

Teaneck Board of Education May 28, 2010

Final Energy Audit Report



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May 26, 2010

Mr. Anthony D'Angelo, AIA, CEFM Director of Facilities & Grounds Teaneck Public Schools 1315 Taft Road Teaneck, NJ 07666

Subject: Final Energy Audit Report for Teaneck Public Schools

Dear Mr. D'Angelo;

Please find attached an electronic copy of our final report detailing the findings and recommendations of CDM's energy audit for Teaneck Public Schools. An electronic copy of this report has also been provided to TRC for their record.

•

Very truly yours,

Matthew T. Goss, P.E., C.E.M., C.E.A., LEED[®]AP Project Manager CDM

Colleen Kling (TRC)

Enclosure

Contents

Executive Summary

Section 1	Introduction	
1.1	General	
1.2	Background	
1.3	Purpose and Scope	
0 11. 0	To all the Deconduction	
Section 2	Facility Description	
2.1	Benjamin Franklin Middle School	
	2.1.1 Description of Bullding Envelope	
	2.1.2 Description of Building HVAC	
	2.1.3 Description of Building Lighting	
2.2	Bryant Elementary School	
	2.2.1 Description of Building Envelope	
	2.2.2 Description of Building HVAC	
	2.2.3 Description of Building Lighting	
2.3	Eugene Field Administration Building	
	2.3.1 Description of Building Envelope	
	2.3.2 Description of Building HVAC	.2-3
	2.3.3 Description of Building Lighting	
2.4	Hawthorne Elementary School	
	2.4.1 Description of Building Envelope	
	2.4.2 Description of Building HVAC	
	2.4.3 Description of Building Lighting	.2-5
2.5	Lowell Elementary School	
	2.5.1 Description of Building Envelope	
	2.5.2 Description of Building HVAC	
	2.5.3 Description of Building Lighting	
2.6	Teaneck High School	
	2.6.1 Description of Building Envelope	
	2.6.2 Description of Building HVAC	
	2.6.3 Description of Building Lighting	
2.7	Thomas Jefferson Middle School	
	2.7.1 Description of Building Envelope	
	2.7.2 Description of Building HVAC	
	273 Description of Building Lighting	
2.8	MURE School	
BUXORE	781 Description of Building Envelope	
TEXNOL	OG 12 52 IN State of Building HVAC	
	3 Description of Building Lighting	
29	High School Athletic Field Lighting, Scoreboard, and Well Put	mp2-9
5 -S'	TR-Nº C/415	
"	201 y	

Table of Contents Teenack Board of Education Final Energy Audit Paport

2.9.1	Description of Press Box Building HVAC	9
2.9.2	Description of Press Box Building Lighting	9
2.9.3	Description of Athletic Field Lighting	9
2.9.4	Description of Scoreboard	9
2.9.5	Description of Well Pump.	9
Miscel	laneous Equipment	9

Section	n 3	Baseline	Energy Use		
	3.1	Utility	Data Analysis		
		3.1.1	Electric Charges .		
		3.1.2	Natural Gas Charges		
		3.1.3	Oil Changes		
	3.2	Facility	Results		
		3.2.1	Benjamin Franklin Middle School	*** ********	
		3.2.2	Bryant Elementary School		
		3.2.3	Eugene Field Administration Building		
		3.2.4	Hawthorne Elementary School	******	
		3.2,5	Lowell Elementary School	*****	
		3.2.6	Teaneck High School	** ** * * * * * ***	
		3.2.7	Teaneck High School - Athletic Field Lighting	******	
		3.2.8	Teaneck High School - Scoreboard	***	
		3.2.9	Thomas Jefferson Middle School	9 % % * 0% % * 2% augus a %a * 9 a % %** 1	
		3.2.10	Whittier Elementary School	********	3-25
	3.3	Aggree	sate Costs	*****	
	3.4	Portfol	io Manager	** * * * * * * * *** **** ***	
		3.4.1	Portfolio Manager Overview	147 18 0 40 8 4 mm 24m o 24 a 8 3 a 7 mm a	3-29
		3.4.2	Energy Performance Rating		
		3.4.3	Portfolio Manager Account Information	143+1444 Pa ant plates and	
Sectio	n 4	Energy C	onservation and Retrofit Measures (ECRM)		
	4.1		g Lighting Systems		
		4.1.1	Benjamin Franklin Middle School		
		4.1.2	Bryant Elementary School		
		4.1.3	Eugene Field Administration Building		
		4.1.4	Hawthorne Elementary School		
		4.1.5	Lowell Elementary School		
		4.1.6	Teaneck High School		
		4.1.7	Thomas Jefferson Middle School		
		4.1.8	Whittier Elementary School		
		4.1.9	Athletic Field Lighting & Scoreboard		
		4.1.10	Tenneck High School - Press Box		



4.2

2.10

.

H

Table of Contents Teeneck Board of Education Final Energy Audit Report

			t with the start has
	4.2.1	Benjamin Franklin Middle School	
	4.2.2	Bryant Elementary School	
	4.2.3	Eugene Field Administration Building	
	4.2.4	Hawthorne Elementary School	
	4.2.5	Lowell Elementary School	
	4.2.6	Teaneck High School	
	4.2.7	Thomas Jefferson Middle School	
	4.2.8	Whittier Elementary School	
4.3	Alterna	ative Energy Sources	
	4.3.1	Photovoltaic Solar Energy System Overview	4-66
		4.3.1.1 Benjamin Franklin Middle School	
1		4.3.1.2 Bryant Elementary School	
		4.3.1.3 Eugene Field Administration Building	
		4.3.1.4 Hawthorne Elementary School	4-69
		4.3.1.5 Lowell Elementary School	4-69
		4.3.1.6 Teaneck High School	
		4.3.1.7 Thomas Jefferson Middle School	
		4.3.1.8 Whittier Elementary School	
		4.3.1.9 Basis for Design and Calculations	4-71
	4.3.2	Wind Power Generation	
	4.3.3	Ground Source Heat Pumps	4-75
4.4	Additi	onal Measures	4-76
Section 5		on of Energy Purchasing and Procurement Strategies	1.1
5.1	Energy	Deregulation	
5.2	Demar	nd Response Program	·····5-2
Section 6	Ranking	of Energy Conservation and Retrofit Measures (ECRM)	
6.1	ECRM	8. 1 , ,	
	6.1.1	Lighting Systems	
	6.1.2	HVAC Systems	
	6.1.3	Solar Energy	
	6.1.4	Wind Power Generation	
Section 7	Availabl	e Grants, Incentives and Funding Sources	
7.1	Renew	vable Energy	
	7.1.1	Renewable Energy Certificates (NJ BPU)	
	7.1.2	Clean Energy Solutions Capital Investment Loan/Grant	
		(NJ EDA).	
	7.1.3	Renewable Energy Incentive Program (NJ BPU)	
	7.1.4	Grid Connected Renewables Program (NJ BPU)	



Table of Contents Teenack Board of Education Final Energy Audit Placoft

Utility Financing Programs 7.1.5 7.1.6 7.1.7 7.1.8 7.1.9 7.1.10 Performance Based Contracts (ESCOs) 7.1.11 7.1.12 7.2.2 7.2.3 7.2.4 Clean Energy Solutions Capital Investment Loan/Grant (NJ EDA).7-5 7.2.5 Performance Based Contracts (ESCOs) 7.2.6

Appendices

7.2

Appendix A Utility Bill Information

Appendix 8 Statement of Energy Performance Portfolio Manager Reference Sheet

Appendix C eQUEST Model Run Summaries

Appendix D Lighting Upgrades Analysis Spreadsheet

Appendix E Solar PV System Financial Analysis

Appendix F Facility Data Forms

Appendix G NJ Smart Incentives Information and Worksheets NJ Pay for Performance Incentive Structure

Appendix H Engineer's Opinion of Probable Construction Costs

Appendix I ECRM Financial Analysis

Appendix J Wind Turbine Energy System Wind CAD Analysis

Appendix K Wind Turbine Energy System Financial Analysis

P 1

Executive Summary

As part of an initiative to reduce energy cost and consumption, the Teaneck Board of Education (BOE) has secured the services of Camp Dresser and McKee (CDM) to perform an energy audit at their school facilities in an effort to develop comprehensive Energy Conservation and Retrofit Measures (ECRMs).

CDM's energy audit team visited the facilities on February 9-12, 2010. As a result of the site visits and evaluation of the historical energy usage of the facilities, CDM was successful in identifying opportunities for energy savings measures.

CDM has also evaluated the potential for renewable energy technologies to be implemented at the school facilities to offset the electrical energy usage. Specifically, the use of solar electric photovoltaic panels and wind turbines were investigated.

In addition to identifying ECRMs and the potential for on-site energy generation, an alternate third party supplier was contacted in an effort to identify further energy cost savings available for Teaneck BOE. This is discussed further in Section 5. Additionally, there is potential for Teaneck BOE to make money by participation in a Demand Response Program, as discussed in Section 5.2.

Not all ECRMs identified as a result of the energy audit are recommended. ECRMs must be economically feasible to be recommended for implementation. The feasibility of each ECRM was measured through a simple payback analysis. The simple payback period was determined after establishing Engineer's Opinion of Probable Construction Cost estimates, O&M estimates, projected annual energy savings estimates, and the potential value of New Jersey Clean Energy rebates, or Renewable Energy Credits, if applicable. Generally, ECRMs with a payback period of 20 years or less are recommended, unless other various factors need to be factored into the decision process.

Historical Energy Usage

The following table, Table ES-1, summarizes the historical energy usage at each of the Board's facilities as presented in Section 3. These values can serve as a bench-marking tool, along with the building profiles that have been established through the EPA's Portfolio Manager Program, to quantify the reduction in electrical energy, natural gas usage, and oil usage following the implementation of the recommended ECRMs.

CDM

Executive Summary

		ECT C	: Summary o	Annual Ene		Cont		
	Electrical Energy Lise (kVHI)	Peak Summer Demand (kW)	Pesis Winter Demand (kW)	Fuel Use for Entire Building (therms)	Final Use for Entire Building (gallons gli)	Cost for Electric Service (\$/k\%h)	Cost for Fuel (\$/therm)	Cost for Fuel (Signifiere)
Benjamin Franklin Middle School	867,410	259	275	6,062	29,621	\$0.1541	\$1.26	\$2.31
linyant Elementary	293,440	102	90	135	36,107	\$0.1730	\$2.41	\$2.32
Eugene Fields Administration Building	177,150	65	41	622	8,759	\$0.1648	\$1.42	\$2.30
Hawthorne Elementary School	402,390	122	128	41,795		\$0.1649	\$1.25	56
Lowell Elementary School	298,450	106	92	453	27,018	\$0.1876	\$1.40	\$2.36
Teanack High School	1,962,270	618	501	130,184	86,701	\$0.1589	\$1.08	\$3.33
Teaneck High School - Scoreboard	5,355	141	75	-		\$1.0689	•	-
Teaneck High School - Athletic Field Lighting	5,698	78	71	Ч		\$2.1980	w	5
Thomas Jefferson Middle School	762,720	239	246	7.626	41.516	\$0.1761	\$1.24	\$2.40
Whittier Elementary School	385,100	126	113	306	28,959	\$0.1867	\$1.60	\$2.37

Building Lighting and HVAC System ECRMs

The following table, Table ES-2, presents the ranking of recommended ECRMs identified for the building lighting and HVAC systems based on the simple payback analysis.

Additional ECRMs associated were identified and evaluated, as discussed in Sections 2 and 4; however, were not recommended due to longer payback periods. This table includes the Engineer's Opinion of Probable Construction Cost, projected annual energy cost savings, projected annual energy usage savings, and total simple payback

CDM

ES-2

period for each recommended ECRM. The ECRMs are ranked based on payback period.

Re	inking of Energy Sevings Means	Table E8-2'	D Lighting and H	VAC Systems	
Overall Ranking Based on Simple Payback)	Site	Total Cost	Anticipated Annual Energy	Annual Fiscal Bavings	Simple Paybaci (Years)
1	Teaneck High School (separate DHW Heater)	\$5,240	1,300 therms	\$9,977	8.5
2	Teanock High School - Prass Bex Lighting	\$107.8	7.1 id//h	\$78.02	1.4
3	Benjamin Franklin Middle School (Botter Replacement)	\$98,127	12,192.9 therms	\$33,837	2.9
4	Thomas Jefferson Middle School(Boiler Replacement)	\$147,190	14,203.4 therms	\$48,667	3.1
5	Bryant Elementary School (DDC BMS)	\$40,915	3,322 gal oil; 21,038 kWh	\$11,347	3.6
6	Whittler Elementary School (DDC BMS)	\$47,539	3,122 gal oil; 20,053 kWh	\$10,742	4.4
7	Teansck High School (VFD)	\$76,123	-3,522 gal oil; 173,640 kWh	\$15,863	4.8
8	Bryant Elementary School Lighting	\$96,319	89,811.3 kWh	\$18,291.8	5.3
9	Hewthores Elementary School (DDC BMS)	\$42,584	4,297 therms; 13,276 kWh	\$7,580	5.6
10	Eugene Field Administration Building (DDC BMS)	\$21,456	911 gal oil; 10,212 kWh	\$3,777	\$.7
11	(DDC BMS)	\$40,629	2,064 gal oil; 11,932 kWh	\$7,109	5.7
12	Whittier Elementary School Lighting	\$108,502.9	16,811 kWh	\$18,477.9	5.9
13	Engene Fielda Administration Building Lighting	\$56,146.5	7, 8 91.9 kWh	\$8,665.7	6.5
14	Teaneck High School Lighting	\$142,903.3	20,173.5 kWh	\$21,750.8	6.6
15	Benjamin Franklin Niddle School Lighting	\$390,818.7	45,923.7 kWh	\$52,545.9	7.4
16	Thomas Jefferson Nilddle School Lighting	\$213,303.3	25,679.3 kWh	\$27,889.1	7.6
17	Bryant Elementary School (Boller Replacement)	\$175,185	6987.7 Iherms	\$20,871	8.4
18	Lowell Elementary School Lighting	\$74,288.8	7,834.3 kWh	\$8,355	8.9
19	Hawthorse Elementary School Lighting	\$103,835.2	10,015.5 kWh	\$11,216	9.3
20	Hawthorne Elementary School (Beller Replacement)	\$175,165	12,991,1 Chemica	\$17,739	9.9
21	(Lowell Elementary Echael (Ballar Replacement)	\$216,990	8,654.1 therms	\$21,871	9.9
22	Eugene Field Administration	\$98,127	1,884.5	\$7,017	14.0

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ES-3

Executive Summery

Ra	nking of Energy Sevings Mean	Table E8-2'	Liahting and H	VAC Bystem	
Overall Ranking (Based on Simple Perspeck)	Site	Total Cost	Anticipated Annual Enorgy Sayings	Annual Fiscal Savings ³	Silimple Payback (Yeam)
P	Building (Boller Replacement)		thems		
23	Whittler Elementary School (Boller Replacement)	\$216,990	3506.8 Ihems	\$11,170	19.4
24	Hewthorne Elementary School (AHU Replacement)	\$16,963	268 therms; 2,098 kWh	\$681	24.9
25	Teaneck High School (AHU Replacement)	\$126,848	1,336 therms; 12,696 kWh	\$3,460	36.7

1. 'Total Cost' takes into account any applicable rebates.

- Sevings assume all building heat provided by natural gas and/or oil, at current aggregate rate per unit of fuel
- 3. 'Annual Fiscal Savings' takes into account maintenance costs.

Renewable Energy ECRMs

Solar Energy

Section 4.3 of the report provides for an economic evaluation of a solar energy system recommended to be installed at eight (8) of the Board's facilities. The evaluation covered the economic feasibility of the Board installing a solar energy system under a typical construction contract and to assume full responsibility of the operation of such a system.

Based on a simple payback model, summarized in Table ES-3, it would benefit the Board to further investigate the installation of a solar energy system at eight (8) buildings. This is primarily based on the initial upfront capital investment required for a solar energy system installation and the 12.1 year payback period. This payback period may justify installing the solar energy system. Other options, such as Power Purchase Agreements, are potentially available as well to help finance the project. Solar technology is constantly changing and will most likely continue to lower in price.

Two major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions and Solar Renewable Energy Credit (SREC) rates, with the largest impact to the psyback model being the SREC credit pricing. For the payback model, conservative estimates of the SREC's market value over a 15 year period were assumed, as discussed in Section 4.3.

Table ES-3 includes a simple payback analysis for the installation of a solar energy system at the identified Board buildings.

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E8-4

Executive Summary

Parameter	Solar
Estimated Budgetary Project Cost	\$16,571,045
1 ^{et} Year Production	2,0 35,3 34 kWh
Annual Electric Savings	\$291,903.8
Annual Estimated SREC Revenue	\$1,078,023
Project Simple Payback	12.1 Years

Wind Power Generation

Section 4.3.3 of the report provides for an economic evaluation of a wind turbine energy system recommended to be installed at eight (8) of the Teaneck School District facilities. The evaluation covered the economic feasibility of furnishing and installing a wind turbine energy system under a typical construction contract and to assume full responsibility of the operation of such a system.

CDM completed a preliminary desktop wind power production analysis and has concluded that an additional on-site feasibility study is warranted and recommended. Such a feasibility study would include the installation of a wind test rig to measure actual wind conditions as observed on-site.

Wind power as a renewable energy source also qualifies for Renewable Energy Certificates (REC's). The prevailing energy market, REIP and RBC's comprise the major factors influencing a wind turbine energy system installation. Other options, such as government bonds or a Power Purchase Agreement, are potentially available and can assist with the financing of this project.

Table ES-4 includes a typical simple payback analysis for the installation of a wind turbine energy system located at several of the Teaneck Board of Education facilities. Refer to Appendix K for a more detailed wind energy financing spreadsheet.

Table ES-4: Ranking of Energy	Savings Measures Sun	nmary - Wind Turble	e Energy System
Parameter	Wind Turbine (Minimum Site Wind Speed - 9.01 mph)	Wind Turbine (Maximum Site Wind Speed - 13.02 reph)	Wind Turbine (Average Site Wind Speed - 11,2 mph)
Engineer's Opinion of Probable Cost	\$21,895	\$21,895	\$21,895
Renewable Energy Incentive Program**	-\$12,214	-\$21,895	-\$20,304



Executive Summery

Table 85-4: Ranking of Energy	Sevengs measures auf	nimmy - wind furble	is sharily shares
Perameter	Wind Tarbine (Minimum Site Wind Speed - 9,01 mph)	Wind Turbina (Maximum Site Wind Speed ~ 13.02 mph)	Wind Turbine (Average Sile Wind Speed - 11.2 mph)
Total Cost	\$9,681	\$0	\$1,591
1 st Year Production	3,817 kWh	8,316 kWb	8,345 ki//h
Annual Estimated Electric Savings	\$643.2	\$1.401.2	\$1,069.1
Annual Estimated REC Revenue	\$95	\$208	\$159
Project Simple Payback	13.1 Years	9 Years	1.3 Years

** REIP incentive is calculated for only the first year and is applied as a deduction.

Recommended ECRMs

► 1

Table ES-5 summarizes the Total Engineer's Opinion of Probable Construction Cost, annual energy savings, projected annual energy and O&M cost savings and the payback period based on the implementation of all of the above recommended ECRMs.

Table I	.d: Recommended EC.	104	
Total Engineer's Opinion of Probable Construction Coat	Projected Annual Emergy Savings (KWH, therms, or gol oli)	Projected Annual Fiscal Savings	Simple Payback Period (years)
\$2,732,277	332,793 kWh - 67,621 5 lherma 5,897 call of	\$398,758	6.7

 Does not include energy savings associated with Solar Energy System or Wind Power Generation.

Section 1 Introduction

1.1 General

As part of an initiative to reduce energy cost and consumption, the Teaneck Board of Education has secured the services of Camp Dresser and McKee (CDM) to perform an energy audit at the District's eight (8) school buildings in an effort to develop comprehensive energy conservation initiatives.

The performance of an Energy Audit requires a coordinated phased approach to identify, evaluate and recommend energy conservation and retrofit measures (ECRM). The various phases conducted under this Energy Audit included the following:

- Gather preliminary data on all facilities;
- Facility inspection;
- Identify and evaluate potential ECRMs;
- a Develop the energy audit report.

Figure 1-1 is a schematic representation of the phases utilized by CDM to prepare the Energy Audit Report.

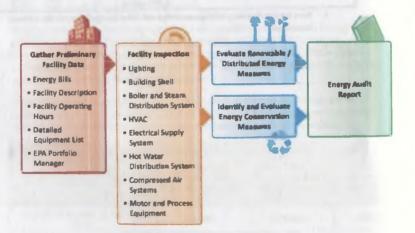


Figure 1-1: Emergy Audit Phases



1-1

1.2 Background

The eight (8) achools that were included in the energy audit for the Teaneck Board of Education were Benjamin Franklin Middle School, Bryant Elementary School, Eugene Field Administration Building, Hawthome Elementary School, Lowell Elementary School, Teaneck High School, Thomas Jefferson Middle School, and Whittier Elementary School.

The Benjamin Franklin Middle School is a 100,202 ft² building that was originally built in 1957. The school is utilized for middle school classes, grades 5 through 8, occupied by 575 students and approximately 105 faculty and staff members. The school is occupied by students from 6 am to approximately 4 pm during the week, with custodial coverage until 12 am. The school is closed on the weekends except for special events and is open during the summer for school classes and camps.

The Bryant Elementary School is a 47,438 ft² building that was originally built in 1926. The school is utilized for grades Pre K and K, occupied by 386 students and approximately 76 faculty and staff members. The school is occupied from 6 am to approximately 4 pm during the week, but is closed on the weekends and during the summer except for summer school classes and camps.

The Eugene Field Administration Building is a 24,877 ft² building that was originally built in 1955. The building is utilized for administration office space and is occupied by approximately 47 employees. The building is occupied from 6 am to approximately 4 pm during the week, is closed on the weekends, and opens during the summer for summer school classes and camps.

The Hawthome Elementary School is a 49,373 ft² building that was originally built in 1925. The school is utilized for elementary school classes, grades 1 through 4, occupied by 342 students and approximately 60 faculty and staff members. The school is occupied from 6 am to approximately 4 pm during the week, but is closed on the weekends and during the summer except for summer school classes and camps.

The Lowell Elementary School is a 47,106 ft² building that was originally built in 1934. The school is utilized for elementary school classes, grades 1 through 4, occupied by 305 students and approximately 61 faculty and staff members. The school is occupied from 6 am to approximately 4 pm during the week, is closed on the weekends and opens during the summer for summer school classes and camps.

The Teaneck High School is a 215,808 ft² building that was originally built in 1927. The school is utilized for high school classes, grades 9 through 12, occupied by 1,410 students and approximately 187 faculty and staff members. The school is occupied from 6 am to approximately 8 pm during the week, and is open on the weekends and the summer for special events, summer school classes, and administrative purposes. The Thomas Jefferson Middle School is a 105,216 ft² building that was originally built in 1958. The school is utilized for middle school classes, grades 5 through 8, occupied by 627 students and approximately 55 faculty and staff members. The school is occupied from 6 am to approximately 4 pm during the week, but is closed on the weekends and during the summer except for summer school classes and camps.

The Whittier Elementary School is a 55,118 ft² building that was originally built in 1921. The school is utilized for elementary school classes, grades 1 through 4, occupied by 402 students and approximately 55 faculty and staff members. The school is occupied from 6 am to approximately 4 pm during the week, but is closed on the weekends and during the summer except for administrative personnel.

1.3 Purpose and Scope

The objective of the energy audit is to identify energy conservation and retrofit measures to reduce energy usage and to develop an economic basis to financially validate the planning and implementation of identified energy conservation and retrofit measures.

Due to the rising costs of power and the desire to minimize dependence on foreign oil supplies, energy consumption is taking a higher priority across the nation. Significant energy savings may be available with retrofits to the buildings' envelopes, heating, cooling, and lighting systems. It should be noted that the magnitude of energy savings available is not only dependent on the type of heating, lighting or insulation systems that are in use, but also on the age and condition of the equipment and the capital available to implement major changes.

The purpose of this energy audit is to identify the various critical building comfort systems within the buildings that are major consumers of electrical energy and are clear candidates for energy savings measures. In addition, the potential for alternative energy systems to be installed at each building was evaluated and presented herein.

Section 2 Facility Description 2.1 Benjamin Franklin Middle School 2.1.1 Description of Building Envelope

The walls of the Benjamin Franklin Middle School consist of brick and mortar facade, and finished interior. The newer portions of the roofing system consist of fully adhered EPDM membrane over flat roof deck; older noof sections consist of sprayed foam insulation with light gray gravel finish over a flat roof deck. There was evidence of leakage and in general deterioration of the older foam system.



Beterhenting Foam Roof

21

The windows throughout the building are doublepaned. The majority of exterior doors are FRP doors.

FRP doors are highly recommended from an energy efficiency perspective. FRP doors are made out of a high strength, light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing climate. Weather stripping on these doors appeared to be in poor condition and in need of replacement.

It was determined that the building envelope is in good condition and is currently providing a fair level of insulation. It is recommended that a qualified roofing contractor evaluate the system, including the structural capacity of the building frame, and repair or replace the existing roofing system with an EPDM membrane roofing system. A roof replacement will be costly; therefore, the system analysis, including the structural integrity of the building, may warrant the application of an elastomeric waterproof roof coating system to rectify any leaks and improve the level of insulation that the current roof is providing.

It is also recommended that a white thermal barrier coating be considered. This coating works to reduce the surface temperature of the roof by reflecting the UV rays, and provides insulation for the interior of the building reducing the heating and cooling loads.

2.1.2 Description of Building HVAC

CD

Two oil-fired cast iron steam boilers located in the boiler room provide heat for the entire building. The steam from the boilers is fed through a heat exchanger to produce hot water that is then circulated to fan coil unit ventilators in each classroom. DX air handling units located throughout the building, including the roof provide heating, cooling, or both to the zones they serve.

Ductless split system and through-the-wall air conditioning units provide cooling for the computer lab, server room, nume's office, main office, administration area, principal's office, media center, operation and maintenance office, windowless classrooms, guidance rooms, technology rooms, mail room, reading room, teacher's break room and a few other classrooms.

Domestic hot water for this building is produced by a gas fired water heater.

2.1.3 Description of Building Lighting

The Benjamin Franklin Middle School existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures, with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.2 Bryant Elementary School

2.2.1 Description of Building Envelope

The walls of the Bryant Elementary School consist of brick and mortar facade or Exterior Insulated Finish System (EIPS) with finished interior. The existing roofing system consists of fully adhered EPDM membrane over flat roof that is 13 years old, and slate shingles over pitched roof decks that are 70 years old.

The windows throughout the building are double-paned windows. The majority of exterior doors are FRP doors. FRP doors are highly recommended from an energy efficiency parspective. FRP doors are made out of a high strength, light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing dimate. Weather stripping on these doors appeared to be in poor condition and in need of replacement. There was also gapping noted between the door and door frame allowing for air to infiftrate into the building. Door replacement should be considered on main entrance doors.

2.2.2 Description of Building HVAC

Two oil-fired cast iron steam bollers located in the boller room provide heat for the entire building. The steam from the bollers is fed through a heat exchanger to produce hot water for space heating. This water is circulated through the unit ventilators in some of the classrooms. One DX air handling unit located on the roof and another located at grade provide cooled outdoor air throughout the building. An older portion of the building employs steam heating with either unit ventilators or two-pipe steam radiator units.

Ductless split system and through the wall air conditioning units provide cooling for the nurse's office, some interfor classrooms, special services room, server room, speech therapy room, child therapy room, principal's office, main office, and teacher's lounge.

