Notre Dame Sustainability Conference
St. John’s University
Takes on New York City Mayoral Challenge

October 9th, 2009
Queens Campus (2.1 million square feet)
Branch Campuses

Manhattan

Staten Island

Oakdale
Sustainability Initiatives at St. John’s

• Significant Challenges
  - Management Commitment
  - Board’s Endorsement
  - Resource Allocation
  - Capital Funding
  - Student & Faculty Involvement
Challenge

On Earth Day 2007, Mayor Bloomberg announced PlaNYC.

3010 Plan – 30% Reduction in 10 years
Commitment from the Top

St. John’s Is Making Progress on the Path to a Sustainable Future

To: University Community
From: James Pellow, Ed.D., Executive Vice President and COO
Re: St. John’s Is Making Progress on the Path to a Sustainable Future
Date: Thursday, February 21, 2008

Last year, St. John’s University President Rev. Donald J. Harrington, C.M., along with a number of other New York City university presidents, signed the “Mayoral Challenge for Climate Change for 30 in 10.” Their commitment was, and still remains, to reduce their institutions’ overall carbon dioxide (CO₂) emissions by 30 percent before the year 2017.

We’re taking the Challenge, which mainly addresses fuel and electricity consumed by our buildings, very seriously and have rolled up our sleeves to meet that commitment long before the 2017 end date. In early January, Vice President of Facilities Brij Anand brought on a Director of Environmental and Energy Conservation, Thomas Goldsmith, who comes to us from The New School where he had long been involved in energy conservation and, most recently, the Mayoral Challenge.

Already Brij and Tom have reviewed the steps we have taken, such as installing building-management system controls that cut back on off-hour usage in about 35 percent of our buildings; initiating a recycling program for paper, plastic and metals; switching to alternate fuels; and searching for other opportunities to lower our consumption of fossil fuel and electricity. We’ve also prepared a list of initiatives to be accomplished in order to reduce our “carbon footprint” (a term defined by the World Resources Institute as “a representation of the effect you, or your organization have on the climate in terms of total amount of greenhouse gases you produce, measured in units of carbon dioxide”).

To do this, we want to boost existing programs while at the same time introducing new initiatives for a “sustainable future,” one in which our demands on the environment are in balance with nature’s ability to meet those demands.

Going forward, Brij Anand will report on initiatives and keep you apprised of the steps we are taking and why we are taking them. As the initiatives roll out, I urge you to seriously consider volunteering for one of the task forces or committees that will be formed to better recycle and conserve our resources.

Remember, now more than ever before, achieving a sustainable future is everyone’s responsibility. It’s important that each of us treats the environment as though it’s on loan to us from future generations.
1. Reduce carbon footprint by 30% in 10 years (2017)
2. Establish base line for 2007
3. Come up with a Plan or Strategy to reduce
4. Meet monthly / report progress
5. Member Schools: NYU, CUNY, Cooper Union, Pratt, Barnard, Fordham, Columbia, New School, Pace University, Fashion Institute of Technology, Polytechnic Institute of NYU, School of Visual Arts, Berkeley College, Weill Cornell Medical College & St. John’s University
Facilities Management & Carbon Reduction

Management & Awareness
- Sustainability office established
- Mayoral Challenge commitment 30% reduce
- Carbon footprint base year calculated
- Reduction plan defined
- 10 initiatives working
- NYSERDA discussions
- Intense student & faculty engagement
- Primary focus involvement
  - Awareness plan
  - Entire community
  - Energy & recycling
  - Monthly newsletter
  - Web site
  - Other communication

Maintenance & Operations
- Building Management System (BMS) 35% campus
- Boost recycling
- Tree planting
- Fixing what’s broken
- Purchasing re-cycled products
- Examining green cleaning products
- Training staff
- Improving IAQ
- Moving away from gas-powered vehicles

Energy & Utilities
- Utility data collection & trending usage
- Energy supply bidding & contracts
- Infrastructure mapping
- Energy audit phase 1
- Load profiling
- Determining base load for co-generation
- Interviewed potential co-generation service providers.

Design & Construction
UCAC building & St. Vincent projects
- NYSERDA money
- Local products
- Products with recycle content
- Products from renewal plant materials
- High performance chiller plant & exterior glass
- Reflective roof coating
- Demand control ventilation
- Day light harvesting
- Efficient light fixtures
- Valance heat / cool
Carbon Footprint Reduction
• Energy Conservation
  Infrastructure Upgrades
  Building Management Sys. (BMS)
  Community Involvement
• New Construction Design
  UCAC & St. Vincent Hall projects
• Other Initiatives
  Recycling, Copy Paper,
  Tree Plantings, Hybrid Cars,
  Cogeneration.

