SALEM COMMUNITY COLLEGE
Energy Audit

Prepared For:
SALEM COMMUNITY COLLEGE

Contact
Raymond Constantine
Exec. Director of Special Projects

Prepared By:
Dome – Tech, Inc.

Prepared Under the Guidelines of the State of NJ Local Government Energy Audit Program

May 2010

FINAL

510 Thornall Street, Suite 170
Edison, NJ 08837
Phone: 732-590-0122
Fax: 732-590-0129

May 18, 2010

Erik J. Miller
Dome-Tech Group
510 Thornall Street, Suite 170
Edison, NJ 08837

Dear Mr. Miller,

This letter is to inform you that the energy audit report submitted, as outlined below, has been approved. You may now send the final audit report to the participating local government. Thank you for your contribution to the Local Government Energy Audit Program.

Very truly yours,

John Malanga

Applicant Entity:	Salem Community College
Project Number:	Salem Community College 1001
Auditing Firm Awarded:	Dome-Tech Group
Expiration Date:	May 18, 2011

Application Number	Facility Name	Approved Audit Report Name/Review/ Number
01796MA	Donaghay Hall	Salem Community College
01799MA	Tillis Hall	
01800MA	Contini Hall	
01797MA	Nursing Center	
01795MA	Davidow Hall	
01798MA	Salem Center	
01794MA	Glass Education Center	

CC: Raymond Constantine
Executive Director of Special Projects
Salem Community College
460 Hollywood Avenue
Carneys Point, NJ 08069

Commercial & Industrial Market Manager
New Jersey's **Clean Energy** Program
c/o TRC Energy Services
900 Route 9 North, Suite 104, Woodbridge, NJ 07095
Toll Free – 866-433-4479 • Phone – 732-855-0033 • Fax – 732-855-0422

Dome-Tech, Inc.

www.dome-tech.com

510 Thornall Street, Suite 170
Edison, NJ 08837
Tel: 732.590.0122
Fax: 732.590.0129

SALEM COMMUNITY COLLEGE
ENERGY AUDIT REPORT
TABLE OF CONTENTS

Dome-Tech, Inc.

www.dome-tech.com

510 Thornall Street, Suite 170
Edison, NJ 08837
Tel: 732.590.0122
Fax: 732.590.0129

May 27, 2010

Mr. Raymond Constantine
Executive Director of Special Projects
Salem Community College
460 Hollywood Ave
Carneys Point, NJ 08069

Re: EXECUTIVE SUMMARY FOR SALEM COMMUNITY COLLEGE
STATE OF NEW JERSEY LOCAL GOVERNMENT ENERGY AUDIT –REVISED REPORT

Dear Mr. Constantine:

Dome-Tech was retained by Salem Community College, as a pre-qualified participant in the Local Government Energy Audit Program, to perform an energy audit. The objective of the energy audit was to evaluate the school's energy consumption, establish baselines for energy efficiency and identify opportunities to reduce the amount of energy used and/or its cost.

The scope of the audit is standardized under the Program, and consisted of the following:

- Benchmarking historic energy consumption utilizing EPA Energy Star's Portfolio Manager
- Characterizing building use, occupancy, size, and construction
- Providing a detailed equipment list including estimated service life and efficiency
- Identifying and quantifying energy conservation measures (ECMs)
- Evaluating the economic viability of various renewable/distributed energy technologies
- Performing a utility tariff analysis and assessing savings potential from energy procurement strategies
- Providing the method of analyses

Based upon data received for the period May 2008 – May 2009, the College had an annual expenditure of:

- Electricity: 2,344,080 kWh at a total cost of $368,440
- Natural Gas: 28,130 therms at a total cost of $38,280
- Propane 17,010 gallons at a total cost of $40,380

Please refer to Section 2 of this report for a detailed list of identified Energy Conservation Measures (ECMs), along with a summary of their preliminary economics (estimated project cost, estimated annual energy savings, applicable rebate(s), etc.) In this report, all identified ECMs are ranked and presented according to their simple payback; however, please note that the master ECM table can also be sorted by building, by measure type, etc.

If all identified ECMs were to be implemented, they would provide the following estimated benefits to Salem Community College:

- Total annual electrical savings: 999,810 kilowatt-hours; 43%
- Total annual natural gas savings: 22,485 therms of natural gas usage; 80%
  - A portion of this savings is offset by additional Landfill gas purchase but the rates/costs are less with landfill gas.
- Total annual cost savings: $212,035; 47%
- Total annual CO_2 emissions reduction: 553 tons
- Total estimated implementation cost: $3,176,500
- Total average simple payback: 14.8 years

The projects that are recommended for implementation (at all facilities) include: installing a Building Management System (BMS), upgrading the lighting, installing programmable thermostats, installing vending machine power management devices, and implementing energy awareness programs.

The Salem Community College data was entered into the US EPA ENERGY STAR's Portfolio Manager database program. The scores ranged from a low of 6 to a high of 30. Buildings with scores of 75 or higher may qualify for the ENERGY STAR Building Label. Please see report for individual facility scores.

Distributed/Renewable Energy Systems were reviewed with the following conclusions:

- Dome-Tech considered three different types of wind turbine technologies that consisted of both building-mounted and traditional ground-mounted variety. Due to attractive payback and high potential for energy reduction, the 50 kilowatt ground mounted wind turbine project appears to be the most attractive option. Should Salem Community College decide to pursue a wind turbine project, Dome-Tech recommends commissioning a more detailed study.
- A roof-mounted 88 kw dc and ground mounted 371 kw dc photovoltaic system that could provide 33% of the school's annual energy usage was assessed for implementation.
- CHP, Fuel Cells, and Micro-turbines were also researched, but are not recommended due to the lack of thermal requirements in the summertime.

Regarding the procurement of utilities, Dome-Tech understands that Salem Community Colleges facilities are served by six electric accounts behind Atlantic City Electric, under various rate classes. Dome-Tech understands that Salem Community College has Annual and Monthly General Service Fixed Price accounts that are currently not contracted with a retail energy supplier. The College is also served by two natural gas accounts behind South Jersey Gas Company. Now is an ideal time to seek longer-term rate stability through a fixed price arrangement through a retail supplier.

During the development of this audit, Dome-Tech was assisted by facility personnel, who were both knowledgeable and very helpful to our efforts. We would like to acknowledge and thank those individuals.

Sincerely,

Bang Duong
Energy Engineer

SALEM COMMUNITY COLLEGE
ECO/ECM Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SALEM COMMUNITY COLLEGE
ECO/ECM Summary

	Energy Conservation Measure (ECM)	Building	Energy Savings			Propane	Lease/Buy	Gross Installed Cost	Life in Yrs (Cost Class)	Analytical Adjustments	Net Implementation Costs	Annual Energy Cost Savings*	Annual Operating Cost Savings*	Total Annual Cost Savings*	Simple Pay Back*	Measure Life (Years)	Return on Investment (ROI)	1 Blended Cost Savings*	Net Present Value (NPV)	Internal Rate of Return (IRR)	Annual Avoided CO2 Emissions
			kWh	kW	Therms	Gallons	Thermos														
14																					
15																					
16																					
17																					
18																					
19																					
20																					
21																					
22																					
23																					
24																					
	Totals	All Buildings	668,613	27.4	24,445	17,004	14,842	$3,113,244	1	—	$98,125	$5,138,282	$712,648	0	$	13.8	15.5	3%	$3,527,733	NA	NA	302.9

Notes:

1. With Utilities Only (E) costs only shown in the base time, 2, no economic escalation for this measure.
2. Emissions (Green, gree (E) savings are shown in the base we costs and 40% any measure at lower Kilowatt (kWh)use, but are annually evaluated for this measure.

cent 49.3
mass 160.8

Energy Audit Purpose & Scope

Purpose:

- The objectives of the energy audit are to evaluate the site's energy consumption, establish baselines for energy consumption and identify opportunities to reduce the amount of energy used and/or its cost.

Scope:

I. Historic Energy Consumption: Benchmark energy use using Energy Star Portfolio Manager

II. Facility Description: Characterize building usage, occupancy, size and construction.

III. Equipment Inventory: Detailed equipment list including useful life and efficiency.

IV. Energy Conservation Measures: Identify and evaluate opportunities for cost savings and economic returns.

V. Renewable/Distributed Energy Measures: Evaluate economic viability of various renewable/distributed energy technologies.

VI. Energy Purchasing and Procurement Strategies: Perform utility tariff analysis and assess potential for savings from energy procurement strategies.

VII. Method of Analysis: Appendices

Historic Energy Consumption

Utility Usage and Costs Summary — Time-period: May 2008 – May 2009

Buildings	Electric				Natural Gas			
	Account Number	Annual Consumption (kWh)	Annual Cost	$ / kWh	Account Number	Annual Consumption (therms)	Annual Cost	$ / Therm
Davidow Hall	1017 7369 992	744,000	$ 112,236.12	$0.151	meter#337545 21240007407	27,808	$ 37,362.80	$1.344
	No Additional Electrical Service				meter#249259 212403054-05	329	$ 917.30	$2.788
	No Additional Electrical Service				212400290-05	*Natural Gas*	*Not Used*	*Not Used*
Contini Hall & Tillis Hall	2490 2299 999	768,960	$ 121,824.41	$0.158	*No Natural Gas Service*			
Donaghay Hall	0249 0229 9957	452,560	$ 70,565.75	$0.156	*No Natural Gas Service*			
Glass Education Center *	0249 0239 9971	52,721	$ 8,940.16	$0.170	Modern Gas- 01-7401-5645	17,013	$ 40,382.61	$2.374
					PROPANE in Gallons			
Salem Center	1348 1409 9997	235,760	$ 39,748.34	$0.169	*No Natural Gas Service*			
Nursing Center	0249 0229 9957	90,080	$ 15,127.11	$0.168	*No Natural Gas Service*			
TOTAL / AVERAGE		**2,344,081**	**$ 368,441.89**	**$0.157**		**28,137**	**$ 38,280.10**	**$1.360**

**Glass Education Center Building has an incomplete year of utility billing so pricing is assumed from portion of year provided*

Please see Appendix for full utility data and consumption profiles for all Buildings.

Historic Energy Consumption

ENERGY STAR SCORES

- Energy Star Score is calculated to establish a facility-specific energy intensity baseline.
- Energy Star can be used to compare energy consumption to other similar facilities and to gauge the success of energy conservation and cost containment efforts.
- Buildings with an Energy Star rating/score of 75, or above, are eligible to apply for an official Energy Star Building label.
- Energy Star scores are only applicable to certain types of buildings (i.e.: schools K-12, offices or dormitory buildings). Energy Star Score can not be determined for the college classroom building type.

