Energy Conservation
Renewable Energy
The Future
Rutgers

University Facilities
Operations & Services
Utilities Operations
6 Berrue Circle
Piscataway, NJ 08854
Strategic Planning for Energy Conservation

• Created a Sustainable Model

• One area of the Sustainable Model is Energy Conservation and Renewable Energy
Conservation Projects

• Metering

• HTHW – Line replacement

• Motors and Transformers

• Lighting Project
  PSEG Direct install Program
  NJ Clean Energy Direct install Program

• Solar Project
Metering

- Existing metering at substations and newer buildings
- Program to meter every building.
- In the past year Rutgers installed 60 + new meters
- With the meters installed we are able to come up with monthly usages for all buildings on the New Brunswick Piscataway Campuses
- We are inputting the data into the “AIMS” system and in the near future we will be able to ascertain energy usage not only by building but by department.
High Temperature Hot Water Line Replacement

- Replacing 40 year old deteriorated high temperature hot water pipes with new insulated pipes.

- The size of the piping varies from 4” to 14”.

- The estimated savings is 2,520,000 therms per year. This is a reduction in emissions of CO2 by 2,285 tons per year.
High Temperature Hot Water Line Replacement
Lighting Project

• Replacing inefficient lighting with high efficiency lighting and controls at Camden, Newark, and New Brunswick/Piscataway campuses.
• This will take place as funding becomes available.
• We will reduce our energy consumption by 42,500,000 KWH and reduce our CO2 by 23,333 tons.
• First Phase of the Project was implemented through the “Direct Install Program” form PSE&G.
PSEG Direct Install Program

- 80% of the cost from PSEG
- 20% of the cost from Rutgers
- 31 Buildings
- Total Project Cost $5,621,31
- PSEG Portion $4,088,231
- Rutgers Portion $1,533,086
- Savings $955,638
- ROI Rutgers 1.6 years
NJ Clean Energy Direct Install

- Buildings 200KW Demand or less
- Lighting and Mechanical
- 21 Buildings
- NJ Clean energy Portion $249,948
- Rutgers Portion $166,632
- ROI for Rutgers 2 Years
Motors and Transformers

• Replaced Standard Efficiency motors and transformers are being replaced with high efficiency motors and transformers throughout the New Brunswick/Piscataway Campus.

• The estimated savings is 2,465,000 KWh per year.

• Reduction in emissions of Co2 by 1,359 tons per year.
Motors and transformers

- Motors 10 HP and Above 316 replaced
- Transformers 30 KVA to 150 KVA 93 replaced
- Cost $1,004,591
- Savings $320,510
- ROI 3.13 years
Alternative Energy

Cogeneration Plant Installed 1997

- 13 MW Plant
- Solar Taurus 60 gas Turbines
- 104,000,000 KWh per year
- 7,036,000 therms HTHW
- 65% energy used to make electricity
- 35% is waste heat used to make HTHW
- Rutgers dispatches the plant
Livingston Solar Farm

7996 silicon based panels on a fixed mounted system. The panels are arranged in five main sub-arrays that feed into five inverters. The power is converted to 480 volts and then is stepped up to 13.8kV. The line voltage is interconnected with the university grid. The solar electric system is monitored through a web based monitoring system.
Site conditions prior to construction
Construction Complete
System Size and Output

- DC Watts (W-DC) 1,345,000
- DC to AC derate factor 0.95
- AC Watts (W-DC) 1,277,750
- NJ Annual Capacity Factor 14.0%
- First Year kWh 1,567,033
- Equivalent to Power 145 Homes 1,800 square feet for a family of four
Environmental Benefits

• Reduce emissions by 1,216 tons of $\text{CO}_2$ per year
  – Equivalent to not burning 2,955 barrels of oil per year
  – Equivalent to not burning 660 tons of coal
  – Equivalent to 155 vehicles off the road assuming 12,000 miles per year at 14.5 mpg
Fiscal Responsibility

Project Costs - $10 million

BPU Core Rebate - $4.9 million

Rutgers Contribution - $5.1 million
New Projects

• Geothermal

• Solar Canopy project
The new Rutgers Business School and future auditorium will be heated and cooled using a geothermal bore field.

- 321 wells 500 ft deep
- Heat/Cool Chillers
- Deliver 700 + tons
Geothermal

- The new Rutgers Business School and future auditorium will be heated and cooled using a geothermal bore field

- 321 wells 500 ft deep

- Heat/Cool Chillers

- Deliver 700 + tons

- Cost $6 million dollars
Geothermal Bore Field Under Construction
Geothermal Bore Field Under Construction
Overhead shot of borefield
Livingston Solar Canopy project

• Solar canopies over 32 acres of parking.

• Parking lots need to be redone and new parking, made available.

• A Feasibility study was done.

• Put out an RFP for Design Build and Financial through a lease. Other financials would be entertained.
Livingston Solar Canopy Project

- Net Savings
  - Project Cost $ 40.8 Million
- Energy and SRECs:
  - Produce 8,855,245 KWH/Year
  - 8,855 SRECS per year
- Provide over 51% of the power needs for the Livingston Campus
- Reduce GHG by 6,364 tons of CO2
- Operation January 2013
Livingston Solar Canopy project

- 30,242 265W Yingli Panda Mono-Crystalline Panels
- 16 500 KW Advanced Energy Inverters
- Solaire Generation Canopy System
Financial Opportunities

• Lesser will have a 30% tax grant. This is based on equipment purchased for the project.

• Lesser will have 5 year accelerated depreciation.

• Rutgers will maintain SRECs and energy savings.
Solar Canopies Under Construction
Overhead of Solar Canopies
Sustainability at Rutgers

- All new Buildings to be LEED Equivalent
- Must be designed to achieve energy efficiency above 90.1 2007
- Sustainability plan for Facilities produced and published
- Received a B rating from the Sustainable Endowment
- 2009 NJ Clean Energy “Educator of the year Award”
- 2009 signed MOU with USEPA
Any Questions?

Michael D. Kornitas, CEM, LEED
Director, Sustainability and Energy, Facilities
Rutgers the State University of New Jersey
Operations and Services
6 Berrue Circle,
Piscataway, NJ, 08854
mkornitas@facilities.rutgers.edu
848-445-3726