



**Rutgers University**  
**Environmental Assessment:**  
**Green MOU SemiAnnual Report**  
**November 20, 2013**



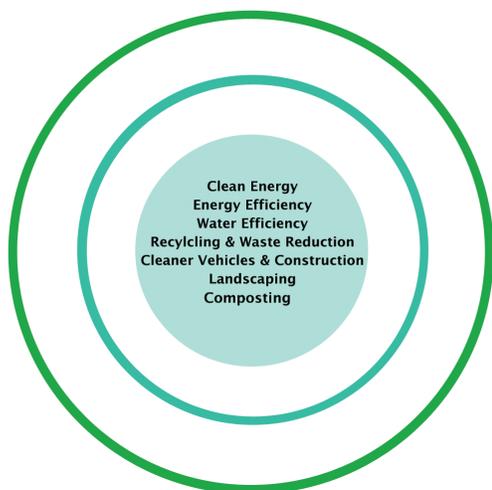
**Environmental Protection Agency**  
**Region 2**

Andrew Bellina, PE  
*Senior Policy Advisor*  
212-637-4126

Jose Pillich  
Michael Wanser  
*Research Analysts*

## Accomplishments

### Reductions of 261,080 MTCO<sub>2</sub>e



## Memorandum of Understanding

On November 3, 2009, Rutgers University signed a Memorandum of Understanding (MOU) pledging to become an environmental steward by implementing a number of green initiatives that would reduce its carbon footprint and further improve our planet's environment. This partnership with the United States Environmental Protection Agency (EPA) and Rutgers University has resulted in reducing energy, water and solid waste production across campus operations.

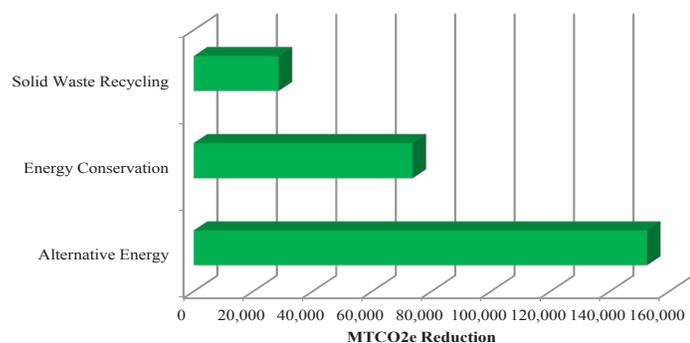
## Reduction in Environmental Footprint

Rutgers University has provided eight updates documenting its green initiatives. The EPA has analyzed the submitted information and generated an environmental footprint for the organization. Due to the progressive green efforts of the organization, the university has managed to reduce its carbon footprint by 261,080 MTCO<sub>2</sub>e\* and saved an estimated \$41 million in operating expenses.

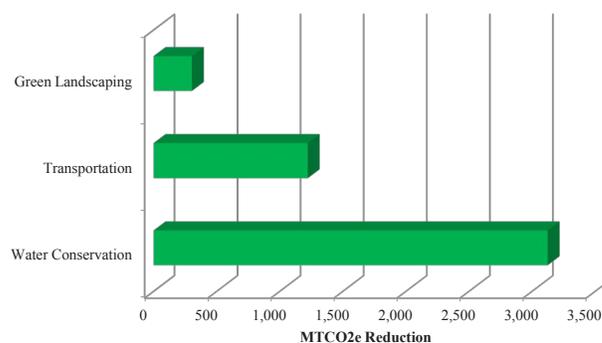
\*Metric Ton Carbon Dioxide Equivalent

Environmental Metrics	Total Sector (MTCO <sub>2</sub> e)
Energy Conservation	75,337.8
Alternative Energy	152,539.4
Water Conservation	3,123.5
Solid Waste	28,554.9
Green Landscaping	303.8
Transportation	1,221.6
Total (MTCO <sub>2</sub> e)	261,080.9

### Primary Initiatives



### Secondary Initiatives



## Measurement and Continuous Improvements

EPA uses these environmental conversion models to calculate metric tons of carbon dioxide equivalents:

Greenhouse Gas Equivalencies (GHG) Calculator converts GHG reductions into scenarios that can be easily communicated to the public.

eGRID Version 1.1 (2007) and the EPA Pollution Prevention (P2) GHG Conversion Tool which convert standard metrics for electricity, green energy, fuel use, chemical use, water use, and sustainable materials management into MTCO<sub>2</sub>e.

