods to treat and manage storm water runoff through the integration of ecologically sound landscape architectural and site design solutions.



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**Three Years:** Within three years, implement to the maximum extent practical, low impact best management practices for managing storm water in new capital construction or major renovations. Implement several recommendations set forth in the storm water and landscape management master plan for the Busch and Livingston Campuses. The storm water and landscape management master plan should be a tool used to help guide the University's future growth and development, serve as the cornerstone for Rutgers natural resource preservation, provide locations for storm water detention/retention and create policies and practices for the restoration and enhancement of the ecological and drainage systems.

**Five Years:** Within five years, create a storm water and landscape management master plan for the Cook, Douglass, and College Ave campuses and begin to implement the plan's priority recommendations. Develop planning principals and practices to comprehensively manage storm water keeping in mind the long range visions for the New Brunswick/Piscataway Campuses. Implement practices that benefit water quality in our daily operations and small projects, including implementing projects for the very reason of water quality.

**By 2020:** By 2020, have a fully implemented storm water and landscape management master plan for all Rutgers owned lands, design standards and a capital budget solely for the purpose of implementing projects that benefit water quality, water quantity, and groundwater recharge.

**Additional Information:** Storm water and landscape management master plan for the Busch and Livingston Campuses has a summer 2009 expected completion date.



**Turf Management Practices (with subsections on Landscaping with Native Plants, Promoting Biodiversity, and Pest Management):**

**History:** Areas on campus that have active building use are mowed. In the past, clippings were collected and disposed of with the trash. Leaves were also collected and disposed of with the trash. All campus areas were treated with fertilizer and weed control applications regardless of the condition of the area.

**Current Status:** Currently the University has established 10 acres of low/no mow areas, and incorporated wild flowers on various campus locations as a means of reducing carbon emissions and labor, and in an effort to increase storm water compliance on campus. The use of weed control chemicals is now limited to flower beds, and very high profile buildings such as student and recreation centers. Fertilizer applications have been reduced to once per year or as needed based on soil sample results.

**Projects Completed:** The University has recently introduced wildflowers, low/no mow areas, and rain gardens. Leaves are now collected and recycled, and the grass clippings are also recycled.

**Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years, the University should work to incorporate the use of bioenzymes for fertilization as they become readily available and affordable. The amount of low/no mow areas should also be increased.

**Five Years:**

**By 2020:**

**Additional Information:**

### Landscaping with Native Plants:

#### History:

**Current Status:** Currently there are no guidelines for the use of native plants at the University; however, recent planting projects have included the use of native plantings.

**Projects Completed:** Recently, the Busch Campus Center Patio Planting was completed using 100% native plants. There has also been the creation of no-mow areas to establish meadows on the Livingston Campus and buffers between roadways and woodland and surrounding areas of the Ecological Preserve and other parts of the campus. The campus has also begun a reduction of annual plantings in favor of masses perennial plantings (moving toward masses of native flowering perennial plants).

#### Phased Goals and Strategies for Achievement:

**Three Years:** Within three years, the University will use 50% native plants on all new plantings with 25% being NJ native plants. The University will also create a Master Plant List which will include recommended Native Plant species and native plant nurseries.

**Five Years:** Within five years, the University will use 75% native plants on all new plantings with 50% being NJ native plants.

**By 2020:** By 2020, the University will exclusively use NJ native plants on all new planting projects.

**Additional Information:** The use of native plants at the University helps to reinforce a sense of place and recognizes the ecology of NJ. The use of NJ native plants is the only logical next step in terms of creating low maintenance self sustaining landscapes with dwindling resources and cuts to staffing. There are several projects in the planning stages including the Greening of College Avenue, the Center for Integrated Proteomics on the Busch Campus, and the Rutgers Welcome Center on the Busch Campus will be using a palette of only native plants. The Rutgers Welcome Center will also highlight plants that have been developed at Rutgers and may include non-native plants. The Livingston Student Center expansion project Constructed Wetlands/ Storm water Management System is going to be planted with all native plants. This project will be the first large scale example of an Integrated Landscape approach to Storm water management at the University.

**Promoting Biodiversity:**

**History:**

**Current Status:** Currently there are no guidelines for the promotion of biodiversity.

**Projects Completed:** The no-mow areas on the Livingston Campus are becoming meadows that are rich with life and provide shelter and food sources for various species.

**Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years, the University should catalog all of the no-mow areas on campus and engage student volunteers to catalog species diversity and bio-diversity in these areas. The University should then work to increase the amount of no-mow areas and expand them to all of the New Brunswick and Piscataway campuses. The University should also make efforts to reduce herbicide and pesticide usage.

**Five Years:** Within five years, the University should work to promote integrated pest management strategies that reduce or eliminate the use of commercial pesticides, herbicides, or fertilizers.

**By 2020:**

**Additional Information:** The University may wish to consider engaging not only the students, but some of the talented faculty to consider this idea as part of their research agenda.

### **Pest Management**

**History:** Rutgers University has been using integrated pest management since the late 90s

**Current Status:** The University uses integrated pest management and limits the usage of herbicides, fungicides and pesticides.

### **Phased Goals and Strategies for Achievement:**

**Three Years:** As improvements are made in integrated pest movement the university will follow.

**Five Years:** Same as three year.

**By 2020:** Same as three year

**Additional Information:** Pest management is an important area for health and safety reasons and at the same time the applications for pest management must take into consideration the health and safety of the people at the university and to the environment at large.

### **Snow/Ice Removal:**

**History:** Piles of salt and sand were stored uncovered on site. As with any organization, the University practice was to utilize generous applications of salt and sand mix as prescribed by the DOT in the interest of safety. Calcium Chloride was used on sidewalks. Non-calibrated equipment was used with little or no level of control, leading to inconsistent spreading.

**Current Status:** Currently the University uses sparingly salt products on roads and parking lots and Magnesium Chloride based products on sidewalks.

**Projects Completed:** The University constructed two salt domes to contain and store product. The University has also purchased and calibrated equipment for product application and evaluated and switched from a Calcium Chloride to a Magnesium Chloride per environmental best management practices.

### **Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years, the University should work reduce snow removal efforts and product use by better data collection of utilized space (i.e. those areas that are not well utilized may not need to have snow removed)

**Five Years:** Over the next five years, University personnel should stay apprised of any technological advances in the area of snow removal techniques.

**By 2020:** Be inline with best environmental practices at the time.

**Additional Information:** Central data collection of buildings and parking lots being used at specific times could aid in eliminating unnecessary use of product and man-hours.

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### **Day to Day maintenance activities (paints/solvents/carpet cleaning/ floor cleaning):**

**History:** In 2007-2008, “green” paint (low or no VOC’s) and solvents were identified. These identified products are the standard for use by Facilities and Capital Planning Maintenance.

**Current Status:** These “green” materials will continue to be used in day to day painting activities and are part of the Facilities and Capital Planning Maintenance painting plan.

**Projects Completed:** This standard will be amended as new and enhanced products are identified. Facilities and Capital Planning Maintenance is working with a company that provides various “green” products and will update materials as they become available.

### **Phased Goals and Strategies for Achievement:**

**Three Years:**

**Five Years: By 2020:**

**Additional Information:** Low/No VOC paint was recently used in the painting upgrade of all classrooms. This same paint is used where applicable in all campus buildings. In addition, no VOC epoxy was used to repair flooring in lab animal applications. This product is safe to use around the animals .

### **Cleaning Products:**

**History:** For many years, the University used petroleum based cleaning and floor care products. There were several different manufacturers and various dispensing equipment models.

**Current Status:** All cleaning and floor care products purchased are bio-based and environmentally friendly, where available.

**Projects Completed:** In 2005, Environmental Services completed an in-depth study of cleaning and floor care manufacturers. This allowed the university to change over from petroleum based products to renewable, sustainable bio-based products. In addition, consistent measurement was obtained by installing new metered, simple to use dispensing systems which conserves both water and product.

### **Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years, the University should work toward implementing the use of microfiber cleaning technology in all areas.

**Five Years:** Over the next five years, University personnel should stay apprised of any technological advances including investigating new electrolyzer cleaning methods.

**By 2020:** The University should only clean with water and microfiber.

**Additional Information:** The Environmental Services & Grounds Department has won the President's Bridge Award and representatives have spoken at multiple professional organizational functions, helping to guide peers with the process of cleaning "Green."



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### **Sub-metering:**

**History:** Until the last 10 years electricity was a cheap commodity and in most cases was not metered at a building level. With the significant rise in electrical prices and the environmental impact that electricity has the university has moved to metering all new buildings and is implementing a plan to meter all existing building.