Domestic hot water for this building is produced from a 50 gallon and a 40 gallon electric water heater.



2.2.3 Description of Building Lighting

The Bryant Elementary School existing lighting system consists of 1X4 (1, and 2 hamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.3 Eugene Field Administration Building 2.3.1 Description of Building Envelope

The walls of the Eugene Field Administration Building are composite cavity walls consisting of brick and mortar facade, cavity and concrete masonry CMU back-up blocks and finished interiors in some location. The exterior walls appear to be in good condition. The existing roofing system consists of sprayed foam with gray aggregate that is approximately 16 years old. At the time of the audit, CDM was informed that the roof was acheduled for replacement this summer, but is on hold pending budget considerations.

The windows throughout the building are single and double-paned windows. The majority of exterior doors are FRP doors. FRP doors are highly recommended from an energy efficiency perspective. FRP doors are made out of a high strength, light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing dimste. Weather stripping on these doors appeared to be in poor condition and in need of replacement. There was also gapping noted between the door and door frame allowing for air to infiltrate into the building.

2.3.2 Description of Building HVAC

Two oil-fired cast iron steam bollers located in the boller room provide heat for the entire building. The steam from the bollers is fed through a heat exchanger to produce hot water for space heating. This water is then circulated through unit ventilators in each classroom.

Two air handling units located in the gym. Each is equipped with a DX cooling coil section and hot water coil section to provide heated and cooled air to the gym. These air handling units also provide outside air for ventilation.

Ductless split system and through the wall air conditioning units provide cooling for all rooms within the buildings.

Domestic hot water for this building is produced from a 50 gallon natural gas-fired water heater.

2.3.3 Description of Building Lighting

The Eugene Field Administration Building existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures

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with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.4 Hawthorne Elementary School

2.4.1 Description of Building Envelope

The walls of the Hawthorn Elementary School consist of brick and mortar facade, and finished interior. The existing roofing system consists of fully adhered EPDM membrane over flat roof that is approximately 13 years old, asbestos composite shingles over pitched roof decks that are 70 years old, and sprayed foam with aggregate surfacing that is 16 years old. No pooling was observed, but existing shingled pitched roof appeared to be in poor condition.

The windows throughout the building are double-paned windows.

It was also noted that Hawthorn Elementary School has a number of window AC

units. It is recommended that the air conditioning sleeves be checked for a tight seal and if the AC units are left in place through the winter, AC covers should be purchased and installed. It was noted during the audit that the AC units serving the office are covered during the winter. An outdoor AC covers the top and sides of the unit to stop drafts. Window and through-wall AC covers are UV resistant, water repellent PVC vinyl with elasticized corners and straps for a tight fit. Outdoor or indoor AC covers can also be customized to meet the District's needs. A standard outdoor AC cover can cost around \$15. The impact on the overall building heating load will be minimal; however, there will be a direct impact on the occupants comfort.



Example an Outdoor AC Cover

2.4.2 Description of Building HVAC

Two natural gas-fired cast iron steam boilers located in the boiler room provide heat for the entire building. The steam from the boilers is fed through a heat exchanger to produce hot water for space heating. This water is then circulated through unit ventilators in some of the classrooms. Two DX air handling units located on the roof and one located in the cafeteria. These air handling units provide heated and cooled air throughout the building. These air handling units also provide the building with outside air for ventilation. An older portion of the building employs steam heating with either unit ventilators or two-pipe steam radiator units.

Ductless split system and through the wall air conditioning units provide cooling for the principal's office, server closet, teacher's lounge, child study room, nurse's office, and room 11.



Domestic hot water for this building is produced from an 80 gallon electric hot water heater.

2.4.3 Description of Building Lighting

The Hawthome Elementary School existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.5 Lowell Elementary School

2.5.1 Description of Building Envelope

The walls of the Lowell Elementary School are composite cavity walls consisting of brick and mortar facade, cavity and concrete masonry CMU back-up blocks and finished interiors in some locations. The exterior walls appear to be in good condition. The roofing system consists of hot tar built up roof with white granular finish and asphalt shingles over pitched roof decks. At the time of the audit, CDM was informed that the flat noof was replaced within the past year, while the asphalt shingles are about 6 years old.

The windows throughout the building are double-paned. The majority of the exterior doors are FRP doors.

It was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.5.2 Description of Building HVAC

Two oil-fired cast iron steam boilers located in the boiler room provide heat for the entire building. The steam from the boilers is fed through a heat exchanger to produce hot water for space heating. This water is then circulated through unit ventilators in some of the classrooms. One DX air handling unit located on the roof and two located in the building provide cooled outdoor air throughout the building. An older portion of the building employs steam heating with either unit ventilators or two-pipe steam radiator units.

Ductless split system and through the wall air conditioning units provide cooling for the principal's office, main office, special education rooms, library, server closet, computer room, and nurse's office.

Domestic hot water for this building is produced from a 40 gallon natural gas fired water heater.

2.5.3 Description of Building Lighting

The Lowell Elementary School existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.6 Teaneck High School

2.6.1 Description of Building Envelope

The walls of the Teaneck High School are composite cavity walls consisting of brick and mortar facade, and finished interior. The existing roofing system is about 16 years old and consists of sprayed foam roofing with light gray gravel finish over a flat roof deck. There was evidence of leakage and in general deterioration of the existing system.

The windows throughout the building are double and single paned. The majority of exterior doors are FRP doors. FRP doors are highly recommended from an energy efficiency perspective. FRP doors are made out of a high strength, light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing dimate. Weather stripping on these doors appeared to be in poor condition and in need of replacement.

It was determined that the building envelope is in fair condition. It is recommended that a qualified roofing contractor evaluate the system, including the structural capacity of the building frame, and repair or replace the existing roofing system with an EPDM membrane roofing system. A roof replacement will be costly; therefore, the system analysis including the structural integrity of the building may warrant the application of an elastomeric waterproof roof coating system to rectify any leaks and improve the level of insulation that the current roof is providing.



High School Form Roof Deterior stlop

2.6.2 Description of Building HVAC

Two oil-fired cast iron steam bollers located in the boller room provide serve as a heat source for the building. The bollers are dual-fueled and thus have the ability to be fired with natural gas-fired or fuel oil. These bollers operate throughout the year. The steam from the bollers serves a number of purposes. A portion of the steam is fed through a hot water heat exchanger for space heating. This water is circulated through unit ventilators in each classroom. Another portion of the steam serves a separate double wall heat exchanger to generate domestic hot water.

The steam also emergizes a single-stage absorption liquid chiller located in the boiler room, which generates chilled water for building cooling. The aforementioned unit



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ventilators use this chilled water to cool the spaces they are located in. The chiller is typically in operation only during peak conditions in the summer months. A couple of separate screw chillers, located adjacent to the boiler noon, are responsible for the majority of the summer cooling load. Air handling units equipped with a DX cooling and hot water coil heating sections are located throughout the building, including the roof. These air handling units provide heating, cooling, or both to the zones they serve.

Ductless split system and through the wall air conditioning units provide cooling for the server closet, main office, principal's office, nurse's office, technical closet, administrative office, and technician's room.

2.6.3 Description of Building Lighting

The Teaneck High School existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp). 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.7 Thomas Jefferson Middle School

2.7.1 Description of Building Envelope

The majority of the walls of the Thomas Jefferson Middle School are composite cavity walls consisting of brick and mortar facade, cavity and concrete masonry CMU backup blocks with interior finishes. The majority of the roofing system consists of hot tar built up roof with white granular finish over a flat roof deck. This system was installed in two phases within the past two years.

The windows throughout the building are double-paned. The majority of the exterior doors are FRP doors.

It was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.7.2 Description of Building HVAC

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Two oil-fired cast iron steam bollers located in the boller room provide heat for the entire building. The steam from the bollers is fed through a heat exchanger to produce hot water for space heating. This water is then circulated through unit ventilators in each classroom. Air handling units located throughout the building provide heating and cooling, to the zones they serve. These air handling units have DX cooling coils and hot-water heating coils.

Ductless split system and through the wall air conditioning units provide cooling for the child guidance room, main office, principal's office, server closet, nurse's office, teacher's lounge, and basement computer room. Unit heaters provide heat for the corridor adjacent to the boiler room and the kitchen office.

Domestic hot water for this building is produced from a 199 MBH gas-fired water heater located in the boiler room.

2.7.3 Description of Building Lighting

The Thomas Jefferson Middle School existing lighting system consists of 1X4 (1, and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.8 Whittier Elementary School

2.8.1 Description of Building Envelope

The majority of the walls of the Whittier Elementary School are composite cavity walls consisting of brick and mortar facade, cavity and concrete masonry CMU backup blocks with interior finishes. The majority of the existing roofing system consists of hot tar built up roof with white granular finish and asphalt shingles over pitched roof decks. This system was installed within the past year. The existing (center) portion consists of fully adhered EPDM membrane over flat roof.

The windows throughout the building are double-paned windows. The majority of exterior doors are FRP doors. FRP doors are highly recommended from an energy efficiency perspective. FRP doors are made out of a high strength. light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing dimate. Weather stripping on these doors appeared to be in poor condition and in need of replacement.

It was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.8.2 Description of Building HVAC

Two oil-fired cast iron steam boilers, located in the boiler room, provide heat for the entire building. Steam from the boilers is fed through a heat exchanger to produce hot water for space heating. This water is then circulated through unit ventilators in each classroom. An older portion of the building employs steam heating with either unit ventilators or two-pipe steam radiator units.

Ductless split system and through the wall air conditioning units provide cooling for the cafeteria, elevator, basement lunch room, main office, principal's office, computer room, child study room, and nurse's office.

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Domestic hot water for this building is produced from a 50 gallon natural gas-fired water heater and an 80 gallon electric water heater.

2.8.3 Description of Building Lighting

The Whittier Elementary School existing lighting system consists of 1X4 (L and 2 lamp), 1X8 (2 lamp), 2X2 (2 lamp), and 2X4 (2, 3, and 4 lamp) T12 linear fluorescent fixtures with magnetic ballasts, 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, metal halide fixtures, incandescent fixtures, and CFL fixtures. See Section 4 for a more detailed description.

2.9 Teaneck High School Athletic Field Lighting, Scoreboard, and Well Pump

2.9.1 Description of Press Box Building HVAC

An electric unit heater provides heat for the press box when needed.

2.9.2 Description of Press Box Building Lighting

The existing lighting system in the Press Box consists of incandescent fixtures and CFL fixtures. See Section 4 for a more detailed description.

2.9.3 Description of Athletic Field Lighting

The Athletic Field lighting system consists of four lighting towers, each containing 21 1000 Watt Metal Halide fixtures. See Section 4 for a more detailed description.

2.9.4 Description of Scoreboard

The scoreboard is manufactured by the Fairtron Corporation. Additional information pertaining to the scoreboard was unavailable because equipment tags were missing.

2.9.5 Description of Well Pump

Information on the existing well pump was unavailable.

2.10 Miscellaneous Equipment

The classrooms throughout Teaneck contain computers, printers, TVs and overhead projectors. In addition, the schools also have tech centers and libraries with 20 or more computers in each.

It is recommended that the Board consider implementing the standardized use of Smart Strips. Computer peripherals, such as monitors, printers or scanners, continue to use energy even after they are shut off, which adds up over time. The Smart Strip Power strips offer surge protection and the ability to monitor the current on a single 'control' outlet. When the computer that is plugged into that single outlet is shut down the Smart Strip shuts off all of the other peripherals on the power strip. This is discussed further in Section 4.4.

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The schools also have office areas and nurse's officers, that contain copiers, microwaves, refrigerators, vending machines, soda ranachines and coffee makers.

The schools kitchess contain a number of appliances including convection ovens, refrigerators, electric warming tables and cabinets armid walk-in refrigerators and freezers.

It is recommended that the District implement the standardized use of Energy Star appliances, as the need arises. All of the copiers that were noted during the audit were Energy Star copiers. Energy Star refrigerators and freezers, for example, use up to 40% less energy than models built in 2001. Energy Star appliances will not only reduce the District's utility bills, but will also outperform standard appliances, due to the improved design and advanced technologies.

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Section 3 Baseline Energy Use

3.1 Utility Data Analysis

The first step in the energy audit process is the compilation and quantification of the ficility's current and historical energy usage and associated utility costs. It is important to establish the existing patterns of electric, gas, and oil usage in order to be to identify areas in which energy consumption can be reduced.

For this study, the monthly oil, gas, and electric bills per facility were analyzed and unit costs of energy were obtained. The unit cost of energy, as determined from the information provided by the Board of Education, was utilized in determining the feasibility of switching from one energy source to another or reducing the demand on that particular source of energy to create annual cost savings for the Board of Education.

3.1.1 Electric Charges

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It is important to understand how the utility companies charge for the service. The majority of the energy consumed is electric, as a result of both indoor and outdoor lighting, heating, ventilating and air-conditioning equipment. Electricity is charged by three basic components: electrical consumption (kWH), electrical demand (kW) and power factor (kVAE) (reactive power). The cost for electrical consumption is similar to the cost for fuel oil. The monthly consumption appears on the utility bill as kWH consumed per month with a cost figure associated with it. The service connections are either billed on a flat rate or time of day rates per kWH.

Electrical demand can be as much as 50 percent or more of the electric bill. The maximum demand (kW value) during the billing period is multiplied by the demand cost factor and the sesult is added to the electric bill. It is often possible to decrease the electric bill by 15 ~ 25 percent by reducing the demand, while still using the same amount of energy.

The power factor (reactive power) is the power required to energize electric and magnetic fields that result in the production of real power. Power factor is important because transmission and distribution systems must be designed and built to manage the need for real power as well as the reactive power component (the total power). If the power factor is low, then the total power required can be greater than 50 percent or more than the real power alone. The power factor charge is a penalty for having a low power factor. This penalty does not affect the Board.

The other parts of the electric bill are the supply charges, delivery charges, system benefits, transmission revenue adjustments, state and municipality tariff surcharges and sales taxes, which cannot be avoided.

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PSE&G is the current supplier and distributor of electric energy for the Teaneck Board of Education.

3.1.2 Natural Gas Charges

PSE&G is the current supplier and distributor of natural gas for the school facilities. The school facilities are charged for the cost of the natural gas, a delivery charge and a customer charge, which covers gas administration charges.

3.1.3 Oil Charges

Allied Oil LLC and Rachles/Michele's Oil Company are the current suppliers and distributors of oil for the school facilities. The school facilities are charged for oil by the gallon.

3.2 Facility Results

3.2.1 Benjamin Franklin Middle School

Electric power for the Benjamin Franklin Middle School Building is fed from one General Secondary Service three phase line from PSE&G. The Benjamin Franklin Middle School also has generation supplied by South Jersey Energy. Figure 3.2-1 illustrates the average monthly total energy consumption from January 2008 through December 2009. For example, for the month of October, the bar graph represents average energy consumption for October 2008 and October 2009. This same graphical representation approach has been carried through for all months and is typical for all graphs presented in this Section. Electrical usage has been averaged by month for the above referenced time period to portray a more encompassing monthly usage trend.

From this graph, it can be determined that the average annual electrical consumption for the Benjamin Franklin Middle School is approximately 71,421 kWh / month. An unexpected peak in electrical consumption in October should be investigated further by the Board. Lowering the electrical consumption in October could result in significant energy cost savings.



Section 3 Baseline Energy Use

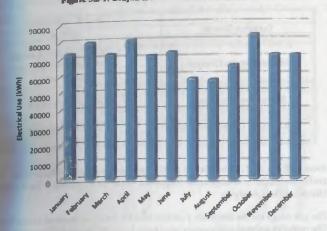
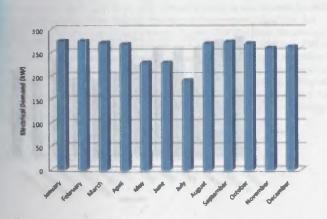


Figure 3.3-1: Benjamin Franklin Middle School Electrical Usage

Figure 3.2-2 illustrates the average monthly demand load for the Benjamin Franklin Middle School from January 2008 through December 2009.



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Figure 3.2-2: Benjamin Franklin Middle School Maximum Monthly Demand

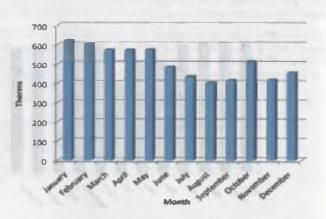
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	Acct #: 4208867818
Customer Charge:	\$374 60
Delivery Service Charges:	\$0.005101024/kWh On-Peak \$0.005100088kWh Off-Peak
	\$3.247/kW
Societal Benefits Charge:	\$0,007568060/kWh
ecuritization Transition Charge:	\$0.010353944/kWh

The charges listed below can be found on the electrical bills provided by PSE&G.

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

The gas usage for the Benjamin Franklin Middle School is metered at one location. The monthly average gas consumption from July 2007 through December 2009 at the school is illustrated in Figure 3.2-3.





For more information on the Benjamin Franklin Middle School's gas usage, refer to Section 4.3.

The oil usage for the Benjamin Franklin Middle School is metered at one location. The monthly average oil consumption from November 2007 through December 2009 at the school is illustrated in Figure 3.2-4.

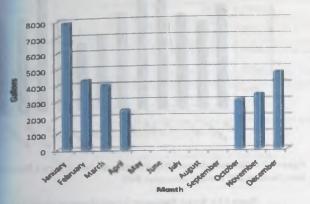


Figure 3.2-4: Benjamin Franklin Middle School Oil Usage

3.2.2 Bryant Elementary School

Electric power for the Bryant Elementary School is fed from one General Secondary Service three phase line from PSE&G. The Bryant Elementary School also has generation supplied by South Jersey Energy. Figure 3.2-5 Illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Bryant Elementary School is approximately 24.453 kWh / month. Unexpected peaks in electrical consumption in April and October, and electrical demand in May should be investigated further by the Board. Lowering the electrical consumption in April and October and the electrical demand in May could result in significant energy cost avings.

Baseline Energy Use

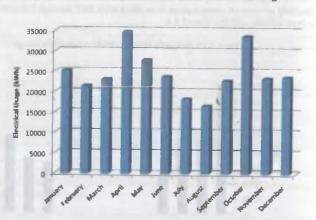
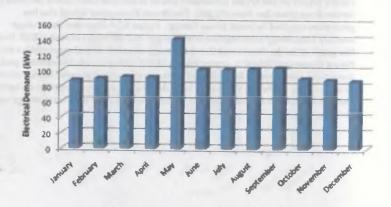


Figure 3.2-5: Bryant Elementary School Electrical Usage

Figure 3.2-6 illustrates the monthly demand load for the Bryant Elementary School from January 2008 through December 2009.





The charges listed below can be found on the electrical bills provided by PSE&G.

Section 3 Baseline Energy Use

	Apri #: 6962867166
Customer Charge	\$10.12
Delivery Service Charges:	\$0.008990181/kWh
	\$3.92/kW
Societal Benefits Charge	\$0.00758976/kWh
Securitization Transition Charge:	\$0.010353852/kWh

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

The Bryant Elementary School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-7.

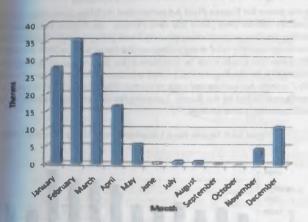


Figure 3.2-7: Bryant Elementary School Natural Gas Usage

The oil usage for the Bryant Elementary School is metered at one location. The monthly average oil consumption from November 2007 through December 2009 at the achool is illustrated in Figure 3.2-8.

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Baseline Energy Use

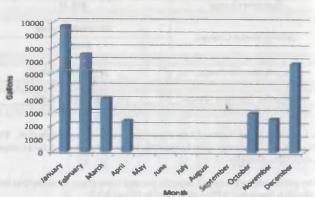


Figure 3.2-8: Bryant Elementary School Oil Usage

3.2.3 Eugene Field Administration Building

Electric power for Eugene Field Administration Building is fed from one General Secondary Service three phase line from PSE&G. The Eugene Field Administration Building also has generation supplied by South Jersey Energy. Figure 3.2-9 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Eugene Field Administration Building is approximately 28,670 kWh / month. An unexpected peak in electrical demand in May should be investigated further by the Board. Lowering the demand in May could result in significant energy cost savings.

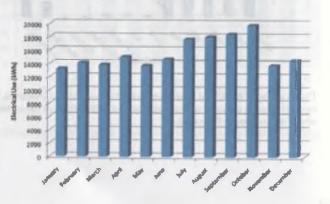


Figure 3.2-9: Eugene Field Administration Building Electrical Usage

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Figure 3.2-10 illustrates the monthly demand load for the Eugene Field Administration Building from January 2008 through December 2009. Figure 3.2-19: Eugene Field Administration Building Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: 6642121802
Customer Charge:	\$4.27
Delivery Service Charges:	\$0.008990082/kWh
	\$3.92/kW
Societal Benefits Charge:	\$0.007568204/kWh
Securitization Transition Charge:	\$0.010353857/kWh

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Eugene Field Administration Building's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-11.

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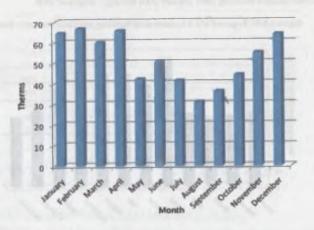
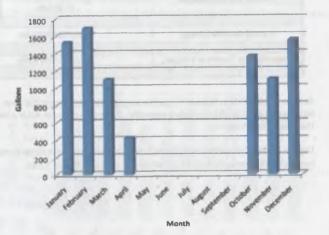


Figure 3.2-11: Eugene Field Administration Building Natural Gas Usage

The oil usage for the Eugene Field Administration Building is metered at one location. The monthly average oil consumption from November 2007 through December 2009 at the school is illustrated in Figure 3.2-12.





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Section 3 Baseline Energy Use

3.2.4 Hawthorne Elementary School

Electric power for the Hawthorne Elementary School is fed from one General Secondary Service line from PSEdcG. The Hawthorne Elementary School also has generation supplied by South Jersey Energy. Figure 3.2-13 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Hawthorne Elementary School is approximately 32,470 kWh / month. An unexpected peak in electrical demand in May should be investigated further by the Board. Lowering the demand in May could result in significant energy cost savings.

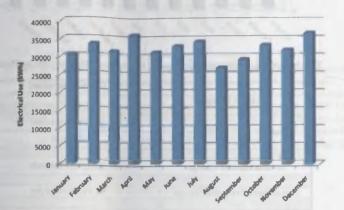


Figure 3.2-13: Hawthorne Elementary School Electrical Usage

Figure 3.2-14 illustrates the monthly demand load for the Hawthorne Elementary School from January 2008 through December 2009.

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Section 3 Baseline Energy Use

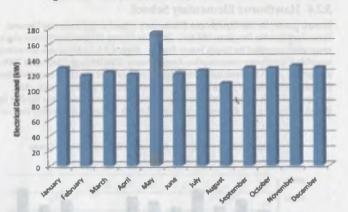


Figure 3.2-14: Hawthorne Elementary School Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: 6756264383	
Customer Charge:	\$4.27	
Delivery Service Charges:	\$0.008990096/kWh	
	\$3.92/kW	
Societal Benefits Charge:	\$0.007587912/kWh	
Securitization Transition Charge:	\$0.010353990/kWh	

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Hawthorne Elementary School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-15.

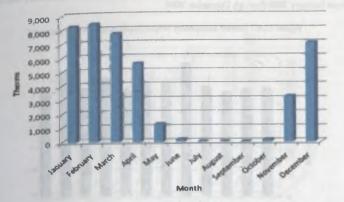


Figure 3.2-15: Hawthorne Elementary School Natural Gas Usage

3.2.5 Lowell Elementary School

Electric power for the Lowell Elementary School is fed from one General Secondary Service three phase line from PSE&G. The Lowell Elementary School also has generation supplied by South Jersey Energy. Figure 3.2-16 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Lowell Elementary School is approximately 23,971 kWh / month. An unexpected peak in electrical consumption in electrical demand in May should be investigated further by the Board. Lowering the electrical demand in May could result in significant energy cost savings.

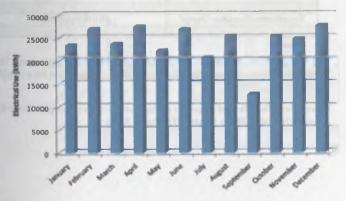


Figure 3.2-16: Lowell Elementary School Electrical Usage

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Figure 3.2-17 illustrates the monthly demand load for the Lowell Elementary School from January 2008 through December 2009.

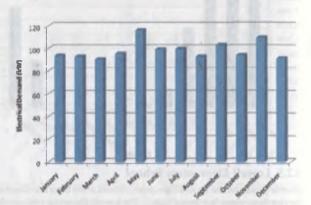


Figure 3.2-17: Lowell Elementary School Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: 6590052301 \$4.27	
Customer Charge:		
Delivery Service Charges:	\$0.008946429/kWh (First 2240) \$0.008990017/kWh (After 2240)	
	\$3.92/kW	
Societal Benefits Charge:	\$0.007588038/kWh	
eouritization Transition Charge:	\$0.010354035/kWh	

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Lowell Elementary School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-18.

Section 3 Beseline Energy Use

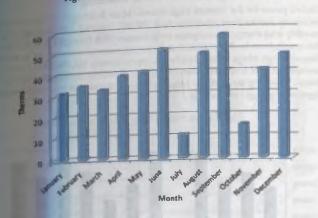
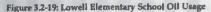


Figure 3 2-18: Lowell Elementary School Natural Gas Usage

The oil usage for the Lowell Elementary School is metered at one location. The monthly average oil consumption from November 2007 through December 2009 at the school is illustrated in Figure 3.2-19.



CDM



3.2.6 Teaneck High School - Main Building

Electric power for the Teaneck High School - Main Building is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-20 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Teaneck High School - Main Building is approximately 163,786 kWh / month. An unexpected peak in electrical demand in May should be investigated further by the Board. Lowering the electrical consumption and demand in May could result in significant energy cost savings.

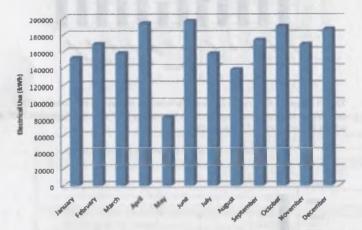


Figure 3.2-20: Teaneck High School Electrical Usage

Figure 3.2-21 illustrates the monthly demand load for the Teaneck High School from January 2008 through December 2009.

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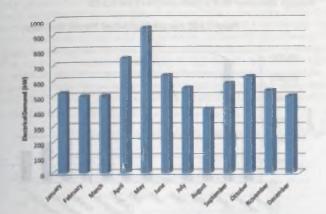


Figure 3.2-21: Teanock High School Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: 4200312018	
Customer Charge:	\$374.60	
Basic Generation Service:	\$0.10389401/kWh (First 72519 kWh On Peak \$0.10314687/kWh (First 32340 kWh On Peak \$0.07437209/kWh (First 38995 kWh Off Peak \$0.07362508/kWh (First 22725 kWh Off Peak \$6.80/kW	
Delivery Service Charges:	\$0.00505946/kWh (Finst 72519 kWh On Peak \$0.00510064/kWh (Finst 32340 kWh On Peak \$0.00506902/kWh (Finst 38995 kWh Off Peak \$0.00510357/kWh (Finst 22725 kWh Off Peak	
	\$0.00510357/kWrl (Piliti 22725 kWrl Off Pea \$3.25/kW	
Societal Benefits Charge:	\$0.007568001/kWh	
ecuritization Transition Charge:	e: \$0,10354008/kWh	

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.