LEED Standards
• UC/AC & St. Vincent Design
• Water Efficiency
• Energy & Atmosphere
• Materials & Resources
• Indoor Environmental Quality
• Design Innovation

Sustainability (goal and philosophy)
Base Year FY 06/07 (carbon tons)
Baseline 49,635 tons carbon. Reduction target 16,380 tons carbon (33%).
## Preliminary Review

(FY09 thru FY13)

<table>
<thead>
<tr>
<th>Project</th>
<th>Carbon Reduction</th>
<th>Cost Estimate</th>
<th>Annual Savings</th>
<th>Payback Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cogeneration</td>
<td>5,000 tons</td>
<td>$7M</td>
<td>$1M</td>
<td>7</td>
</tr>
<tr>
<td>Chiller Plant &amp; Maintenance</td>
<td>4,400 tons</td>
<td>$6M</td>
<td>$853</td>
<td>7</td>
</tr>
<tr>
<td>Building Management Sys.</td>
<td>3,100 tons</td>
<td>$4M</td>
<td>$900K</td>
<td>4.4</td>
</tr>
<tr>
<td>Infrastructure Retrofits</td>
<td>1,200 tons</td>
<td>$2M</td>
<td>$475K</td>
<td>4.2</td>
</tr>
<tr>
<td>Lighting</td>
<td>800 tons</td>
<td>$1M</td>
<td>$325K</td>
<td>3.1</td>
</tr>
<tr>
<td>Master Plan Upgrades</td>
<td>500 tons</td>
<td>N/A</td>
<td>$200K</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Carbon Reduction (15,000 tons)

* To be funded thru 3rd Party and paid from savings.
And finally, the Gold Star,” Mayor Bloomberg said. “St. John’s goes to the head of the class, for accelerating its greenhouse gas reduction plan to reach its 30% decrease target by the year 2013.”
Established Office of Sustainability

Committed to Mayor Bloomberg’s PlaNYC for 30% carbon reduction in 10 years.

Engaged Students as Sustainability Coordinators

Reduction Initiative Investigated

Baseline Carbon Footprint 49,635 Tons
Reduction Target 16,380 (33%) over 5 years
TAC Scope

• Perform investment grade audits, finalize project scope, savings and capital costs
• Provide BOA & DASNY with a project plan with fixed project costs and guaranteed savings
• Design and build the infrastructure upgrades
• Monitor upgrade performance and savings of the contract

TAC (The Andover Company, Division of Schneider Electric & Clinton Global initiative)
### Project Savings Summary

**Energy, Water and Cost Savings by EWCM**

<table>
<thead>
<tr>
<th>Proposed EWCM</th>
<th>Electric Reduction</th>
<th>Fuel Reduction</th>
<th>Water/Sewer Reduction</th>
<th>Project Cost</th>
<th>TAC Guaranteed Savings</th>
<th>Simple Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consumption</td>
<td>Demand</td>
<td>Consumption</td>
<td>Consumption</td>
<td>$</td>
<td>Years</td>
</tr>
<tr>
<td>1 Cogeneration Plant</td>
<td>12,180,000</td>
<td>17,500</td>
<td>(49,572)</td>
<td>-</td>
<td>5,515,518</td>
<td>$ 1,103,070</td>
</tr>
<tr>
<td>2 Steam System Improvements</td>
<td>-</td>
<td>-</td>
<td>18,689</td>
<td>-</td>
<td>1,324,951</td>
<td>$ 175,310</td>
</tr>
<tr>
<td>3 D'Angelo Center Chiller Plant / Infrastructure</td>
<td>46,270</td>
<td>(1,007)</td>
<td>32,540</td>
<td>-</td>
<td>6,269,999</td>
<td>$ 608,221</td>
</tr>
<tr>
<td>4 North Chiller Plant</td>
<td>(949,162)</td>
<td>(2,674)</td>
<td>36,244</td>
<td>-</td>
<td>4,448,898</td>
<td>$ 392,644</td>
</tr>
<tr>
<td>5 Sullivan Fuel Switch</td>
<td>(66,226)</td>
<td>(393)</td>
<td>4,472</td>
<td>-</td>
<td>47,677</td>
<td>$ 50,933</td>
</tr>
<tr>
<td>6 Kitchen Hood Renovations</td>
<td>117,350</td>
<td>-</td>
<td>849</td>
<td>-</td>
<td>179,821</td>
<td>$ 21,512</td>
</tr>
<tr>
<td>7 Controls Planning / Improvements</td>
<td>3,722,933</td>
<td>881</td>
<td>48,850</td>
<td>-</td>
<td>4,075,820</td>
<td>$ 389,311</td>
</tr>
<tr>
<td>8 Lighting System Improvements</td>
<td>2,154,147</td>
<td>1,980</td>
<td>819</td>
<td>-</td>
<td>2,925,825</td>
<td>$ 277,043</td>
</tr>
<tr>
<td>9 Water Conservation</td>
<td>-</td>
<td>-</td>
<td>2,084</td>
<td>11,158</td>
<td>637,573</td>
<td>$ 87,223</td>
</tr>
<tr>
<td>10 HPS System Improvement</td>
<td>(32,842)</td>
<td>(324)</td>
<td>2,381</td>
<td>-</td>
<td>109,329</td>
<td>$ 27,417</td>
</tr>
<tr>
<td>11 Lab Hood Improvements</td>
<td>119,951</td>
<td>327</td>
<td>2,565</td>
<td>-</td>
<td>360,138</td>
<td>$ 40,304</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17,292,421</td>
<td>16,292</td>
<td>99,921</td>
<td>11,158</td>
<td><strong>25,895,549</strong></td>
<td><strong>3,172,988</strong></td>
</tr>
</tbody>
</table>