**Current Status:** We have sub metering, analog and digital, in 300 + buildings. A portion of the buildings and all substations can be read remotely. The University is implementing a plan to meter every building in the university.

**Projects Completed:** All new projects in the past five years are metered.

**Three Years:** Within three years, the University will work toward installing sub-metering in all new construction and 5% of the existing buildings that are not metered.

**Five Years:** Over the next five years, the University will work toward installing sub-metering in all new construction and 10% of the existing buildings on campus that are not metered digitally.

**By 2020:** The University will work toward installing sub-metering in all new construction and 50% of the existing buildings on campus.



### **Commissioning/ Retro-commissioning:**

**History:** A major retro-commissioning project is being undertaken at the Nelson Biology Building for over one year. A survey of the building HVAC systems and controls was performed. The EMS shop has reprogrammed the existing Honeywell controls, repaired or replaced other components of the controls. A wing by wing air balancing project is in its final stages. Commissioning has been performed on three new buildings. This commissioning process included reviewing plans and specifications during the design process, a review of the installation of the HVAC equipment during the construction phase and finally performing a functional check of the HVAC system with the respective automatic control company [Utilities]. Commissioning and retro-commissioning was value engineered out of new buildings and the maintenance budget could never support retro-commissioning. New buildings turned over to maintenance suffered from the lack of commissioning causing maintenance dollars being spent annually to correct problems/issues that could have been addressed during construction. HVAC issues that could potentially waste energy and valuable maintenance dollars are identified and corrected during design/construction through commissioning. Retro-commissioning has been done on several existing buildings making them function properly and saving energy.

**Current Status:** The University is following AHRAE standards for Commissioning. There have been four new buildings or areas and two renovated areas that have been commissioned. There has been one building, Nelson Biology, where a major HVAC system retro-commissioning project has been performed. There have been five other buildings where areas of the building have had the HVAC and/or control equipment repaired or replaced during the retro-commissioning process.

**Projects Completed:** Commissioning services have been performed on PAL, Buell during renovations. Retro-commissioning services were performed, by an outside firm, on Wright Riemen, Life Sciences, Biomedical Engineering, and the Camden Law School. The results of commissioning the four new buildings assured that the HVAC systems and automatic temperature controls were installed properly and functioning as designed. Also, the commissioning process ensured that university personnel were trained on the new building's systems. In the buildings that were retro-commissioned, there is a reduction or no occupant temperature related complaints. Further, the fume hoods are operating at the required 100 ft/min face velocity.

There have been meetings with the university's architect to develop commissioning and retro-commissioning standards to be added to the university's standard specifications [Utilities]. The university will add commissioning specifications that will require that the commissioning agent be either in-house or an outside contractor. That agent will be involved with the design, submittal reviews, and the installation process of new buildings to review the HVAC systems and automatic temperature controls. This will ensure that the university's mechanical, electrical and automated control systems meet the standard specifications when installed.



## RUTGERS FACILITIES & CAPITAL PLANNING SUSTAINABILITY PLAN

**Three Years:** Within three years, the University will adopt an advanced/enhanced commissioning standard on all new buildings; perform enhanced commissioning on 50% of buildings that are commissioned; perform re-commissioning or retro-commissioning on 15% of all existing buildings with no study older than five years

**Five Years:** Over the next five years, the University should perform enhanced commissioning on 75% of buildings that are commissioned; perform re-commissioning or retro-commissioning on 30% of all existing buildings with no study older than five years.

**By 2020:** The University should perform enhanced commissioning on 100% of buildings that are commissioned; perform re-commissioning or retro-commissioning on 75% of all existing buildings with no study older than five years.

**Additional Information:** The value of Commissioning and Retro Commissioning are understood by the university.



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## **RUTGERS FACILITIES & CAPITAL PLANNING SUSTAINABILITY PLAN**

**System in place for preventive maintenance of compressed air leaks:**

**History:** There are central compressor loops throughout the university. There are also stand alone systems for buildings. A study of the Compressor systems was done by the Center for Advanced Energy Studies.

**Current Status:**

**Projects Completed:** Study of Compressed air system completed.

**Phased Goals and Strategies for Achievement:** Implement recommendation from the compressed air study.

**Three Years:** Within three years, a plan will be in place to inspect compressor loops on an annual basis.

**Five Years:** Continue inspections of loops and implement energy savings

**By 2020:** Implement new technologies as they become available.

**System in place for regular insulation inspection:**

**History:** Piping insulation is inspected on a regular basis and replaced as needed. Wall and building insulation is not inspected and not replaced unless walls are opened for repairs. Insulation is replaced at that time.