Teaneck High School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-22.

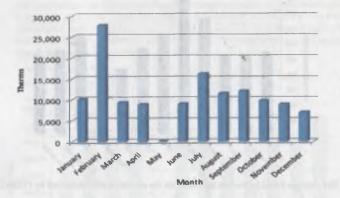


Figure 3.2-22: Teaneck High School Natural Gas Usage

The oil usage for the High School is metered at one location. The monthly oil consumption from January 2008 through December 2008 at the school is illustrated in Figure 3.2-23.

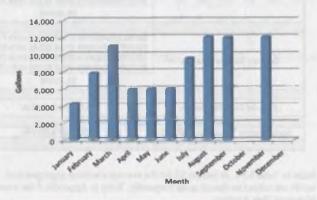


Figure 3.2-23: Teaneck High School Oil Usage

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3.2.7 Teaneck High School - Athletic Field Lighting

Electric power for the Teaneck High School - Athletic Field Lighting is fed from one General Secondary Service three phase line from PSE&G. The Tsaneck High School -Athletic Field Lighting also has generation supplied by South Jersey Energy. Figure 3.2-24 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Teaneck High School - Athletic Field Lighting is approximately 486 kWh / month. A peak in electrical usage and demand from September to December can be attributed to the fall sports program, along with shorter daylight hours. The unexpected spike in electrical demand in July should be investigated by the School District.

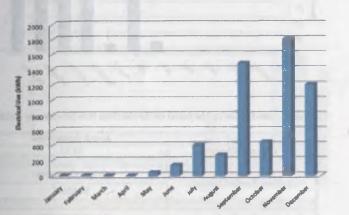


Figure 3.2-24: Teaneck High School - Athletic Field Lighting Electrical Usage

Figure 3.2-25 illustrates the monthly demand load for the Teaneck High School - Athletic Field Lighting from January 2008 through December 2009.

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Section 3 Baseline Energy Use

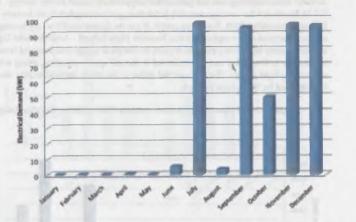


Figure 3.2-25: Teaneck High School - Athletic Field Lighting Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: 6580617084
Customer Charge:	\$4.27
D. H	\$0.008990854/kWh
Delivery Service Charges:	\$3.92/kW
Societal Benefits Charge:	\$0.007587073/kWh
Securitization Transition Charge:	\$0.010353659/kWh

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Section 3 Baseline Energy Use

3.2.8 Teaneck High School - Scoreboard

Electric power for the Teaneck High School - Scoreboard is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-26 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Teaneck High School is approximately 441 kWh / month. An unexpected peak in electrical demand in June and July should be investigated further by the Board. A peak in electrical usage and demand from September to November can be attributed to the fall sports program, along with shorter daylight hours. The unexpected spike in electrical demand in June and July should be investigated by the School District.

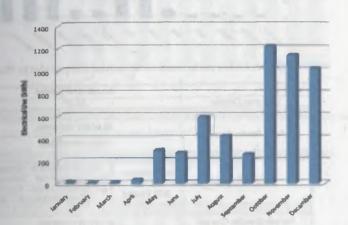


Figure 3.2-26: Teaneck High School - Scoreboard Electrical Usage

Figure 3.2-27 illustrates the monthly demand load for the Teaneck High School -Scoreboard from January 2008 through December 2009.

Section 3 Baseline Energy Use

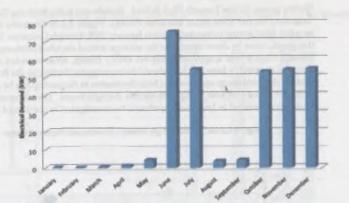


Figure 32-27: Teaneck High School - Scoreboard Maximum Monthly Demand

The charges listed below can be found on the electrical bills provided by PSE&G.

	Acct #: #747639304		
Customer Charge:	\$4.27		
		\$0.008971963/kWh	
Delivery Service Charges:	\$3.920560748/kW		
	BGS Capacity	\$5.123639960/kW - Generation \$1.673790776/kW - Transmission	
Supply Charges:	BGS Energy	\$0.088695652/kWh - First 69 kWh \$0.089473684/kWh - Next	
Societal Benefits Charge:	\$0.007570093/kWh		
Securitization Transition Charge:		\$0.010373832/kWh	

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

3.2.9 Thomas Jefferson Middle School

Electric power for Thomas Jefferson Middle School is fed from one General Secondary Service three phase line from PSE&G. The Thomas Jefferson Middle School also has generation supplied by South Jersey Energy. Figure 3.2-28 illustrates the average monthly total energy consumption from July 2007 through March 2009. From this graph, it can be determined that the average annual electrical consumption for the Thomas Jefferson Middle School is approximately 64,967 kWh / month.

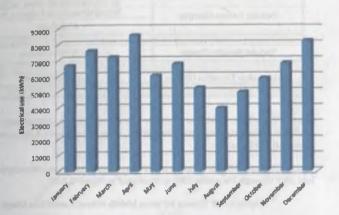
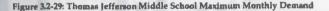


Figure 3.2-28: Thomas Jafferson Middle School Electrical Usage

Figure 3.2-29 illustrates the monthly demand load for the Thomas Jefferson Middle School from January 2008 through December 2009.





	Acct #: 4200398818	
Customer Charge:	\$449.52	
Delivery Service Charges:	\$0.005100995/kWh (First 58320) \$0.005100962/kWh (After 31200)	
Delively Service Charges.	\$3.896/kW	
Societal Benefits Charge:	\$0.007568029/kWh	
Securitization Transition Charge:	\$0.010353999/kWh	

The charges listed below can be found on the electrical bills provided by PSE&G.

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Thomas Jefferson Middle School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-30.

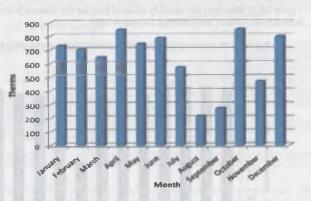


Figure 3.2-39: Thomas Jefferson Middle School Natural Gas Usage

The oil usage for the Thomas Jefferson Middle School is metered at one location. The monthly total gas consumption from November 2008 through December 2009 at the school is illustrated in Figure 3.2-31.

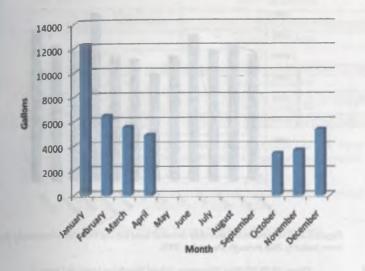


Figure 3.2-31: Thomas Jefferson Middle School Oil Usage

3.2.10 Whittier Elementary School

Electric power for the Whittier Elementary School is fed from one General Secondary Service three phase line from PSE&G. The Whittier Elementary School also has generation supplied by South Jersey Energy. Figure 3.2-32 illustrates the average monthly total energy consumption from January 2008 through December 2009. From this graph, it can be determined that the average annual electrical consumption for the Whittier Elementary School is approximately 31,406 kWh / month. Unexpected peaks in electrical consumption in electrical demand in May should be investigated further by the Board. Lowering the electrical demand in May could result in significant energy cost savings.



Section 3 Beseline Energy Use

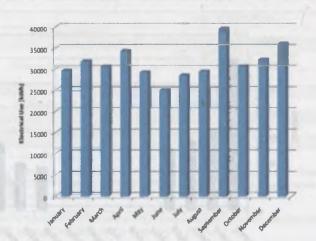
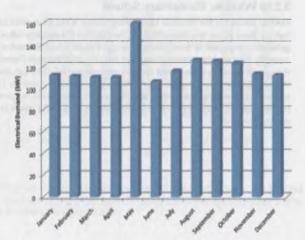


Figure 3.2-32: Whittier Elementary School Electrical Usage

Figure 3.2-33 illustrates the monthly demand load for the Whittier Elementary School from January 2008 through December 2009.





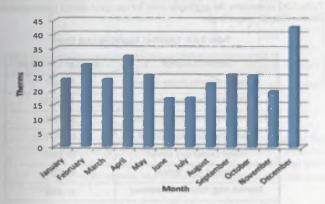
	Acct #: 6612801603
Customer Charge:	\$4.27
E Il and Sender Charmen	\$0.008990051/kWh
Delivery Service Charges:	\$3.92/kW
Societal Benefits Charge:	\$0.007568112/kWh
Securitization Transition Charge:	\$0.010354082/kWh

The charges listed below can be found on the electrical bills provided by PSE&G.

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Whittier Elementary School's monthly average natural gas consumption from July 2007 through December 2009 is illustrated in Figure 3.2-34.





The oil usage for the Whittier Elementary School is metered at one location. The monthly total gas consumption from July 2008 through October 2009 at the school is illustrated in Figure 3.2-35.

Section 3 Baseline Energy Use

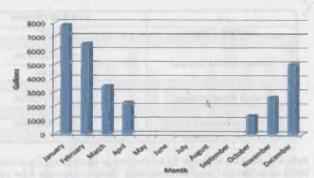


Figure 3.2-35: Whittler Elementary School Oil Usage

3.3 Aggregate Costs

For the purposes of computing energy savings for all identified energy conservation and retrofit measures, aggregate unit costs for electrical energy and fuel, in terms of cost/kWH and cost/therm, were determined for each service location and utilized in the simple payback analyses discussed in subsequent sections. The aggregate unit cost accounts for all distribution and supply charges for each location. Table 3.3-1 and Table 3.3-2 summarize the aggregate costs for electrical energy consumption and therms utilized, respectively.

Service Location	Aggregate \$ / kW-hr
Benjamin Franklin Middle School	\$0.1541
Bryant Elementary School	\$0.1730
Eugene Field Administration Building	\$0.1648
Hawthome Elementary School	\$0.1648
Lowell Elementary School	\$0.1876
Teaneck High School	\$0.1589
Teaneck High School - Scoreboard	\$1.0689
Teaneck High School - Athletic Field Lights	\$2.1980
Thomas Jefferson Middle School	\$0.1781
Whittier Elementary School	\$0,1667

Table 3.3-1: Electrical Aggregate Unit Costs

Section 3 Baseline Energy Use

Service Location	Aggregate \$ / therm	
Benjamin Franklin Middle School	\$1.26	
Bryant Elementary School	\$2.41	
Eugene Field Administration Building	\$1.42	
Hawthome Elementary School	\$1.25	
Lowell Elementary School	\$1.40	
Teaneck High School	\$1.08	
Thomas Jefferson Middle School	\$1.24	
Whittler Elementary School	\$1.60	

Table 3.3-2: Natural Gas Aggregate Unit Costs

Table 3.3-3: Oll Aggregate Unit Costs

Service Location	Aggregate \$ / gallon	
Benjamin Franklin Middle School	\$2.31	
Bryant Elementary School	\$2.32	
Eugene Field Administration Building	\$2.30	
Lowell Elementary School	\$2.36	
Teaneck High School	\$3.33	
Thomas Jefferson Middle School	\$2.40	
Whittier Elementary School	\$2.37	

3.4 Portfolio Manager

3.4.1 Portfolio Manager Overview

Portfolio Manager is an interactive energy management tool that allows Teaneck BOE to track and assess energy consumption at the school facilities in a secure online environment. Portfolio Manager can help Teaneck BOE set investment priorities, verify efficiency improvements, and receive EPA recognition for superior energy performance.

3.4.2 Energy Performance Rating

For many facilities, you can rate their energy performance on a scale of 1-100 relative to similar facilities nationwide. Your facility is not compared to the other facilities entered into Portfolio Manager to determine your ENERGY STAR rating. Instead, statistically representative models are used to compare your facility against similar facilities from a national survey conducted by the Department of Energy's Energy



Information Administration. This national survey, known as the Commercial Building Energy Consumption Survey (CBECS), is conducted every four years, and gathers data on building characteristics and energy use from thousands of facilities across the United States. Your facility's peer group of comparison is those facilities in the CBECS survey that have similar facility and operating characteristics. A rating of 50 indicates that the facility, from an energy consumption standpoint, performs better than 50% of all similar facilities nationwide, while a rating of 75 indicates that the facility performs better than 75% of all similar facilities nationwide.

3.4.3 Portfolio Manager Account Information

A Portfolio Manager account has been established for Teaneck Board of Education, which includes a profile for the eight (8) buildings. Information entered into this Portfolio Manager Facility profile, including electrical energy consumption and natural gas consumption has been used to establish a performance baseline.

It is recommended that the information be updated each month to track the buildings' energy usage. Only Eugene Field Administration Building was eligible for an energy star label and rating. At the time of the audit the Administration Building received a rating of 82. This information would have to be confirmed in order to apply for an energy star label.

Appendix B contains the Statement of Energy Performance developed for the Administration Building and a Portfolio Manager Reference sheet.

The following website link, username and password shall be used to access the Portfolio Manager account and building profiles that has been established for the Board:

https://www.energystar.gov/istar/pmpam/

USERNAME: Teaneck1

PASSWORD: EnergyStar

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Section 4 Energy Conservation and Retrofit Measures (ECRM)

4.1 Building Lighting Systems

4.1.1 Benjamin Franklin Middle School

It is recommended that the existing lighting system at the Benjamin Franklin Middle School, as discussed in Section 2.1.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-1 below.

	Table 4.1-1
	Benjamin Franklin Middle School Lighting System Improvements
Interior Lighting	High Performance T8 Retrofts, Incandescent to Compact Fluorescent Conversion, Occupancy Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 83.7 kW, 276,772 kWh and \$42,650

Exterior Lighting: 4.2 kW, 21,242 kWh and \$3,273

The following table, Table 4.1-2, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Benjamin Franklin Middle School. Included In this simplified payback analysis summary table is the 'Annual Return on Investment' (AROI) values. This value is a performance measure used to evaluate the efficiency of an investment and is calculated using the following equation:

 $AROI = \frac{AECS + OCS}{NET ECM Cost} - \frac{1}{Llfetime}$

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Where OCS = Operating Cost Savings, and AECS = Annual Energy Cost Savings.

Also included in the table are net present values for each option. The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (DR) (assume bond rate of 3%). NPV is calculated using the following equation:

$$NPV = \sum_{n=0}^{n} \frac{C_n}{(1+DR)^n}$$

Where Cn=Annual cash flow, and N = number of years.

The IRR expresses an annual rate that results in a break-even point for the investment. If the BOE is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the BOE to compare ECM's against each other to determine the most appealing choices.

$$IRR \to 0 = \sum_{n=0}^{N} \frac{C_n}{(1 + IRR)^n}$$

Where Cn=Annual cash flow, and N = number of years.

The lifetime energy savings represents the cumulative energy savings over the assumed life of the ECM.

Table 4.1-2 Benjamin Franklin Middle School Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$329,261.5	\$82.692.2	\$411,953.7
New Jersey SmartStart Rebate	-\$21,135*	-\$0*	-\$21,135*
Total Cost	\$308,126.5	\$82,692.2	\$390,818.7
Annual Energy Savings	\$42,650.3	\$3,273.4	\$45,923.7
Annual Maintenance Cost Savings (AMCS)	\$6,576	\$48.49	\$6,622.1
Simple Payback	6.3 years	24.8 years	7.4 years
Annual Return on Investment (AROI)	9.31%	-2.65%	6.78%
Lifetime Energy Savings (15 years)**	\$793,249.3	\$60,881.7	\$854,131
Internal Rate of Return (IRR)	16.44%	-3.25%	13.17%
Net Present Value (NPV)	\$408,756.1	-\$34,344.3	\$374,411.8

 Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, Appendix G.
 yearly inflation on electricity costa.

**See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.2 Bryant Elementary School

It is recommended that the existing lighting system at the Bryant Elementary School, as discussed in Section 2.2.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bubs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-3 below.

	Table 4.1-3
	Bryant Elementary School Lighting System Improvements
Interior Lighting	High Performance T8 Retrofits, incandescent to Compact Fluorescent Conversion, Occupancy Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 25.9 kW, 87,307.4 kWh and \$15,103.5

Exterior Lighting: 0.5 kW, 2,503.9 kWh and \$433.2

The following table, Table 4.1-4, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Bryant Elementary School.



43

Section 4 Energy Conservation and Retroft Measures

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Table 4.1-4 Bryant Elementary School Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$99,705.7	\$19,843.3	\$119,549
New Jersey SmartStart Rebate	-\$23,230*	-\$0*	-\$23,230°
Total Cost	\$76,475.7	\$19,843.3	\$96,319
Annual Energy Savings	\$15,103.5	\$433.2	\$15,536,6
Annual Maintenance Cost Savings (AMCS)	\$2,713.1	\$42.05	\$2,755.2
Simple Payback	4.3 years	41.8 years	5.3 years
Annual Return on Investment (AROI)	16.63%	-4.27%	12.32%
Lifetime Energy Savings (15 years)**	\$280,908.7	\$8,057	\$288,964
Internal Rate of Return (IRR)	25.02%	-8.31%	20.09%
Net Present Value (NPV)	\$182,989.9	-\$12,922.2	\$170,066.3

* Additional Incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.3 Eugene Field Administration Building

It is recommended that the existing lighting system at the Eugene Field Administration Building, as discussed in Section 2.3.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-5 below.

	Table 4.1-5
	Eugene Field Administration Building Lighting Bystom Improvements
Interior Lighting	High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion Occupency Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

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The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 12.4 kW, 39,955.7 kWh and \$6,586.3

Exterior Lighting: 1.6 kW, 7,920.5 kWh and \$1,305.6

The following table, Table 4.1-6, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Eugene Field Administration Building.

Table 4.1-6 Eugene Field Administration Building Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Totel
Engineer's Opinion of Probable Cost	\$45,476.8	\$14,794.8	\$60,271.5
New Jersey SmartStart Rebate	-\$4,125*	-\$ 0*	-\$4,125*
Total Cost	\$41,351.8	\$14,794.8	\$56,148.5
Annual Energy Savings	\$6,586.3	\$1,305.6	\$7,891.9
Annual Maintenance Cost Savings (AMCS)	\$748.29	\$25.51	\$773.8
Simple Payback	5.6 years	11.1 years	6.5 years
Annual Return on Investment (AROI)	11.07%	2.33%	8.77%
Lifetime Energy Savings (15 years)**	\$122,498	\$24,282	\$146,780.8
Internal Rate of Return (IRR)	18.60%	6.69%	15.76%
Net Present Value (NPV)	\$65,462.6	\$4,590.3	\$70,053

*Additional Incentives, based on eligibility, are available through the New Jersey SmartStart Program. see Appendix G.

**3% yearly inflation on electricity costs.

**See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.



4.1.4 Hawthorne Elementary School

It is recommended that the existing lighting system at the Hawthorne Elementary School, as discussed in Section 2.4.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-7 below.

	Table 4.1-7
	Hawthorne Elementary School Lighting System Improvements
Interior Lighting	High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion, Occupancy Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 16.8 kW, 56,096.5 kWh and \$9,248.8

Exterior Lighting: 0.9 kW, 4,650.1 kWh and \$766.7

The following table, Table 4.1-8, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Hawthorne Elementary School.

Ti Hawthorne Elementary Scho	able 4.1-8 of Lighting Syst	tem improveme	ints***
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$71,618.4	\$36,851.8	\$108,470.2
New Jersey SmartStart Rebate	-\$4,635*	-60*	-\$4,635*
Total Cost	\$66,983.4	\$36,851.8	\$103,835.2
Annual Energy Savings	\$9,248.8	\$766.7	\$10,015.8
Annuel Maintenance Cost Savings (AMCS)	\$1,191	\$9.49	\$1,200.5

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Sector 4 Energy Conservation and Retrolit Measures

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Table 4.1-8 Hawthorne Elementary School Lighting System Improvementa***			
Simple Payback	6.4 years	47.5 years	9.3 years
Annual Return on Investment (AROI)	8.92%	-4.58%	4.14%
Lifetime Energy Savings (15 years)**	\$172,018	\$14,259.8	\$186,277.4
Internal Rate of Return (IRR)	15.95%	NA	9.47%
Net Present Value (NPV)	\$85,052.5	-\$25,548.1	\$59,504.5

 Additional incentives, based on eligibility, are available shrough the New Jussey SmartDiart Program, see Appendix G.

*3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.5 Lowell Elementary School

It is recommended that the existing lighting system at Lowell Elementary School, as discussed in Section 2.5.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-9 below.

	Table 4.1-9
Interior Lighting	Lowell Elementary School Lighting System Improvements High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion, Occupency Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 10.0 kW, 34,828.5 kWh and \$6,534.3

Exterior Lighting: 1.4 kW, 6,929.2 kWh and \$1,300



Section 4 Energy Conservation and Retroft Measures

The following table, Table 4.1-10, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Lowell Elementary School.

Table 4.1-10 Lowell Elementary School Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$44,335.4	\$33,663.4	\$77,998.6
New Jersey SmartStart Rebete	-\$3,710*	-\$0"	-\$3,710*
Total Cost	\$40,625.4	\$33,663.4	\$74,288.8
Annual Energy Savings	\$6,534.3	\$1,300	\$7,834.3
Annual Maintenance Cost Savings (AMCS)	\$505.5	\$15.2	\$520.7
Simple Payback	5.8 years	25.6 years	8.9 years
Annual Return on Investment (AROI)	10.66%	-2.76%	4.58%
Lifetime Energy Savings (15 years)**	\$121,530.9	\$24,179	\$145,709.5
Internal Rate of Return (IRR)	16.10%	-3.53%	10.12%
Net Present Value (NPV)	\$61,895.2	-\$14,509.7	\$47,385.7

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.6 Teaneck High School

It is recommended that the existing lighting system at the Teaneck High School, as discussed in Section 2.6.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-11 below.

Energy Conservation and Retrofft Meanmas

	Table 4.1-11 Teaneck High School Lighting System Improvements
Interior Lighting	High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion, Occupancy Sensors
Exterior Lighting	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 38.4kW, 120,609.7 kWh and \$19,168.1

Exterior Lighting: 1.2 kW, 6,326.2 kWh and \$1,005.4

The following table, Table 4.1-12, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Teaneck High School.

Table 4.1-12 Teaneck High School Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$122,876.8	\$31,878.6	\$154,753.3
New Jersey SmartStart Rebate	-\$11,850*	-\$0*	-\$11,850°
Total Cost	\$111,026.8	\$31,878.6	\$142,903.3
Annual Energy Savings	\$19,168.1	\$1,005.4	\$20,173.5
Annual Maintenance Cost Savings (AMCS)	\$1,452.6	\$124.7	\$1,577.3
Simple Payback	5.4 years	28.2 years	6.6 years
Annual Return on Investment (AROI)	11.91%	-3.12%	8.55%
Lifetime Energy Savings (15 years)**	\$356,505.8	\$15,599.4	\$375,205.2
Internal Rate of Return (IRR)	19.60%	-4.54%	15.48%
Net Present Value (NPV)	\$189,274.8	-\$15,418.7	\$173,856.4



Section 4 Energy Conservation and Retrofit Measures

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.7 Thomas Jefferson Middle School

It is recommended that the existing lighting system at the Thomas Jefferson Middle School, as discussed in Section 2.7.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-13 below.

	Table 4.1-13
	Thomas Jefferson Middle School Lighting Bystem Improvements
Interior Lighting	High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion. Occupancy Sensors
Exterior	LED Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 41.5 kW, 138,055.2 kWh and \$24,587.2

Exterior Lighting: 1.2 kW, 6,132 kWh and \$1,092.1

The following table, Table 4.1-14, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Thomas Jefferson Middle School.

Section 4

Energy Conservation and Retrofit Measures

Ta	ble 4.1-14		
Thomas Jefferson Middle School Lighting System improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$203,239.5	\$25,798.8	\$229,038.3
New Jersey SmartStart Rebate	-\$15,735*	-\$0*	-\$15,735*
Total Cost	\$187,504.5	\$25,798.8	\$213,303.3
Annual Energy Savings	\$24,587.2	\$1,092.1	\$25,679.3
Annual Maintenance Cost Savings (AMCS)	\$2,203.7	\$6.13	\$2,209.8
Simple Psyback	7.0 years	23.5 years	7.6 years
Annual Return on Investment (AROI)	7.62%	-2.41%	8.41%
Lifetime Energy Savings (15 years)**	\$457,295.2	\$20,311.9	\$477,807.1
Internal Rate of Return (IRR)	14.28%	-2.62%	12.67%
Net Present Value (NPV)	\$202,653.7	-\$9,805.2	\$192.848.5

*Additional incentives, based on eligibility, are available through the New Jersey StructStart Program, see Appendix G.

**3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.8 Whittier Elementary School

It is recommended that the existing lighting system at the Whittler Elementary School, as discussed in Section 2.8.3, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing lighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-15 below.

	Table 4.1-16
	Whittler Elementary School Lighting System Improvements
Interior Lighting	High Performance T8 Retrofits, Incandescent to Compact Fluorescent Conversion, Occupancy Sensora
Exterior Lighting	LED Retrofit of Exterior Fixtures



The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for the two options is as follows:

Interior Lighting: 28.3 kW, 99,436.8 kWh and \$16,572.5

Exterior Lighting: 0.3 kW, 1,430.8 kWh and \$238.5

The following table, Table 4.1-16, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Whittier Elementary School.

Table 4.1-16 Whittler Elementary School Lighting System Improvements***			
in the state of the state	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	\$104,823.9	\$11,339	\$116,162.9
New Jersey SmartStart Rebate	-\$7,660*	-80*	-\$7,660*
Total Cost	\$97,163.9	\$11,339	\$108,502.0
Annual Energy Savings	\$16,572.5	\$238.5	\$16,811.0
Annual Maintenance Cost Savings (AMCS)	\$1,624.1	\$42,87	\$1,666.9
Simple Payback	5.3 years	40.3 years	5.9 years
Annual Return on Investment (AROI)	12.08%	-4.19%	10.36%
Lifetime Energy Savings (15 years)**	\$308,230.5	\$4,435.8	\$312,688.3
Internal Rate of Return (IRR)	19.78%	-7.98%	17.74%
Net Present Value (NPV)	\$167,834.6	-\$7.241.4	\$160,593

^a Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.9 Athletic Field Lighting & Scoreboard

CDM evaluated the athletic field lighting and has determined that minimal energy savings can be achieved, because the Teaneck BOE already limits the use of the lighting system to athletic events. The scoreboard lighting was also evaluated and the same conclusion has been reached. The minimal energy savings for both the athletic field lighting and the scoreboard would result in an extended payback period greater than 20 years, and therefore CDM does not recommend and ECRMs related to the athletic field lighting and the scoreboard.

4.1.10 Teaneck High School - Press Box

It is recommended that the existing lighting system at the Teaneck High School - Press Box, as discussed in Section 2.9.2, be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaries to the existing jighting systems. Two options have also been proposed in Appendix D for interior and exterior lighting, and are listed in Table 4.1-17 below.

	Table 4.1-17
Ter	ieck High School - Press Box Lighting System Improvements
Interior Lighting	Incandescent to Compact Fluonescent Conversion

The annual energy savings for the two options is as follows:

Interior Lighting: 0.1 kW, 7.1 kWh and \$7.5

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The following table, Table 4.1-18, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Teaneck High School - Press Box.

