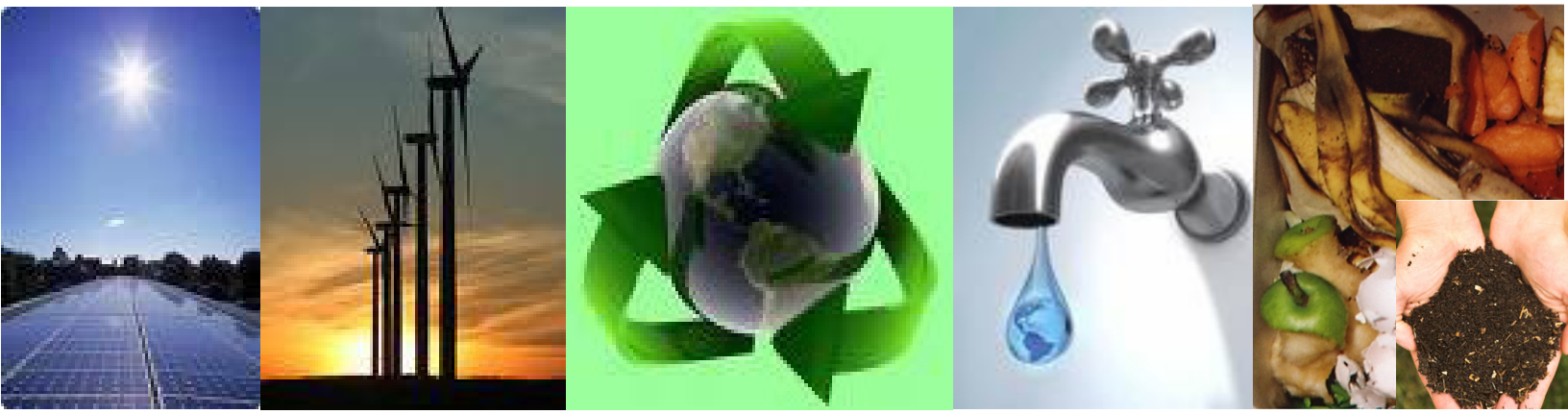
Rutgers University
Environmental Assessment:
Green MOU SemiAnnual Report
September 30, 2015

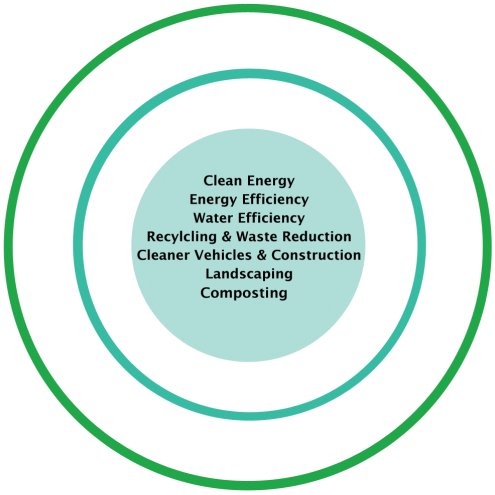


Environmental Protection Agency
Region 2

Michael Poetzsch, PE
212-637-4147

Accomplishments

Reductions of 353,446 MTCO2e



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.

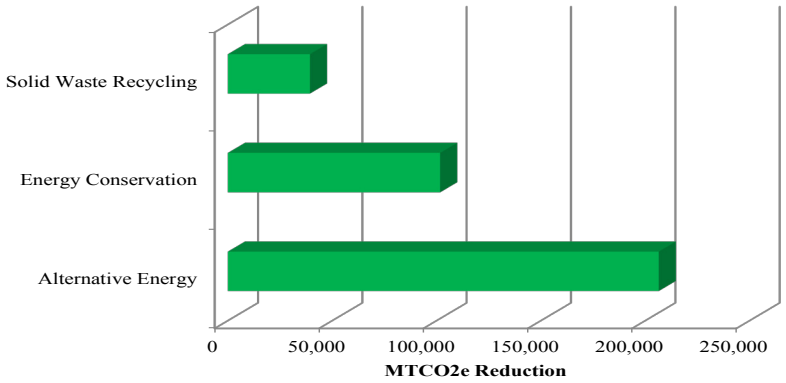
Reduction in Environmental Footprint

Rutgers University has provided ten 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 353,446 MTCO2e* and saved an estimated $55 million in operating expenses.