**Anticipated NYSERDA Funding** (2,000,000)

**Final Project Cost** 23,895,549 7.53
Carbon Foot Print

Measured in tons of carbon dioxide (CO$_2$) emitted annually into the atmosphere.

Direct: Burning of Diesel, petroleum or natural gas fuels

Indirect: Use of Electric and Steam from sources that use fossil fuel
Producers and offsets

<table>
<thead>
<tr>
<th>Activity</th>
<th>Carbon Output/Year</th>
<th>Per Year Offset</th>
<th>→ Carbon Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol – Car</td>
<td>89 Gallons</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Diesel – Truck</td>
<td>91 Gallons</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>150 Sq. Ft. Office Space</td>
<td>Per Year</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2,000 Sq. Ft. House</td>
<td>Per Year</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Steam Heating</td>
<td>Per Year</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Electric – 150 Sq. Ft. Office</td>
<td>Per Year</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Steam Heat – 150 Sq. Ft. Office</td>
<td>Per Year</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Air Conditioning – 150 Sq. Ft. Office</td>
<td>Per Year</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>1 Ton Copy Paper (200,000 Sheets or 400 Reams)</td>
<td>17 Trees</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **1 Acre of Lush Forest = 50 Trees**
  - Per Year Offset
  - 7 Tons Carbon Cleaning
- **Small Wind Turbine 10,000 Kwh**
  - Per Year Offset
  - 6 Tons Carbon Offset
- **Hybrid Vehicle**
  - Per Year Offset
  - 3 Tons Carbon Reduction
- **100 Compact Fluorescent Light Bulbs**
  - Per Year
  - 16 Tons Carbon Reduction
# Carbon Per Square Foot

<table>
<thead>
<tr>
<th>Campus</th>
<th>Tons of CO2</th>
<th>Pounds</th>
<th>Squ.Ft.</th>
<th>Pounds/S.F.</th>
<th>Tons CO2 / 1000SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queens</td>
<td>43,380</td>
<td>86,760,409</td>
<td>2,178,615</td>
<td>39.8</td>
<td>20</td>
</tr>
<tr>
<td>Staten Island</td>
<td>2,486</td>
<td>4,971,354</td>
<td>173,697</td>
<td>28.6</td>
<td>14</td>
</tr>
<tr>
<td>Manhattan</td>
<td>1,839</td>
<td>3,678,239</td>
<td>143,091</td>
<td>25.7</td>
<td>12</td>
</tr>
<tr>
<td>Oakdale</td>
<td>1,604</td>
<td>3,207,128</td>
<td>274,748</td>
<td>11.7</td>
<td>6</td>
</tr>
</tbody>
</table>

**STJ Average**  49,309   98,617,129   2,770,151   **35.6**   **18**

**STJ 2009 new average pounds /S.F (8% savings)**  **33.1**
Baseline 49,635 tons carbon. Reduction target 15,203 tons carbon.
Carbon Reduction / Savings

Carbon Baseline & Reduction Plan
Based On FY07 Target Reduction Carbon Is 15,000 Tons

Utility Cost Reduction Plan
Based On FY07 Utility Target of $3.1M
Funding Rebates and Incentives

DSIRE Database of State Incentives for Renewables & Efficiency

DSIRE is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency. Choose one or both databases to search:

- Renewable Energy
- Energy Efficiency

Federal Incentives

[Map of the United States with states shaded in purple and state abbreviations labeled.]
Carbon Reduction Targets