Table 4.1-18 Teaneck High School - Press Box Lighting System (mprovements***	
	Total
Engineer's Opinion of Probable Cost	\$107.8
New Jersey SmartStart Rebate	-\$0*
Total Cost	\$107.8
Annual Energy Savings	\$7.5
Annual Maintenance Cost Savings (AMCS)	\$70.52

Section 4 Energy Conservation and Retrofit Measures

Table 4.1-18 Teaneck High School - Press Box Lighting System Intprovements***		
Simple Payback	1.4 years	
Annual Return on Investment (AROI)	65.71%	
Lifetime Energy Savings (15 years)**	\$139.5	
Internal Rate of Return (IRR)	75.35%	
Net Present Value (NPV)	\$1,028.4	

^a Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

*3% yearly inflation on electricity costs.

***See Appendix H & I for ECRM Financial Analyses.

It should be noted that the Annual Energy Savings assurate the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.2 HVAC Systems

The goal of this section is to present any heating and cooling energy reduction and cost saving measures that may also be cost beneficial. Where possible, measures will be presented with a life-cycle cost analysis. This analysis displays a payback period based on weighing the capital cost of the measure against predicted annual fiscal savings. To do this, the buildings have been modeled as accurately as possible to predict energy usage for space heating and cooling, as well as domestic hot water use.

Each building is modeled using software called eQuest, a Department of Energysponsored energy modeling program, to establish a baseline space heating and cooling energy usage. Climate data from Freehold, NJ was used for analyses. From this, the model may be calibrated, using historical utility bills, to predict the impact of theoretical energy savings measures.

Once annual energy savings from a particular measure have been predicted and the initial capital cost has been estimated, payback periods may be approximated. Equipment cost estimate calculations are provided in Appendix H.

Dual-fuel boilers, which burn both natural gas and light fuel oil, offer the Board of Education flexibility of choice. The cost and availability of each fuel may fluctuate. However, at this time the highest efficiency dual-fuel boilers, which are commercially available, are rated at about 86%. Smaller residential boilers are now able to operate on low-sulfur diesel fuel in the condensing temperature range, but they are not available in the larger capacities required for buildings such as schools. An impractical number of these smaller boilers would be required to adequately serve large buildings. Hence, CDM's recommendation for condensing boilers is restricted to natural gas-fired units, which operate at a 91+% efficiency. Natural gas is also ignificantly cheaper and easier to maintain than fuel oil, which makes it a more favorable option.

4.2.1 Benjamin Franklin Middle School

A model of Benjamin Franklin Middle School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and oil bills from November 2007 to December 2009. Figure 4.2-1 below compares actual monthly electricity usage, with those predicted by the eQuest model.

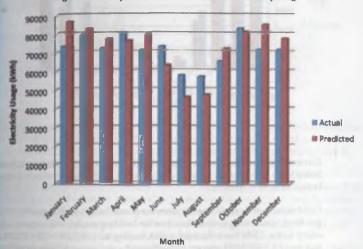


Figure 4.2-1: Benjamin Franklin Middle School Electricity Usage

Increased electrical usage in the winter is indicative of the greater heat load during the peak heating season as well as the heavy occupancy during these months.

Figure 4.2-2 below compares the school's actual monthly oil usage to model-predicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption.

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Section 4 Energy Conservation and Retrofit Measures

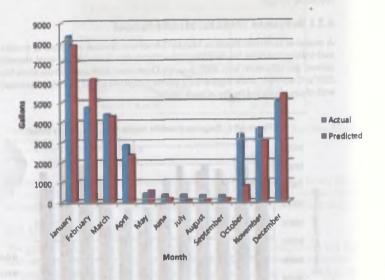


Figure 4.2-2: Benjamin Franklin Middle School Oil Usage

Currently, the heating system utilizes two (2) Smith Cast Iron Sectional boilers. Each boiler has a gross-output capacity of 4,517 MBH. CDM conservatively estimates these boilers to be 80% efficient.

CDM recommends replacing the aforementioned boilers with high-efficiency, natural gas-fired, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a peak heating load of 5,000 MBH. CDM anticipates that two (2) 3,000 MBH output, high-efficiency condensing boilers should adequately heat the school.

Figure 4.2-3 compares current gas usage with predicted gas usage resulting from a switch to high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~91.5% and return water temperature of 100°F.

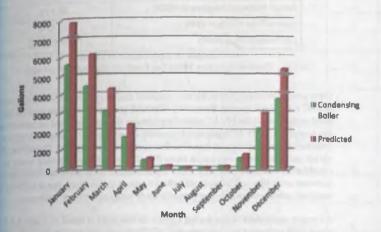


Figure 4.2-3: Benjamin Franklin Middle School - Beller Upgrade - Oll Usage

Fiscal savings from such an upgrade are then identified in Table 4.2-1 below. Lifetime savings calculations for all ECRM's may be found in Appendix II. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical firetube boilers. CDM estimates a firetube boiler system will typically cost around \$3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around \$2,000 per year. Therefore, replacing the existing boiler system with a condensing boiler system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 4.2-1: Benjamin Franklin Middle School Boller Upgrade Payback		
Current Annual Oil Cost for Existing Boilers	\$70,967	
Predicted Annual Gas Cost for Condensing Boilers	\$38,830	
Total Annual Savings	\$32,137	
Initial Capital Cost of Upgrade	\$104,127	
Incentives**	\$6,000	
Cost of Upgrade	\$98,127	
Bimple Payback	2.9	
Lifetime Energy Savings (24 years)*	\$1,142,363.47	

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Section 4 Energy Conservation and Retroit Measures

Table 4.2-1: Benjamin Franklin Middle Schoo	of Boller Upgrade Payback
Annual Maintenance Cost Savings (AMCS)	\$1,500
Annual Return on Investment (AROI)	30.11%
Internal Rate of Return (IRR)	37.12%
Net Present Value (NPV)	\$676,099.86

*Assumes 3% yearly inflation on fuel costs

**Incentives, per New Jersey Clean Energy Program, are \$1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-2 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Where equipment ages were not found on the equipment tags, they have been estimated based on the unit appearance or approximate renovation dates. In some cases, service locations may have been estimated based on unit proximity. Additionally, in cases where a unit's manufacturer and/or model could not be determined due to an unreadable, faded, destroyed, or lost tag, manufacturer and model number information has been represented as "unknown".

Table 4.2-2 Benjamin Franklin Middle School HVAC Equipment Service Lives										
Description [Tag ID]	Unit Location	Service Locatien	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)				
ACC	Lobby/High Roof	Computer Lab	Friedrich	Model MR30C3F	SEER 18	~5				
ACC	Gym/Cafelorie Roof	Server Classroom	Friedrich	Model MESOCSF	SEER 18	~5				
ACC	Gym/Cafeteria Roof	Norma's Office	Friedrich	Barne 2 ton	SEER 18	~5				
ACC	Gym/Cafetoria Roof		Trans	2TTR2024A10	Unknown	-5				
ACC	Gym/Caletoria Roof	Catetoria	Trane	Model 2TTR2042B10 09AA	Unknown	~5				



Section 4 Energy Conservation and Retroff Measures

				Madel			1
	Gym/Cafeteria		-	2TTR2042B10			
	Rivel	Caletonia	Trana	OBAA	Uningwit	-6	1 2
ACC	Gym/Careteria			1. And the state			
	Roof	hining Center	Frieddich	MRGACSE	SEER 18	-j	1
ACC	Gym/Cafeleria			Madal			
	Roof	Media Center	Friedrich	MILTO JE	SEER 18	-5	3
ACC	Gy n/c.areierta			A des day			
	Rool	Media Center	Fradrich	MR30C3E	SEER 18	Ű	2
ACC	Gym/Cafeleria			Modal			1
	Roof	Madia Center	Friedrich	MENCOL	SEER 18	-6	2
ACC	PLOD			Stociel			
	GAM Office	OAM Office	Cerrier	300 00000000000	Untraciwn	-5	10
ACC	Gym/Cal a			Model	- State		
		Gym	Bohn	BETOISH2C	Linteran	-6	-
ACC	Roof	ta grin	1 ISTALIU	Ente	Unknown	-0	
		Tech 308	Friedrich		67 EB (0		-
ACC	Other	TECH 300	Frieditian	GL 36L SOA-C	SEER 18	-5	<u></u>
		Pack 207	Eduddah	Moret	00000 45		
ACC	Other	Tech 307	Friedrich	8136130A-C	SEER 18	-6	20
				Madel			
	and the second se		-	2TTR2024A10			
ACC	Guidance Rooms	Guidance Rooms	Trana	OGAA	Untenown	-5	30
	Main	Main		Madal			
	Office/Windowleas	Office/windowless		2TTR2048A10			
ACC	Classrooms	cleanscoma	Tranc	OGAA	Unitrown	-5	a
100	Main	Main		Madol	I		-
	Office/Windowiess	Office/windowless		2TTR2042810			
ACC	Classrooms	classrooms	Trana	OGAA	Unintern	-5	E
100	Main	Main		Madel	Of Supervise wept		1
	Office/Windowless	Office/windowless		2TTR2024A10			
ACC			Trace	OBAA	Linimum		
100	Classrooms	classrooms	Ching	the second se	Uninown	-0	20
				Model			
			-	MCCBOOBUAO			
AHU	Fen Room 1	Basement	Trans	COUA	~80%	-7	2
		provide a second second		Model			1
				MCCB010UA0			1
AHU	Fan Reom 2	Basemant	Trane	COLIA	-80%	-7	1 2
				Model			1
	O&M next to Conf			MCCBOOBUAD	_		
AHU	Room	Basement	Trane	COUA	~80%	-7	05
				[hindo]			I
	O&M next to Conf			MCCBOORNAD			
AHU	Room	Basement	Trano	COUA	~80%	-7	25
			Constant Constant	Model	1		
				SLHFC40E44			
				GeC59D1D01			
	Roof above Boiler	1st/2nd floor	Intellipat/	ACEOGOKLO			
AHU	Room	Tollets	Trans	0RT008600	~80%	-7	20
	the second se	· DI U U	1.0.0	CHAIL DANDORD	2070	-1	100
AHU	Gym/Cafeteria Roof						
-	the second se	Gym/Calateria	unknown	Unknown	~60%	-17	30
AHU	Gym/Caletoria						
	Rogt	Gym/Cafateria	Trans	LINECOLVER		20	30
				Medel			
				TSGA017U0B			
HU	Gym/Caleteria			000000A00A2			
	Roof	Gym/Cataloria	Trane	70	-50%	-7	20
				Model			
	Gym/Cafeleria			TECAOOSUOB			
	Root	100-1	Trane		-0.04/	7	
AHU	PLOOF	KRCDAR					
AHU	Gym	Kiichan	I FERTING	05 A0CA117	- WW ra	1	

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No No

Section 4 Energy Conservation and Retroft Measures

AHU	Gym	Gym	Trane	Heating (large)	~80%	~7	
AHU	Girls/Boys Locker Rooms	Locker Roome	Trane	Bmailer	~80%	-7	1
AHU	Giris/Boya Locker Rooms	Locker Roome	Trane	Smaller	~80%	~7	
Boller	boller room	All rooms	Smith	28A Series	80%	>20	1
Boller	boiler room		Smith	28A Series	80%	>20	
EF	Roof above Boller Room	Auditorium	Loren Cook	Model 180C78	Unknown	~5	
EF	Roof above Boller Room	2nd floor Toilets	Dayton	Model 4YY20	Unknown	~5	
EF	Auditorium Roof	Auditorium	Loren Cook	Model 135C48	Unknown	~5	
EF	Auditorium Roof	Auditorium	Chelsea	Model R0K50	Unknown	~5	
EF	Auditorium Roof	Auditorium	Chelses	Model R6K30	Unknown	~5	
EF	Lobby/High Roof	Auditorium	Loren Cook	Model 190C2B	Unknown	-5	
EF	Lobby/High Roof	Toilet Rooms	Loren Cook	ACE Model 135C4B	Unknown	~5	
EF	Lobby/High Roof	Claseroom	Loren Cook	Model 100 C28	Unknown	8	
EF	Lobby/High Roof	Classroom	Loren Cook	Model 100C28	Unknown	~5	
EF	Lobby/High Roof	Classroom	Dayton	Model 4YY18	Unknown	-5	
EF	Lobby/High Roof	Classroom	Loran Cook	Model 150C88	Unknown	-5	
EF	Music Room Roof	Classroom	Carnes	Model VEIK18P1A2 UA205PC1	Unknown	~5	
EF	Music Room Roof	Claseroom	Loren Cook	Model 100C2B	Unknown	~5	
EF	General Hellway Roof	Classroom	Loren Cook	Model 135C5B	Unknown	-5	
EF	Gym/Cafetoria Roof	Classroom	Loren Cook	Madel 180C8B	Unknown	~5	-
EF	Gym/Cafeteria Roof	Classroom	Dayton	Model 3GY708	Unknown	~5	_
EF	Gym/Cafeloria Roof	Classroom	Loren Cook	Model 270C78	Unknown	~5	-
EF	Gym/Cafeteria Roof	Classroom	Loren Cook	Model 270C7B	Unknown	~5	-
Pump	Boller Room	Circulation	Baldor	M2531T	Unknown	~10	-
Pump	Boiler Room	Circulation	Baldor	M2531T	Unknown	~10	-
Pump	Boiler Room	Sump	Well	H368	Unknown	~5	+
Pump	Boller Room	Bump	AO Smith Robbins &	H328	Unienciwn	-5	-
Pump	Boiler Room	Circulation	Muers	Unknown	Unknown	~15	-
Pump	Boiler Room	Circulation	Unknown	P55CSS-1246	Unknown	~10	

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	Boller Room	Circulation	Unknown	P55C99-1240	Unknown	~10	
P	Boller Room	Circulation	Grundfos	P/N 52722363	Unknown	~10	- 28
2	Other	Classroom 304A	Unknown	Older 3 ton	Unknown	>15	10
ACU		Classroom 394	unknown	Older "real old" 2 ton unit	Unknown	>15	12
ACU	Other	Mailroom	Air Temp	2 ton unit	Unknown	~10	15
ACU	Other	Rending Room	Air Temp	2 ton unit	Unknown	~10	10
ACU	Other	Teacher's Break Room near Cateteria	Air Temp	3 ton unit	Unknown	~10	12

Section 4 Energy Conservation and Retroff Measures

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

CDM also created an inventory of observed domestic water heaters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-3 below.

Table 4.2-3 Benjamin Franklin Middle School Domestic Water Heaters									
Location	Make	Storage Capacity (Gallons)	Model Number	Туре	Heating Capacity	Observed Condition			
Boller Room	AO Smith	Unknown	Unknown	Electric	Unknown	Pear			

4.2.2 Bryant Elementary School

A model of the Bryant Elementary School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and oil bills from November 2007 to December 2009. Figure 4.2-4 below compares actual monthly electricity usages, with those predicted by the eQuest model.

CDM

Section 4 Energy Conservation and Retrofit Measures

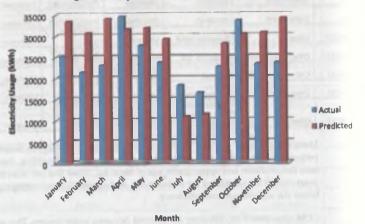
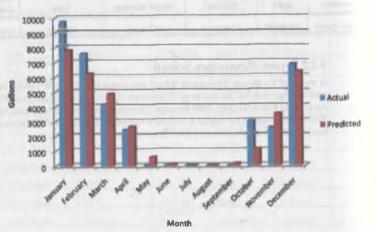


Figure 4.2-4: Bryant Elementary School Electricity Usage

Increased electrical usage in the winter is indicative of the greater heat load during the peak heating season as well as the heavy occupancy during these months.

Figure 4.2-5 below compares the school's actual monthly oil usage to model-predicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption.



CDM

Section 4 Energy Conservation and Retroft Measures

Currently the HVAC systems at the Bryant Elementary School are controlled independently, by room thermostats. It is recommended that a direct digital control (DDC) building management system (BMS) be implemented. A system like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the school to save, on average, 10% of the energy being used for HVAC. Table 4.2-4 demonstrates the potential payback from such an implementation.

Table 4.2-4: Bryant Elementary School I	DDC BMS Payback
Predicted Annual Savings (Gallons Oil)	3,322
Annual Savings (OII)	\$7,708
Predicted Annual Savings (kWh)	21,038
Annual Savings (Electricity)	\$3,640
Total Annual Savings	\$11,347
Initial Capital Cost of Upgrade	\$40,915
Incentives**	\$0
Cost of Upgrade	\$40,915
Annual Maintenance Cost Savings (AMCS)	\$0
Bimple Payback	3.6
Lifetime Energy Savings (15 years)*	\$211,044.62
Annual Return on Investment (AROI)	21.07%
Internal Rate of Return (IRR)	29.88%
Net Present Value (NPV)	\$124,334.44

*Assumes 3% yearly inflation on oil and electricity costs **No Incentives found for this upgrade

Currently, the heating system utilizes two (2) Smith Cast Iron Sectional boilers. Each boiler has a gross-output capacity of 2903 MBH. CDM conservatively estimates these boilers to be 80% efficient.

CDM recommends replacing these boilers with high-efficiency, natural-gas fired, condensing boilers. Based on the building model, and accounting for a 25% safety factor, anticipates that two (2) 3,000 MBH output, high-efficiency condensing boilers should adequately heat the school. In this upgrade, the existing steam heating system would be retrofitted for hot water use. Steam traps would be replaced with hot water control valves, condensate piping would be scheduled for demolition, and new hot water return piping and insulation would be installed.

CDM

Section 4 Energy Canservation and Retroft Measures

Figure 4.2-6 compares current gas usage with predicted gas usage resulting from a switch to high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~91.5% and return water temperature of 100°F.

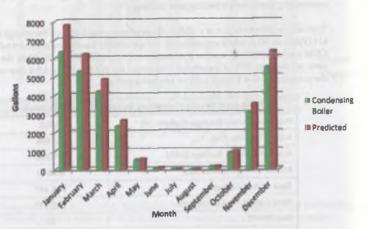


Figure 4.2-6: Bryant Elementary School - Botter Upgrade - Oil Usage

Fiscal savings from such an upgrade are then identified in Table 4.2-5 below. The aggregate cost of natural gas calculated from the utility data for this school is not representative of typical natural gas costs relative to other schools, because the school is still expensed for service and distribution charges despite using very little gas. As such, the cost of natural gas per therm used to calculate fiscal savings is the average of the aggregate costs for all eight buildings. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical firetube bollers. CDM estimates a firetube boiler system will typically cost around \$3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around \$2,000 per year. Therefore, replacing the existing boiler system with a condensing boiler system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 4.2-5: Bryant Elementary School Boller Upgrade Paybaak						
Current Annual Oil Cost for Existing Bollers	\$77,078					
Predicted Annual Gas Cost for Condensing Boilers	\$57,704					

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Energy	Conservation	and	Retrofit	Mossures

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Table 4.2-5: Bryant Elementary School Bo	ller Upgrade Payback
Total Annual Savings	\$19,371
Initial Capital Cost of Upgrade	\$181,165
Incentives**	\$6,000
Cost of Upgrade	\$175,165
Simple Payback	8.4
Lifetime Energy Savings (24 years)*	\$702,887 20
Annual Maintenance Cost Savings (AMCS)	\$1,500
Annual Return on Investment (AROI)	7.75%
Internal Rate of Return (IRR)	13.65%
Net Present Value (NPV)	\$301,609.52

*Assumes 3% yearly inflation on fuel costs

"Incentives, per New Jersey Clean Energy Program, are \$1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-6 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Table 4.2-6 Brysht Elementary School HVAC Equipment Service Lives											
Hancrighten (Tay ID)	Unit Location	Service Location	Manufacturer	Model	fistimated Efficiency	Estimated Age (Years).	ASHRAE Expected Life (Years)				
20	Nursets	Nurse's Office	Trana	TTR018D100AD	Unknown	-7	20				
×	Root	Interior Classroom	Friedrich	MR24C3F	SEER 18	-5	29				
xc	Roof	Special Services	Friedrich	MR12C1P	SEER 18	-5	20				
x	Root	Special Services	Friedrich	MR12C1F	SEER 18	-5	20				
20	Root	Special Services	Friedrich	MR12C1F	SEER 18	-5	20				

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Section 4 Energy Conservation and Retrofit Measures

Description [Tag ID]	Unit Location	Service Location	Menufacturer	Nodel	Estimated Edisiency	Estimated Age (Years)	ASHR Expect Life (Year)
ACC	Roof - Server Room	Server Room	Davion	outdoor: MAKA-024JAX; Indoor: MBHA-14J0GNUAA	Unknown	~7	20
ACC	Roof	Speech Therapy	Friedrich	MR12Y1F	BEER 18	~5	20
ACC	Other	Principal's Office	Friedrich	outdoor: MR18Y3E; indoor ¹ MW18Y3E	SHER 18	~5	20
ACC	Other	Main Office	Friedrich	outdoor: MR24C3E; indoor: MW24C3E	SEER 18	~5	20
AHU	Other	General Building	Trana	MCCA012MAG0A0A0DD0AA00	~80%	13	20
Boiler	Boller Room	Boiler Room	HB Smith	M45L Mills Boiler	-80%	>20	23
Boller	Boller Roam	Boiler Room	HE Smith	M45L Mills Bollor	-80%	>20	25
EF	Roof	Unknown	PVC	CX 78	Unknown	~7	20
EF	roof- lower, above classroom	Unknown	PVC	DX 99	Unknown	~7	20
EF	Roof - Caletaria	Caleteria	PVC	0X158	Unknown	~7	20
EF	Roof - Cafeleris	Catetoria	PVC	DX98	Unknown	~7	20
EF	Rix# - Nurse's office	Nurse's Office	PVC	DX 78	Unknown	~7	20
EF	Root - Nurse's office	Nurse's Office	PVC	DX 78	Unknown	~7	20
EF	Roof - Nurse's office	Nurse's Office	PVC	DX 78	Unknown	~7	20
MAU	Roof Cafeteria	Cafeteria	Trane	RAUCC20EBM13D	~75%	~7	20
Pump	Boiler Room	Circulation	Taco	P63CZC-3020	Unknown	~7	20
Pump	Boller Room	Circulation	Taco	P63CZC-3020	Unknown	~7	20
Pump	Boller Room	Sump	Unknown	unknown	Unknown	~5	12
Wall ACU	Other	Nurse's Office	Friedrich	KS15L10-A	Unknown	~5	10
Wall AC	Other	Room 15 - Child Therapy	Friedrich	MR24Y3F	Unknown	~5	10
Wall ACU	Other	Room 33	Whinkool	ACQ082XAD	Unknown	~7	10
Wall ACU	Other	Room 33	Whinloool	ACQ052XA0	Unknown	-7	10
Wall ACU	Other	Teacher's Lounge	GE	Unknown	Unknown	older	10

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Section 4 Energy Conservation and Rebroft Measures

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

CDM also created an inventory of observed domestic water heaters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-7 below.

	Table 4.2-7 Bryant Elementary School Domestic Water Heaters								
Location	Make	Storage Capacity (Gallone)	Model Number	Туре	Heating Capacity	Observat Costilium			
Boiler Room	Rheem	50	1PZ75	Electric	4500 W	Gaad			
Roof Access - room adjacent to Delateria	Rudd Evon:lean	40	ELD40-B	Electric	6000 W	Good			

4.2.3 Eugene Field Administration Building

A model of the Eugene Field Administration Building was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and oil bills from November 2007 to December 2009. Figure 4.2-7 below compares actual monthly electricity usages, with those predicted by the eQuest model.

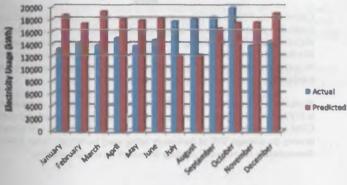


Figure 4.2-7: Eugens Field Administration Building Electricity Usage

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Local spikes in the summer could be attributed to summer session activities or increased occupancy due to administrative preparation for the next school year. Increased electrical usage in the winter is indicative of the greater heat load during the peak heating season as well as the heavy occupancy during these months.

Figure 4.2-8 below compares the school's actual monthly oil usage to model-predicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption.

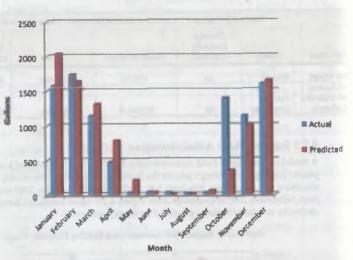


Figure 4.2-8: Eugene Field Administration Building Oil Usage

Currently the HVAC systems at the Eugene Field Administration Building are controlled independently, by room thermostats. It is recommended that a direct digital control (DDC) building management system (BMS) be implemented. A system like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the building to save, on average, 10% of the energy being used for HVAC. Table 4.2-8 demonstrates the potential payback from such an implementation.

Energy Conservation and Retroft Measures

Table 4.2-8: Eugene Field Administration Bull	ding DDC IBMS Payback
Predicted Annual Savings (Gatons Oil)	911
Annual Savings (OII)	\$2,095
Predicted Annual Savings (kWh)	10,212
Annual Savings (Electricity)	\$1,683
Totai Annual Savings	\$3,777
Initial Capital Cost of Upgrade	\$21,456
Incentives**	\$0
Cost of Upgrade	\$21,456
Annual Maintenance Cost Savings (AMCS)	\$0
Simple Payback	5.7
Lifetime Energy Savings (15 years)*	\$70,258.14
Annual Return on Investment (AROI)	10.94%
Internal Rate of Return (IRR)	18.44%
Net Present Value (NPV)	\$33.554.74

*Assumes 3% yearly inflation on oil and electricity costs **No Incentives found for this upgrade

Currently, the heating system utilizes two (2) Smith Cast Iron Sectional boilers. Each boiler has a gross-output capacity of 1827 MBH. CDM conservatively estimates these boilers to be 80% efficient.

CDM recommends replacing these boilers with high-efficiency, natural gas-fired, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM anticipates that two (2) 3,000 MBH output, high-efficiency condensing boilers should adequately heat the school.

Figure 4.2-9 compares current gas usage with predicted gas usage resulting from a switch to high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~91.5% and return water temperature of 100°F.