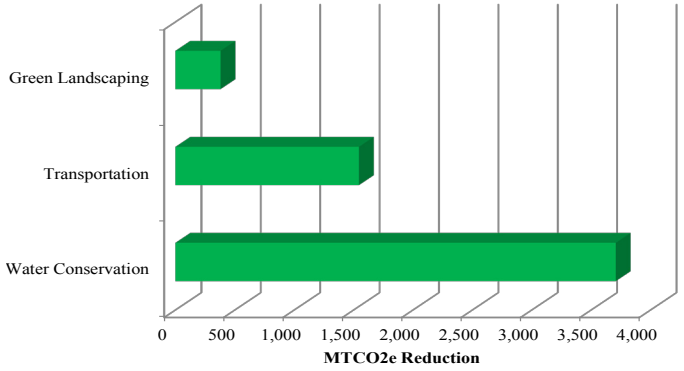
*Metric Ton Carbon Dioxide Equivalent

Environmental Metrics	Total Sector (MTCO2e)
Energy Conservation	101,765.9
Alternative Energy	206,528.9
Water Conservation	3,707.2
Solid Waste	39,323.6
Green Landscaping	379.7
Transportation	1,544.9
Total (MTCO2e)	353,446.3

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. This report utilized conversion factors developed from prior report(s).

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 MTCO2e.

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 MTCO2e because scientific models do not currently exist.

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

Greenhouse Gas Equivalencies

What does the reduction of 353,446 MTCO2e represent ?
The organization's effort is equivalent to any one of the following:

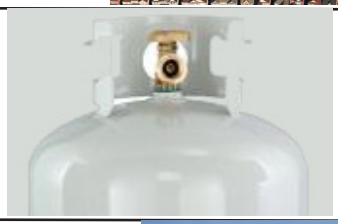
- Annual greenhouse gas emissions from 74,410 vehicles

- Carbon dioxide emissions from 39,771,126 gallons of gasoline

- Carbon dioxide emissions from 821,967 barrels of oil consumed

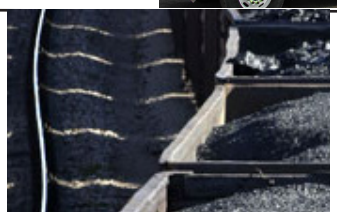
- Carbon dioxide emissions from the energy use of 48,617 homes for one year

- Carbon dioxide emissions from 14,726,917 propane tanks used for home barbeques



- Carbon dioxide emissions from gasoline carried by 4,679 tanker trucks

- Carbon dioxide emissions from burning 1,895 railcars' worth of coal (over 28 miles long)



Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Updates	May/Nov 2011 Updates	May/Nov 2012 Updates	May/Nov 2013 Updates	May/Nov 2014 Updates	May 2015 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
Energy Conservation/Energy Star									
Total Savings (MTCO2e)	***8,915***	***11,593***	***18,950***	***18,950***	***18,950***	***18,950***	***9,475***	***101,766***	***$13,824,533***
Miscellaneous Energy Conservation									
Motors and Transformers	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	2,188,953 kwh	1,094,476.5 kwh	10,286	$1,810,220
Lighting Project Fixtures (Bulbs and Ballast)		7,595,398 kwh	7,595,398 kwh	7,595,398 kwh	7,595,398 kwh	7,595,398 kwh	3,797,699 kwh	26,769	$4,710,932
High temp Hot water Pipe replacement, therms saved	1,386,600 therms	872,000 therms	2,258,600 therms	2,258,600 therms	2,258,600 therms	2,258,600 therms	1,129,300 therms	64,711	$7,303,381
HVAC, Chiller & Electrical									
Bulb Replacement (CFLs)									
Bulb Replacement (LEDs)									
Gas Savings									
Fuel Oil Savings									
Steam Savings									
Alternative Energy									
Total Savings (MTCO2e)	***16,222***	***32,419***	***32,284***	***32,420***	***36,288***	***17,932***	***38,964***	***206,529***	***$36,702,538***
On-Site Solar	874,235 kwh	1,712,127 kwh	1,521,745 kwh	1,713,822 kwh	7,145,750 kwh	3,274,643 kwh	13,259,899 kwh	19,152	$3,696,628
On-Site Wind									
On-Site Geothermal									
On-Site Combined Heat and Power (13 MW)		96,137,000 kwh	74,313,000 kwh	73,127,200 kwh	83,384,100 kwh	41,067,500 kwh	82,974,614 kwh	187,377	$33,005,910
Purchase of Green Energy/ Green Power									
Water Conservation/WaterSense									
Total Savings (MTCO2e)	***599***	***599***	***599***	***599***	***599***	***599***	***300***	***3,707***	***$3,420,000***
Miscellaneous Water Conservation	25,000,000 gal	255,000,000 gal	255,000,000 gal	255,000,000 gal	255,000,000 gal	255,000,000 gal	127,500,000 gal	3,707	$3,420,000
Low Flow/Hands Free Faucets									
Low Flow Toilets									
Low Flow Shower Heads									
Low Flow Urinals									
Waterless Urinals									
Solid Waste Recycling									
Total Savings (MTCO2e)	***39***	***12,417***	***4,002***	***5,694***	***7,817***	***2,384***	***7,064***	***39,324***	***$746,076***
Mixed Recyclables (includes Wastewise)		4,334 tons	1,414 tons	1,899 tons	2640.26 tons	836.53 tons	2,089.71 tons	37,394	$528,540
Mixed Recyclables (Camden campus)							369.91 tons	1,047	$14,796
Steel Recycled during Deconstruction									

Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Updates	May/Nov 2011 Updates	May/Nov 2012 Updates	May/Nov 2013 Updates	May/Nov 2014 Updates	May 2015 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
Concrete / Asphalt Recycled during Deconstruction									
Recycled C & D Waste (Construction Waste)		427.42 tons						106	$17,097
Recycled C & D Waste (Camden Campus)							36.38 tons	9.0	$1,455
Mixed Metal (construction/non-construction)									
Paper, Mixed									
Blue Wrap									
Can / Bottle Recycling									
Mixed Organics									
Food Donation (Waste diversion)									
Biosolids & Food Waste Recycling / Composting				2,132.5 tons	2302.25 tons	113.65 tons		682	$181,936
Fluorescent Bulbs									
Ceiling tiles Recycled	25 tons							11	$1,000
Carpet recycled	11.727 tons	19.56 tons						74	$1,251
Waste Oil Recycled									
Magazines/ThirdClass Mail									
Newspaper									
Office Paper									
Green Landscaping									
Total Savings (MTCO2e)	***34***	***68***	***68***	***68***	***68***	***68***	***34***	***380***	***$120,000***
Green Roofs									
Porous Pavement									
Grass									
Low/no mow area	10 Acres (1/2 yr)	10 acres	10 acres	10 acres	10 Acres	10 Acres	10 Acres (1/2 yr)	380	$120,000
Green Space									
Re-use of Collected Stormwater									
On-Site Re-use of Compost									
Moisture Sensing Sprinklers									
Number / Acres of Trees									
Reflective Roof									
Synthetic Turf									
Native Plants									
Leaves Composted									

Environmental Metrics	Nov 2009 MOU	May/Nov 2010 Up-dates	May/Nov 2011 Up-dates	May/Nov 2012 Up-dates	May/Nov 2013 Up-dates	May/Nov 2014 Up-dates	May 2015 Update	Total Conversion (MTCO2e)	Cost Savings (Est.)
Electronics Recycling									
Total Savings (MTCO2e)						***196***		***196***	***$4,902***
Recycling of Electronics						122.56 tons		196	$4,902
Re-Use/Donation of Used Computers									
Toner/Ink Recycling and Use of Recycled Ink									
Battery Recycling									
Transportation									
Total Savings (MTCO2e)	***7***	***304***	***304***	***304***	***304***	***304***	***152***	***1,545***	***$516,823***
Hybrid Vehicles									
Electric Vehicles	2	2	2	2	2	2	2 (1/2 yr)	35	$19,800
Biodiesel Vehicles		38	38	38	38	38	38	335	
Fuel Savings		26.000 gal	26,000 gsl	26,000 gal	26,000 gal	26,000 gal	13,000 gal	1,174	$492,523
Clean Construction Vehicles									
LNG Vehicles	3							1	$4,500
Alternate Fuel Vehicles (Zipcar)									
Smartway Transporters									
Bike Racks									
LEED Projects									
		4 buildings	4 buildings	4 buildings	4 buildings	4 buildings	4 buildings		
Total Savings (MTCO2e)								***0***	
Silver - 10%									
Gold - 17%									
Platinum - 20%									
MTCO2e Savings									
Total (MTCO2e)	***25,817***	***57,400***	***56,205***	***58,035***	***64,025***	***40,432***	***55,988***	***353,446***	***$55,334,872***
Energy	8,915	11,593	18,950	18,950	18,950	18,950	9,475	101,766	$13,824,533
Alternative Energy	16,222	32,419	32,284	32,420	36,288	17,932	38,964	206,529	$36,702,538
Water	599	599	599	599	599	599	300	3,707	$3,420,000
Solid Waste	39	12,417	4,002	5,694	7,817	2,384	7,064	39,324	$746,076
Landscaping	34	68	68	68	68	68	34	380	$120,000
Electronics Recycling	0	0	0	0	0	196	0	196	$4,902
Transportation	7	304	304	304	304	304	152	1,545	$516,823

Rutgers University Additional Green MOU Accomplishments and Cost Savings

2015

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 4,500 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:

Camden/Newark and RBHS Campuses
Camden recycled over 400 tons of mixed recyclables including 36 tons of C&D waste therby reducing GHG emmisions by over 1,100 MTCO2e. Rutgers will be upgrading lighting and replacing standard efficiency motors with high efficiency motors at their Camden, Newark, and RBHS campuses. The total estimated annual savings will be 5,145,198 KWH.

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 and Parks
New Brunswick Urban Gardening
Trenton Local Food Network
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