**Current Status:**

**Projects Completed:** This standard will remain.

**Phased Goals and Strategies for Achievement:**

**Three Years:** Within three years, a plan will be in place to inspect 155 of the insulation each year.

**Five Years:** Within five years, the plan will include inspecting 50% of the insulation each year.

**By 2020:** By 2020, 75% of the insulation will have been inspected within the calendar year on a rolling preventive maintenance schedule.

**Building Temperature Setbacks:**

**History:** Building temperature setbacks usually occur during semester breaks. In some buildings, setbacks occur during evening hours.

**Current Status:** The standard exists based on building usage which is determined by Space Management and individual departments.

**Projects Completed:** Standards will remain the same.

**Phased Goals and Strategies for Achievement:** Upgrade all building controls so that temperature set back can be implemented.

**Three Years:** 25% of all buildings with a BMS will have temperature setbacks activated.

**Five Years:** 50% of all buildings with a BMS will have temperature setbacks activated.

**By 2020:** 100% of all buildings with a BMS will have temperature setbacks activated.

**Additional Information:**



## RUTGERS FACILITIES & CAPITAL PLANNING SUSTAINABILITY PLAN

### **Energy Efficient Lighting:**

**History:** University is currently conducting a lighting survey to determine the most efficient interior lighting [Utilities].

**Current Status:** Facilities and Capital Planning maintenance is always looking for more efficient lighting solutions for interior and exterior lighting. Energy efficient lighting is always upgraded and installed when existing fixtures need replacement. Efficient lighting is always identified and recommended for new building design.

**Projects Completed:** High standard for energy efficient lighting replacement, both interior and exterior will always be followed.

## RUTGERS FACILITIES & CAPITAL PLANNING SUSTAINABILITY PLAN

### Energy Efficient Equipment:

**History:** The University has always looked for energy efficiency. Cost was always the biggest factor for not installing energy efficient equipment. Now with the price of electricity and the environmental impact we are looking at life cycle costs.

**Current Status:** Per the design standards all new buildings will have High efficiency transformers and premium efficiency motors. All HVAC will be specified with high efficiency as criteria. All equipment is to meet Energy Star and qualify for New Jersey Smart Start Rebates.

**Projects Completed:** All new construction a major renovations in the past two years have implemented the standards. The University replaced all motors, 10 horse power and above, on the New Brunswick and Piscataway Campuses with an estimated savings of \$300,000.00 per year with a 3 year payback.

**Phased Goals and Strategies for Achievement:** All new construction and major renovations will implement the design standards for High efficient equipment.

**Three Years:** The University will have a requirement that all new equipment purchased at the University shall be Energy Star or equivalent.

**Five Years:** In five years the University should retrofit all HVAC systems with VFDs where applicable.

**By 2020:** All Mechanical equipment at the University to be High efficiency equipment.

**Additional Information:** By having only high efficient equipment the university can assure that we are enhancing the way we use electricity and in turn save electric and reduce our Carbon footprint.

### **Alternative Energy:**

**History:** The University has always been open to alternative usage of energy. In the 1980s the use of solar for heating was implemented.

**Current Status:** We currently have a Cogeneration plant that produces 13 Mega Watts of electricity and high temperature hot water for central heating of Busch and Livingston Campuses. We are near completion of a 1.4 MW ground mounted solar farm which will supply electric power to 10% of the Livingston campus.

### **Projects Completed**

**Phased Goals and Strategies for Achievement:** Alternative energy will be investigated for all new projects.

**Three Years:** The University will look to install another solar farm on the cook campus

**Five Years:** The University will look to other alternative and renewable energy as it becomes available and cost effective.

**By 2020:** Design building with net zero energy.

**Additional Information:** By having alternative and renewable energy the University can assure that we are enhancing the way we use electricity and in turn save electric and reduce our Carbon footprint.



**Maintenance software scheduling/purchasing program:**

**History:** Maintenance software scheduling/purchasing program is managed by Facilities and Capital Planning Business Administration Department.

**Current Status:** Maintenance work order system currently being upgraded by Facilities and Capital Planning IT.

**Projects Completed:**

**Phased Goals and Strategies for Achievement:**

**Three Years:**

**Five Years:**

**By 2020:**

**Additional Information:**

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