Facility Name	Total Floor Area	Energy Star Score	Eligible to Apply for ENERGY STAR	Current Site Energy Intensity (kBtu/SF)	Current Source Energy Intensity (kBtu/SF)
Donaghay Hall	48,000	NA	NA	29.6	98.8
Contini Hall (science & tech) & Tillis	66,200	NA	NA	40.6	135.5
Nursing Center -formerly Glass	5,700	NA	NA	55.3	184.5
Davidow Hall	65,650	NA	NA	82.4	175
Salem Center	12,600	NA	NA	64.1	214
Glass Education Center	14,000	NA	NA	*-One Year Data*	*-One Year Data*

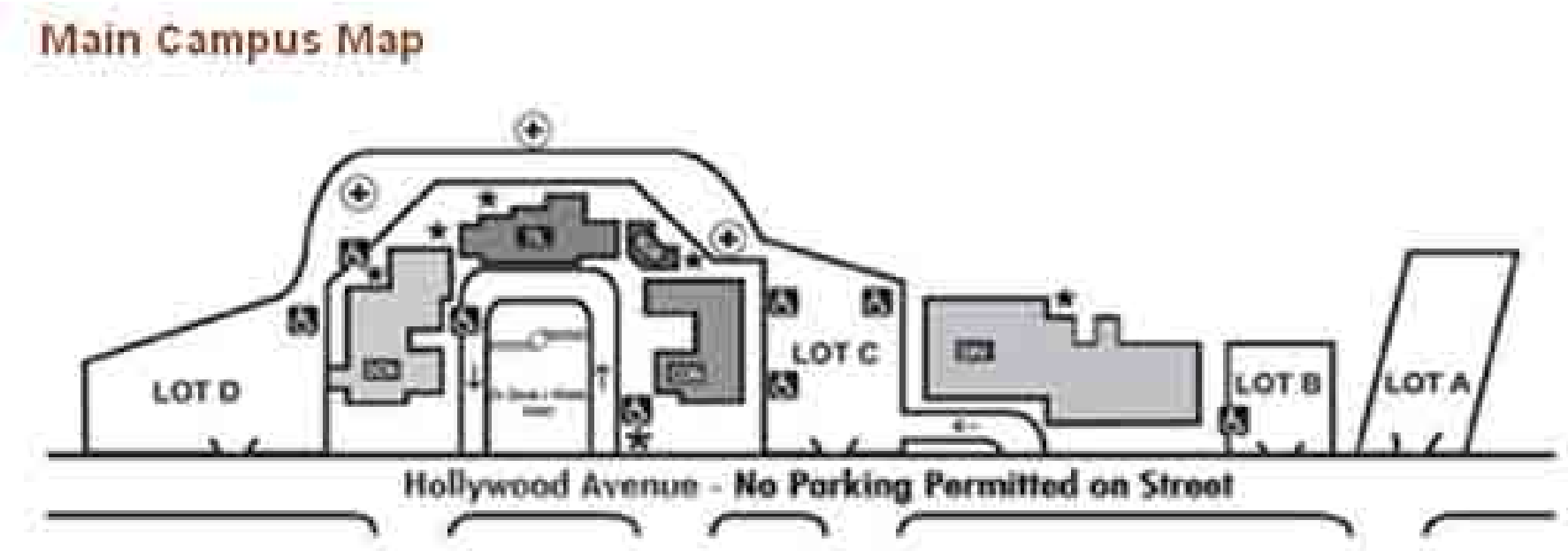
Historic Energy Consumption (continued)

Portfolio Manager Sign - In

- An account has been created for Salem Community College in Portfolio Manager. You will have received an email to notify you of the generation of this account and shared access with Dome-Tech. Please use the login information to view your facility data. Please feel free to alter this information when the report is finalized. We would ask that you leave the sign-in information alone until then. Your college's information is currently shared as read only.
- When the report is finalized the shared access will be changed so that you can use / edit the information and change as you wish.
- Website link to sign-in: https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.Login

- Username: ***SalemCC***
- Password: ***DTSalemCC***
- Email for account: ***constant@salemcc.edu***

Facility Information



CON- CONTINI HALL DAV- DAVIDOW HALL DON- DONAGHAY HALL NUR- NURSING CENTER
TIL – TILLIS HALL GLASS CTR & SALEM CENTER ARE OFF THE MAIN CARNEYS POINT CAMPUS

Facility Information

- **Building Name:** **Donaghay Hall**

Address:	460 Hollywood Avenue Carney's Point, New Jersey
Gross Floor Area:	48,000 sf
Year Built:	1978; addition in 1998
# Occupants:	250 students/ 23 staff members plus 5 Staff Librarians and 15 faculty and kitchen staff
Use:	This two story building houses a Student Services unit, bookstore, testing center, library, café, student union, and student activities office. It is operated from 7 AM to 11 PM, 5 days per week, 12 months per year

- **Construction Features:**

Facade:	Brick and stucco façade with concrete masonry block. The stucco in certain area's are in poor condition and cracking.
Roof Type:	Pitched, wood deck, brown built-up, approximately 10 + years old, in fair condition.
Windows:	Wood frame, fixed, installed in 1978, in fair condition.
Exterior Doors:	Metal, installed in 1978, in fair condition.

Facility Information (continued)

- **Building Name:** Donaghay Hall
- **Major Mechanical Systems**

  - **Ground Source Heat Pumps**
    - Seven (7) Water Furnace Ground Source Heat Pumps that range in capacity from 2 to 25 tons.
    - The fans on these units range from approximately 800 to 2,200 CFM.
    - Three (3) Baldor pumps (3 & 5 HP) that circulate ground source loop water.

  - **Boilers / Heating Systems**
    - COGEN plant in Davidow Hall supplies heating hot water to the ground source heat pumps
    - One (1) State Select 82 gallon electric Domestic Hot Water Tank with a capacity of 4.5 kW.
    - Seven (7) Water Furnace Ground Source Heat Pumps with supplemental electric resistance heat that range in capacity from 2 to 25 tons.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

Building Name: Tillis Hall

Address:	460 Hollywood Avenue Carney's Point, New Jersey
Gross Floor Area:	27,200 sf
Year Built:	1927
# Occupants:	125 students; 45 staff
Use:	This two story building houses the Academic Affairs, Administrative Services, Campus Operations, Cultural Events, Foundation, President's, Institutional Research, Planning and Development, and Public Relations Offices; as well as classrooms, and a Robotics Lab; operation is from 7 am until 11 pm. This Building is connected to Contini Hall.

Construction Features:

Facade:	Brick with concrete masonry block.
Roof Type:	Pitched, wood deck, built-up, brown, rubber roof is in good condition, asphalt shingles are in fair condition; approximately 15+ years old.
Windows:	Cover approximately 20% of façade, wood frame, and metal, fixed, double hung, with glazing, approximately 7 years old, in fair/good condition.
Exterior Doors:	Approximately three (3) metal doors, approximately 7 years old, in good condition.

Facility Information (continued)

- **Building Name: Tillis Hall**
- **Major Mechanical Systems**

  - **Ground Source Heat Pumps**
    - Seventeen (17) Water Furnace Ground Source Heat Pumps that range in capacity from 1 to 8 tons.
    - The fans on these units range from approximately 800 to 2,200 CFM.
    - Two (2) Baldor pumps (7.5 HP) that circulate ground source loop water.

  - **Boilers / Heating Systems**
    - Seventeen (17) Water Furnace Ground Source Heat Pumps with supplemental electric resistance heat that range in capacity from 1 to 8 tons.
    - One (1) Weil-McLain fire-tube boiler with a capacity of 665 MBH that supplies heating hot water to the ground source heat pumps. (This unit is no longer in use.)
    - Two (2) State Select 40 gallon electric Hot Water Storage Tanks with a capacity of 3.5kW and 4.5 kW.
    - One (1) Ruud 52 gallon electric Hot Water Storage Tank with a capacity of 4.5 kW.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

Building Name: Contini Hall

Address:	460 Hollywood Avenue Carney's Point, New Jersey
Gross Floor Area:	39,000 sf
Year Built:	1982
# Occupants:	350 students; 18 staff
Use:	This two story building houses classrooms, computer graphics, nursing, science and math laboratories. It operates from 7 AM to 11 PM, 5 days per week, 12 months per year. This Building is connected to Tillis Hall.

Construction Features:

Facade:	Brick with concrete masonry block.
Roof Type:	Pitched, wood deck, built-up, truss has asphalt shingles, approximately 15+ years old, in fair/good condition.
Windows:	Cover approximately 20% of façade, approximately 10+ years old, in fair/good condition.
Exterior Doors:	Approximately five (5) metal doors, approximately 10+ years old, in fair/good condition.

Facility Information (continued)

- **Building Name:** **Contini Hall**
- **Major Mechanical Systems**

  - **Ground Source Heat Pumps**
    - Eighteen (18) Water Furnace Ground Source Heat Pumps that range in capacity from 2 to 6 tons.
    - The fans on these units range from approximately 800 to 2,200 CFM.
    - Two (2) US Electric pumps (7.5 HP) that circulate ground source loop water.

  - **Boilers / Heating Systems**
    - Eighteen (18) Water Furnace Ground Source Heat Pumps with supplemental electric resistance heat that range in capacity from 2 to 6 tons.
    - One (1) Precision electric boiler with a capacity of 90 kW that supplies heating hot water to the ground source heat pumps.
    - One (1) Vanguard 80 gallon electric Hot Water Storage Tank with a capacity of 4.5 kW.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

Building Name: Nursing Center

Address:	460 Hollywood Avenue Carney's Point, New Jersey
Gross Floor Area:	5,700 sf
Year Built:	1999
# Occupants:	90 students; 9 staff
Use:	This single story nursing center was formerly the glass/art labs and is now used for nursing education. It operates from 7 AM to 11 PM, 5 days per week, 12 months per year.

Construction Features:

Facade:	Brick with concrete masonry block.
Roof Type:	Pitched, wood deck, built-up, brown, approximately 15+ years old, in fair condition.
Windows:	Covering approximately 10% of façade, metal frame, fixed, glazed, approximately 10+ years old, in fair condition.
Exterior Doors:	Approximately two (2) doors, metal frame, approximately 10+ years old, in fair condition.

Facility Information (continued)

- **Building Name:** Nursing Center
- **Major Mechanical Systems**
  - **Ground Source Heat Pumps**
    - Two (2) Water Furnace Ground Source Heat Pumps that have a capacity of 5 tons each.
    - One(1) Marathon pump (1/2 HP) that circulates ground source loop water.
  - **Air Handling Units**
    - Two (2) Greenheck Air Handling Units.
    - The fans on these units are approximately 2,000 CFM.
    - These units were formerly equipped with heat recovery wheels. Due to a recent change in use, the heat wheels have been removed.
  - **Boilers / Heating Systems**
    - Two (2) Water Furnace Ground Source Heat Pumps with supplemental electric resistance heat that have a capacity of 5 tons each.
    - Four (4) State Select 40 gallon electric Hot Water Storage Tanks with a capacity of 4.5 kW.
    - One (1) State Select 10 gallon electric Hot Water Storage Tank with a capacity of 4.5 kW.
    - One (1) PEX Radiant floor heating system – Non operational.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

- **Building Name:** **Davidow Hall**

Address:	460 Hollywood Avenue Carney's Point, New Jersey
Gross Floor Area:	65,650 sf
Year Built:	1991
# Occupants:	250 students; 12 staff
Use:	This single story building houses a theatre, field house and athletics offices, business and education offices, classrooms, lecture hall, gallery, and Community Outreach office. It operates from 7 AM to 11 PM, 5 days per week, 12 months per year.