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Section 4 Energy Conservation and Retrofit Measures

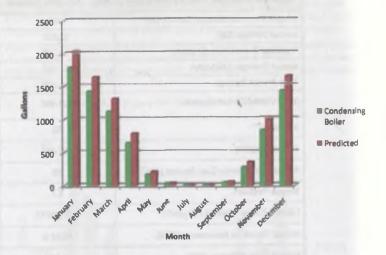


Figure 4.2-9: Eugene Field Administration Building - Baller Upgrade - Oil Usage

Fiscal savings from such an upgrade are then identified in Table 4.2-9 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing bollers, their operation and maintenance costs tend to be less than those of typical firetube bollers. CDM estimates a firetube boller system will typically cost around \$3,500 per year for regular preventative maintenance, whereas a condensing boller system would cost around \$2,000 per year. Therefore, replacing the existing boller system with a condensing boller system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 4.2-9: Eugene Field Administration Build	ng Boiler Upgrade Payback
Current Annual Oil Cost for Existing Boilers	\$20,945
Predicted Annual Gas Cost for Condensing Bollers	\$15,428
Total Annual Savings	\$5,517
Initial Capital Cost of Upgrade	\$104,127
Incentives**	\$6,000
Cost of Upgrade	\$98,127
Simple Psyback	14.0

CDM

Section 4 Energy Conservation and Retrolit Measures

Lifetime Energy Savings (24 years)*	\$225,935.69
Annual Maintenance Cost Savings (AMCS)	\$1,500
Annual Return on Investment (AROI)	2.98%
Internal Rate of Return (IRR)	7.18%
Net Present Value (NPV)	\$55,831.30

"Assumes 3% yearly inflation on fuel costs

"Incentives, per New Jersey Clean Energy Program, are \$1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-10 below. along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

	Table 4.2-10	Eugene Field Adr	ninistration Build	ting HYAC Equi	pment Service	Lives	
Description (Tag ID)	Unit Location	Bervice Location	Manufacturer	Medel	Estimated #fficiency	Estimated Age (Years)	ASHRAE Expedied Life
ACC	Meetna Room	Meeting Room	Friedrich	MW24C3E/M R24C3E	36ER 18	5	20
ACC	Meeting (00m	Maeting ream	York	CA91-265	Unitationen	-7	32
ACC	Beorptary's Office	Secretary's Office	Friedrich	MW18C3E/M R18C3E	SEER 18		20
ACC	Superintendent	Superintendent	Friedrich	MW30C3F/MI R30C3F	SEER 18	-6	20
ACC	Assistant Succerclendent	Assistant Supprintendant	Friedrich	MW18C3E/M	BEER 18	-5	270
ACC	Devid Bicofsky's Offices	Devid Bicofeky's	Friedrich	MW24C3F/M	BEER 18	-6	20
ACC	Admin Assistants	Admin	Friedrich	MW30C3F/M	SEER 18	-5	1
ACC	From 4A	Room #A	Friedrich	MW10C3E/M	SEER 10	-5	-
ACC	Hoom 4A	Room #A	Friedrich	MW18C3E/M	SEER 18	-1	20



Section 4 Energy Conservation and Retroft Measures

Description [Teg ID]	Unit Location	Service Location	Menufacturer	Mode!	Estimated Efficiency	Estimated Age (Years)	ALL C
ACC	Christine Ftanagan's Office	Christine Flanegan's Office	Friedrich	MW12C1E/M R12C1E	SEER 18	~5	
ACC	Christine Flansgan's Office	Christine Flanegan's Office	Friedrich	MW12C1E/M R12C1E	SEER 18	~5	
ACC	Christine Flanegan's Office	Christine Flanegan's Office	Friedrich	MW24C3E/M R24C3E	SEER 18	-5	
ACC	Deldre's Office	Deldre's Office	Friedrich	MW24C3E/M R24C3E	SEER 18	~5	
ACC	Deidre's Office	Deidre s Office	Friedrich	MW12C1E/M R12C1E MW16C3E/M	SEER 18	~5	
ACC	Deldre's Office	Deidre's Office	Friedrich	R18C3 MW24C3F/M	SEER 18	~5	-
ACC	Deidre's Office Room 5- Staff	Deidre's Office Room 5- Staff	Friedrich	R24C3F MW24C3E/M	SEER 18	-5	-
ACC	Development Room 5- Staff Development	Room 5- Staff	Friedrich	R24C3E MW24C3E/M R24C3E	SEER 18	~5	1
ACC	Room 7- Special Services	Room 7- Special Services	Friedrich	MW24C3E/M R24C3E	SEER 18	~5	
ACC	Room 7- Special Services	Room 7- Special Services	Friedrich	MW24C3E/M R24C3E	SEER 18	-5	
ACC	Room 7-	Room 7- Special Services	Friedrich	MW24C3E/M R24C3E	SEER 18	~5	
ACC	Room 20 - Transportation	Room 20 - Transportation	Friedrich	MW24C3E/M R24C3E/M	SEER 18	~5	
ACC	Room 20 - Transportation Room 20 -	Room 20 - Transportation Room 20 -	Friedrich	AC3E/M R24C3E MW24C3E/M	SEER 18	~5	-
ACC	Transportation Room 20 -	Transportation Room 20 -	Friedrich	R24C3E MW18Y3F/M	SEER 18	~5	-
ACC	Temportation Room of Office	Transportation Room off Office	Friedrich Friedrich	R18Y3F MW18Y3F/M	SEER 18 SEER 18	-5	-
ACC	Speces	Speces	Unitary Products	R16Y3F	SECK 10		T
ACC	Roof Director of	Unknown Director of Students	Group	G MW12C1F/M R12C1F	SEER 18	-5	-
ACC	Students Director of Students	Director of Students	Friedrich	MW12C1F/M R12C1F	SEER 18	-5	
ACC	Classroom 21	Claseroom 21	Friedrich	MW24C3F/M R24C3F	SEER 18	~5	-
Boller	Boiler Room	Bidg dist	HB Smith	26A-8	~80%	>20	-
Boiler	Boiler Room	Bidg dist	HB Smith	284-6	~80%	>20	+
MAU	Gym	Gym	Carrier/Baldor	Unknown	~80%	~7	1

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Section 4 Energy Conservation and Retrofit Measures

-	I		1				ASHINA
Cesoription (Tag ID)	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Yeare)	Expected Lille (Years)
		Gym	Cerrior/Ealdor	Unknown	-80%	-7	Ξθ
MAU	Gym			EVE14STTD	0010		20
	Poller Room	Circulation	Unknown	R5352A8	Unknown	~10	20
Pump				EVE140TTD			
Pump	Boller Rouni	Girculation	Unknown	RETARA	Unknown	~10	<u>29</u>
		Circulation	Unknown	EVE145TTD R5362AB	Unknown	~10	
Pump	Boile Room	Officiential	CHARLOWIT	1 123 104	Cristian and		1
	Boller Read	Fuel of	Dayton	5::447C	Untroum	~10	The
Pump	- Marchard						
Pump	Boller Moom	FileI oli	Dayton	511170	Untrocan	~1 Ω	20
	Statement of the second		Bell and	101010			
Pump	Bolle: Room	<u> Ĉirculation</u>	Gosneti	HVÇiğ	Unincen	~10	
Wall ACU	Faculty Room	Finality Room	Unknown	<u>Ųako mo</u>	Unknowm	-7	18
Wall ACU	Office (Gym)	Ôñer (Gym)	GE	AMDIGABMI	Unkaciwa	~7	鍧
	Beorgtary's	Secretary's					
Nell ACU	Offica	Office	Trane	Unknowity	Unknown	~7	12
Nall ACU	Devid Bloofsky's	David Bioofeky's Office	ĜĒ	Unknown	Uninown	~7	18
	Admin	Admin		COMPLEX OF 1	1 Digmoscienti	1	1.0
Wall ACU	Assistants	Assistante	GE	ARM27DAR	Unknown	~7	18
	Outer Large	Outer Large				1	
Wall ACU	Admin	Admin	EMI	Unknown	Unkasim	-7	10
Nal ACU	Director's Office	Director's Office	GE	Unknown	ปละกองก	-7	10
Well ACU	Server Forem	Server Room	ĞĒ	Unknown)	Unknown	~10	10
Well ACU	Server Flaum	Sarver Ronn	GE	Unkapen	Unknown	~10	镝
Wall ACU	Cina moom 25	Classroom 25	GE	Uakaosa	Unknç m	-10	10
Wall ACU	Chaleroon 25	Classroom 25	Kentrore	Uningwa	Unimoun	~10	18
Wall ACU	Classroom 23	Cleastoom 23	Friedrich	Uakaowa	Untrawn	~10	10
Well ACU	Room 21 A &	Room 21 A 6	Unknown	Unknown	Unteren	-10	1a
Wall ACU	Room 21 A &	Room 21 A 8	Unknown		Unkindasen	~10	10

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

CDM

Section 4 Energy Conservation and Retrofit Measure

CDM also created an inventory of observed domestic water heaters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-11 below.

	Table 4.2-	11 Eugene Field	Administration Build	ling Domestic Wa	ter Hentern
Location	Marke	Storage Capecity (Gallons)	Model Number	Туре	Heating Capacity
Boiler Room	Rheem	50	41V50	Gas fired	40 MBH

4.2.4 Hawthorne Elementary School

A model of the Hawthorne Elementary School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009. Figure 4.2-10 below compares actual monthly electricity usages, with those predicted by the eQuest model.

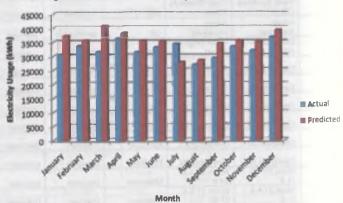


Figure 4.2-10: Hawthorne Elementary School Electricity Usage

Increased electrical usage in the winter is indicative of the greater heat load during the peak heating season as well as the heavy occupancy during these months.

Figure 4.2-11 below compares the school's actual monthly natural gas usage to modelpredicted natural gas use.

Section 4 Energy Conservation and Retroft Measures

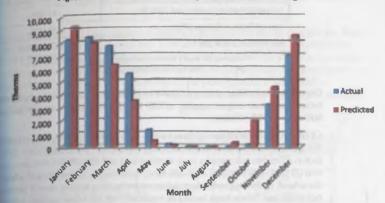


Figure 4.2-11: Hawthorne Elementary School Natural Gas Usage

Currently the HVAC systems at the Hawthorne Elementary School are controlled independently, by room thermostats. It is recommended that a direct digital control (DDC) building management system (BMS) be implemented. A system like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize comfort, while inimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the school to save, on average, 10% of the energy being used for HVAC, Table 4.2-12 demonstrates the potential payback from such an implementation.

Table 4.2-12: Hawthorne Elementary Scho	ol DOC BMS Payback
Predicted Annual Savings (Therms)	4.297
Annual Savings (Natural Gas)	\$5,371
Predicted Annual Savings (kWh)	13,276
Annual Savings (Electricity)	\$2,189
Total Annual Savings	\$7,580
Initial Capital Cost of Upgrade	\$42,584
Incentives**	\$0
Cost of Upgrade	\$42,564
Annual Maintenance Cost Savings (AMCS)	\$0
Simple Payback	5.6
Lifetime Energy Savings (15 years)*	\$140,607.09

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Section 4 Energy Conservation and Retrofit Measures

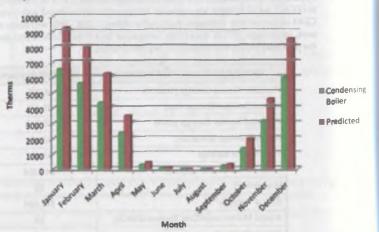
hool DDC BMS Payback
11.09%
18.62%
\$67,512.33

*Assumes 3% yearly teflation on natural gas and electricity costs **No Incentives found for this upgrade

Currently, the heating system utilizes two (2) Smith Cast Iron Sectional boilers. Each boiler has a gross-output capacity of 2289 MBH. CDM conservatively estimates these boilers to be 75% efficient.

CDM recommends replacing these boilers with high-efficiency, natural gas-fired, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a peak heating load of 2,400 MBH. CDM anticipates that two (2) 3,000 MBH output, high-efficiency condensing boilers should adequately heat the school. In this upgrade, the existing steam heating system would be retrofitted for hot water use. Steam traps would be replaced with hot water control valves, condensate piping would be scheduled for demolition, and new hot water return piping and insulation would be installed.

Figure 4.2-12 compares current gas usage with predicted gas usage resulting from a switch to high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~92% and return water temperature of 100°F.



4-36

Figure 4,3-12: Hawthorne Elementary School - Boller Upgrade - Natural Gas Usage

Fiscal savings from such an upgrade are then identified in Table 4.2-13 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's

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important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical firetube boilers. CDM estimates a firetube boiler system will typically cost around \$3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around \$2,000 per year. Therefore, replacing the existing boiler system with a condensing boiler system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 4.2-13: Hawthome Elementary School I	Boller Upgrade Payback
Predicted Annual Savings (Therms)	12,991
Total Annual Savings	\$18,239
Initial Capital Cost of Upgrade	\$181,165
Incentives**	\$6,000
Cost of Upgrade	\$175,165
Simple Payback	9.9
Lifetime Energy Savings (24 years)*	\$595,048.01
Annuel Maintenance Cost Savings (AMCS)	\$1.500
Annuel Return on Investment (AROI)	5.96%
Internal Rate of Return (IRR)	11.46%
Net Present Value (NPV)	\$228,620.39

*Assumes 3% yearly inflation on natural gas costs

"Incentives, per New Jersey Clean Energy Program, are \$1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC related equipment that may be used as an estimate for the useful life of HVAC related equipment that may be used as an estimate for the useful life of HVAC related equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-14 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

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Section 4 Energy Conservation and Retroft Measures

Description [Tag ID]	Unit	Service Location	Manufacturer	School HVAC Equip Model	Estimated Efficiency	Estimated Age (Years)	ADI
ACC	Roof	Principal's Office	Friedrich	MR24C3F	SEER 18	-5	
ACC	Roof	Server Closet	Friedrich	MR24C3F	SEER 18	~5	
ACC	Roof	Principal's Office	Friedrich	MR30C3F	SEER 18	~5	
ACC	Left Roof	Interior	Trane	RAUC020EBM13D	Unknown	~7	
AHU	Library Roof	Interior	Trane	5ACA-501-A	Unknown	>20	
AHU	Computer Lab Roof	Interior	Trane	SACA-501-A	Unknown	>20	
AHU	Roof	Interior	Unknown	Unknown	Unknown	~15	-
AHU	Roof Boiler	Interior	Unknown	Unknown	Unknown	~15	
Boiler	Room	Interior	HB Smith	Unknown	~75%	~25	
Boller	Room	Interior	HB Smith	Unknown	~75%	-25	
EF	Roof	Interior	PVC	DX138	Unknown	-7	
EF	Roof	Interior	PVC	DX138	Unknown	-7	
EF	Roof	Interior	PVC	DX168	Unknown	-7	
EF	Roof	Interior	PVC	DX16B	Unknown	-7	
EF	Roof	Interior	PVC	DX78	Unknown	-7	
EF	Roof	Interior	PVC	DX78	Unknown	-7	
EF	Clessroom Roof	Interior	Unknown	Unknown	Unknown	~20	
EF	Classroom Roof	Interior	Unknown	Unknown	Unknown	~20	
EF	Roof	Restroom	PVC	DX138	Unknown	-7	
EF	Roof	Restroom	PVC	DX16B	Unknown	-7	-
EF	Roof	Restroom	PVC	DX78	Unknown	-7	-
EF	Roof	Restroom	PVC	DX188	Unknown	-7	-
EF	Roaf	Cafeteria	PVC	DX16B	Unknown	-7	-
EF	Root	Cefeteria	PVC	DX98	Unknown	-7	-
EF	Roof	Cafeteria	PVC	DX78	Unknown	-7	-
EF	Roaf	Cafeteria	PVC	CM10	Unknown	-7	

Table 4.2-14 Hawthome Elementary School HVAC Equipment Service Lives Estimated ABHRAE Estimated Service Aga Ference Description Unit Location Manufacturer (Years) Location Model Efficiency Lille (Peers)-(Tag ID) MCCA012BBG0 Unknown Cafeteria Trane A)DAD. 14 20 Roal Role Circulation Emerson P63CZ8-3019 Unknown -10 20 Room Pump (P-1) Boile Circulation Manthon DQJ 56T17D53338 Unknown -10 Room Pump (P-2) Teachers Teachara GRI AVM24DCR1 10 Lounge Unknown ~10 ounde Well ACU Room 11 Room 11 **GE** Child Study Child Study Unknown Unknown -10 1 Well ACU Nurse's Nurse's GE ~10 10 Office Unknown Unknown Office Mell AGU Room 14 GE AVM18DAV1 Unknown ~10 Room 14 10 Wall ACU

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

It can be seen that several of the rooftop units have either exceeded or are close to exceeding their ASHRAE expected service lives. Consequently, it can be assumed that these units are not performing at their rated efficiencies. The two Trane units on the library and media center roof are 5 ton units that are in need of immediate replacement. Table 4.2-15 demonstrates the anticipated combined savings resulting from upgrading to similarly sized modern units, with higher cooling and heating efficiencies.

Table 4.2-15: Hawthorne Elementary School RTU Replacement Payback					
Predicted Annual Savings (therms)	268				
Predicted Annual Savings (kwh)	2098				
Total Annual Savings	\$681				
Initial Capital Cost of Upgrade	\$17,753				
Incentives**	\$790				
Cost of Upgrade	\$16,963				
Simple Payback	24.9				
Lifetime Energy Savings (24 years)*	\$23,444.43				
Annual Maintenance Cost Savings (AMC8)	\$0				

4-39

Section 4

Energy Conservation and Retroft Measures.

Section 4 Energy Conservation and Resrot

Description (Tag ID)	Linik Location	Bervice Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	100
ACC	Roof	Principal's Office	Friedrich	MR2NC3F	SEER 10	~5	F
ACC	Roof	Server Closet	Fredrich	MR24C3F	SEER 18	-5	F
ACC	Roat	Principal's Office	Friedrich	MR30C3F	SEER 18	-5	
ACC	Left Rool	Interior	Trane	RAUCOZOE MISD	Unknown	-7	
AHU	Library Roof	Interior	Trans	SACA-SO1-A	Unknown	>20	
AHU	Computer Lab Rool	Interior	Trans	SACA-501-A	Unknown	>20	
AHU	Roof	Intertor	Uninown	Unknown	Unknown	-15	
AHU	Roof	Interior	Uninown	Unknown	Unknown	~15	-
Boiler	Room Boller	Interior	HB Smith	Unknown	-75%	-25	-
Bofer	Room	Interior	HB Smith	Unknown	-75%	-25	
EF	Root	Interior	PVC	DX13	Unknown	~7	-
EF	Roal	Interior	PVC	DX130	Unknown	-7	-
CF.	Roof	Interior	PVC	DX100	Unknown	~7	
EF	Pipal	Interior	PVC	DX10B	Unknown	~7	-
EF	Roof	Interior	PVC	DX7	Unknown	~7	
(F	Roof	Interior	PVC	DX7	Unknown	-7	-
EF	Classrooth Roof	Interior	Unknown	Unknown	Unknown	~20	-
0	Classroom Roof	Interior	Unknown	Unknown	Unknown	-20	-
EF	Rool	Restroom	PVG	DX130	Unknown	-7	-
UF	Roof	Restroom	PVG	DX1	Unknown	-7	-
EF	Real	Restroom	PVC	DX7	Unknown	-7	-
EF	Roal	Restroom	PYC	DX100	Unknown	-7	-
EF	Root	Cafateria	PVC	0X100	Unknown	-7	-
EF	Roat	Catatana	PVC	OXP	Unknown	-7	-
EF	Roof	Cafeteria	PVC	DX78	Unknown	-7	-
EF	Roal	Catatana	PVC	CM10	Unknown	-7	L

Sector 4 Energy Conservation and Revolt Measures

-	Location	Earvian Location	Manufacturer	Nadel		Estimated Aps (Yeam)	Expected Ullo (Feare)
TAN ID	Roof	Celsteria	Trans	MCCA012BBG0 A)DA0	Unknown	14	20
(0.1)	Room	Circulation	Emerson	P83C28-3018	Unknown	~10	20
(1-1)	Boler	Circulation	Menthon	DQJ 56T 17063335	Unknown	-10	2
(FA)	Teachart	Lounge	GE	AVM24DCR1	Unknown	~10	
ACU ACU	Room 11 Child Study	Room 11 Child Study	g	Unknown	Unknown	-10	
cu	Numers Office	Nummer's Office	QE	Unknown	Unknown	~10	10
JU	Report 14	Room 14	GE	AVMIEDAVI	Unknown	~10	

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

It can be seen that several of the rooftop units have either exceeded or are close to exceeding their ASHRAE expected service lives. Consequently, it can be assumed that these units are not performing at their rated efficiencies. The two Trane units on the library and media center roof are 5 ton units that are in need of immediate replacement. Table 4.2-15 demonstrates the anticipated combined savings resulting from upgrading to similarly sized modern units, with higher cooling and heating efficiencies.

Table 4.2-15: Hawthorne Elementary School RTU Replacement Payback				
Predicted Annual Savings (therms)	208			
Predicted Annual Savings (kwh)	2008			
Total Annual Savings	2011			
Initial Capital Cost of Upgrade	\$17,753			
Incentivos**	8790			
Cost of Upgrade	\$16,963			
Simple Paybaok	34.0			
Liletime Energy Savings (34 years)*	823,444.43			
Annual Maintenance Cost Savings (AMC8)	\$0			

Sector 4 Energy Conservation and Retroft Measures

Table 4.2-15: Hawthorne Bomentary Schoo	ATU Replacement Payback
Annual Return on Investment (AROI)	(-0.15%)
Internal Rate of Return (IRR)	(2.46%)
Net Present Value (NPV)	(\$1,095.17)

"Assumes 3% yearly inflation on electricity costs

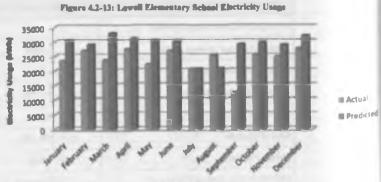
"Incentives, per New Jerney Smart Stert Program, \$79/Ton

CDM also created an inventory of observed domestic water heaters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak officiency. This domestic water heater inventory may be seen as Table 4.2-16 below.

	Table 4	2-16 Hawthorn	e Elementary School D	omestic Water	Heaters	
Location	Main	Storage Capecity (Gallona)	Model Number	Туре	Heating Capacity	Obact Cond
Boiler Room	Rheem	80	81VBODA	Electric	4500 kW	Goor

4.2.5 Lowell Elementary School

A model of the Lowell Elementary School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and oil bills from November 2007 to December 2009. Figure 4.2-13 below compares actual monthly electricity usages, with those predicted by the eQuest model.





Local spikes in the summer could be attributed to summer session activities or increased accupancy due to preparation for the next school year. Increased electrical usage in the winter is indicative of the greater heat load during the peak heating session as well as the heavy occupancy during these months.

Figure 4.2-14 below compares the achool's actual monthly oil usage to modelpredicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption.

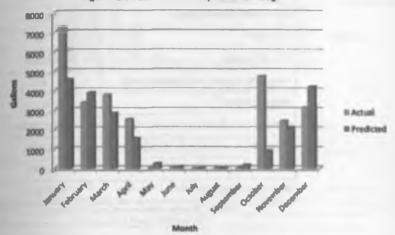


Figure 4.2-14: Lowell Elementary School Oll Usage

Currently the HVAC systems at the Lowell Elementary School are controlled independently, by room thermostats. It is recommended that a direct digital control (DDC) building management system (BMS) be implemented. A system like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the school to save, on average, 10% of the energy being used for HVAC. Table 4.2-17 demonstrates the potential payback from such as implementation.

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Bection 4 Every Communition and Related Measures

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Table 4.2-18: Lewell Elementary School	Boller Upgrade Payback
Internal Rate of Return (IRR)	11.44%
Nat Present Value (NPV)	\$263,080.23

"Anonaus 3% yearly inflation on fael com

"Incentives, per New Jersey Close Brangy Program, are \$1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it causes to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-19 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

		Table 4.2-19 Low	di Elementery S	chool HVAC Equipment	t Bervies Lives		
Description [Tag ID]	Unit	Service Location	Manufacturer	Model	Estimated	Estimate Age (Years)	Alle Esci
AGE	Grade	Principal/Main Office	Friedrich	MR30CJE	SEER 18	~5	
ACC	Grade	Principa"main office	Friedrich	MR30C3E	SEER 18	~5	
ACC	Roof	Interior rooms (Special Ed)	International Comfort Products	AC8030A2C1 FBA030GC1	Unistant	~10	2
ACC	Roaf	Library	Intercity Products Corps	CA5648VHD2 CBA048HB2	Unknown	~10	
ACC	Roaf	Library	Intercity Products Corps	CA5548VHD2 CBA048HB2	Unknown	-10	2
AGC	Root	Server Closel	Friedrich	autdoor: MR12C1F indoor: MW12C1F	SEER 18	-5	2
ACC	Roof	Computer Room	Intercity Products Corps.	CASESIMHD2 CRACCOMER	Unknown	~10	8
ACC	Roof	Computer Room	Intercity Products Corps	CAMINTO2 CBA036HB2	1. Interviewen	-10	2
ACC	Ruot	interior more	Friedrich	P-12	SEER 10	~5	2

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Bestion 4 Emergy Conservation and Related Measures

-		Table 4.2-16 Loss	el Elementary 5	chool HVAC Equipment Be	rvice Lives		
(Tau 10)	Unil Location	Service Location	Manufacturer	Marchel	Estimated Efficiency	Entimated Age (Years)	ASHRAE Expecter Life (Years)
	Roof	Calipteria	McCuary	ALP019D	Unknown	-15	20
HU	Room	Room 228	McQuay	BSCSIBLI 14DH	Unknown	-15	20
UIU	Bolier Room	Elida Dist	Hill Smith	28A-7	-60%	>20	25
toke	Boler Room	Bidg Dist	HB Smith	28A-S/W-07	-80%	>20	25
-	Roof	Restroom	Laren Cook	160PR 16PR	Unknown	-5	20
E	Roof	Interior	Carnes	VT818P1A1NA15SPCX	Unknown	-5	20
F	Roof	Interior	Carnes	VTBK2451C15SPCX	Unknown	~5	20
F	Rool	Interior	Carnes	VTBK21R1C1NA15SPCX	Unknown	~5	20
EF.	Roof	Interior	Carnes	VEBK10L1A1NA15APCX	Unknown	-5	20
F	Roof	Restroom/Locker Room	Unknown	Unknows	Unknown	-20	20
F	Roof	Restroom/Locker Room	Univolain	Unknowe	Unknown	-20	20
F	Roal	Restroom/Locker Room	Linknown	Unknown	Unknown	-20	20
F	Roof	RestroomLocker Room	Unknown	Unknown	Unknown	-20	20
F	Root	Restroom/Locker Room	Unknown	Unknown	Unknown	-20	20
FF	Roof	Kitchen	Carmes	VEBKOBLIAINAISAPCX	Unknown	-7	20
EF .	Roof	Interior	Cames	Unknown	Unknown	-7	20
FF	Low Roof	interior	Carnes	Unknown	Unknown	-7	29
EF	Low Roaf	Interior	Cames	Unknown	Unknown	-7	20
EF	Gym Roof	Gym	Loren Cook	BOPR BPR	Unknown	-7	20
F	Gym. Roof	Gym				-7	
EP	Roof	Classroom	Loren Cook	160PR 16PR	Unknown		20
<u>er</u>	Root	Cafoteria	Carnes	VEBK06L1A1NA15APCX VWDK08F3A1NA15SPX	Unknown	-7	20
0	Root	California	Carnes	VEBK301ATNA15SPCX	Unknown	-5	20
LE	Roof	Unknown	Carnes	VIBRISLIAINE20GX	Unknown	-5	20
ER	Root	Unknown	Cames	VIBK12K3A1NL20GX	Unknown	-7	20

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Bector 4 Energy Concernation and Ratrolt Measures

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	Table 4.2-19 Lowell @Incommy School HVAC Explorement Bervice Lives							
Description [Tag ID]	Unit	Service Location	Mamuflactureer	Blocks	Estimated Efficiency	Estimated Age (Years)		
Pump	Boiler Room	Circulation	Baldor	M3218T	Unknown	~10		
Pump	Boiler Room	Circulation	Baldor	M3218T	Unknown	-10		
Pump	Boiler Room	Feed Water	Baldor	Unknows	Unknown	~10		
Punto	Boller Room	Feed Water	Baldor	Unknown	Unknown	-10		
Purap	Boller	Circulation	Baldor	VM3158	Unknown	-10		
Punto	Boler	Sump	Unknown	8-135311-03	Unknown	-5		
Pump	Boller	Sump	Unknown	8-135311-03	Unknown	-5		
wall ACU	Nurse's Office	Nurse's Office	Carrier	Unknows	Unknown	-7		
wall ACU	Nurse's Office	Nurse's Office	Friedrich	Unknows	Unknown	-7		
wall ACU	Room 120	Room 120	Hot Point	Unknows	Unknown	~10		

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

It may be seen that some air handling units have likely exceeded their ASHRAE expected service lives. CDM recommends replacing these units as soon as financially feasible to ensure minimal downtime and mitigate increasing maintenance costs. However, CDM anticipates minimal energy savings from replacements as the units primarily utilize hot and chilled water colls and therefore do not have rated efficiencies that may be improved.