1. Existing Infrastructure.


Existing Infrastructure

1. Cogeneration Plant.
2. Steam System Improvements.
3. D’Angelo Center Chiller Plant.
5. Sullivan Hall Chiller.
7. Controls and Planning (BMS)
8. Lighting System Improvements
11. St. Albert’s Hall Lab Hood Improvements
Infrastructure: Cogeneration

- Install 2 MW Cogeneration at Grand Central
- Feed Dorms, UCAC, St. Al’s, Marillac.
- Use waste heat to heat and air conditioning.
- Use Existing Space in Building

**Combined heat and power**

*Combined heat and power produces electricity and thermal energy from a single fuel*

- **Existing SHP Conventional Generation (49% overall efficiency)**
  - 154 units
  - 68 units (Losses)

- **Combined Heat and Power (75% overall efficiency)**
  - 100 units
  - 30 units Electricity
  - 45 units Heat
  - 11 units (Losses)
  - 25 units (Losses)
Infrastructure: Cogeneration

- Produce electric on site
- Recycle waste heat for heating and Air Conditioning
- Reduce Utility bills (approx $1M)
- Avoid cost of Boilers ($2M)
- Design built duration 18 -24 month
- Reduce Carbon Foot Print ( 7000 tons)
- Increase reliability and redundancy.
- Third party Finance / Lease
- Payback 5-7 years / 4-6 Years (w/cost avoidance)
- Incentives available ($1M)
Marillac Hall Savings from installing BMS

Night setback 9 PM to 7 AM
Energy Analysis Results – UCAC building

<table>
<thead>
<tr>
<th>Energy Efficiency Measure</th>
<th>ASHRAE 90.1 Base Building</th>
<th>ECM#1 District Cooling</th>
<th>ECM#2 Daylight Harvesting</th>
<th>ECM#3 Reduced Lighting</th>
<th>ECM#4 Demand Control Ventilation</th>
<th>ECM#5 Displacement Units</th>
<th>Total ECM - Interactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASHRAE 90.1 = 43 lbs/sf</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As Designed = 30 lbs/sf</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

UC/AC Electricity Savings

Tons of CO2 reduced
Renovation of Existing buildings

St. Augustine Hall Renovation for FY’08
Renovation of Existing buildings

Day lighting Controls designed in the major renovation for FY’08
Savings from reduction is electric use and reduction in HVAC
Payback usually less than 3 years

St. Augustine Hall - Library
Renovation of Existing buildings

High Performance Glass

St. Vincent Hall’s Renovation
Benefits
- Introduced efficient air conditioning without increasing carbon foot print
- Air moves through the unit without mechanical fan.
- High comfort level and individual room zone control.
Renovation of Existing buildings

Sullivan Hall Improvements
1. BMS Control System
2. Chiller Improvements
3. Heating Improvements
4. 10% reduction in energy use from 2007 to 2008
Upgrade Controls from the 1980s.
The technology we use today is not the same as 1980.
Emails, web, cell phones, etc.
Why not communicate with our mechanical equipment the same way.
Saves Energy.
<table>
<thead>
<tr>
<th>Month</th>
<th>Daily solar radiation - horizontal (kWh/m²/d)</th>
<th>Daily solar radiation - tilted (kWh/m²/d)</th>
<th>Electricity exported to grid (MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1.97</td>
<td>2.79</td>
<td>63.89</td>
</tr>
<tr>
<td>February</td>
<td>2.86</td>
<td>3.67</td>
<td>74.93</td>
</tr>
<tr>
<td>March</td>
<td>3.93</td>
<td>4.53</td>
<td>100.43</td>
</tr>
<tr>
<td>April</td>
<td>4.83</td>
<td>5.12</td>
<td>107.32</td>
</tr>
<tr>
<td>May</td>
<td>5.55</td>
<td>5.55</td>
<td>117.43</td>
</tr>
<tr>
<td>June</td>
<td>6.03</td>
<td>5.90</td>
<td>117.88</td>
</tr>
<tr>
<td>July</td>
<td>5.82</td>
<td>5.75</td>
<td>117.29</td>
</tr>
<tr>
<td>August</td>
<td>5.27</td>
<td>5.45</td>
<td>111.34</td>
</tr>
<tr>
<td>September</td>
<td>4.37</td>
<td>4.87</td>
<td>98.12</td>
</tr>
<tr>
<td>October</td>
<td>3.26</td>
<td>4.00</td>
<td>85.79</td>
</tr>
<tr>
<td>November</td>
<td>2.14</td>
<td>2.94</td>
<td>62.92</td>
</tr>
<tr>
<td>December</td>
<td>1.73</td>
<td>2.53</td>
<td>57.45</td>
</tr>
<tr>
<td><strong>Annual</strong></td>
<td><strong>3.99</strong></td>
<td><strong>4.43</strong></td>
<td><strong>1,114.79</strong></td>
</tr>
</tbody>
</table>
Progress to Date