- **Construction Features:**

Facade:	Brick with concrete masonry block.
Roof Type:	Pitched, aluminum metal deck, built-up, ballasted, brown, installed in 2008 (in new condition); 40 year warranty.
Windows:	Covering 20% of façade, metal, operable, double glazed, shades/blinds, approximately 10 years old, in good condition.
Exterior Doors:	Approximately fifteen (15) doors, approximately 10+ years old.

Facility Information (continued)

- **Building Name:** **Davidow Hall**
- **Major Mechanical Systems**

  - **Chillers**
    - One (1) Thermax Absorption Chiller.
      - Two (2) US Electric Chilled Water Pumps 30 HP each.
      - One(1) Recirculation Pump ¾ HP.
      - Two (2) Loop Water Pumps 30 HP each.
      - Two (2) Absorption Chiller Pump 3 & 7.5 HP.
    - One (1) Trane Packaged Air Cooled Chiller.

  - **Air Handlers**
    - Six (6) McQuay Air Handlers equipped with chilled water cooling and hot water coils.
    - Fans are equipped with variable frequency drives (VFDs).
    - The fans range in size from 11,000 CFM to 21,000 CFM.
    - Three (3) Fan Coil Units equipped with chilled water cooling and hot water coils.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information (continued)

- **Building Name:** **Davidow Hall**
- **Major Mechanical Systems**

  - **Cooling Tower**
    - One (1) Baltimore Aircoil (BAC).
    - The Cooling tower fans are equipped with a 30 HP fan with a variable frequency drive.
      - Two (2) Condenser Water Pumps 40 HP each.

  - **Package Heat Pumps**
    - Two (2) McQuay – Air Cooled Heat Pumps.

  - **Micro-turbine based Co-Generation Plant**
    - Three (3) Capstone 65 kW Micro-turbines.
    - Two (2) Marathon Electric Heating Hot water pumps 10 HP each.
    - One (1) Turbine Heat Recovery Pump 1.5 HP.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information (continued)

- **Building Name:** **Davidow Hall**
- **Major Mechanical Systems**

  - **Boilers / Heating Systems**
    - COGEN plant in Davidow Hall supplies heating hot water to Air Handlers and Variable Volume Boxes.
    - Eight (8) – Weil-McLain Fire-tube boilers that are emergency heating source.
    - One (1) AO Smith 100 gallon natural gas Domestic Hot Water Tank.
    - One (1) AO Smith 250 gallon natural gas Domestic Hot Water Tank.
      - One (1) Domestic Hot Water Recirculation Pump ¼ HP.

  - **Terminal Air Units**
    - Nineteen (19) – variable volume boxes and fan power boxes equipped with hot water coils.

  - **Controls**
    - Optimum Control System – Manages HVAC in Davidow Building.
    - Luma Lighting Control System – Manages Landscape Lighting.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

Building Name: Salem Center

Address:	174 East Broadway Salem, New Jersey
Gross Floor Area:	12,600 sf
Year Built:	1998
# Occupants:	120 students; 15 staff
Use:	This two story building serves as the Career Center. This building is off the Main Carney's Point Campus.

Construction Features:

Facade:	Brick façade with Concrete masonry block, painted.
Roof Type:	Flat, wood deck, rubber roof, approximately 10+ years old, in good condition.
Windows:	Wood frame, approximately 10+ years old, in good condition.
Exterior Doors:	Wood frame, approximately 10+ years old, in good condition.

Facility Information (continued)

- **Building Name:** Salem Center
- **Major Mechanical Systems**

  - **Ground Source Heat Pumps**
    - Fifteen (15) Water Furnace Ground Source Heat Pumps that range in capacity from 3 to 5 tons.
    - The fans on these units range from approximately 800 to 2,200 CFM.
    - Two (2) Goulds Manufacturing pumps (7.5 HP) that circulate ground source loop water.

  - **Boilers / Heating Systems**
    - Fifteen (15) Water Furnace Ground Source Heat Pumps with supplemental electric resistance. heat that range in capacity from 3 to 5 tons.
    - One (1) Vanguard 20 gallon electric Hot Water Storage Tank with a capacity of 1.5 kW.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Facility Information

Building Name: Glass Education Center

Address:	286 Welchville Road, Alloway, NJ
Gross Floor Area:	14,000 sf
Year Built:	2009
# Occupants:	150 students; 8 staff
Use:	This single story facilty is approximately 4,000 sf is used for classrooms and administration; the remaining 10,000 sf is the workshop area. The building is operated from 7 a.m. until 11 p.m., 6 days per week, 12 months per year. This building is off the Main Carney's Point Campus.

Construction Features:

Facade:	Concrete and fabricated stone front; pre-fabricated steel building attached to the rear.
Roof Type:	Pitched asphalt shingle in front; flat membrane above steel building in rear.
Windows:	Vinyl clad operable casement windows, in new condition.
Exterior Doors:	Metal, mostly glass in front; six (6) garage doors on building in rear.

Facility Information

- **Building Name: Glass Education Center**
- **Major Mechanical Systems**

  - **Air Cooled Heat Pumps**
    - Two (2) Trane Air Cooled Heat Pumps equipped with DX cooling coils.
    - The fans on these are rated at 2000 CFM.

  - **Boilers / Heating Systems**
    - One (1) Weil- McLain propane boiler that supplies heating hot water to the radiant floor heating system.
      - Five (5) Taco Recirculation Pumps 1/25 HP each.
    - One (1) Trane Ceiling Mounted fan assisted propane fired furnace.
    - One (1) Bradford –White 40 gallon electric Hot Water Storage Tank with a capacity of 4.5 kW.

Please see Appendix for detailed equipment and lighting inventory for the buildings.

Greenhouse Gas Emission Reduction

Implementation of all the identified ECMs will yield:

- 999,810 kilowatt-hours of annual avoided electric usage.
- 22,485 therms of annual avoided natural gas usage.
- 17,850 gallons of annual avoided Propane usage.
- 16,000 therms of annual ***additional*** Landfill gas usage.
- This equates to the following ***annual*** reductions:

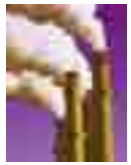
- 553 tons of CO2;

  -OR-

- 96 Cars removed from road;

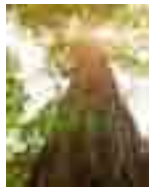
  -OR-

- 151 Acres of trees planted annually



The Energy Information Administration (EIA) estimates that power plants in the state of New Jersey emit s 0.66lbs CO2 per kWh generated.

The Environmental Protection Agency (EPA) estimates that one car emits 11,560 lbs CO2 per year.



The EPA estimates that reducing CO2 emissions by 7,333 pounds is equivalent to planting an acre of trees.

Notes and Assumptions

- Project cost estimates were based upon industry accepted published cost data, rough order of magnitude cost estimates from contractors, and regional prevailing wage rates. The cost estimates presented in this report should be used to select projects for investment grade development. The cost estimates presented in this report should not be used for budget development or acquisition requests.
- The average CO2 emission rate from power plants serving the facilities within this report was obtained from the Environmental Protection Agency's (EPA) eGRID2007 report. It is stated that power plants within the state of NJ emit 0.66 lbs of CO2 per kWh generated.
  - The EPA estimates that burning one therm of natural gas emits 11.708 lbs CO2.
  - The EPA estimates that one car emits 11,560 lbs CO2 per year.
  - The EPA estimates that reducing CO2 emissions by 7,333 pounds is equivalent to planting an acre of trees.
- The following COGEN utility prices provided were used Davidow Hall within this study:
  - Electricity Cost ($/kWh): $0.034
  - Price of Hot Water ($/therm): $0.939
- The following utility prices provided were used within this study:

Building	$ / kWh	$ / Therms	$/ Propane
Davidow	$0.151	$1.360	NA
Contini & Tillis	$0.158	NA	NA
Donaghay	$0.156	NA	NA
Glass Center	$0.170	NA	$2.374
Salem Center	$0.169	NA	NA
Nursing Center	$0.168	NA	NA

Energy Conservation Measures - ECM #1: Optimize Time of Day Schedules

Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$22,960
Estimated Gross Implementation Costs:	$3,000
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$3,000
Estimated Simple Payback:	0.1
Annual Avoided CO_2 Emissions (tons):	143.1

	On	Off	Hrs/Day	Days/Yr
Existing	0	24	24	365
Proposed	6	23	17	365

Unit	Area Served	CFM	Estimated Savings
AHU-1	Offices/Classrooms	10,000	$3,857
AHU-2	Theater	12,000	$4,628
AHU-3	Theater Lobby	12,000	$4,628
AHU-4	Gymnasium	12,000	$4,628
AHU-5	Gymnasium	12,000	$4,628
AHU-6	Locker Room	5,000	$1,928
FCU-1	Classroom	1,200	$463
FCU-2	Classroom	1,200	$463
FCU-3	Classroom	1,200	$463

- A review of the schedules in the building management system (BMS) revealed an opportunity to optimize the time of day schedules.
- Optimizing the schedules to better reflect actual building occupancy will reduce heating and cooling costs.
- For example, programming the units to come on at 6 AM and turn off at 11 PM rather than operating the units around the clock, will reduce HVAC cost.

Please see Appendix for Time of Day Schedules

ECM #2: Fuel Switch from propane to LFG

Picture: Showing Landfill Gas Piping

Glass Center	TOTALS
Estimated Annual Energy Cost Savings:	$1,910
Estimated Gross Implementation Costs:	$600
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$600
Estimated Simple Payback:	0.3
Annual Avoided CO_2 Emissions (tons):	0

- Salem Glass Center may have the ability to utilize Landfill Gas (LFG) from the neighboring Landfill. All piping for LFG has been pre-installed. Salem Community College should look into acquiring fuel service from the neighboring LFG provider.

- The average propane cost Salem Community College is paying is $2.374 per gallon. When compared to propane on a BTU basis, the equivalent landfill gas cost is $2.58 per therm. The actual price (recommended by Salem Community College) for LFG is approximately $1.34 per therm which is over 92% less than propane heat. The price of Landfill Gas is generally cheaper than natural gas.

- Replacing the propane with LFG will provide at least $1,900 in annual savings. Internal piping to all the furnaces and glass blowing equipment has been installed and is prepared for the fuel switch. Dome-Tech recommends contacting the local natural gas representative to discuss installing natural gas supply piping to the site and pricing with LFG provider.

- Prior to installing gas-fired equipment , refer to applicable fire codes for proper ventilation requirements.