CDM also created an inventory of observed domastic water heaters. This will attempt to inform the BOE of any water heaters that are in mod of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at pask efficiency. This domastic water heater inventory may be seen as Table 4.2-20 below.

Bergion # Energy Conservation and Rebuft Measures

-	Table	4.2-20 Lowell	Liemantary School Do	mentic Water He	dara -	
Location	tight o	Storage Cepacity (Gallone)	Model Number	Тура	Heating Capacity	Observed Confilien
Boler Room		40 gal	FBG 40 242	Gas-find	32 MBH	Gent

4.2.6 Teaneck High School

Alana Espini Unit

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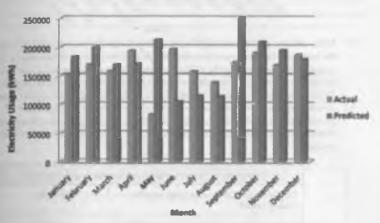
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A model of the Teanock High School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and oil bills from January 2008 to December 2008. Figure 4.2-16 below compares actual monthly electricity usages, with those predicted by the «Quest model.





Local apikes in the summer could be attributed to summer session activities or increased occupancy due to preparation for the next achool year. Increased electrical usage in the winter is indicative of the greater heat load during the peak heating sesson as well as the heavy occupancy during these months.

Figure 4.2-17 below compares actual oil usage to model-predicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption. The boilers are dual-fuel and use either oil or natural gas depending on which fuel option is chesper.

Energy Conservation and Retroft Messure:

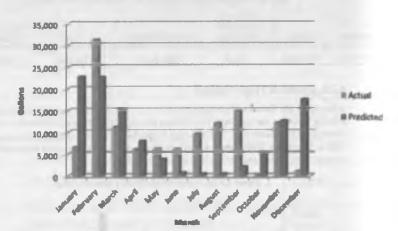


Figure 4.2-17; Teenesk High School Off Usage

In the existing system, the single stage absorption chiller is energined by steam from the boilers, which requires the boilers to run all year long. This results in a spike in oil usage in the summer months. CDM secondaries have loading the screw chillers in the summer months, so that the absorption chiller is only needed for peak conditions. The domestic hot water load on the existing boilers can be segregated to a new condensing domestic water heater to help accomplish this change. Table 4.2-21 provides anticipated savings associated with the implementation of a separate domestic hot water heater. No maintenance cost savings were considered for this measure.

Table 4.2-21: Teaneck High School DHW Heater Payleck					
Current Annual Oil Cost for DHW load on easiling bollers	\$15,702				
Predicted Asmuel Gas Cost for expensis DHW heater	\$6,725				
Total Annual Savings	\$8,977				
Initial Capital Cost of Upgrade	\$5,240				
Incantives**	\$0				
Cost of Upgrade	\$5,240				
Simple Paylack	0.5				
Lifetime Energy Savings (24 years)*	\$343,471.86				
Annual Maintenance Cost Bavings (AMCS)	80				
Annual Return on Investment (AROI)	108.24%				

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Section 4 Emergy Conservation and Retroit Measures

Table 4.2-21: Teanack High School DHW Heater Payback				
Internal Ante of Rotum (IRR)	193.41%			
Net Present Value (NPV)	\$227,233.40			

"Assume 3% yearly reliation on fuel costs

"No accentives were noted for domestic hot water heaten

Currently, the chilled water, hot water, and domestic hot water circulation pumps are set to provide a constant flow through their respective systems when in operation. The Board expressed interest in variable speed control for the hot water circulation pumps. Varying the flow in the water systems to match building requirements can provide significant electricity savings, as the pumps are no longer consistently running at full speed. However, the decreased electricity is compensated by an increase in the oil load. Since the oil usage is a function of boiler run time, the cast iron, firetube boilers run at full capacity whenever they are running. Therefore, a variable frequency drive (VFD) on the water circulation pumps causes the boiler no run longer and consume more fuel to maet the building's heating and cooling needs. Table 4.2-22 provides anticipated savings associated with the implementation of variable speed drives for all pumps. CDM anticipates no maintenance cost savings associated with variable speed drives.

Table 4.2-32: Teanack High School Variable Speed Hot Water Pump Payment					
Predicted Annual Savings (kWh)	173,640				
Electricity-related Sevings	\$27,501				
Predicted Annuel Savings (Gal Oli)	-3,522				
Oil-related Servings	-\$11,729				
Total Annual Savings	\$15,863				
Initial Capital Cost of Upgrade	\$76,123				
Incentives**	\$0				
Cost of Upgande	\$76,123				
Eimpis Paylanck	4.8				
Lifetime Energy Savings (15 years)*	\$296,030 29				
Annual Maintenance Cost Bavings (AMCS)	\$0				
Annual Return on Investment (AROI)	14.17%				
Internal Rate of Return (IRR)	22.24%				
Not Presant Value (NPV)	\$154,808.40				

"Assumes 3% yearly inflation on oil and electricity costs

4.00

""No incentives were noted for variable speed drives on hot water carculation pumps

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Over several decades, ASHRAE has compiled data pertaining to service lives of mast HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a malse-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decease with ags.

All major equipment noted during CDM's on site audit is listed in Table 4.3-23 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Where equipment ages were not found on the equipment tags, they have been estimated based on the unit appearance or approximate renovation dates. In some cases, service locations may have been estimated based on unit proximity. Additionally, in cases where a unit's manufacturer and/or model could not be determined due to an unreadable, fields, destroyed, or lost tag, manufacturer and model number information has been represented as "unknown".

Table 4.2-23 Tegrade High School HVAC Eggigment Bervice Lives							
Description [Tag ID]	Unit	Bervice	Manufacturer	Model	Enlimpted Efficiency	Age (Years)	AS Eq Life (
Absorption Chiller	Bother Room	Bildg Diel.	Trans	ABSC046ALM01A AAHABBAAAA0D 0 3011000011	Unimoun	+5	
ACC	Roof	Server Closed	Friedlich	MROBGIE	-BEER 18	~5	1
ACC	Roof	Server Closel	Friedlich	MROBCIE	-BEER 1	-5	1
ACC	Main Office	Man Office	Friedlich	NR30C3F, indoor evap: MW30Y3F	-BEER 18	-5	1
ACC	Principal Office	Principal Office	Friedlich	NR24C3F Edoor	-BEER 15	-5	1
ACC	Nurse's Office - 1al floor	Numeria Office - 1st floor	Deltin	FXMQ38MV.IU	Unknown	~5	1
ACC	Technicia n'a Room	Technician's Room	Friedrich	ouldoor: MR3DC3F indoor MW3DC3F	-SEER 10	~5	
ACC	Technicia n's Room	Technician's Room	Friedrich	ouldoor: MR30C3F, Indoor:	-GEER 18	~5	
ACU	Nurse's Office - 1st Roof	Narad's Cillica - 1al Roor	Canan	BREMON	Urangen	-5	4
ANU PRTU-6	Red	Audionum	1 and	Unknown	Unknown	>30	1



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Sacilier 4 Energy Contervation and Retrolit Measures

-	-	1	1	1		Estimated	ASHRAE
Description . (Tau Itil	Unit	Service Location	Manufacturer	Model	Estimated Efficiency	Age (Years)	Expected Life (Veens)
ANU PATU-AL	Roof	Media center	Tjernlund	Unkapen	Linksown	>30	34
ANU PRTU-1]	Roof	plicolowiana diasercione	McQuery	RWSBOARW	Listenown	- 20	20
ANU PREVIOUS	Roof	Lockers Hall	unkeawn	unkopm	Usknown	-20	20
AHE	Roof	Band Room	Trano	unknown	Ustrown	-0	20
Sec.	Roci	geridance, media, extentor classroome	McQuity	RWSROARW	Unknown	-20	20
ANU PRTU-21	Gym	Gem	Trave	DECETTA BIMA	Usknown	7	20
AHU		Gen	Trane	BROETTA BUMA	Unknown	7	
AM	Gym Dym Lookar	Gym Locker	-	MCCAD10GAV0AAA 00000CCAD0CDAD0 00AC000C000AA80	Controller	-	20
ANG	Room Boiler	Reom	Trans Cleaver	00	Unknown	-5	20
NAV.	Room	Billip Dist.	Brooks	C81-200-380-015	-85%	~10	25
	Boiler Room	ERIA DIM	Chiatver Broaks	C81-200-360-815	-85%	-10	25
57	Rial	AutBorium	Unknown	Unknown	Linknown	+20	20
107	Roaf	Auditorium	Linksport	Unknown	Unknown	>29	20
07	Roof	Art Room 327	Greenheck.	QUBE-131-4	Unknown	-5	20
<u>e</u>	Rod	Art Room 325	Greentheck.	GB-180-7	Unknown	-5	20
611	Rod	Kitchen	PVC	FX36BFT	Unknown	-5	30
EF	Roof	Haliway	PVC	FX16BFT	Unknown	-5	20
SE.	Roof	Hallway	PVC	0X78	UNINGWO	-5	20
IE	Root	Gum	Greentrack	G8-205-10	Unknown	-5	20
NF.	Root	Gen	Greenback	GB-200-10	Unimoun	-5	20
<u>er</u>	Root	Gym	Graenheck	G8-200-10	Unknown	-5	20
K P	Roal	Gym	Grantheck	GIB-200-10	Unimpwn	-5	20
310	Roal	3rd Roor Hallivory	PVC	AB35	Unknown	-5	20
1 P	Root	Barys Spiel	PVC	DAVIDSR	Usknown	-5	20
UP	Root	Girls Tollef	unisono	unitrown	unlinger:	-18	

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Energy Conservation and Reputit Measured

Table 4.2-23 Teanack High School HVAC Engineers Service Lives								
Dasseription (Tag ID)	Unit Location	Service	Mendlactorer	Note	Estimated Efficiency	Entimatine Age (Varans)	10.00	
		Resen						
EF	in the second	Girfs Toilet	PVC	DX109R	Unknown	-15		
E.b.	Red	Garia Coma	PW	UATUGH	Unandona		1	
EF	Roof	manen 321	PVC	DX10SR	Unknown	-5		
~~					Unknown	-20		
<u>EF</u>	Unknows	Unknown	Unkater	WXREE	Unitriown	-20	1	
7	Unknows	Untenown	Unknown	WACREEL	Unknown	-20	1	
Ø	Unknown	Uningen	Unineen	WXREEL	Unknown	~20		
	Art Rooms	Art Roome	Contraction of the local data				-	
	327 & 326	117 A 325						
MAU	(3rd R)	(200 0)	Тлаго	BOC6118 BAMA	Unknown	. 6	1	
MAIL	Room 140	Gm	Trans	BECETID BIMA	Unknown			
	Room 138	Copie		Concert for grant	Granting		-	
	(Aux Gym)	Gym	Trano	BECEIIC BANA	Unknown	0.	1	
_	Boller							
Piero	Room	Semp	Magnatek	8-180001-02	Unknown	-5	1	
Pin th	Room	Sump	Magnetek	8-188091-02	Unknown	-8		
	Boiler		Universal					
Purp	Room	Croulelion	Elactric	SVESST 17DECOA	Unknown	~10	1	
E	Room	Circulation	Conversal	SVESST 17DEEDA	Unknown	-10		
Prent	Boller	La Canal Chi	Electric Bell and	STEEDI II DIELEN	Gradional		1 1	
Plane	Room	Circulation	Gosaett	100AB F49	Unknown	~10	1	
_	Boile/	_						
Plano	Boler	Circulation	Tace	007-8F5	Unknown	-10		
Rigp	ROOM	Circulation	Balder	CJH3108	Unknown	-10	1	
	Bolint						i i	
Puno	Room	Citodation	Bakky	CJH3108	Unknown	~10	-	
	Boiler	milin	-	FM5010	Unknown	-10	1	
PLANE	Boller	Condensor	TAS	Philotty	Original			
Planto	HICOTH.	Condenser	Tace	FM5010	Unknown	~10		
	Doiler							
Рипр	Root	Circulation	Tace	92	Unknown	-10	-	
Paret	Boliar Room	Circulation	Tece	92	Unknown	~10	1	
	Boller							
Pump	Room	Circulation	Tece	FM4000	Unknown	-10	1	
1000	Boiler	matrice		5144000	Internet	-10	1	
Euro	Room	Circulation	Tece	FM4000	Unknown	-10		
Pump	Room.	Circulation	US Electrical	8075	Unknown	~10		
	Boller							
Plants	Higgm	Circulation	US Electrical	975 97514530101553564	Unknown	-10	-	
Fine	Boller Room	Circulation	Marathon	9VJ143TTDRESSBA	Unknown	-10		
	HOART			WIRLSTON SSIE				
Ритр	Room	Circulation	Marathon	8	Unknown	-10	-	
	Boilsr						1 1	

442

Section 4 Energy Conservation and Retrolt Measures

Table 4.2-23 Testesk High School HVAC Equipment Service Lives							
Dawney Ch	Unit	Service Location	Manufacturer	Medal	Entrusted Efficiency	Estimated Age (Years)	Astronomi Expected Life (Yeare)
1000	Botter Room	Fuel Of	Marathon	STUTISET 17334.5P	Uningen	-10	20
PART (P-1)	Boiter Room	Diraktion		BF88151-5/4	Unkraun	-10	28
Amp (0.7)	Bailer Room	Carolaten	AFS Industries	BF68151-34	Citekanowa	-10	28
100	Boller Room	Circulation	BPE Industries	MESB151-34	Linkson	813	28
NT.	Bailer Room	Condensor		37027839	(Introven	-10	20
PART	Boiler Room	Condenser	Bintdor	37027X33	Unkaguin	-10	28
nep	Boiler Room	Chiller	Umangan	Linksown	Unincen	-15	28
0.00	Boiler Room	Children	Urencian	Lintrowa	Litangen	-15	20
Beam Chiller	Baile: Office		Dunham	FCWX100	Lintergens	-15	23
Acres Chiller	Dalle: Office	fildy Dim	Dunham	PCV/X100	Uteknown	-15	23
	Presa Box	Press Bax	6****	AMD 10361	Unknown	Unknown	13
WHACU	Room 303	Room TES	Frigidinia Electrolyn	Linkoun	Linkomm	- 30	10
IN ACU	Technica! Cilosof	Technical	Unknowa	Electronia	Unkrainen	- 15	18
MACU	Admin Office	Adam Office	Unknown	Limitrown	Umbrigati	-15	18
UMACU	Science Lab	Galence Lab	Unknown	Unknown	Linknown	=15	18

Many classrooms in the school utilize unit ventilators for heating. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the aquipment-rated efficiency.

It can be seen that several of the rooftop units (RTU-1, 2, 3, 4, and 5) have either exceeded or are close to exceeding their ASHRAE expected service lives. Consequently, it can be assumed that these units are not performing at their rated efficiencies. Unfortunately, CDM was unable to determine the capacity of many of these units because model numbers were not available. For modeling and cost estimating purposes, the two large Tjernhand units have been assumed to each be 300 MBH models with a cooling capacity of 20 tons. Table 4.2-24 demonstrates the anticipated combined savings resulting from upgrading to similarly sized modern units, with a cooling seasonal energy efficiency ratio (SEER) of 14.7 (COP is approximately 3.76), and heating annual fael utilization efficiency (AFUE) of 94.6%. Due to the increased efficiency and enhanced controls and capabilities of these units, they typically effer a 40% energy savings over their predecessors.

Dir.

Table 4.2-24: Teenesk High School RTU	Replacements Paybook
Predicted Annual Savings (therms)	1336
Predicted Annual Savings (auth)	12006
Total Annual Sevings	\$3,460
Initial Capitel Cost of Upgrade	\$130,006
incentives	\$3,160
Cost of Upgrade	\$ \$126,848
Single Payback	36.7
Litatime Energy Savings (24 years)"	\$119,115.59
Annual Maintenance Coel Bavings (AMCS)	\$0
Annual Return on Investment (AROI)	(-1 44%)
Internel Rate of Return (IRR)	(-0 45%)
Nat Present Value (NPV)	(\$46,226.14)

"Assumes 3% yearly inflation on electricity costs

"Incentives, per New Jersey Smart Start Program, \$79/Ton

CDM also created an inventory of observed domestic water basters. This will alternate to inform the BOE of any water heaters that are in need of septecement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-25 below.

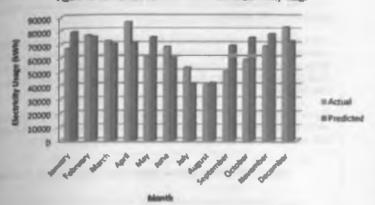
	Ta	ble 4.2-25 Tean	edi High School Dame	ndic Water Hant	971	
Location	Make	Biorage Capacity (Gallore)	Model Number	Тура	Handing Capacity	Observal Condition
Boter Room	Bradfanil White	Unknown	40A-15-3-103-N- AA	Electric	Unknown	Not in Line

4.2.7 Thomas Jefferson Middle School

A model of Thomas Jeffsreon Middle School was created in «Quest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July, 2007 through December, 2009 and ell bills from November 2007 to December 2009. Figure 4.2-38 below compares actual monthly electricity usages, with those predicted by the «Quest model.



Section 4 Energy Consen ation and Retrolt Measures



Pigure 4.2-18: Thomas Jefferron Middle School Electricity Unage

Local spikes in the summer could be attributed to summer session activities or increased occupancy due to preparation for the next school year. Increased electrical usage in the wister is indicative of the greater heat load during the peak heating sesson as well as the heavy occupancy during these months.

Figure 4.2-19 below compares the school's actual monthly oil usage to modelpredicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption

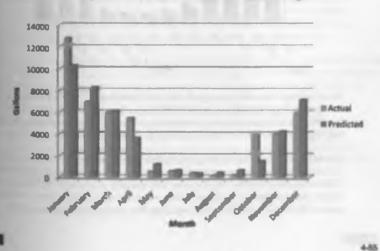


Figure 4.2-19: Thomas Jefferson Middle School Oll Usage

Carrently, the heating system utilizes two (2) Smith Cast Iron Sectional bollers. Each boller has a gross-output capacity of 5,618 MBH. CDM conservatively estimates these bollers to be 80% efficient.

CDM recommends replacing these bollers with high-efficiency, natural gas-fired, condensing bollers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a peak hasting load of 6,700 MBH. CDM anticipates that three (3) 3,000 MBH output, high-efficiency condensing bollers should adequately heat the school.

Figure 4.2-20 compares current gas usage with prodicted gas usage resulting from a switch to high-efficiency, condensing bollers. Condensing bollers are modeled with a full-load efficiency at ~91.5% and return water temperature of 100°F.

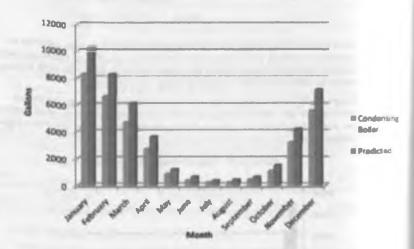


Figure 4.3-30: Thomas Jeffersen Möddle School - Baller Lupgrade - Oll Usage

Fincal savings from such an upgrade are then identified in Table 4.2-26 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing bollers, their operation and maintenance costs tend to be less than those of typical firetube bollers. CDM estimates a fixedule boller system will typically cost around \$3,500 per year for regular proventative maintenance, wheteas a condensing boller system would cost around \$2,000 per year. Therefore, replacing the existing boller system with a



condensing boller system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 1.2 Thomas Jefferson Middle Schoo	i Boller Upgrude Paylandi
Current Annual Oli Cost for Estating Bollers	\$108,828
Predicted Annual Gns Cost for Condensing Boliers	\$59,858
Total Annual Savings	\$47,167
Initial Capital Cast of Upgrade	\$156,190
Incentives	38.000
Cost of Upgande	\$147,190
Simple Paylack	8.1
Lifetime Energy Savings (24 yeam)*	\$1,009,004.34
Annual Maintenance Cost Savings (AMCS)	\$1.800
Annual Return on Investment (AROI)	28.90%
Internal Rate of Return (IRR)	35.94%
Not Present Value (NPV)	\$977,257.53

"Assume 3% yearly inflation on fuel costs

"Inventions, per New Jersey Clean Energy Program, are \$1.00 per MBH

Over several dacades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until seplacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.3-27 below, slong with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Where equipment ages were not found on the equipment tags, they have been estimated based on the unit appearance or approximate renovation dates. In some cases, nervice locations may have been estimated based on unit proximity. Additionally, in cases where a unit's menufacturer and/or model could not be determined due to an unreadable, faded, destroyed, or lost tag, manufacturer and model number information has been represented as "unknown".

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Cardia Cassacoma	Cardan/Canarooms Rod	Media Canter/Cassecoms Rod	Mada Cantar/Classrooms Rod	Boller Room	Bolley Room	Calumria	Grada	Locker Room unit. under Gum	Locker Room unit, under Gren	Locker Room unit, under Gym	Unknown	Basement serving CallsCooten	Children Bludy	Charus Room	Male Office	Male Office	Center/Causyoune Red	Nector Cassrooms Roof	Outer Wall	Currian/Casserooms Rod	Reds Cantar/Cassrons Red	Unit Lacoliton
Loder	Locket Rooms	Lodear	Unknown	Mi nomi	Al room	Calutoria	Main/Princip al's Offices	0 m	Gim	9.00	Unknown	CalifClohan	Children Shudy	Room	Main /Office	Main Office	Losker Rooma	Additionant	Closed	tooma	Child	Banka
Cont	Lower Cook	Lamen Cook	Lanus Cook	Tore	HB Smith	Tare	Turre	Tiane	Tigne	Trant	Ture	Turre	Trane	Tome	Trane	Tiane	Tuese	Transi Intelligaci	Friedsch	Canta	Tomm X0112	Manufacturer
Model 1200C48	Model FISCHERH	Model 70C190H	Model 130R48	Series 430 Mills B	Derive 450 Mills D	Model MCCB0210 0008	Model TT/A080A00	Model MCCB014L	Model MCCB014	Model MCCB008	Model BICH024E2 0A1002 E02 _BI	Model MCCB0171 0C0UB	Model BBG477AB	1002E BE	Model MCCB010L 0C0//B	DOWBITEO-CEUEA	Model TSCA0000 MOEADOCAVED	CONTROLOGY	Nodel MB30C3F	Model 3NCRICOV2	Model 2111R2036J	Modal
Unknown	Unknown	Unkornen	Unknown	-69#	2 495	-80%	0-10%	-10%	-80%	-007	-80%		10	-07	-100%	-an	4	-10%	SUBM 18	Unknown	Unknown	Estimated
4	6	4	de .	->dit	500	-4	4	1	7	7	7	7	1	7	1	4	7	-7	4	4	4	Entirement Ager (Vissor)

4.05

1	14	No.	l		r le	1	3	ľ	0	1	W	17	5		P	T	U.	8	8	a l	-	-	-	1
THE WORK		Halloway near base	Boller Room	Briter Room	Baller Room	Bother Floore		Rood	Kotohen	ConterCassoons Rod	Center/Cateroons	Cantal/Classicons Roof	Certar/Casaroons Rod	Cantar/Cassinoria Rod	Contan/Classingaria Rod	CommerConservation	Caster/Casesoons Rod	Roef Roef	Center Claterooms Rod	Roof Roof	Cantar Classrooms Rod	Consul Consultant	Cantan Cassoona Rad	Table 4.3-27
Once	Room	Hallway .	Circulation	Circulation	Orosiston	Growinton		Kitchan	Kitchen	Locker	Restroom	Locker Rooms	Restroom	Rooms	Qum	2	Nochen	Kachen	Room	Mada Canter	Mada	Locker	Locker	Thomes Jeff
Gmax	Tana		hatty	Betty	Gamet	Gomest	Bell and	Lanan Couch	Laren Cook	Laren Caok	Lanten Cook	Loren Cook	Laren Carde	Laren Caole	Laren Ceck	Laren Ceck	Internet	Unfinown	Loren Clock	Laren Caok	Larryn Coost	Laren Caok	Laren Caole	terson Middle S
University	Model UHMARD		MOSOIT	MORSHT	12100M	1210BN	6 A GM	sim roe	Model 225TONB	Model 138CSB	Model TOCISON	Model 100C38	Model BOCTODH	Model 100C100H	Model 248C88	Model 246C88	unknown	Unknown	Model 180C68	Model 100928	Model 185C48	Model 100C28		School HVAC Equip
Linknown	Unknown		Unternoven	Unencien	Unternovien	Untercipien	Concerning of		Untercontry	Unknown	Unknown	Unknown	Uninown	Unknown	Unifercitien	Unknown	Unknown	Unknown	Untrosen	Listenmen	Unitercover	Untinoun	Unknown	ment Service
-7	4		-10	-10	-10	-10	-9		-5	4	4	4	d.	d	4	4	-15	-#	4	d.	4	6	4	Invice Lives
đ	U		N	R	2	8		-	8	8	8	R	8	8	8	8	8	8	8	8	8	8	8	

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Energy Conservation and Restall Meanurs

	Table 4.2-27 Th	owan Jellen	nan Middle Sc	hoel HVAC Equipm	ent Service L	Ives
Well ACU	Nume's Office	Nume's Office	GE	Madel All ADIA	Unknown	10
	Teacher's Loungs	Teacher's Lounge	untension	unistant	Unknown	-16
	G-8 Beserveni Comp Rim	G-6 Basemant Comp Rm	GE	Model AM24DAR1	Unknown	-10
Well ACU	G-8 Benefitert Comp Ren	G-6 Basement Comp Rat	GE	Model AM24DAR1	Uningen	~1
Well ACL	G-8 Beasment Comp Ren	G-8 Busemant Comp Rej	GE	Model AM24DARLS	Untrown	-10
Wall ACU	Kilchen Office	Kitchen Office	Sharp	Unknown	Unknown	-10

Many classrooms in the school utilize unit ventilators for heating. As facility personnal continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

CDM also created an inventory of observed domestic water heaters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not oparating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-28 below.

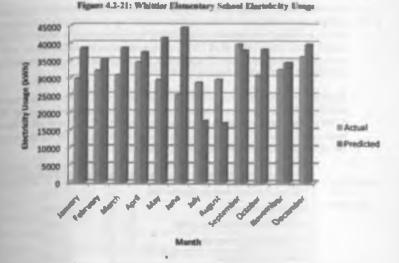
	Table 4.1	-28 Thomas Je	Berson Middle School	Damaatic Water	Hadden	
Location	Maka	Storage Capacity (Galloos)	Madel Humber	Туре	Heating Capacity	Observal Condition
Balar Room	AO smith	Unknown	Model HW 200M 1942	Electric	188 MBH	Fet

4.2.8 Whittier Elementary School

A model of the Whittler Elementary School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity and natural gas bills from July. 2007 through December, 2009 and oil bills from November 2007 to December 2009. Figure 4.2-21 below compares actual monthly electricity usages, with those predicted by the eQuest modul. Historical monthly usages were averaged for each month observed over multiple years.



Energy Consernation and Rebuilt Measures



Local spikes in the summer could be attributed to summer sension activities or increased occupancy due to preparation for the next school year. Increased electrical usage in the winter is indicative of the granter heat load during the peak heating senson as well as the heavy occupancy during these months.

Figure 4.2-22 below compares the school's actual monthly off-usage to modelpredicted oil use. Actual oil usage accounts not only for the gallons of oil consumed per month, but also for the gallons of oil represented by the monthly natural gas consumption.