• Committed to Mayor Bloomberg’s challenge of reducing carbon footprint by 30% in 10 years
• Continue to participate in periodic review & strategic dialogues with NYC Mayor’s Office of Long-Term Planning & Sustainability
• Signed a memo of understanding with EPA
• Mayor Bloomberg recognized STJ as best in class for developing carbon reduction program
• Participate with Department of Transportation – Clean Air Campus participation
• Enrolled with AASHE – STARS rating program

FY10 Plan

• Continue to demonstrate leadership in Mayoral Challenge (carbon reduction)
• Continue the dialogue and sharing progress with EPA
• Attend & participate at the Notre Dame conference on Sustainability in October 2009
• Develop program for participation in Clean Air Campus
• Register and complete (annually) AASHE STARS rating system
• Collaborate with trade publications on feature articles on sustainability plan and progress at St. John’s
On December 5, 2008 Environmental Protection Agency signed its first Memorandum of Understanding with a private university.

- MOU is a five year voluntary commitment to demonstrate continuous improvement
- MOU is structured from eight EPA volunteer partnership programs:

  Energy Star    GreenScapes
  WasteWise     WaterSence
  Coal Combustion Products
  Combined Heat & Power
  National Clean Diesel Campaign
Hired as of March 2008, student workers work as a change-agents for campus sustainability

• Organize sustainability events on campus to inspire others to make positive behavioral changes
• Data collection – energy, water, recycling & waste
  • RecycleMania all year long
• Inspections to identify waste
• Waste characterization studies
• Staff events, athletic games and special projects
• Projects – 4000 recycling containers, organic garden, compost
Recycling & Waste Characterization

2009 RecycleMania - St. John’s recorded weights

- 377,874 pounds total waste
- 271,970 pounds trash
- 15,934 pounds bottles & cans
- 41,590 pounds paper
- 48,380 pounds cardboard

Recycle 28% of total waste

5.5 pounds per person

46 metric tons greenhouse gas prevented (EPA WARM)

10-week tournament

Goal for 2010
Increase recycling to 35 percent of total waste

Staten Island Theology Students “Go-Green” for an Eco-Friendly Campus Environment
Involvement In Resident Halls

Students training students works best

• Student workers as sustainability coordinators visit as many suites as possible to speak with students.

• Recycling program in the resident halls include recycling instructions duct tape to recycling container issued to every suite and recycling containers in every corridor

• Resident advisors are trained in energy and water conservation

• Metering per building complete with real-time electronic dashboard currently being installed
NYC Agencies:
Council on the Environment, City Harvest & Wearable Collections

Service / Learning 2009 Events
Water shed tour, Sophia Garden, Central Park tour

Annual Service Day 2009
5-mile hike and clean up, Special Olympics, Regina House garden planting

STJ Bread of Life Soup Kitchen
Serving food, Income tax prep, Other activities i.e. yoga
Student Earth Club Members and Sustainability Coordinators feed the food composter and work in the organic garden.

• On Earth Day 2009 students showcased St. John’s new in-vessel food composter

• Students feed the Rocket model A500 daily with food waste and wood chips - compost in 14 days. Compost is the backbone of organic gardening

• Summer 2009 student workers as sustainability coordinators built a 54 by 34 foot organic garden with twenty five 4 by 7 foot beds
Students visited two local farms and walked through a large food distribution facility on Long Island.

- Farmers produce a list of crops to be picked one week in advance
- Food distributor sends list with pricing to St. John's chef
- Chef decides what will be on the menu and locks in the order
- Farmer harvests the crop and distributor delivers fresh produce within 30 hours.

On average in season, STJ food service vendor, Chartwells is able to purchase about 20% of its produce from local farmers.
Sustainability Committee

Summer 2009 Facilities Services, Faculty, and Office of Student Life initiated the Sustainability Committee

Committee purpose is to support the St. John’s mission:

“strive to preserve and enhance an atmosphere in which scholarly research, imaginative methodology, global awareness and an enthusiastic quest for truth serve as the basis of a vital teaching-learning process and the development of lifelong learning”.

St. John's Sustainability Initiative (STJSI) exists to advance the university efforts for a sustainable future by working with administrative, staff, faculty, and students to provide knowledge, skills and motivation that will integrate sustainability responsibilities into construction of new facilities, operation of existing facilities and working / learning activities.