ECM #3: Cap Existing DX Pipes in AHU 1,2,3 (savings from sealing holes in AHU)

Picture: Davidow AHU -1

Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$930
Estimated Gross Implementation Costs:	$330
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$330
Estimated Simple Payback:	0.4
Annual Avoided CO_2 Emissions (tons):	5.8

- The Air Handlers in Davidow Hall have large holes from the refrigerant piping that was removed. This allows conditioned air into plenum causing an unnecessary increase in the heating, cooling and dehumidification load.
- Dome-Tech recommends capping these holes.
- Energy savings will be realized by the reducing conditioned air and excess fan energy required.

ECM #4: Optimize Setpoints for Server Room

	Donaghay Hall	Tillis Hall	TOTALS
Estimated Annual Energy Cost Savings:	$100	$210	**$310**
Estimated Gross Implementation Costs:	$50	$140	**$190**
NJ Smart Start Rebate:	$0	$0	**$0**
Net Estimated Implementation Costs:	$50	$140	**$190**
Estimated Simple Payback:	0.5	0.7	**0.6**
Annual Avoided CO_2 Emissions (tons):	0.0	0.0	**0.0**

- The Air Conditioning Units in the Server Rooms in Tillis and Donaghay are set on their lowest temperature. ASHRAE conditions allows a setpoint of 75 °F for server rooms.
- DomeTech recommends raising the setpoint to 75 °F.

Picture: Server Room AC Unit set for 63 °F

ECM #5: Setpoint Optimization – Salem Center

Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$1,500
Estimated Gross Implementation Costs:	$1,100
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$1,100
Estimated Simple Payback:	0.7
Annual Avoided CO_2 Emissions (tons):	0.0

- A review of the facilities showed that the HVAC systems were controlled by programmable thermostats.
- Dome-Tech took sample readings and a review of the programmed setpoints revealed room and supply temperature setpoint inconsistencies. The typical readings were 71 degrees for cooling and 74 degrees for heating.
- Dome-Tech recommends that standard summer/winter setpoints be implemented as follows:
  - *74 °F cooling – 72 °F heating*
  - *Ensure there are no deviations between the zone temperature setpoints* ***(prevents one zone heating, next zone cooling)***

ECM #6: Vending Machine Power Management

	Contini Hall	Tillis Hall	Donaghay Hall	Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$370	$370	$735	$200	**$1,675**
Estimated Gross Implementation Costs:	$360	$360	$720	$180	**$1,620**
NJ Smart Start Rebate:	$0	$0	$0	$0	**$0**
Net Estimated Implementation Costs:	$360	$360	$720	$180	**$2,335**
Estimated Simple Payback:	1.0	1.0	1.0	0.9	**1.4**
Annual Avoided CO_2 Emissions (tons):	0.8	0.8	1.6	0.4	**3.6**

VENDING MACHINE COUNT	QTY
Contini Hall	2
Tillis Hall	2
Donaghay Hall	4
Salem Center	1

- Dome-Tech recommends installing a VendMiser vending machine power management device on all vending machines.
- The device uses a passive infrared sensor to power down the machine when the area surrounding it is vacant. Then it monitors the room's temperature and automatically re-powers the cooling system at one- to three-hour intervals, independent of sales, to ensure that the product stays cold.
- The microcontroller will never power down the machine while the compressor is running, eliminating compressor short-cycling. In addition, when the machine is powered up, the cooling cycle is allowed to finish before again powering down (reduces compressor wear and tear).

ECM #7: Optimize and Standardize the Space Temperature Setpoints

Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$500
Estimated Gross Implementation Costs:	$1,100
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$1,100
Estimated Simple Payback:	2.2
Annual Avoided CO_2 Emissions (tons):	0.0

- A review of the building management systems revealed room and supply temperature setpoint inconsistencies.
- DomeTech recommends that standard summer/winter setpoints be implemented as follows:
  - *74 °F cooling – 70 °F heating*
  - *Ensure there are no deviations between the zone temperature setpoints* ***(prevents one zone heating, next zone cooling)***

AHU	CFM	Observed Current Average Zone Winter Setpoint	Proposed Zone Winter Setpoint
AHU-1	10,000	74	70
AHU-2	12,000	72	70
AHU-3	12,000	72	70
AHU-6	12,000	72	70
FCU-1	1,200	72	70
FCU-2	1,200	76	70
FCU-3	1,200	72	70
FCU-4	1,200	72	70

ECM #8: Lighting Upgrade

	Contini Hall	Tillis Hall	Donaghay Hall	Salem Center	Nursing Center	Glass Center	Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$10,590	$6,530	$9,870	$5,590	$1,260	$2,640	$3,090	**$39,570**
Estimated Gross Implementation Costs:	$19,250	$16,000	$19,580	$11,340	$3,200	$8,940	$29,900	**$108,210**
NJ Smart Start Rebate:	$1,040	$1,030	$975	$1,030	$135	$1,790	$6,580	**$12,580**
Net Estimated Implementation Costs:	$18,210	$14,970	$18,605	$10,310	$3,065	$7,150	$23,320	**$95,630**
Estimated Simple Payback:	1.7	2.3	1.9	1.8	2.4	2.7	7.5	**2.4**
Annual Avoided CO_2 Emissions (tons):	22.1	13.6	20.9	10.9	2.5	5.1	30.0	**105.2**

- Although most of the current light fixtures have higher efficiency T-8 fluorescent lamps and ballasts, improved light fixture designs will further reduce lighting energy costs by relamping while maintaining the minimum lighting output as per state codes. The Dupont Field house (which is part of Davidow Hall) has older technology HID lighting and should be retrofitted with High Output T5 fixtures.

- Many areas were observed to have lights on regardless of occupancy. Installing occupancy sensors in these areas will automatically turn lights on/off according to actual occupancy by sensing the presence of people in the room. Occupancy sensors will reduce lighting energy costs by approximately 30%*.
- See Appendix for detailed , room by room upgrades.

*Source: Turner, Wayne, Energy Management Handbook, 1999.

ECM #9: Install Timers on Hot Water Heaters

	Donaghay Hall	Nursing Center	Contini Hall	Glass Center	Tillis Hall	Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$100	$260	$50	$50	$100	$40	**$600**
Estimated Gross Implementation Costs:	$160	$800	$160	$160	$320	$160	**$1,760**
NJ Smart Start Rebate:	$0	$0	$0	$0	$0	$0	**$0**
Net Estimated Implementation Costs:	$160	$970	$190	$190	$390	$190	**$1,760**
Estimated Simple Payback:	1.6	3.1	3.2	3.2	3.2	4.0	**3.0**
Annual Avoided CO_2 Emissions (tons):	0.2	0.5	0.1	0.1	0.2	0.1	**1.2**

*Equipment cost only. Assumes install by staff.

- These buildings generate domestic hot water from electric hot water heaters. The hot water heaters range from 10-100 gallons and 1.5 – 4.5 kilowatts of heating.
- Although hot water heaters/storage tanks are insulated, there is significant standby heat loss during off hours. The heating elements turn on throughout unoccupied hours to maintain the desired set point temperature.
- Placing timers on the units will turn the units off during unoccupied hours and turn them back on two hours prior to occupation. This setback schedule eliminates energy used to make up the standby heat loss.

ECM#10: Office AHU Static Pressure Reset

Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$460
Estimated Gross Implementation Costs:	$1,740
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$1,740
Estimated Simple Payback:	3.8
Annual Avoided CO_2 Emissions (tons):	4.4

- The discharge air static pressure set points for Air Handling Unit #1, which serves the office area's with variable volume boxes, are currently set manually by the operators.

- Under a static pressure reset strategy, the BMS will periodically (every 15 minutes) poll VAV box damper positions and adjust the static pressure set point to maintain the box that is most open at 95% damper position.

- A static pressure reset strategy will reduce fan power consumption and yield energy savings by reducing the static pressure to the lowest required limit without affecting desired space conditions.

ECM #11: Install Heat Recovery from Glass Blowing Furnace

Picture: Salem Glass Center Furnaces

Glass Center	TOTALS
Estimated Annual Energy Cost Savings:	$1,990
Estimated Gross Implementation Costs:	$9,730
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$9,730
Estimated Simple Payback:	4.9
Annual Avoided CO_2 Emissions (tons):	0.0

- These furnaces run 24/7. Reclaiming wasted heat from the glass blowing furnaces exhaust system and integrating it into the radiant floor system, will reduce the facility's propane use.

- Installing a waste heat energy recovery system will provide about $2,000 in annual savings.

ECM #12: Heat Pump Replacement

	Donaghay Hall	Nursing Center	Contini Hall	Tillis Hall	Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$3,600	$800	$7,200	$6,300	$6,300	**$24,200**
Estimated Gross Implementation Costs:	$171,650	$15,600	$177,495	$175,430	$157,230	**$697,405**
NJ Smart Start Rebate:	$5,180	$810	$5,910	$5,310	$4,860	**$22,070**
Net Estimated Implementation Costs:	$166,470	$14,790	$171,585	$170,120	$152,370	**$675,335**
Estimated Simple Payback:	46.2	18.5	23.8	27.0	24.2	**27.9**
Annual Avoided CO_2 Emissions (tons):	7.7	1.7	15.1	13.2	12.4	**50.1**

- The existing heat pump units (HP's) are between 15-30 years old and are at the end of their estimated equipment service life (EESL) per ASHRAE standards. (The EESL for package heat pump units is 15 years.)
- Replacing these HP's with new, higher efficiency units will significantly reduce annual energy and maintenance costs.
- The well fields are beginning to fail; an alternative cooling option is to replace the failing ground source heat pumps with high efficiency air conditioning units. Refer to ECM #18 to see heating option replacement.
- New Jersey SmartStart offers rebates that usually pay for the incremental cost to upgrade to higher efficiency units.

Ton Ranges	(QTY)	Standard SEER	Hi Efficiency SEER
1	1	13	17
2	5	13	17
3	13	13	17
4	22	13	17
5	13	13	17
6	1	13	17
7.5	1	13	17
25	2	13	17

*Savings do not include maintenance savings.

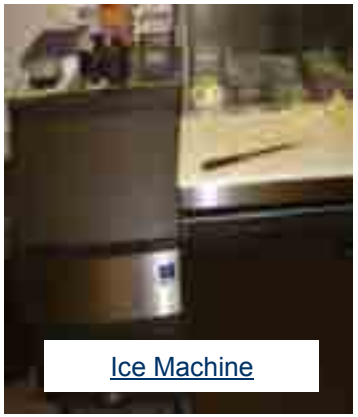
Picture: Tillis Hall Heat Pump

*Energy Efficiency Ratios: EER is the rating of heating /cooling output (Btu) divided by the electrical energy input (watts). The higher the EER, the more efficient the unit.