Figure 4.2-22: Whittler Elementary School Oll Umage

441

Currently the HVAC systems at the Whittier Elementary School are controlled independently, by most thermostats. It is succommended that a direct digital control (DDC) building management system (BMS) be implemented. A system like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the achool to save, on average, 10% of the energy being used for HVAC. Table 4.2-29 demonstrates the potential payback from such an implementation.

Table 4.2-28 Whittler Elementary School	DOC BMS Payback
Predicted Annual Savings (Gallone Oil)	3,122
Annual Savings (Oil)	\$7,400
Predicted Annuel Savings (IdWh)	20,053
Annual Savings (Electricity)	\$3,343
Total Annual Savings	\$10,742
Initial Capital Cost of Upgrade	847,530
Incentive	\$0
Cost of Upgende	847.538
Annual Maintenance Cost Savings (AMCS)	\$0
Simple Payback	4.4
Lifetime Energy Savings (15 years)*	\$199,797.00
Annual Return on Investment (AROI)	15.93%
Internal Rate of Return (IRR)	24.24%
Not Present Value (NPV)	\$108,903.46

**No incertives found for this upgrade

Currently, the heating system utilizes two (2) Smith Cast Iron Sectional boilers. Each boiler has a gross-output capacity of 2,836 MBH. CDM conservatively estimates these boilers to be 80% efficient.

CDM recommends replacing these bollers with high-efficiency, natural gas-fired, condensing bollers. Based on the building model, and accounting for a 25% safety factor, CDM anticipates that two (2) 3,000 MBH output, high-efficiency condensing boilers should adequately heat the achool. In this upgrade, the existing steam heating system would be netrofitted for hot water me. Steam traps would be replaced with hot water control valves, condensate piping would be scheduled for demolition, and new hot water return piping and insulation would be installed. Figure 4.2-23 compares current gas usage with predicted gas usage resulting from a switch to high afficiency, condensing boilers. Condensing boilers are modeled with a fail-load efficiency of ~91.5% and return water temperature of 100°F.

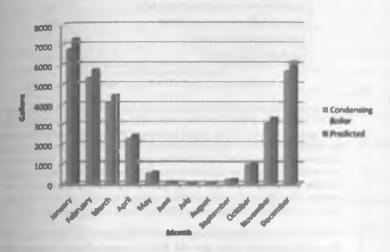


Figure 4.3-23: Whittler Elementary School - Boller Upgrods - Off Unge

Fiscal savings from such an upgrade are then identified in Table 4.2-30 below. Lifetime savings calculations for all BCRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before purming boiler replacements.

Due to the improved automation and control within modern condensing boilers, their speration and maintenance costs tend to be less than those of typical firetube boilers. CDM estimates a firetube boiler system will typically cost around \$3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around \$2,000 per year. Therefore, replacing the existing boiler system with a condensing boiler system should result in an operation and maintenance cost savings of \$1,500 per year.

Table 4.2-38: Whittler Elementary School Bo	iller Upgrade Paybock
Current Annual Oll Cost for Existing Ballers	\$73,996
Predicted Annual Gas Cost for Condensing Boliers	864,328
Total Annual Savings	88.670
Initial Capital Cost of Upgrada	\$222,980
Incentives**	86.000

Every Conservation and Retrolt Medium

4.64

Table 4.2-30: Whittler Bernentary School	Baller Upgrade Paylant
Cost of Upgrade	\$216,990
Bimpin Paylanck	19.4
Lifetime Energy Sevings (24 years)"	\$368,896 32
Annual Maintenance Cost Savings (AMCS)	\$1,500
Annual Return on Investment (AROI)	0.96%
Internal Rate of Return (IRR)	4.24%
Nat Present Value (NPV)	\$33,728.57

"Assumes 3% werly inflation on fuel center

"Insentives, pay New Jerrery Close Energy Program, see \$1.08 per MBH

Over several decades, ASHRAE has compiled data partaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a make-up air unit has a median service life of 20 years. Therefore, if a makeup air unit has been in service for more than 20 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between usits (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to docume with age.

All major equipment noted during CDM's on site audit is listed in Table 4,2-31 below, along with estimated current ages and ASHRAE-expacted service lives. It should be noted that only equipment that was observed at the time of the audit is included.

		Table 4.2-31 W	hitter Mamortar	School HVAC Squip man	Bervice Lives		1
Description (Tag ID)	Unit Location	Bervice Lection	Manudate barner	Medel	Estimated Efficiency	Entimeted Age (Yasra)	ASHE Lite (Yes)
ACC	Roof	Elevator	Lite.com Mr. Sira	MU12NN, even MS12NNBeek	SEEN 18	~10	n
ACC	Roof	Classrooms	Timm	RAUCCAGE PTERDAGE	Unknown	-7	A.
ACC	Feaulty Courtyand	Lanch Room in Basement	Friedrich	MR24C3E-A		-5	Ł
ACC	Front Entrance	Man Office	Friedrich	MR30C3F	SEER 10	-3	L
ACC	Principal's Office	Preciper's Office	Friedrich	MR24C3F	SEER 10	-6	2
ACC	Other	Room 2 Campula: Room	Friedrich	mdoor MNV12C1F evideor MIN12C1F	SEER 18	-5	2
Bater	Boller Room	(Hido Diet	Smith	284-13	-80%	>20	2
Baller	Bolar History	Bidg Dimi	Beraik	284-5-W-01	-00%	2.30	1
P	Real	Manaria Office	Loren Cagt	100010000	Unknesser	-7	1

Energy Conservation and Reinelli Alexander

	Unit	Service	Manufacturar	Mantal	Estimated Efficiency	Estimated Age (Tears)	ASHIRAE Expected Life (tears)
1140 101	Rod	Name's office	Loren Cook	109C10DH	Unknown	-7	20
E	Roof	Interior Records	Cames	WEBK10K2A1NA20APCX	Unknown	-10	20
E	Roat	Andersilicor Hospittus	Carmas	VEBK12L1ATNA20APCX	Unknown	-10	20
IF	Roal	Intentior ecoms	Carnes	VEBK18M1A1NA2BAPCX	Unknown	~10	20
E	Rost	Intention ADDITM	Carmes	VEBK24P1C1NA20APCX	Linkrown	-10	20
E	Redf	Intentor rooms	Carnes	VEBR15L1A1NA2DAPCX	Unknown	-10	20
	Roof adjacent to Cal	Jadenkor Axioma	Unincen	Unknown	Unknown	-20	20
2	Roof adjacent to Cal	intentior sports	Unknown	Unknown	Unknown	-20	20
-	Roof adjacent to Call	intentior coortis	Unknown	Unknown	Unknown	-20	20
#	Roof adjacent to Cal	Intentor Apprint	Unknown	Lisinovn	Unknown	-20	20
	Roof adjacent to Cal	Julinticer Address	Unimown	Unknown	Untinown	-20	20
18	Existing Roof mea	intentior spertra	Unknown	Unknown	Unknown	-20	70
	Existing Roof snus	Interlicy rooms	Unincent	Unknown	Unknown	-30	30
-	Boller Room	Circulation	Emerson	PSF2Y-4417	University	-10	20
-	Boller Room	Circulation	Emerson	P3F2Y-4417	thengen	-10	30
hing .	Eosley Room	Circulation	Marathon	SV1213TTD97049AA	Unskrupers	-10	-20
-	Boller Room	Ceculation	Marathon	SVJ213TTDV7049AA	Unknown	~10	20
	Boller Room	Circulation	Leland- Faraday	MEDIA	Unknown	~10	28
100	Room	Circulation	Leland- Faraday	MEDIA	Unknown	-10	20
ILGA BUT	Other	Citelial Standy Team	RCA	Linkrown	Unknown	~16	10

Many classrooms in the school utilize unit ventilators for besting. As facility personnel continue to service unit ventilators throughout the building, they should note the condition and approximate age of the units. Those that are older than 15 years should be considered for replacement, as they are likely operating significantly below the equipment-rated efficiency.

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CDM also created an inventory of observed domestic water basters. This will attempt to inform the BOE of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-32 below.

Table 4.2-32 Whittler Elementary School Domestic Water Heaters								
Location	Mala	Storage Capacity (Gallons)	Nodel Number	L Type	Heating Capacity	Obser Conde		
Baller Room	Rheem	50	411/50	Gee-Find	40 MBH	Gne		
Room	AO Bmith	80	DVEB0A917	Electric	15 KW	0.00		

4.3 Alternative Energy Sources

4.3.1 Photovoltaic Solar Energy System Overview

Photovoltair (PV) cells convert energy in sunlight directly into electrical energy through the use of silicon semi conductors, diodes and collection grids. Several I^{PV} cells are then linked together in a single frame of module to become a solar panel. PV cells are able to convert the energy from the sun into electricity. The angle of inclination of the PV cells, the amount of sunlight available, the orientation of the panels, the amount of physical space available and the efficiency of the individual panels are all factors that affect the amount of electricity that is generated.

Based on the estimated cumulative total available roof area, calculations determine that the installation of eleven systems with a total rating of approximately 1395 kW (dc) will be appropriate for the eight School District buildings.

As part of this energy audit, a preliminary engineering feasibility study of the sites outlined above to support solar generation facilities was completed consisting of the following tasks:

- a. Site Visit by our engineers.
- Satellite Image Analysis and Conceptual design and layout of the photovoltaic system
- c. Design and construction cost astimates
- Determine a preliminary design for the size and energy production of the solar system.

The total unobstructed available area of each section of the roof with southern exposure was evaluated. It is important to note the following:

1084

- The structural integrity of the roafs was not confirmed during our site visit. The municipal buildings may require some degree of roofing work prior to the implementation of a solar system.
- 2. In the case of the flat areas, the PV system sizing and kWh production was calculated assuming the installation of a crystalline module facing south direction (220 Degree Azissuth) and tilted approximately 20 degrees to allow better rain water shedding and snow melting. Please note that the kWh production as well as system size anay differ significantly based on final panel tilt selected during the RFP and dasign phase.
- Blended electric rates were used based on actual utility bills and were applied for the facilities

The following is a preliminary study on the feasibility of installing PV solar systems at the eight School District buildings to generate a portion of each facility's electricity requirements. Each system is designed to offset the electric purchased from the local utility and not as a backup or emergency source of power.

In order to determine the best location for the installation of the PV solar system, a satellite image analysis and site walkthrough of the facilities was performed on February 9-11th. As per the



Scope of Work, only the facilities roofs were considered for PV installation.

Also, as part of our assessment we investigated possible locations for electrical equipment that need to be installed such as combiner boxes, disconnect switches and DC to AC inverters. Consideration was also given to locations of interconnection between the solar system and building's electrical grid.

4.3.1.1 Benjamin Franklin Middle School

The roof of the Benjamin Franklin Middle School is flat with very few obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 265.5 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the emisting 800A, 3 Phase, 208V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit braker, and protective selaying will also have to be implemented. Any connection pointa would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required point to implementation of a PV system.

4.3.1.2 Bryant Elementary School

The roof of the Bryant Elementary School is flat with very few obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walk through and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 49.8 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the existing 800A, 3 Phase, 208V service entrance equipment wheten the PV system feeder connections will have to be made after the main circuit breaker and protective selaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.3 Eugene Field Administration Building

The roof of the Eugene Field Administration Building is flat with very few obstructions such as exhaust fans, rooltop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satulite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 60.2 kW (dc).

Electrical Service

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The interconnection point for the PV system will require a modification or replacement of the existing 400A, 3 Phane, 208V service entrance agaipment whereas

468

the PV system feeder connections will have to be made after the main circuit baseher, and protective selaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.4 Hawthorne Elementary School

The roof of the Hawthome Elementary School is flat with very faw obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defacts. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 148.1 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the existing 800A, 3 Phase, 208V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective selaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.5 Lowell Elementary School

The roof of the Lowell Elementary School is flat with very few obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection sevealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 69.9 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the existing 800 A, 3 Phase, 208V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to mast NEC and local utility requirements. Further investigation and

449

verification of existing electrical equipment would be required poor to implementation of a PV system.

4.3.1.6 Teaneck High School

The roof of the Teanack High School is flat with numerous obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a wartasty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 277.8 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the existing 3000A, 3 Phase, 480V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective selaying will also have to be implemented. Any connection points would have to seet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.7 Thomas Jefferson Middle School

The roof of the Thomas Jefferson Middle School is flat with very few obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 549.5 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or replacement of the existing 800A, 3 Phane, 208V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker and protective selaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.



4.3.1 8 Whittier Elementary School

The roof of the Whittier Elementary School is flat with very few obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 239.9 kW (dc).

Electrical Service

The interconnection point for the PV system will require a modification or suplacement of the existing 800A, 3 Phase, 2080V service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.9 Basis for Design and Calculations

The most common roof mounted system is referred to as a ("fixed tilt") system typically mounted to a metal rack that can be fixed at a spacific angle. There are also ("tracking systems") or movable along one or two axes to follow the position of the sun during the day. For a roof-mounted PV system, tracking systems are very rarely installed and are usually used for ground-mounted systems only, as they require more complex tacks and higher maintenance costs. For the "fixed" system, the tilt is determined based on the following factors: geographical location, total targeted kWh production, seasonal electricity requisements and weather conditions such as wind. Ideally, the module tilt for Northern New Jenney should be 25-35 degrees with an azimuth as close as possible to 180 (south); however, our experience has shown that PV systems are typically installed at a tilt of 20 degrees or lower in order to avoid any insues with wind and to maximize total system size

The type of PV panels and equipment used to mount the system shall be determined based on the wind conditions and structural integrity of the roof determined during the design phase of the project. In general, ponetration/tio-down systems, nonpenetrating ballasted type systems, or a combination of the two should be considered.

Calculation of PV System Yield

An industry accepted software package, PV Watts was used to calculate projected annual electrical production of the crystalline silicon PV system in its first year, as commarized in Table 4.3-1. The system was design to provide maximum kWh production based on available soof space.

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-	Est. Aras (fi2)		Annual Bnorgy Bovings	Ent. Armuni SREC	Energy Envirge (28	Annual Roturn On Investment (AROI)	Hat Probant Visitua (MPV)	Intern Rate (Ratur (IRR)
Benjamin Paseldin Middle School	26.548	325,372	\$50,107.3	\$205.127	\$1,856,213	4.20%	562,134	3.223
Bryani E lamantary	4.975.2	60,976	\$10,549	\$38,442	\$390,778	3.15%	-\$63,435	1.953
Eugene Pield Administration	8,025	73.837	\$12,143	\$46,550	\$451,330	3.32%	-883,957	2 091
Hawthorne Elementary Sicheol	14,812	181,535	\$29,963	8114 446	\$1,109,613	4.08%	\$25.081	3 169
Lawell Elementary	0.904	85,712	\$16,114	\$54,036	\$598,836	3.69%	-89,059	2 899
Teennek High School	27,776	340,420	\$54,127	\$214,613	\$2,005,114	4.27%	\$108,716	3 389
Thomas Juliarson Missim Echool	54,953	673,498	\$119.883	\$424,598	\$4,441,022	4.63%	9632.029	4 099
Elementary Elementary	23.967	293.954	\$49,095	\$185,338	\$1,818,724	4.30%	\$131.487	3 519

Table 4.3-1 Bammary of Solar (PV) Bystoms

"3% yearly inflation on electricity costs

Total Costs

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It should be noted that construction costs are only estimates based on historic data compiled from similar installations, and engineering opision. Additional engineering, and analysis is required to confirm the condition of the roofs, structural integrity of the roofs, the system type, sizing, costs and savings. Budget costs assume existing roofs are structurally sound, do not need to be replaced, and can accommodate a solar system. For illustration purposes, a draft financial analysis pro forma is attached outlining all project costs and revenues.

Table 4.3-2 Engineers Opinion of Probable Cost

Engineers Opinion of Probable Cost	\$10,082,008
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As stated above the estimated installation costs are based on significant experience+ with the pricing of solar installations in New Jersey, and are intended to provide the District with a realistic budget cost. A typical solar installation can vary in cost from \$7.00 - \$10.00 per wait depending on size, complexity of the system, labor rates, etc. Approximately 60-70% of that number is material costs while the balance is labor, engineering, etc. Like any installation, contain conditions can affect a price upward or downward. For purposes of this analysis the estimated installation cost does not include any roofing or structural work which may be required to maintain warranties -4-72

Section 4 Energy Conservation and Retroft Measures

or for additional structural support. We have included a budget of \$9/watt for the solar system installation with an additional estimated budget of \$100,000 for potential electric service work.

Refer to Section 7 for discussion on Solar Renewable Energy Certificates and other financing options for solar projects. The financial model in Appendix E provides an annual forecast illustration of project revenues and costs for 25 years.

4.3.2 Wind Power Generation

On-site wind power generation typically utilizes a form of turbine, which is rotated with the flow of wind across it, this rotational force powers a generator, producing DC electricity. The DC electricity is then converted into AC electricity, which can be used for commercial power, or can be fed back into the power grid, reducing the

overall electric demand. The size of the turbine is proportional to the amount of wind and concurrently the amount of energy it can produce.

CDM has determined that it is feasible for the Teanack School District to install wind turbine energy systems at 8 of its sites. This is primarily due to 1.3 year payback for averaged wind speeds. There are many other incentives that could possibly

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provide additional funding which would reduce the payback period further, and possibly eliminate the cost of the turbine installation completely.

Because the School District does not have a large area for installation of a larger wind turbine at any of the 8 locations surveyed for the audit, a small 2.5kW wind turbine was chosen. A turbine of this size could be installed in most locations. Depending on area available, and funding, the School District may choose to install more than 1 wind turbine on the premises.

Utilizing the NASA Surface Meteorology wind mapping tool, it was determined that the local average wind speeds for Teaneck. NJ ranged from 9.01 mph to 13.02 mph, or 4.03 m/s to 4.5m/s at 20 meters above the ground. In general, around 7 mph of average wind speed, as determined over the course of a year, is necessary to "fuel" the turbine. These values fall within the range of feasibility for installation of a new wind turbine system.

For the purposes of this feasibility analysis, CDM chose a 2.5kW Wind Energy Solutions (WB5) Tulipo wind turbine. This turbine size is used most often for small commercial applications. Power Curve data was determined through the use of the product specification sheets on vendor websites. Actual turbine size, height, location, and manufacturer should be determined upon design of a wind turbine system.

Energy Conservation and Retrolit Measures

The estimated wind speed data, associated wind probability distribution function (weibull value), turbulence losses, and other relevant data were then incorporated into Wind Cad to estimate the annual output for the wind turbine. Refer to Appendix J for Wind Cad Modeling.

In order to determine simple payback analysis of the proposed wind turbine, CDM used the industry standard of \$3-68/W to compute total cost of the wind turbine. For this analysis, CDM used \$7/W. This figure includes Overhead & Profit values. By installing the proposed wind turbine, the BOE will offset between \$282.3 and \$736 per year in utility costs per facility based on the minimum and maximum average local wind speeds. In addition, Renewable Energy Credits (REC's) are obtainable for renewable power and incentives are available through the Renewable Energy Incentive Program (REIP); refer to Section 7 for a more in depth explanation.

This simple payback calculation takes into account the incentive provided for wind turbines through the REIP program. For the first 16,000 kWh of production, the incentive is \$3.20/kWh. For production between 16,000 kWh = 750,000 kWh the REIP program incentive is \$0.50/kWh. CDM used this incentive as an upfront deduction from the Engineer's Opinion of Probable Cost. In addition, in order to benefit from the REIP incentive, the BOE must purchase a wind turbine on the approved NJ Clean Energy list. CDM chose the WES Tulipo wind turbine for this analysis as it in approved by the NJ Clean Energy program and is the appropriate size for smaller commercial installations and the limited area available on the site. Refer to the NJ Clean Energy website for more information.

Table 4.3-3 includes a simple payback analysis for the installation of one wind turbine energy system. Refer to Appendix K for a more detailed wind turbine financing spreadsheet, including utility cost avoidance and REC's.

Pergmater	Wind Turbine (Minimum Site Wind Speed - 8.81 mph)	Wind Turbine (Maximum Site Wind Speed 12.02 mph)	Wind Turbin (Average SR Wind Speed 11.2 mph)
Engineer's Opinion of Probable Cost	\$21,895	\$21,895	\$21 895
Renewable Energy Incentive Program"	-\$12,214	-\$21,895	-\$20.304
Total Cost	\$9.681	\$0	\$1.591
1 st Year Production	3,817 kMh	8,316 kWh	6,345 kWh
Annual Estimated Electric Savings	\$643.2	\$1,401.2	\$1,069 1
Annual Estimated REC Revenue	305	\$208	\$159
Project Simple Paylock	13.1 Years	8 Years	1.3 Years
Annual Return On Investment (ARIOI)	3,05%	0	74.15%

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Energy Contervation and Retrolt Memory

Table 4.3-3: Simple I	Payback Analysis for W	Ind Tarbine Energy I	lynda m	
Paramolor	Wind Turbine (Minimum Site Wind Speed – 9.81 mph)	Wind Turbine (Maximum Site Wind Speed – 13.82 mph)	Wind Turking (Average Sta Wind Opend - 11.2 mph)	
Lifetime Energy Savings (15 years)**	\$23,827.2	\$51.907	\$38,601.6	
Internel Rate of Return (IRR)	7 82%	0	80.28%	
Net Present Value (NPV)	\$6,625 7	\$35,483,5	\$25.502.4	

"Refer to Appendix | for Wind Cad Modeling

"REIP incentive is calculated for only the first year and is applied as a deduction.

Based on the simple payback model, summarized in Table 4.3-3, it would benefit the School District to further investigate the installation of a wind energy system for all I nites. This is primarily based on the initial upfront capital investment required for a wind turbine energy system installation and the 1.3 year average wind speed payback period.

It should be noted that CDM used only REC values, utility cost avoidance factors, and the REIP incentive in determining simple payback periods. As stated above, other incentives and financial programs such as Power Purchase Agreements are available to help finance this installation. For example, if a Power Purchase Agreement is completed, the private company financing the project would benefit from the 30% isan credit. Other incentives such as CREB's and first year usage incentives could be available to the School District in lowering the payback period. Refer to unum.ds/rmss.org for an extensive listing of possible incentives for the New Jerney area.

It should also be noted that the wind turbine represented above is for fassibility purposes only. If the BOE decides to install a wind turbine, different mounting heights, turbine sizes, and manufacturers should be considered. In addition, penalts may be required for installation according to local zoning laws. The FAA must also be notified in order to give clearance for the tower, and for installation of aviation safety lights if necessary.

4.3.3 Ground Source Heat Pumps

Geothermal systems utilize the constant temperature of the earth throughout the year (at depths from 5 ft. to 1,000 ft. the earth temperature remains at 53 deg, F) as the primary source of energy for the heating/cooling and domestic hot water production. Additionally, since the earth is maintained at a constant temperature from heat absorbed from the sun this energy is considered a "renewable resource," and therefore is not as reliant on existing supplies of fossil fuels

Even though this application requires significantly higher up-front costs, it has several advantages over conventional HVAC systems such as substantially lower operating and maintenance costs. The life span of the system is longer than conventional heating and cooling systems. Most loop fields are warranted for 25 to 50 years and are

expected to last at least 50 to 100 years. However it is important to note that geothermal systems are more difficult to install in existing facilities and require higher capital cost due to having to complete significant infrastructure changes. Therefore, installation of a geothermal system is not recommended at any of the Teaneck BOE facilities at this point.

4.4 Additional Measures

As discussed in Section 2, it may be possible to reduce the plug load of the buildings even further with the implementation of smart strips and energy star appliances. Smart Strips save energy by electronically unplugging all of the devices that are plugged into the "Automatically Switched outlets" when the device plugged into the control outlet is turned off. It is important to note that CDM is not suggesting that computers be plugged into the automatically switched off outlets, as there would be potential for the computers to be shut off mid-operation. There are a vast amount of computer, computers, printers and DSL/Cable modems. These peripherals can be plugged into the automatic outlets.

A standard Smart Strip has one 'control' outlet, six (6) outlets that are automatically switched off when the control device is and three (3) outlets that are always hot. An example of how the BOE can implement the use of Smart Strips within appropriate computer stations at the Teaneck High School Library is to plug a computer into the control outlet, five (5) monitors and a personal printer (8 W in standby mode) into the automatic outlets and three (3) computers into the always hot outlets. An LCD monitor can use up to 34W; in standby mode the monitor utilizes 1 – 2W. A CRT monitor typically utilizes around 75W. The following table 4.5-1 summarizes the payback of a Smart Strip, assuming 5 LCD monitors and 1 printer are automatically powered down that would otherwise been left on 8 hours/day and in standby mode 16 hours/day, 5 days/week for 9 months.

Smart Strip Classroom Application E	ixample
Predicted Annuel Savings – 5 LCD monitors, 1 printer (kWH)	611
Total Annual Savings	\$97
Initial Capital Cost	\$40
ampie Paybach (months)	5.0
Lifetime Energy Savings (15 years)	\$1,804
Nat Present Value (NPV)	\$1,462

Table 4.4-1: Simple Payback

*Aggregate Cost of \$ 1589/kWh taken from the Tearack High School

The following Table 4.4-2 summarizes other applications for the Smart Strip that may be applicable throughout the buildings:

Energy Conservation and Alertaft Messages

Table 4.4-2 Applications for Smart Strips					
Control Outlet	Builched Outlets				
Computer	Monitors, printers, scanners, temps				
TV	VCR, DVD player, cable box				
Lamp	Storeo, space heater				

The BOE should continue to implement Energy Star appliances. This is recommended on an 'as-needed' basis.

In addition to replacing old appliances with Energy Star appliances, the following two maintenance procedures can work to save the energy consumed by the refrigerators. One is cleaning dirty condenser coils, twice a year. A refrigerator's condenser coils and cooling fins are located either under the unit behind a grille in the front or on the back of the appliance. The coils can be cleaned with a brush or vacuum cleaner hose. The second source of wasted energy associated with a refrigerator is the door seal. Realigning the door or replacing a no longer airtight door seal will work to improve energy efficiency.

It may also be considered that the 'Vending Misers' be purchased and utilized for vending machines throughout the schools. A 'Vending Miser' powers down a vending machine when the surrounding area is unoccupied and automatically repowers when the area is occupied, utilizing an infrared sensor. Similarly to occupancy sensors on lighting fixtures; however, the vending miser also monitors the ambient temperature while the vanding machine is powered down and uses this as sort of an internal thermostat to power up the machine and ensure that the drinks remain cold. The implementation of a 'Vending Miser' also reduces maintenance costs and extends the life of the machine, by reducing the number of compressor cycles. A 'Vending Miser' is a \$180 investment, but has been found to reduce power consumption of a cold drink vending machine by an average of 46%.

Section 5 Evaluation of Energy Purchasing and Procurement Strategies

5.1 Energy Deregulation

In 1999, New Jerney State Legislature passed the Electric Discount & Energy Competition Act (EDBCA) to restructure the electric power industry in New Jerney. This law and the deregulation of the market allowed all consumers to shop for their electric supplier. The intent was to create a competitive market for electrical energy supply. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party supplier. Energy deregulation in New Jersey increased the energy buyers' options by separating the function of electricity distribution from that of electricity supply.