The EPA WARM Model which helps calculate GHG emission reductions from several different waste management practices, including source reduction, recycling, combustion, composting and landfilling.

The EPA Pollution Prevention (P2) Cost Calculator that estimates cost savings associated with GHG reductions.

Certain environmental data points cannot be converted to MTCO<sub>2</sub>e because scientific models do not currently exist.

As methodologies improve, environmental assessments will be updated to include any new GHG reduction estimates.

## Accomplishments

**Reductions of 261,080 MTCO<sub>2</sub>e**

## Greenhouse Gas Equivalencies

What does the reduction of 261,080 MTCO<sub>2</sub>e represent ?

The organization's effort is equivalent to any one of the following:

- Annual greenhouse gas emissions from 54,392 vehicles



- Carbon dioxide emissions from 29,269,159 gallons of gasoline



- Carbon dioxide emissions from 607,165 barrels of oil consumed



- Carbon dioxide emissions from the energy use of 13,041 homes for one year



- Carbon dioxide emissions from 10,878,371 propane tanks used for home barbeques



- Carbon dioxide emissions from gasoline carried by 3,424 tanker trucks



- Carbon dioxide emissions from burning 1,122 railcars' worth of coal (17 miles long)





Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Update	May/Nov 2011 Update	May/Nov 2012 Update	May 2013 Update	Nov 2013 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
<b>Energy Conservation/Energy Star</b>								
<b>Total Savings (MTCO2e)</b>	<b>9,002.8</b>	<b>11,903.3</b>	<b>19,281.0</b>	<b>19,281.0</b>	<b>9,640.5</b>	<b>6,229.2</b>	<b>75,337.8</b>	<b>\$10,642,375</b>
Miscellaneous Energy Conservation								
Motors and Transformers	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	1,094,476.5 kwh	546,338 kwh	7,718.0	\$1,302,697
Lighting Project Fixtures ( Bulbs and Ballast)		7,595,398 kwh	7,595,398 kwh	7,595,398 kwh	3,797,699 kwh	3,797,699 kwh	22,554.0	\$3,806,814
High temp Hot water Pipe replacement, therms saved	1,386,600 therms	872,000 therms	2,258,600 therms	2,258,600 therms	1,129,300 therms	564,650 therms	45,065.7	\$5,532,864
HVAC, Chiller & Electrical								
Bulb Replacement (CFLs)								
Bulb Replacement (LEDs)								
Gas Savings								
Fuel Oil Savings								
Steam Savings								
<b>Alternative Energy</b>								
<b>Total Savings (MTCO2e)</b>	<b>16,249.0</b>	<b>32,471.0</b>	<b>32,329.7</b>	<b>32,472.3</b>	<b>18,187.0</b>	<b>20,830.5</b>	<b>152,539.4</b>	<b>\$26,954,934</b>
On-Site Solar	874,235 kwh	1,712,127 kwh	1,521,745 kwh	1,713,822 kwh	3,484,856 kwh	7,045,750 kwh	12,139.4	\$2,048,973
On-Site Wind								
On-Site Geothermal								
On-Site Combined Heat and Power (13 MW)	54,446,982 kwh	96,137,000 kwh	74,313,000 kwh	73,127,200 kwh	44,087,000 kwh	39,297,100 kwh	140,400.0	\$24,905,961
Purchase of Green Energy/Green Power								
<b>Water Conservation/WaterSense</b>								
<b>Total Savings (MTCO2e)</b>	<b>624.7</b>	<b>624.7</b>	<b>624.7</b>	<b>624.7</b>	<b>312.4</b>	<b>312.4</b>	<b>3,123.5</b>	<b>\$2,350,107</b>
Miscellaneous Water Conservation	255,000,000 gal	255,000,000 gal	255,000,000 gal	255,000,000 gal	127,500,000 gal	127,500,000 gal	3,123.5	\$2,350,107
Low Flow/Hands Free Faucets								
Low Flow Toilets								
Low Flow Shower Heads								
Low Flow Urinals								
Waterless Urinals								
<b>Solid Waste Recycling</b>								
<b>Total Savings (MTCO2e)</b>	<b>39.2</b>	<b>12,287.6</b>	<b>3,959.2</b>	<b>5,743.8</b>	<b>4,199.9</b>	<b>2,325.4</b>	<b>28,554.9</b>	<b>\$589,258</b>
Mixed Recyclables (includes Wastewise)		4,334 tons	1,414 tons	1,899 tons	1,406 tons	760 tons	27,476.4	\$392,520
Pallets Waste Avoided/Wood Recycled								
Steel Recycled during Deconstruction								
Concrete / Asphalt Recycled during Deconstruction								
Recycled C & D Waste (Construction Waste)		427.42 tons					106.0	\$17,097
Cardboard (construction/non-construction/ sharp containers)								
Mixed Metal (construction/non-construction)								
Paper, Mixed								
Plastic, Mixed (bottles, construction/non-construction, sharp containers)								
Blue Wrap								
Can / Bottle Recycling								
Mixed Organics								
Food Donation (Waste diversion)								



Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Update	May/Nov 2011 Update	May/Nov 2012 Update	May 2013 Update	Nov 2013 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
Biosolids&Food Waste Recycling/ Composting				2132.5 tons	1315.5 tons	986.75 tons	887.0	\$177,390
Fluorescent Bulbs								
Ceiling tiles Recycled	25 tons						11.4	\$1,000
Carpet recycled	11.727 tons	19.56 tons					74.2	\$1,251
Waste Oil Recycled								
Magazines/ThirdClass Mail								
Newspaper								
Office Paper								
Textbooks								
Phonebooks								
Dimensional Lumber								
Fly Ash								
Aluminum Cans								
Glass								
HDPE								
LDPE								
PET								
Appliances								
Non-Ferrous Metals								
Fats, Oils, Grease								
<b>Green Procurement</b>								
<b>Total Savings (MTCO2e)</b>							<b>0.0</b>	<b>\$0</b>
Purchase of Materials with Recycled Content (paper,tile,carpet,etc)								
Purchase / Use of Compost Socks								
Purchase of EPEAT Products								
Use of Recycled Steel during Construction								
Use of Recycled Iron during Construction								
Use of Recycled Plastic during Construction								
Use of Recycled Aluminum during Construction								
Use of Recycled Concrete / Asphalt during Construction								
Use of Coal Combustion Products								
<b>Green Landscaping</b>								
<b>Total Savings (MTCO2e)</b>	<b>33.8</b>	<b>67.6</b>	<b>67.6</b>	<b>67.6</b>	<b>33.8</b>	<b>33.8</b>	<b>303.8</b>	<b>\$90,000</b>
Green Roofs								
Porous Pavement								
Grass								
Low/no mow area	10 Acres (1/2 yr)	10 Acres	10 Acres	10 Acres	10 Acres (1/2 yr)	10 Acres (1/2 yr)	303.8	\$90,000
Green Space								
Re-use of Collected Stormwater								
On-Site Re-use of Compost								
Moisture Sensing Sprinklers								
Number / Acres of Trees								
Reflective Roof								
Synthetic Turf								



Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Update	May/Nov 2011 Update	May/Nov 2012 Update	May 2013 Update	Nov 2013 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
Native Plants								
Leaves Composted								
<b>Electronics / EPEAT</b>								
<b>Total Savings (MTCO2e)</b>								
Recycling of Electronics								
Re-Use/Donation of Used Computers								
Toner/Ink Recycling and Use of Recycled Ink								
Battery Recycling								
<b>Mass Transit</b>								
<b>Total Savings (MTCO2e)</b>								
Miles Avoided								
<b>Transportation</b>								
<b>Total Savings (MTCO2e)</b>	<b>7.0</b>	<b>303.6</b>	<b>303.6</b>	<b>303.6</b>	<b>151.8</b>	<b>151.8</b>	<b>1,221.6</b>	<b>\$379,832</b>
Hybrid Vehicles								
Electric Vehicles	2	2	2	2	2 (1/2 yr)	2 (1/2 yr)	28.2	\$15,000
Biodiesel Vehicles		38	38	38	38	38	264.4	
Fuel Savings		26,000 gal	26,000 gal	26,000 gal	13,000 gal	13,000 gal	927.7	\$364,832
Clean Construction Vehicles								
LNG Vehicles	3						1.3	
Alternate Fuel Vehicles (Zipcar)								
Smartway Transporters								
Bike Racks								
<b>LEED Projects</b>								
		4 buildings	4 buildings	4 buildings	4 buildings	4 buildings		
<b>Total Savings (MTCO2e)</b>							<b>0.0</b>	
Silver - 10%								
Gold - 17%								
Platinum - 20%								
<b>Misc. - Further Clarification</b>								
<b>Total Savings (MTCO2e)</b>							<b>0.0</b>	
NOX (equipment only)								
NOX (includes vehicles)								
<b>MTCO2e Savings</b>								
<b>Total (MTCO2e)</b>	<b>25,956.4</b>	<b>57,657.7</b>	<b>56,565.7</b>	<b>58,492.8</b>	<b>32,525.3</b>	<b>29,883.0</b>	<b>261,080.9</b>	<b>\$41,006,506</b>
Energy	9,002.8	11,903.3	19,281.0	19,281.0	9,640.5	6,229.2	75,337.8	\$10,642,375
Alternative Energy	16,249.0	32,471.0	32,329.7	32,472.3	18,187.0	20,830.5	152,539.4	\$26,954,934
Water	624.7	624.7	624.7	624.7	312.4	312.4	3,123.5	\$2,350,107
Solid Waste	39.2	12,287.6	3,959.2	5,743.8	4,199.9	2,325.4	28,554.9	\$589,258
Landscaping	33.8	67.6	67.6	67.6	33.8	33.8	303.8	\$90,000
Transportation	7.0	303.6	303.6	303.6	151.8	151.8	1,221.6	\$379,832



2013

## Rutgers University Additional Green MOU Accomplishments and Cost Savings

### *Food Waste Diversion*

The EPA Environmental Assessment Report includes food waste diversion that Rutgers has been conducting over the past few years. Food waste is sent to a local farm for animal feed. Over 5,180 tons of food waste has been diverted from landfills.

### *The Rutgers Center for Urban Environmental Sustainability*

The Center for Urban Environmental Sustainability (CUES) is a collaboration between the departments of Landscape Architecture and Environmental Sciences. This collaboration provides an opportunity to combine the best science, engineering, and design capabilities in order to better address urban environmental issues and questions.

New Jersey is the most densely populated state in the U.S. and has sustained environmental alterations and impacts for more than three centuries. The Center provides expertise and research related to environmental and natural resources, human and ecosystem health, and community development. Through collaborations with governmental and non-governmental organizations (NGOs), other centers, and faculty members, CUES also provides educational opportunities for Rutgers students interested in environmental sustainability. CUES contributes solutions to a wide-spectrum of urban environmental issues - from designing an award-winning park (Voorhees Environmental Park) to leading research that supports reintroduction of the ecologically extinct Eastern Oyster in the Hudson-Raritan Estuary.

These are some of the current initiatives:

#### **Brownfields**

CUES-Sustainable Jersey Brownfields Task Force

#### **Coastal Restoration**

Hudson-Raritan Estuary Oyster Restoration  
Kearny Marsh Freshwater Wetland Restoration

#### **Landfill Re-use**

Burlington County Bioreactor Landfill  
Meadowlands Leachate Recovery  
Voorhees Environmental Park  
Western Monmouth Utilities Authority Reed Bed Sludge Disposal

#### **Urban Gardening**

New Brunswick Urban Gardening  
Trenton Local Food Network

#### **Urban Parks**

Hackensack Water Works Adaptive ReUse  
Liberty State Park  
Overpeck Park  
Teaneck Creek Conservancy Wetlands

#### **Urban Revitalization**

Oak Tree Road Revitalization - Design Studio  
Orange - Design Studio  
Ridgefield - Design Studio

#### **Urban Waters**

Hoboken Block by Block  
Meadowlands District Stormwater Management  
Sustainable Raritan River Initiative