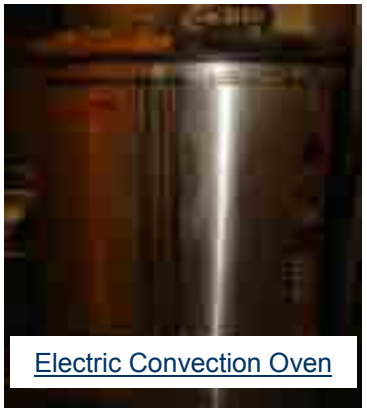
ECM #13: Replace Kitchen Equipment with Energy Star Rated Equipment

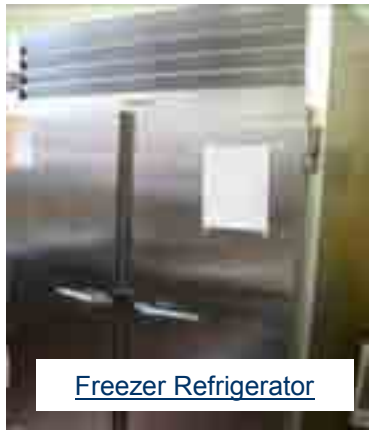
Donaghay Hall	TOTALS
Estimated Annual Energy Cost Savings:	$1,550
Estimated Gross Implementation Costs:	$14,660
NJ Smart Start Rebate:	$0
Net Estimated Implementation Costs:	$14,660
Estimated Simple Payback:	9.5
Annual Avoided CO_2 Emissions (tons):	3.3


Food Warmer


Ice Machine

- Most of the kitchen equipment (reach-in coolers/freezers, food warmers, dishwashers) in Donaghay Hall is older and less efficient than newer higher efficiency equipment.
- Replacing the electric equipment with higher efficiency Energy Star labeled equipment will provide at least $1,550 in annual savings.
- Improvements in kitchen equipment include lower idle rates, better insulation which reduces the amount of standby losses through sides and top, and premium efficiency fan motors.


Electric Convection Oven


Freezer Refrigerator

ECM #14: Weather-stripping Exterior Doors

	Contini Hall	Tillis Hall	Davidow Hall	TOTALS
Estimated Annual Energy Cost Savings:	$150	$110	$100	**$360**
Estimated Gross Implementation Costs:	$1,400	$1,050	$1,050	**$3,500**
NJ Smart Start Rebate:	$0	$0	$0	**$0**
Net Estimated Implementation Costs:	$1,400	$1,050	$1,050	**$3,500**
Estimated Simple Payback:	9.3	9.5	10.5	**9.7**
Annual Avoided CO_2 Emissions (tons):	0.9	0.7	0.7	**2.3**

Infiltration Area

Picture: Davidow Exterior Door

- Many of the perimeter doors have poor weather stripping that allow infiltration to enter conditioned areas causing an unnecessary increase in the heating, cooling and dehumidification load.
- Dome-Tech recommends replacing all old weather stripping on perimeter doors that do not have vestibules.
- Energy savings will be realized by the reduction of hot and cold outside air that the building's HVAC equipment must condition to room temperature.

ECM #15: Install Building Management System

-	Contini Hall	Tillis Hall	Donaghay Hall	Salem Center	Glass Center	Nursing Center	TOTALS
Estimated Annual Energy Cost Savings:	$15,040	$13,460	$13,590	$12,990	$3,148	$3,622	**$61,850**
Estimated Gross Implementation Costs:	$214,235	$203,170	$92,514	$181,040	$37,186	$59,317	**$787,462**
NJ Smart Start Rebate:	$0	$0	$0	$0	$0	$0	**$0**
Net Estimated Implementation Costs:	$214,235	$203,170	$92,514	$181,040	$37,186	$59,317	**$787,462**
Estimated Simple Payback:	14.2	15.1	6.8	13.9	11.8	16.4	**12.7**
Annual Avoided CO_2 Emissions (tons):	31.4	28.1	28.7	25.4	6.3	7.1	**127.1**

- A Building Management System (BMS) is a computer system designed specifically for the automated control and monitoring of the heating, ventilation, lighting, and needs of a single facility or group of buildings such as university campuses, office buildings or factories. The system can also be used for data collection and used to produce trend analysis and annual consumption forecasts.

- These buildings are not equipped with a centralized building management system, and much of the HVAC is operated manually. Salem Community College should consider a campus wide control system. Davidow Hall has a computer based BMS that should be able to control the centralized system. Additional data lines and sensors installation will be incurred. Further analysis will be required to get cost estimates for the centralized system.

ECM #15: Building Management System (Continued)

- Dome-Tech recommends installing a Building Management System with the following capabilities (the following ECMs below are included under the Building Management System energy savings and are detailed in the following pages). Implementing a building management system could produce estimated annual energy savings of $61,000.

  - **Setpoint Optimization**
  - **Time of Day Optimization**

- Optimize and Standardize the Space Temperature Set points - Optimizing the space temperature setpoints to industry standards will reduce heating and cooling loads which will increase energy savings. A review of existing thermostat setpoints revealed inconsistencies and an opportunity to reduce HVAC costs.

- Optimize Time of Day Schedules - Optimizing the schedules to better reflect actual building occupancy will reduce heating and cooling costs. Implementing a time of day schedule would normally incur energy savings.

ECM #15: BMS Option 2: Programmable Thermostats

	Contini Hall	Tillis Hall	TOTALS
Estimated Annual Energy Cost Savings:	$15,040	$13,460	**$28,500**
Estimated Gross Implementation Costs:	$2,820	$2,660	**$5,480**
NJ Smart Start Rebate:	$0	$0	**$0**
Net Estimated Implementation Costs:	$2,820	$2,660	**$5,480**
Estimated Simple Payback:	0.2	0.2	**0.2**
Annual Avoided CO_2 Emissions (tons):	10.3	9.1	**19.4**

- An alternative option to a centralize BMS system is to install programmable thermostats. Although this is an alternative option to the campus wide BMS system, Dome-Tech highly recommends installing a centralized BMS system due to better control and optimization of the HVAC systems.
- A review of the facilities showed that the HVAC systems were controlled by non-programmable thermostats.
- Dome-Tech recommends replacing the non-programmable thermostats with programmable thermostats.
- Installing programmable thermostats will provide scheduled temperature control to prevent overheating and cooling when the building is unoccupied.

ECM #16: Premium Efficiency Motors

	Donaghay Hall	Davidow Hall	Contini Hall	Tillis Hall	Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$350	$60	$250	$250	$260	**$1,170**
Estimated Gross Implementation Costs:	$4,210	$4,230	$3,800	$3,800	$2,750	**$18,790**
NJ Smart Start Rebate:	$110	$90	$80	$80	$110	**$470**
Net Estimated Implementation Costs:	$4,100	$4,140	$3,720	$3,720	$2,640	**$18,320**
Estimated Simple Payback:	11.7	69.0	15.0	14.9	10.2	**15.6**
Annual Avoided CO_2 Emissions (tons):	0.7	0.6	0.5	0.5	0.5	**2.8**

- Most of the existing motors serving the AHU's and pumps are standard efficiency motors. See the appendix for a detailed list of motors surveyed for this ECM.

Typical Efficiencies for Standard & Premium Motors
(1800 RPM Open Drip-Proof Motors)

HP	QTY	STANDARD EFFICIENCY	PREMIUM EFFICIENCY
3	1	82.5%	89.5%
5	3	82.5%	89.5%
7.5	2	85.5%	91.0%
10	1	86.5%	91.7%

- Dome-Tech recommends replacing select regularly operated standard efficiency motors (pumps and large AHU's) with new premium efficiency motors. For all other motors, when the motor starts to fail it is recommended that they are replaced with new premium efficiency motors. The new motors would reduce electrical consumption.

ECM #17: Elevator Motor Efficiency Controller

- The Department of Energy estimates that 44% of the motors in U.S. industry are lightly loaded and operating inefficiently. Electric motors become highly inefficient when they are lightly loaded – when performing less work than they are designed to handle.

- There are several ways to manage motor loading to optimize efficiency. Variable speed drives conserves energy by varying the motor speed in response to the system load. However, many applications with varying motor loads require constant speed. These systems include escalator and elevator motors.

- Another device designed to manage motor energy is a motor power efficiency controller or PEC. PEC's are designed to manage motor efficiency in constant speed systems by varying the power to motor while maintaining a fixed speed.

- A PEC is essentially a soft start with proprietary technology (voltage/amperage control algorithms). The technology senses a lightly loaded motor's inefficiency and reduces the power to the electric motor while maintaining the motor at full operating speed. In numerous tests by independent third parties, the PEC typically saves 20-40% of the electricity used by motors in appropriate applications.

ECM #17: Elevator Motor Efficiency Controller – (continued)

	Contini Hall	Tillis Hall	Donaghay Hall	Salem Center	TOTALS
Estimated Annual Energy Cost Savings:	$1,470	$680	$1,150	$580	**$3,880**
Estimated Gross Implementation Costs:	$15,585	$15,585	$15,585	$15,585	**$62,340**
NJ Smart Start Rebate:	$0	$0	$0	$0	**$0**
Net Estimated Implementation Costs:	$15,585	$15,585	$15,585	$15,585	**$62,340**
Estimated Simple Payback:	10.6	22.9	13.6	26.9	**16.1**
Annual Avoided CO_2 Emissions (tons):	3.1	1.4	2.4	1.1	**8.0**

- Each facility has 1 elevator each equipped with 15 HP motors. Since this is a ***newly emerging technology***, Dome-Tech recommends performing a pilot study on one elevator. If effective, this initiative should be implemented on all four systems. The presented savings and costs assume a single installation.

- The manufacturer of the PEC claims testing has been done by a group of utilities in New Jersey. Dome-Tech recommends reviewing the technology with Atlantic City Electric for potential incentives.

ECM #18: High Efficiency Boilers, COGEN Waste Heat

- The existing 195 kW micro-turbine co-generation plant provides electricity, heating hot water and chilled water to Davidow Hall. Due to a failing geothermal well field, Donaghay Hall's water loop was also interconnected to the co-generation plant. Site personnel inquired about the potential to interconnect the remaining buildings to the plant in order to receive heating hot water.
- The ground source heat pumps are nearing the end of the ASHRAE recommend service life. Some of the ground source heat pump loops are starting to fail. A ***comparison*** of high efficiency condensing boilers to standard fire-tube boilers has been calculated and is shown below. Note that gas lines would have to be piped to the remaining buildings.
- The co-gen plant's current heating capacity is 843 MBtu-h. The combined connected heating load in Davidow and Donaghay Halls exceeds the current heating capacity of the three microturbines. Although the College is considering adding a fourth micro-turbine to the plant, which would provide an additional 280 MBtu-h, the connected heating loads of Davidow and Donaghay exceeds the peak heating output of the plant. The total connected load in the remaining buildings is 1,585 MBtu-h.
- Adding the remaining buildings to the existing loop would not be advisable.
- An alternative option to the ground-source wells and existing auxiliary electric reheat is to install modular high efficiency condensing boilers for the remaining buildings. A central heating plant (via modular condensing boilers) could be installed and piped from the CO-Gen mechanical room.
- To account for the cooling side, a cooling tower can be installed to replace the ground source water loops. Condenser water can be piped from a central location to all buildings.

ECM #18: High Efficiency Boilers, COGEN Waste Heat (continued)

	Contini Hall	Tillis Hall	Donaghay Hall	TOTALS
Estimated Annual Energy Cost Savings:	$5,630	$5,070	$5,140	**$15,840**
Estimated Gross Implementation Costs:	$137,340	$137,340	$108,230	**$382,910**
NJ Smart Start Rebate:	$1,000	$1,000	$1,000	**$3,000**
Net Estimated Implementation Costs:	$136,340	$136,340	$107,230	**$379,910**
Estimated Simple Payback:	24.2	26.9	20.9	**24.0**
Annual Avoided CO_2 Emissions (tons):	24.5	22.1	22.4	**69.0**

- In Tillis, Contini and Donaghay Hall, the high first cost of a new boiler system preclude this ECM from being justified by economics alone. However, reliability issues warrant consideration of this project as part of a long-term capital improvement plan. Installation of a new boiler would allow boiler runtimes to be equally distributed and would allow for reliable backup capacity should one boiler fail or require repairs.
- High efficiency boilers should be considered for theses facilities when the ground source heat pump loop fails. Salem County Community College may consider installing a central heating plant to meet the thermal loads of the campus.
- If the fire-tube boiler in Tillis were replaced with high efficiency condensing boilers, savings will be incurred because condensing boilers extract more heat from the input fuel thus allowing efficiencies of 90% and above. Furthermore, Contini and Donaghay Halls have electric supplemental heat, which is very costly compared to gas fired heating systems.

ECM #19: Window Replacement

	Donaghay Hall	Contini Hall	TOTALS
Estimated Annual Energy Cost Savings:	$630	$1,650	**$2,280**
Estimated Gross Implementation Costs:	$520,350	$554,215	**$1,074,565**
NJ Smart Start Rebate:	$0	$0	**$0**
Net Estimated Implementation Costs:	$520,350	$554,215	**$1,074,565**
Estimated Simple Payback:	826.0	335.9	**471.3**
Annual Avoided CO_2 Emissions (tons):	0.0	0.0	**0.0**

NOTE: The presented economics should be used for planning purposes only. If the client decides to proceed with the window replacement project, these economics should be refined with an investment grade analysis.

- A survey of the facility revealed a mixture of types and sizes of windows, and window functionality and condition varied throughout the buildings.
- A window replacement project would result in a measurable improvement in heat retention. In addition, increased aesthetic value and occupant comfort would accompany a window project. It should be noted however, that even an optimized window project can rarely be justified solely on economic payback.
- Because the economics alone are not sufficient to justify implementation, occupant comfort and aesthetics should be the overriding considerations in moving forward with this project.

ECM # 20: Creation of an Energy Awareness & Education Program

Estimated Annual Savings:	$10,000 - $15,000*
Gross Estimated Implementation Cost:	$1500
Expected Rebate / Energy Efficiency Credit:	None
Net Estimated Implementation Costs:	$1500
Simple Payback (yrs):	Varies
Annual Avoided CO_2 Emissions (tons):	Varies
Cost per Ton CO_2 Reduction ($/ton):	Varies

- Salem Community College currently has no observed program in place.
- Educational institutions are where our nation's youth spend a significant portion of their time. As such, educators can have a potentially large impact on promoting an energy conscious and conservation-minded society that starts at their school, leading to energy cost reductions, environmental benefits, and national energy independence.
- In addition, schools can receive recognition for their efforts and possible media coverage, which can contribute to enhanced school spirit, and individual feelings of accomplishment and connection.

Renewable/Distributed Energy Measures

Distributed Generation & Renewable Energy

- Distributed Generation (on-site generation) generates electricity from many small energy sources. These sources can be renewable (solar/wind/geothermal) or can be small scale power generation technologies (CHP, fuel cells, microturbines). Davidow Hall has three (3) 65 kW microturbines that produce electricity and hot water for the building.

- Renewable energy is energy generated from natural resources (sunlight, wind, and underground geothermal heat) which are naturally replenished

- Photovoltaic (solar) are particularly popular in Germany and Spain and growing in popularity in the U.S.

- Wind power is growing as well, mostly in Europe and the U.S.

Renewable Energy Technologies: Wind

Wind turbines generate electricity by harnessing a wind stream's kinetic energy as it spins the turbine airfoils. As with most renewable energy sources, wind energy is subject to intermittent performance due to the unpredictability of wind resources.

Carney's Point Wind Speed

As previously stated, wind speed is critical to the successful wind turbine installation. According to average wind data from NASA's Surface Meteorology and Solar Energy records, the average annual wind speed for Carney's Point area is 4.6 meters per second. Ideal wind speeds for a successful project should average over 6 meters per second.

For Salem Community College, Dome-Tech considered three (3) types of wind turbine technologies; building integrated wind turbines (1 kW each) and traditional ground mounted wind turbines (5 kW & 50 kW).

Building Integrated Wind Turbines
Model: AeroVironment AVX1000
Height: 8.5'
Rotor Diameter: 6'
Weight: 130 lbs.
Cut-In Wind Speed: 2.2 m/s
Maximum Generating Capacity: 1 kW

5 kW Ground Mount
Model: WES5 Tulipo
Height: 40'
Rotor Diameter: 16'
Weight: 1,900 lbs.
Cut-In Wind Speed: 3.0 m/s
Maximum Generating Capacity: 5.2 kW

50 kW Ground Mount
Model: Entegrity EW50
Height: 102'
Rotor Diameter: 50'
Weight: 21,000 lbs.
Cut-In Wind Speed: 4.0 m/s
Maximum Generating Capacity: 50 kW

Renewable Energy Technologies: Wind

The project economics and wind turbine pros and cons are presented in the following tables:

Wind Turbine Economics

	Building Integrated	Ground Mount 5 kW	Ground Mount 50 kW
Gross Installation Cost Estimate	$130,000	$62,400	$250,000
NJJ SSB Rebate	$45,278	$35,994	$95,720
Net Installation Cost Estimate	$84,722	$26,406	$154,280
Annual Energy Savings	$2,137	$1,698	$15,861
Simple Payback	39.7 yrs.	15.5 yrs.	9.7 yrs.
System Capacity	20 kW	10 kW	50 kW
Annual Avoided Energy Use	14,149 kWh	11,248 kWh	105,041 kWh
Annual CO2 Emissions, Therms	5	4	37
% of Annual Electric Use*	0.7%	0.5%	5.1%

Salem Community College: 2055600 kWh/Year.

Wind Turbine Pros & Cons

Pros	Cons
➢Annual reduction in energy spend and use can be potentially reduced by almost $16,000 (5 % reduction). ➢Typical equipment life span is 15-30 years. ➢Reduction of annual greenhouse gas emissions by 126 tons per year. ➢A wind turbine project could be incorporated into science and other curriculums to raise student awareness of energy alternatives. ➢High visible “green” project.	➢Payback period is significant (over 10 years). ➢Average area wind speed is not ideal and impacts performance. ➢Prone to lighting strikes. ➢Bird collisions are likely, but may be reduced with avian guard (building integrate only). ➢Zoning may be an issue. Check with local zoning regulations. ➢Wind turbines do create noise, although below 50 dB (a typical car ride is over 80 dB).

Due to a reasonable payback and high potential for energy reduction, the 50 kilowatt ground mounted wind turbine project appears to be the most attractive option. Should Salem Community College decide to pursue a wind turbine project, Dome-Tech recommends commissioning a more detailed study.

Solar Photovoltaic

- Sunlight can be converted into electricity using photovoltaic's (PV).
- A solar cell or photovoltaic cell is a device that converts sunlight directly into electricity.
- Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as silicon. Electrons are knocked loose from their atoms, allowing them to flow through the material to produce electricity.
- Solar cells are often electrically connected and encapsulated as a module, in series, creating an additive voltage. The modules are connected in an array. The power output of an array is measured in watts or kilowatts, and typical energy needs are measured in kilowatt-hours.
- Can be recommended in this application for placement on additional buildings / areas (such as fields or parking areas).

Renewable Energy Technologies: Solar Photovoltaic – Roof Mounted System

Solar Photovoltaic Systems for Davidow Hall, Contini Hall, Nursing Center, Tillis Hall and Donaghay Hall.

	Roof Mount
System Capacity, kw-dc (maximum utilization of roof space)	88 kw dc
Annual Electric Generation, kwhrs of AC electricity produced	98,246 kwh
Total Annual Facility Electric Use, kwhrs	2,055,600 kwh
% of Total Annual Usage	5%
All-In Cost of Electric Year 1	$0.157 / kwh
Annual Electric Cost Savings	$15,425
Estimated SREC Value (Year 1):	$589 / SREC
Estimated Year 1 SREC Revenue:	$57,912
Equivalent Annual CO2 Emission Reduction (tons per year)[1]	62 tons/yr
Equivalent Cars Removed From Road Annually[2]	11
Equivalent Acres of Trees Planted Annually[3]	17
System Installed Cost (does not include value of tax credits)	$528,678
Simple Payback (includes tax incentives)	8.4
IRR (25 Years)	9%
Net Present Value (25 yrs, 10% discount rate)	($29,043)

1. Estimated CO2 Emissions Rate: 1.268 lbs/kWh
2. EPA Estimate: 11,560 lbs CO2 per car
3. EPA Estimate: 7,333 lbs CO2 per acre of trees planted

	Roof Mount
System Capacity (kW)	**88**
No. of Panels	**383**
Annual Output (kWh)	**98,246**

Dome-Tech recommends replacing the roofs before installation of PV system.

Renewable Energy Technologies: Solar Photovoltaic – Ground Mounted System

Solar Photovoltaic Systems

	Ground Mount
System Capacity, kw-dc (maximum utilization of Ground space)	371 kw dc
Annual Electric Generation, kwhrs of AC electricity produced	561,825 kwh
Total Annual Facility Electric Use, kwhrs	2,055,600 kwh
% of Total Annual Usage	27%
All-In Cost of Electric Year 1	$0.157 / kwh
Annual Electric Cost Savings	$88,206
Estimated SREC Value (Year 1):	$589 / SREC
Estimated Year 1 SREC Revenue:	$331,174
Equivalent Annual CO2 Emission Reduction (tons per year)[1]	356 tons/yr
Equivalent Cars Removed From Road Annually[2]	62
Equivalent Acres of Trees Planted Annually[3]	97
System Installed Cost (does not include value of tax credits)	$2,225,048
Simple Payback (includes tax incentives)	5.9
IRR (25 Years)	14%
Net Present Value (25 yrs, 10% discount rate)	$523,912

1. Estimated CO2 Emissions Rate: 1.268 lbs/kWh
2. EPA Estimate: 11,560 lbs CO2 per car
3. EPA Estimate: 7,333 lbs CO2 per acre of trees planted

	Ground Mount
System Capacity (kW)	**371**
No. of Panels	**1,216**
Annual Output (kWh)	**561,825**

Renewable Energy Technologies: Solar Photovoltaic

➢ Non-Financial Benefits of Solar PV

- The implementation of solar PV projects at Salem Community College would place your facilities at the forefront of renewable energy utilization. This allows the college the opportunity to not only gain experience with this energy technology, but also to win recognition as an environmentally sensitive, socially conscious institution. Additionally, these projects could be incorporated into science education and additional curriculums to raise awareness of current energy alternatives to the younger generations.

Utility Tariff and Rate Review: Electricity

- **Accounts and Rate Class:** The College has six facilities each with a single electric service. The College's six electric accounts are behind Atlantic City Electric under rate classes Annual General Service and Monthly General Service.

- **Electric Consumption and Cost:** Based on the one-year period studied, the total annual electric expenditure for the College is about $368,000 and the total annual consumption is about 2,344,000 kilowatt-hours (kWh).

- **Average/Effective Rate per kWh:** For the one year period studied, the College's average monthly cost per kilowatt-hour ranged from 13.12 ¢/kWh to 20.01 ¢/kWh, inclusive of utility delivery charges. The College's overall, average cost per kilowatt-hour during this period was 15.70 ¢/kWh.

  - Note that these average electric rates are "all–inclusive"; that is, they include all supply service (generation and commodity-related) charges, as well as all delivery service charges. The supply service charges typically represent the majority (60-80%) of the total monthly bill. It is the supply portion of your bill that is deregulated, which is discussed on subsequent slides in this section.

Utility Tariff and Rate Review: Natural Gas

- **Accounts and Rate Class:** The College's Davidow Hall is served by two natural gas accounts behind South Jersey Gas Company under rate classes Basic Gas Supply Service-General Service Gas (BGSS-GSG). The College's Glass Education Center is served by one Modern Gas account that supplies and delivers Propane.

- **Natural Gas Consumption and Cost:** Based on the one-year period studied, the total annual natural gas expenditure for the College is about $38,000 and the total annual consumption is about 28,000 therms (th). Natural gas is used predominantly throughout the winter period for heating purposes. Total Annual propane expenditure is about $40,000 and total annual consumption is about 17,000 gallons.

- **Average/Effective Rate per Therm:** For the one year period studied, the College's average cost per therm ranged from $0.98 to $2.78 per therm, inclusive of utility delivery charges. The College's overall, average cost per therm during this period was $1.36 per therm. The College's overall, average cost per gallon for propane during this period was $2.37 per gallon.

  - Note that these average natural gas rates are "all–inclusive"; that is, they include all supply service (interstate transportation and commodity-related) charges, as well as all delivery service charges. The supply service charges typically represent the majority (60-80%) of the total monthly bill. It is the supply portion of your bill that is deregulated, which is discussed on subsequent slides in this section.

Utility Deregulation in New Jersey: Background and Retail Energy Purchasing

- In August 2003, per the Electric Discount and Energy Competition Act [N.J.S.A 48:3-49], the State of New Jersey deregulated its electric marketplace thus making it possible for customers to shop for a third-party (someone other than the utility) supplier of retail electricity.
- Per this process, every single electric account for every customer in New Jersey was placed into one of two categories: BGS-FP or BGS-CIEP. BGS-FP stands for Basic Generation Service-Fixed Price; BGS-CIEP stands for Basic Generation Service-Commercial and Industrial Energy Pricing.
- At its first pass, this categorization of accounts was based on rate class. The largest electric accounts in the State (those served under a Primary or a Transmission-level rate class) were moved into BGS-CIEP pricing. All other accounts (the vast majority of accounts in the State of New Jersey, including residential) were placed in the BGS-FP category, receiving default electric supply service from the utility.
- The New Jersey Board of Public Utilities (NJBPU) has continued to move new large energy users from the BGS-FP category into the BGS-CIEP category by lowering the demand (kW) threshold for electric accounts receiving Secondary service. Several years ago, this threshold started at 1,500kW; now, it has come down to 1,000 kW. So, if an account's "peak load share" (as assigned by the utility) is less than 1,000 kW, then that facility/account is in the BGS-FP category. If you are unsure, you may contact Dome-tech for assistance.

Utility Deregulation in New Jersey: Background & Retail Energy Purchasing (continued)

- There are at least 3 important differentiating factors to note about each rate category:
  1. The rate structure for BGS-FP accounts and for BGS-CIEP accounts varies.
  2. The "do-nothing" option (ie, what happens when you don't shop for retail energy) varies.
  3. The decision about whether, and why, to shop for a retail provider varies.

- Secondary (small to medium) Electric Accounts:
  - BGS-FP rate schedules for all utilities are set, and re-set, each year. Per the results of our State's BGS Auction process, held each February, new utility default rates go into effect every year on June 1st. The BGS-FP rates become each customer's default rates, and they dictate a customer's "Price to Compare" (benchmark) for shopping purposes. To learn more about the BGS Auction process, please go to www.bgs-auction.com.
  - A customer's decision about whether to buy energy from a retail energy supplier is, therefore, dependent upon whether a supplier can offer rates that are lower than the utility's (default) Price to Compare. In 2009, and for the first time in several years, many BGS-FP customers have "switched" from the utility to a retail energy supplier because there have been savings.

- Primary (large) Electric Accounts:
  - The BGS-CIEP category is quite different. There are two main features to note about BGS-CIEP accounts that do not switch to a retail supplier for service. The first is that they pay an hourly market rate for energy; the second is that these accounts also pay a "retail margin adder" of $0.0053/kWh. For these large accounts, this retail adder can amount to tens of thousands of dollars. The adder is eliminated when a customer switches to a retail supplier for service.
  - For BGS-CIEP accounts, the retail adder makes a customer's decision about *whether* to switch relatively simple. However, the process of setting forth a buying strategy can be complex, which is why many public entities seek professional assistance when shopping for energy.
  - For more information concerning hourly electric market prices for our region, please refer to www.pjm.com.

Utility Deregulation in New Jersey: Background & Retail Energy Purchasing (continued)

- Natural Gas Accounts:
  - The natural gas market in New Jersey is also deregulated. Unlike the electric market, there are no "penalties", or "adders", for not shopping for natural gas. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. While natural gas is a commodity that is exceptionally volatile and that is traded minute-by-minute during open trading sessions, market rates are "settled" each month, 3 business days prior to the subsequent month (this is called the "prompt month"). Customers that do not shop for a natural gas supplier will typically pay this monthly settlement rate to the utility, plus other costs that are necessary to bring gas from Louisiana up to New Jersey and ultimately to your facility.
  - For additional information about natural gas trading and current market futures rates for various commodities, you can refer to www.nymex.com.
  - A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by enlisting a retail natural gas supplier. Many larger natural gas customers also seek the assistance of a professional consultant to assist in their procurement process.

Retail Energy Purchasing: Recommendations and Resources

- Electric
  - Based on current and recent market conditions, and actual bid processes run by Dome-Tech for various clients, we have seen customers with BGS-FP accounts save approximately 10-20% in projected energy costs by switching to retail energy supplier. The College could secure this type of agreement with the NJ County College Electric Consortium. This could represent an annual savings of approximately $30,000 for the larger accounts at the College. It is important to note that actual rates and potential savings will be dependent on several factors, including market conditions, account usage characteristics/load profile (load factor), volume, and contract term.

- Natural Gas
  - Based on current and recent market conditions, and actual bid processes run by Dome-Tech for various clients, we have seen many customers entering into longer-term contracts for fixed natural gas rates. These rates vary substantially based on load type, volume, and term. The College could secure this type of agreement with the South Jersey Power Co-Operative.

- Energy Purchasing Co-Operatives
  - Many public entities participate in various energy aggregation buying groups. Sometimes, an entity will have multiple options to choose from. These might include purchasing through a County co-operative, or purchasing through a trade-type association (for instance, many schools participate in NJASBO's ACES program). Co-operative purchasing may not necessarily get you the lowest rates; however, there is often substantial volume, and it can represent a good alternative for entities with limited energy consumption who can have a difficult time getting energy suppliers to respond to them on a direct, singular basis.

- To determine whether a savings opportunity currently exists for your entity, or for guidance on how to get started, you may contact Dome-Tech to discuss. There is also additional information provided below.

Retail Energy Purchasing: Recommendations and Resources (continued)

- To learn more about energy deregulation, visit the New Jersey Board of Public Utilities website: www.bpu.state.nj.us
- For more information about the retail energy supply companies that are licensed and registered to serve customers in New Jersey, visit the following website for more information: http://www.bpu.state.nj.us/bpu/commercial/shopping.html
- Provided below is a list of NJ BPU-licensed retail energy suppliers:

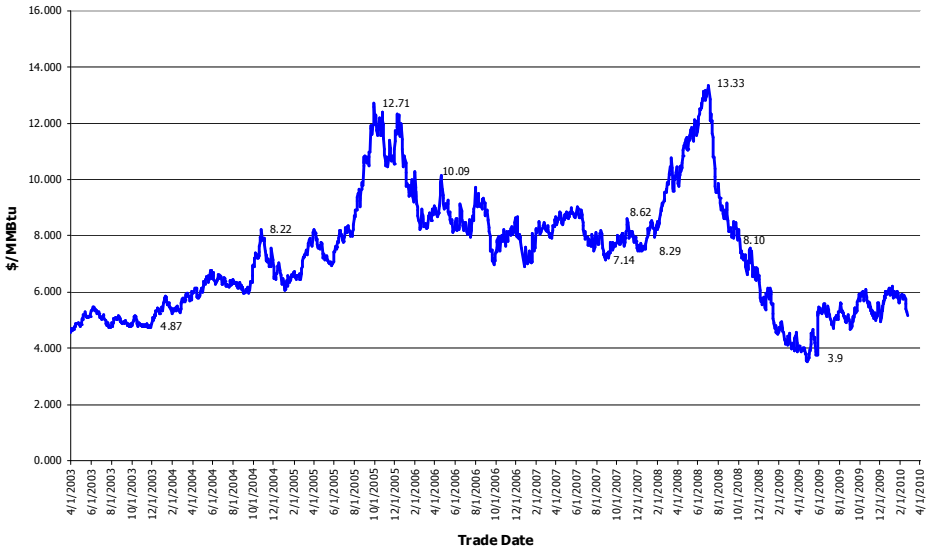
Company	Electricity	Natural Gas	Website
Pepco	X	X	www.pepcoenergy.com
Hess	X	X	www.hess.com
Sprague	X	X	www.spragueenergy.com
UGI	X	X	www.gasmark.com
South Jersey Energy	X	X	www.sjindutries.com
Direct	X	X	www.directenergy.com
Global	X	X	www.globalp.com
Liberty	X		www.libertypowercorp.com
ConEd Solutions	X		www.conedsolutions.com
Constellation	X		www.constellation.com
Glacial	X		www.glacialenergy.com
Integrys	X		www.intergryenergy.com
Suez	X		www.suezenergyna.com
Sempra	X		www.semprasolutions.com
Woodruff		X	www.woodruffenergy.com
Mx Energy		X	www.mxenergy.com
Hudson		X	www.hudsonenergy.net
Great Eastern		X	www.greateasterngas.com

**Note: Not every Supplier serves customers in all utility territories within New Jersey*

Historical Energy Futures Settlement Prices

- Below please find graphs that show the last several years' worth of market settlement prices for both natural gas and electricity. Each of these graphs shows the average closing prices of a rolling 12-month period of energy futures prices. The graphs are representative of the commodity, alone; they do not include any of the additional components (capacity, transmission, ancillary services, etc.) that comprise a retail energy price. They are meant to provide an indication of the level of pricing that a particular customer might expect to see, but the graphs do not account for the specific load profile of any individual energy user.

Henry Hub 12 month strip



PJM West 12 month strip

Operations & Maintenance

Picture: Davidow Hall - AHU – 4

Davidow Hall

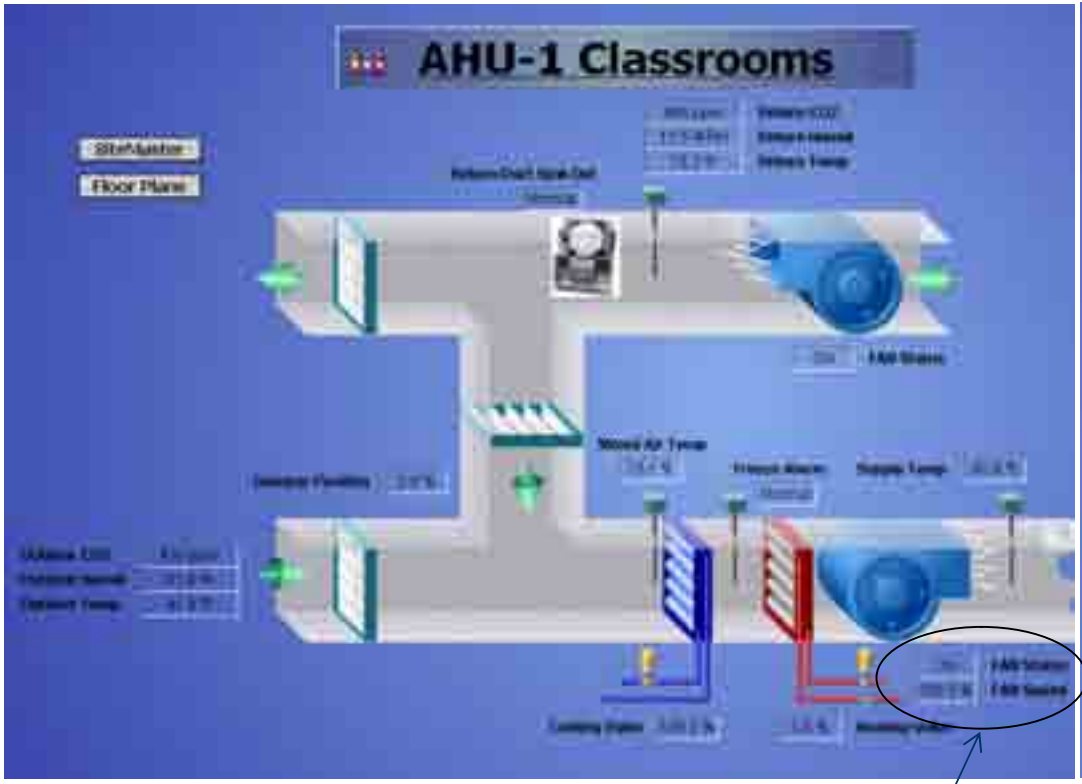
- Issue: Missing Filters
- Impact: Leads to poor air quality, improper pressurization and ventilation and thermal comfort
- Recommendation: Install Filter
  - *There is little or no expected O&M savings from this measure*

Picture: Davidow Hall - Temperature Sensor

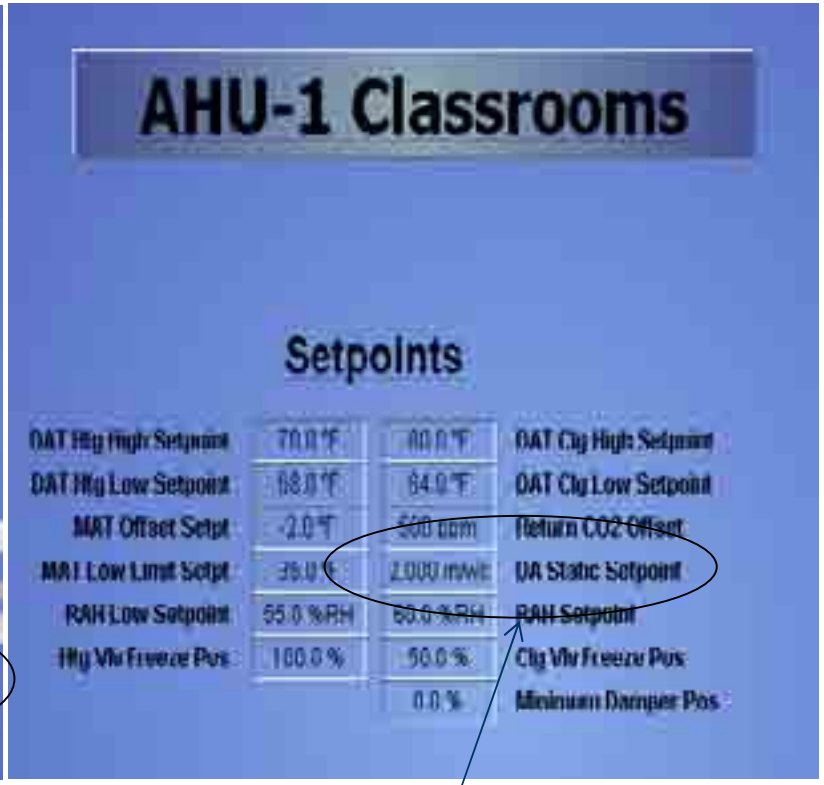
Davidow Hall

- Issue: Overheating - Thermostat Calibration RM – C108, Davidow Hall
- Impact: The thermostats when compared to a calibrated thermometer is off by 4 degrees. As a result, the room is overheating which leads to poor thermal comfort.
- Recommendation: Recalibrate Temperature Sensors
  - *There is minimal to no energy savings due to net savings on cooling side*

Operations & Maintenance



Picture: Davidow Hall – Supply Fan Speed at 100%



Picture: Davidow Hall – Static Pressure Setpoint locked at 2.00 in/w.c.

Davidow Hall

- Issue: AHU – 1: Static Sensor out of calibration
- Impact: Static pressure setpoint will never be satisfied. The fans run at full load and never modulates. As a result, there is an increased and excessive fan use.
- Recommendation: Replace or Recalibrate Static Pressure Sensor
  - *There is approximate $50 year for O&M savings from this measure*

Potential Project Funding Sources

Through the NJ Clean Energy program, the New Jersey Board of Public Utilities currently offers a variety of subsidies or rebates for many of the project types outlined in this report. More detailed information can be found at: www.njcleanenergy.com

NJ Smart Start Buildings – Equipment Rebates noted in ECMs where available.
Equipment Rebates - Water Heaters, Lighting, Lighting Controls/Sensors, Chillers, Boilers, Heat pumps, Air conditioners, Energy Mgmt. Systems/Building Controls, Motors, Motor-ASDs/VSDs, Custom/Others http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

Pay for Performance Program – Performance-Based Incentives for installations.
Provides up to 50% of total project costs. ***Based on findings in this study, up to $285,000 in incentives for project implementation could be provided under this program.*** A minimum reduction target of 15% compared to baseline must be achieved. Energy modeling of building and systems and energy reduction plan is required (incentives provided to pay for part of study costs.)

Energy Savings Improvement Program (ESIP) Public entities can contract with energy saving companies in up to 20-year lease purchases enabling public entities to implement energy conservation measures to their facilities and pay for the costs using the value of energy savings that result from the improvements. The Energy saving companies (ESCO) would assist in bypassing large upfront costs to the entity.
www.**nj**.gov/dca/lgs/lfns/09lfns/2009-11.doc

Potential Project Funding Sources (continued)

Clean Energy Solutions Capital Investment Loan/Grant
The EDA offers up to $5 million in interest-free loans and grants to promote the concept of "going green" in New Jersey. Under this program, scoring criteria based on the project's environmental and economic development impact determines the percentage split of loan and grant awarded. Funding can be used to purchase fixed assets, including real estate and equipment, for an end-use energy efficiency project, combined heat and power (CHP or cogen) production facility, or new state-of-the-art efficient electric generation facility, including Class I and Class II renewable Energy.
http://www.njeda.com/web/Aspx_pg/Templates/Npic_Text.aspx?Doc_Id=1078&menuid=1360&topid=722&levelid=6&midid=1357

Clean Renewable Energy Bonds (CREBs) – For Renewable Energy Projects
Federal Loan Program for Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Hydrokinetic Power, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal

http://www.irs.gov/irb/2007-14_IRB/ar17.html

Renewable funding for PV & wind, plus federal credits currently available:
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program/applications-and-e-forms-renewable-ener

Online Energy Profiler from Atlantic City Electric - Atlantic City Electric offers an Online Energy Profiler program for tracking and managing energy costs for multiple facilities.
http://epo.energyinteractive.com/conectivepo/cgi/eponline.exe

Potential Project Funding Sources (continued)

Small Business Direct Install Program – NJ Clean Energy makes the investment in energy efficiency upgrades by initially covering 80% of the cost to install the recommended energy efficiency measures. If eligible, the entity will pay ONLY 20% of the total cost to install the energy efficiency measures. **http://www.njcleanenergy.com/commercial-industrial/programs/direct-install**

We encourage you to contact the program directly for further information on this particular program for the following buildings: Contini Hall, Tillis Hall, Donaghay Hall, Glass Education Center & Salem Center.

Steps to Participate for Buildings under 200KW / month

1. CONTACT THE PARTICIPATING CONTRACTOR IN YOUR AREA
Identify the contractor assigned and trained to provide Direct Install services in the county where your project is located. Using the contact information provided, call or email the Participating Contractor to discuss your project. The contractor will schedule an Energy Assessment and work with you to complete the Program Application and Participation Agreement. If you're unable to contact the Participating Contractor or have questions, you may contact us at 866-NJSMART or send an e-mail to DirectInstall@trcsolutions.com..

2. REVIEW RESULTS
After the Energy Assessment, the contractor will review results with you, including what measures qualify and your share of the project cost.

3. DECIDE TO MOVE FORWARD
You will sign a Scope of Work document to proceed with implementation of qualifying measures.

4. ARRANGE INSTALLATION
You and the Participating Contractor will set a convenient start date for the installation.

5. CONFIRM INSTALLATION
Once the Participating Contractor completes the installation, you accept the work by signing a Project Completion Form. A program representative will approve the project as complete.

6. COMPLETE TRANSACTION
You pay the Participating Contractor your share of the project cost and the program pays its share.

Next Steps

- **The following projects should be considered for implementation:**
  - Install Building Management System
  - Lighting upgrades
  - Vending machine power management
  - Start Energy Awareness Program
  - Energy Procurement (Electricity & Gas)
  - Heat Pump Replacements
  - High Efficient Condensing Boilers

Note that additional "Phase 2" engineering may be required to further develop these projects, to bring them to bidding and implementation.

- **Consider applying for Pay-For-Performance Program**