To sell electric generation service in New Jersey, electric power suppliers must be licensed by the New Jersey Board of Public Utilities (NJ BPU). They must also be registered with the local public utility (PSE&G) to sell electric service in that utility's service areas. The following suppliers are licensed with the NJ BPU and are registered to sell electric service in the PSE&G service territory:

- a Amerada Hess Corp
- BOC Energy Services
- Con Edison Solutions, Inc.
- Constellation New Energy, Inc.
- Direct Energy, LLC.
- First Energy Solutions Corp.
- Glacial Energy
- Integrys Energy Service
- Liberty Power
- Pepco Energy Services, Inc.
- PP&L Energy Plus, LLC.
- Reliant Energy Solutions East, LLC.
- Sempra Energy Solutions
- South Jenney Energy
- Strategic Energy LLC
- Suez Energy Resources NA, Inc.
- UGI Energy Services

As noted in Section 3, the Board is currently benefiting from the deregulation of the market and is utilizing South Jersey Energy as their third party supplier. It could possibly benefit the Board to obtain price quotes from other third party suppliers.



Evaluation of Energy Purchasing and Procurement Precision

5.2 Demand Response Program

6.1

A Demand Response Program is another opportunity for energy cost savings. Demand Response is a program through which a business can make money on reducing their electricity use when wholesale electricity prices are high or when heavy demand causes instability on the electric grid, which can result in voltage fluctuations or grid failure. Demand Response is an energy management program that compensates the participant for reducing their energy consumption at critical times. Demand Response is a highly efficient and cost efficient means of raducing the potential for electrical grid failure and price volatility and is one of the best solutions to the Mid-Atlantic region's current energy challenges.

The program provides at least two hours advance notice before curtailment is required. There is typically one event a year that lasts about three hours, and since this happens only in summer months, when demand for electricity is at its highest, it may better facilitate the District's involvement. This as a result of summer occupancy requirements, although, energy curtailment in discretionary.

Participation in Demand Response is generally done through companies known as Curtailment Service Providers, or CSPs, who are members of Pennsylvania New Jersey Maryland (PJM) Interconnection. There is no cost to enroll in the program and participation is voluntary, for instance, you can choose when you want to participate. In most cases, there is no penalty for declining to reduce your electricity use when you're asked to do so. The event is managed semotely by notifying your staff of the curtailment request and then enacting curtailment through your Building Management System.

CSPs will share in a percentage of your savings, which may differ among various CSPs, since there may be costs associated with the hardware and / or software required for participation, so it is recommended that a number of CSPs be contacted to review their offers.

Section 6 Ranking of Energy Conservation and Retrofit Measures (ECRM)

6.1 ECRMs

The main objective of this energy audit is to identify potential Energy Conservation and Retrofit Measures and to determine whether or not the identified ECRM's are economically feasible to warrant the cost for planning and implementation of each measure. Economic feasibility of each identified measure was evaluated through a simple payback analysis. The simple payback analysis consists of establishing the Engineer's Opinion of Probable Construction Cost estimates; OKM cost savings estimates, projected annual energy savings estimates and the potential value of New Jersey Clean Energy Rebates or Renewable Energy Credits, if applicable. The simple payback period is then determined as the amount of time (years) until the energy avings associated with each measure amounts to the capital investment cost.

As discussed in Section 3, aggregate unit costs for electrical energy delivery and usage, natural gas delivery and usage, and oil delivery and usage, which accounts for all demand and tariff charges at each complex, was determined and utilized in the simple payback analyses.

In general, BCRMs having a payback period of 20 years or less have been recommended and only those recommended ECRMs within Section 4 of the report have been ranked for possible implementation. The most attractive rankings are those with the lowest simple payback period.

Ranking of ECRMs has been broken down into the following categories:

- Lighting Systems
- HVAC Systems
- a Solar
- e Wind

6.1.1 Lighting Systems

Table 6.1-1 includes the recommended ECRMs to provide energy savings for all building lighting systems, which include the installation of energy-efficient luminaires and occupancy sensors. A detailed discussion on building lighting systems is presented in Section 4.1.

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Ranking of Energy Concernation and Retrait Measures (ECRIM

Ranking of Energy I			- Lighting Sval	em Retrofte	
Location/Massure	Opinion of Probable Cost	intite	Total Cast	Annual Fiscal Bevings'	Stepto Payback (Veara)
Teeneck High School - Press	\$107.8	\$0	\$107.6	\$78.02	1.4
Bryant Elementary School	\$119,549	\$23,230	\$96,319	\$18,291.8	5.3
Whitter Elementary School	\$116,162.9	\$7.000	\$108,502.9	\$18,477.9	6.6
Eugene Field Administration Building	\$60.271,5	\$4,125	\$56.146.5	\$8,666.7	8.8
Teaseck High Bahool	\$154,753.3	\$11,850	\$142,903.3	\$21,750.8	8.8
Benjamin Franklin Middle School	\$411,963.7	\$21,135	\$390.618.7	\$52,545.9	7.4
Thomas Jefferson Middle School	\$229,038,3	\$15,735	\$213.303.3	\$27,888,1	7.6
Lowell Elementary School	\$77,998.8	\$3,710	\$74,288.8	\$8,355	LJ
Hewthorne Elementary School	\$108,470.2	\$4,305	\$103,835.2	\$11,216	8.3

1. 'Total Cost' takes into account any applicable reliates.

2. "Annual Fiscal Savings' takes into account maintenance costs savings.

6.1.2 HVAC Systems

Table 6.1-2 includes the recommended ECRM to provide energy savings for building HVAC systems, most of which provide a simple payback of less than 20 years. A detailed discussion on building HVAC systems is presented in Section 4.2.

Table 6.1-2 Ranking of Energy Savings Measures Summary – HVAC Gystem Upgrodes								
Building	Massara	Retrolit	Instantives	Total Cost	Annuel Fiscal Savings	Simple Payturck (Years)		
Tunnack High School	DW Heater	\$5,240	80	\$5,240	\$9.977	9.5		
Benjamis Franklin Middle Eshool	Boilor	\$104,127	\$6,000	\$98,127	\$33,637	2.9		
Thomas Jefferson Middle School	Boller	\$156,190	\$9.000	\$147,190	\$40,667	11		
Bryant Elementary School	DOC BMS	\$40,915	\$0	\$40,915	\$11,347	1.0		
Whittier Elementary School	DDC BMS	\$47,539	80	\$47,530	\$10,742	4.4		
Teamsck High School	VFD	876,123	80	876,123	\$15,863	4.8		
Hawthorne Elementary School	DDC BM8	842,504	90	\$42,584	\$7.560	5.6		
Building	DOC BMS	821,456	80	821,456	\$3.777	6.7		
Lowel Elementary School	DOC BMB	840,629	30	\$40.629	\$7.109	17		
Bryani Elementary School	Boler	\$101,165	\$6,000	\$175,185	\$20,871			

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62

Sector 8 Rening of Energy Conservation and Retroft Measurie (ECRM)

Hanthome Elementary Bahasi	Boller	\$181,165	\$6,000	\$175,165	\$17.739	3.0
Lowell Elementary School	Boller	\$222,990	\$8,000	6216.660	\$21,871	1.1
Eugene Field Administration Building	Boler	\$104,127	\$6.000	\$98,127	\$7,017	14.0
Whittler Elementary School	Bolle/	\$222,990	\$8.000	\$216,000	\$11,170	18.4
Hawthome Elementary School	AHU	\$17,753	\$790	\$16,963	\$681	24.9
Teenack High School	AHU	\$130,008	\$3,160	\$126,848	\$3,400	36.7

1. Total Cost' takes into account any applicable rebates.

2. "Annual Placel Savings' takes into account maintenance costs savings.

6.1.3 Solar Energy

Insplementation of new solar energy systems have been evaluated to determine the economic feasibility for furnishing and installing such systems for eight buildings for the Teaneck School District. Based on the simple payback modeling performed, it would benefit the Board to further investigate installing the solar energy systems. This is primarily based on the initial upfront capital investment required for a solar energy system installation and the average 12.7 year payback period.

Two major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions and Solar Renewable Energy Credit (SRBC) rates, with the largest impact to the payback model being the SREC credit pricing. For the payback model, conservative estimates of the SREC's market value over a 15 year period were assumed, as discussed in Section 4.3.

Table 6.1-3 includes a simple payback analysis for the installation of seven solar energy systems for the Teaneck School District. Refer to Appendix E for a more detailed solar financing spreadsheet.

Table 0.1-2 Ranking of Em	argy Basings Ham	area Romany - Beler Everyy Systems			
Building & Measure	Retroit Cost	Annusi BREC Credit	Asnuel Piscal	Simple Paybock (Yograj	
Thomas Jefferson Middle School - PV Solar System	\$6,307,156	\$424,598	\$119,863	11.6	
Whittler Elementary School - PV Solar System	\$2,823.532	\$185.338	\$49,095	12.0	
Teanock High Bahoal - PV Balar Bystam	\$3,249,778	\$214,613	854,127	12.1	
Benjamin Franklin biddle Rehool - PV Bally Bystem	\$3,111,650	\$205,127	860.107.3	12.3	
Hawthorns Elementary School - PV Solar Bystem	\$1,791,339	\$114,448	829.963	12.4	
Lowell Elementary School - PV Solar System	\$811,768	\$54,036	\$15,114	13.0	

Ranking of Energy Conservation and Rebolt Mean res (CCRM)

Eugene Field Administration Building - PV Soler Bysteen	\$802,782	\$46,550	\$12,183	11.7
Bryant Elementary - PV Solar System	\$664 ,710	\$38,442	\$10,549	14.8

6.1.4 Wind Power Generation

Implementation of a new on-site wind energy system has been evaluated to determine the economic feasibility for furnishing and installing such systems for the Teaneck School District. Based on the simple payback modeling performed, it would benefit the Board to further investigate installing the on-site wind energy systems at the nine surveyed locations. This is primarily based on the initial upfront capital investment required for a wind energy system installation and an acceptable payback period.

Three major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions, Renewable Energy Certificate (REC) rates and the Renewable Energy Incentive Program, with the largest impact to the simple payback model being the REIP incentive.

Table 6.1-4, includes a summary of the wind energy BCRM for the Teaneck School District.

Table 6.1-4: Eimple Payback Analysis for Wind Turbine Energy Byelem					
Parameter	Wind Turbine (Minimum Site Wind Speed - 9.01 mph)	Wind Turbine (Meximum Bite Wind Speed – 12.02 mph)	Wind Turbino (Average Sile Wind Speed - 11.2 mph)		
Engineer's Opinion of Probable Cost	\$21,895	\$21,895	\$21,895		
Renewable Energy Incentive Program	-\$12,214	-\$21,895	-\$29,304		
Total Cost	\$9,681	80	\$1,591		
1 ^{el} Year Production	3.817 kWh	6.318 xWh	6,345 kWh		
Annual Estimated Electric Savings	\$643.2	\$1.401.2	\$1,088.1		
Annual Estimated REC Revenue	896	8208	\$158		
Project Simple Paylogh	13.1 Yeers	8 Years	1.3 Years		

64

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Section 7 Available Grants, Incentives and Funding Sources

7.1 Renewable Energy

7.1.1 Renewable Energy Certificates (NJ BPU)

As part of New Jersey's Renewable Portfolio Standards (RPS), electric suppliers are required to have an annually-increasing percentage of their retail aslas generated by renewable energy. Electric suppliers fulfill this obligation by purchasing renewable energy certificates (RECs) from the owners of solar generating systems. One REC is created for every 1,000 kWh (1 MWh) of renewable electricity generated. Although solar systems generate electricity and SRECs in tandem, the two are independent commodities and sold separately. The RPS, and creation of RECs, is intended to provide additional revenue flow and financial support for renewable energy projects in New Jersey. Class 1 RECs, which include electricity generation from wind, wave, tidal, geothermal and sustainable biomass typically trade at around \$25/MWh. RECs generated from solar electricity, or SRECs, trade at \$550/MWh due to supplemental funding from NJ PBU. The supplemental funding will decrease over time to \$350/MWh.

7.1.2 Clean Energy Solutions Capital Investment Loan/Grant (N) EDA)

NJ EDA in cooperation with NJ DEP is offering interest-free loans and grants for energy efficiency, combined heat and power (CHP) and renewable energy projects with total project capital equipment costs of at least \$1 million. The interest-free loans are available for up to \$5 million, a portion of which may be issued as a grant. The most recent round was closed as of October 2009, but new CESCI program updates will be posted at www.njeda.com. For additional information, contactCESCI@njeda.com or call 866-534-7789.

7.1.3 Renewable Energy Incentive Program (NJ BPU)

The Renewable Energy Incentive Program (REIP) provides rebates for installing solar, wind, and sustainable biomass systems in Smart Growth regions. Rebates of \$1.00 per watt are available for solar electricity projects up to 50 kW in capacity. Wind systems can receive rebates up to \$3.20 per expected kWh produced. Sustainable biomass rebates start at \$4.00 per watt installed with a maximum incentive amount of 30 percent of project costs. REIP will give out \$53.25 million in rebates from 2009 - 2012. Project owners must complete the Pay for Performance Program, Direct Install or Local Municipal audit, or the rebate will be reduced by \$0.10 per watt. For more information on REIP, plasse as www.njcleanenergy.com.

7.1.4 Grid Connected Renewables Program (NJ BPU)

The New Jensey Grid Connected Renewables Program offers computitive incentives for wind and sustainable biomass electricity generation projects larger than 1



Section 7 Available Grants, Incentives and Funding Bources

Megawatt (MW). Applications for the most recent round of funding, which totaled smillion, were due January 8, 2010. Requests for Proposals (RFPs) for the most roughly \$16 million is available for incentives under this program during 2010. Next of the incentives offered under this program will take the form of a payment for energy production (\$/MWh) once the project is operating. Incentives areas up to \$56.49/MWh for publicly-owned wastewater biogas projects. Up to 10° of the incentive may be requested in the form of a lump grant to cover up-front cosits uch financing fees, interconnection fees, project design, permitting, and construction costs.

7.1.5 Utility Financing Programs

All four Electric Distribution Companies (EDCs) in New Jersey have developed long term contracting or financing programs for the development of solar in all of the programs, Solar Renewable Energy Credits (SRECs) generated by the solar energy systems will be sold at auction to energy suppliers who are required to purchase a certain quantity of SRECs to meet their Renewable Portfolio Standard requirements.

7.1.6 Renewable Energy Manufacturing Incentive (NJ BPU)

New Jerney's Renewable Energy Manufacturing Incentive (REMI) program provides rebates to purchase and install solar panels, inverters, and racking systems manufactured in New Jerney Robates for panels start at \$0.25 per watt and actual for racking systems and inverters start at \$0.15 per watt for solar projects up to 500 LW a capacity. To be eligible for REMI, applicants must apply to either the Renewable Energy Incentive Program (REIP) or the SREC Registration Program (SRT).

7.1.7 Clean Renewable Energy Bonds (IRS)

CREBs are 0% interest bonds typically issued for up to approximately \$3.0 million administered by the Internal Revenue Service (IRS). Last year, \$2.2 billion in CREBs was allocated to municipal entities to fund 610 renewable energy protects, including anaerobic digestion. IRS has been allocating funding for CREBs annually Last year, IRS solicited applications starting in April, which were due in August. The IRS is expected to receive additional funding for CREBs and release another round at solicitations in 2010.

7.1.8 Qualified Energy Conservation Bonds (IRS)

These IRS 0% interest bonds are very similar to CREBs except they are allocated based on state and county population. New Jersey was allocated 990 million as part of the ARRA stimulus fund. QECBs are typically distributed through municipal bond banks or state aconomic development agencies.



72

7.1.9 Global Climate Change Mitigation Incentive Fund (US EDA)

The Economic Development Agency (part of the U.S. Department of Commerce) administers the GCCMIF to public works projects that reduce greenhouse gas emissions and creates new jobs. In FY 2009, \$15 million was allocated to the fund, and additional funding is expected to be allocated in FY 2010. Applications are due on a rolling basis. The program does not have a maximum grant amount but does limit the grant to 50 percent of the project cost.

7.1.10 Private Tax-Exempt Financing

Similar to traditional municipal bond financing, there are many private financial aervice companies that offer a myriad of options for tax-exempt financing of municipal projects. The providers of these services suggest that this capital can be offered at competitive rates in an expedited timeframe and with fewer complications when compared to traditional municipal financing methods. Though these factors would need to be compared on a case-by-case basis, the one distinct advantage to private financing on the current project would likely be the flexibility to structure payments to meet budget needs with consideration given to the terms and conditions of existing loan and/or bond agreements. It should also be noted that, in many cases, the construction and long term financing can be rolled into a single private financing agreement. Also, in some instances, equipment manufacturers have the ability to offer competitive financing terms (e.g. Siemens Financial Services Corporation), though financing from these sources is generally contingent upon a substantial portion of the project cost (~20% to 30%) being for their respective equipment.

7.1.11 Performance Based Contracts (ESCOs)

A second financing alternative for a project of this nature would be to enter into a Performance Based Contract with an Energy Services Company (ESCO). The premise of this type of contract is that it requires no initial municipal capital contributions in order to implement the project - instead relying on future operations cost savings and/or energy production, to fund the annual payments. Prior to entering into an agreement for the funding of the project, an ECSO would perform an energy audit and/or conceptual studies to confirm future energy cost savings or energy production inherent with the projects implementation and operation. The contract would then be formulated based on some measurable parameter(s) (sludge reduction, energy production, etc.) which would be verified by measurement throughout the contract duration. The savings in energy costs or energy production would then be used to pay back the capital investment of the project over the contract time period (typically on the order of 10-years or leas). The ESCO would guarantee the agreed upon energy avoings or energy production. If the project does not meet energy savings or production commitments, the ESCO pays the owner the equivalent difference.

With this funding alternative, the ownership and operation of the facility would be maintained by the original owner. A performance contract may also include ESCO operation and maintanance of the energy-related facilities if that were deemed



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appropriate. Significant ESCO's with experience in this area include Siemens Building Technologies, Chevron and Johnson Controls. CDM has functioned in several roles on performance based contracts including being the owner's representative and, on different contracts, providing design-build services (as a subcontractor to the ECSO). We can provide additional experience-based information upon request.

7.1.12 Power Purchase Agreements (SPCs)

More commonly referred to as a Build-Own-Transfer (BOT) agreement in the Water/Wastewater industry, a Power Purchase Agreement (PPA) also delivers a project with no initial capital contribution by the original owner. In this model, a Special Purpose Company (SPC) created by a developer, would own the energy production facilities. Within the framework of a PPA, a SPC will typically lease property from the owners for construction and operation of the new facilities. The funding and construction of the new facilities would be performed by the SPC who would then own and operate the facilities for the duration of the contract (typically 20 to 30 years). Throughout that period of time, the original owner would purchase power from the SPC at a pre-negotiated rate which would take into account the initial capital cost, operation and maintenance of the constructed facility, ancillary benefits of the project and investor returns on investment. For renewable energy, financial incentives may enable this financing approach to compete favorably with utility power tariffs. Incentives include state and local tax credits, renewable energy credits, and Federal energy production tax credits or energy investment tax credits. It is expected that a number of experienced companies and developers may be interested in a PPA for New Jersey municipal renewable energy projects.

7.2 Energy Efficiency

7.2.1 Introduction

New Jersey's Clean Energy Program (NJ CEP) promotes increased energy efficiency and the use of clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass. The results for New Jersey are a stronger economy, less pollution, lower costs, and reduced demand for electricity. NJCEP offers financial incentives, programs, and services for residential, commercial, and municipal customers.

NJCEP reduces the need to generate electricity and burn natural gas which eliminates the pollution that would have been caused by such electric generation or natural gas usage. The benefits of these programs continue for the life of the measures installed, which on average is about 15 years. Thus, the public receives substantial environmental and public health benefits from programs that also lower energy bills and benefit the economy.

7.2.2 New Jersey Smart Start Buildings Program (NJ BPU)

The New Jersey Smart Start Buildings Program offers rebate incentives for several qualifying equipment such as high efficient premium motors and lighting, and lighting controls.

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74

Available Grants, Incentives and Funding Bources

Incentive information and incentive calculation worksheets are provided for the various new equipment installation identified in this report and are included in Appendix G.

7.2.3 Pay for Performance Program (NJ BPU)

Another program offered through the New Jersey Smart Start Program, is the Pay for Performance Program. Commercial, industrial and institutional buildings with an average annual peak demand over 200 kW are eligible for participation. In addition, local government agencies, which do not meet the 200 kW demand requirement and are not receiving Energy Efficiency and Conservation Block Grants are eligible.

Incentives are available for buildings that are able to present an Energy Reduction Plans that reduce the building's current energy consumption by 15% or more, in addition to incentives for installing the recommended measures and incentives for presenting the energy savings in a post-construction benchmarking report. No more than 50% of the total energy savings may be derived from lighting retrofits. In addition, the total energy savings of 15% may not come from the implementation of one energy savings measure. The incentive structure is provided in Appendix G.

7.2.4 Clean Energy Solutions Capital Investment Loan/Grant (NJ EDA)

NJ EDA In cooperation with NJ DEP is offering interest-free loans and grants for energy efficiency, combined heat and power (CHP) and renewable energy projects with total project capital equipment costs of at least \$1 million. The interest-free loans are available for up to \$5 million, a portion of which may be issued as a grant. The most recent round was closed as of October 2009, but new CESCI program updates will be posted at www.njeda.com, For additional information, contactCESCI@njeda.com or call 866-534-7789.

7.2.5 Private Tax-Exempt Financing

Similar to traditional municipal bond financing, there are many private financial service companies that offer a myriad of options for tax-exempt financing of municipal projects. The providers of these services suggest that this capital can be offered at competitive rates in an expedited timeframe and with fewer complications when compared to traditional municipal financing methods. Though these factors would need to be compared on a case-by-case basis, the one distinct advantage to private financing on the current project would likely be the flexibility to structure payments to meet budget needs with consideration given to the terms and conditions of existing loan and/or bond agreements. It should also be noted that, in many cases, the construction and long term financing can be rolled into a single private financing agreement. Also, in some instances, equipment manufacturers have the ability to offer competitive financing terms (e.g. Stemma Financial Services Corporation), though financing from these sources is generally contingent upon a substantial portion of the project cost (~20% to 30%) being for their respective equipment.

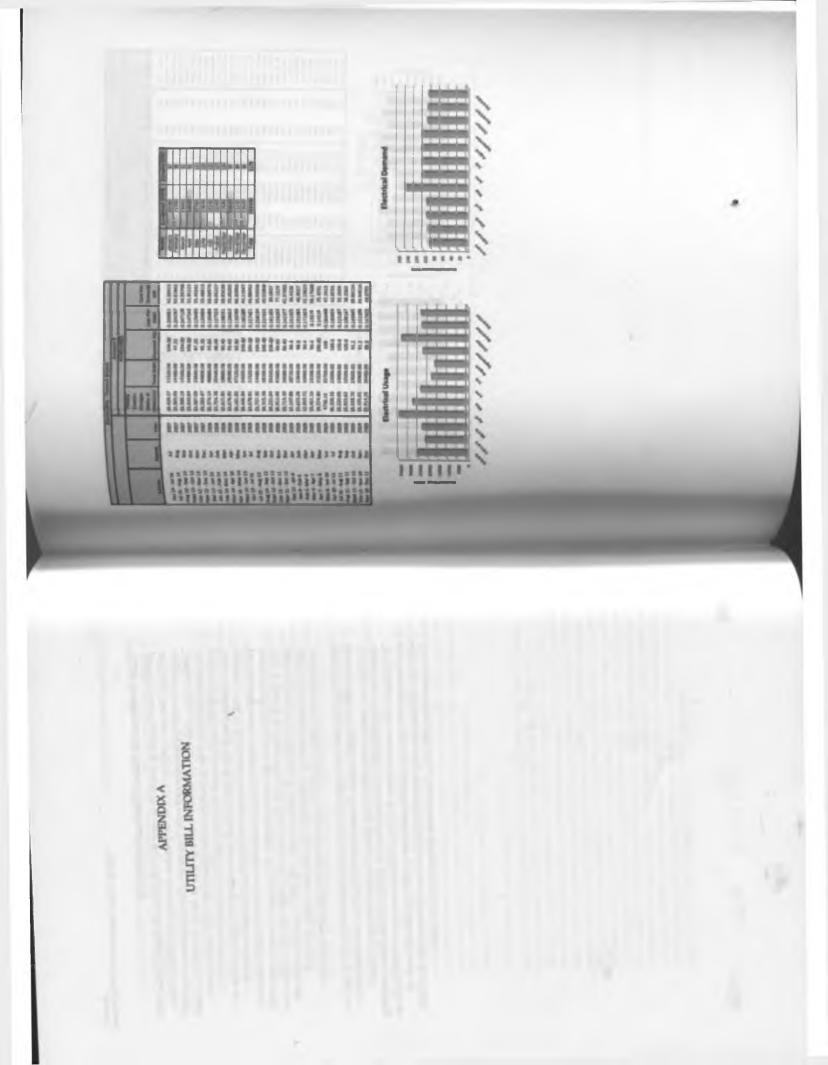


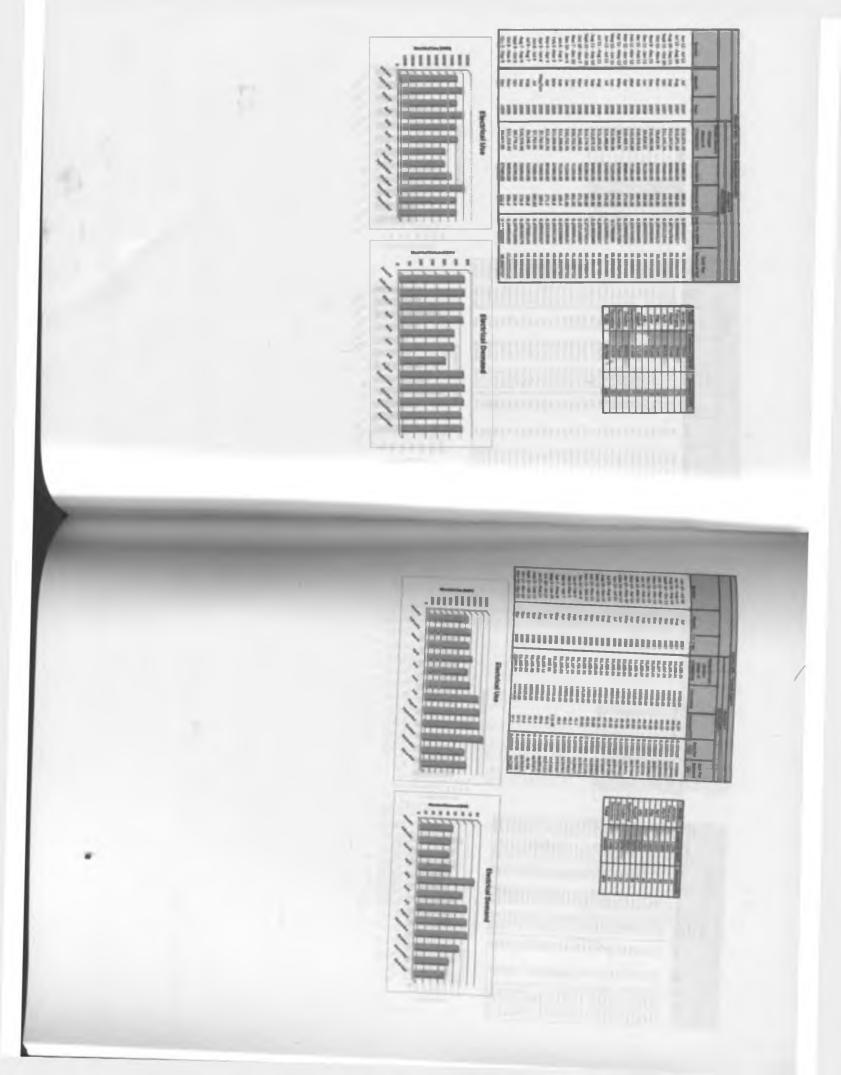
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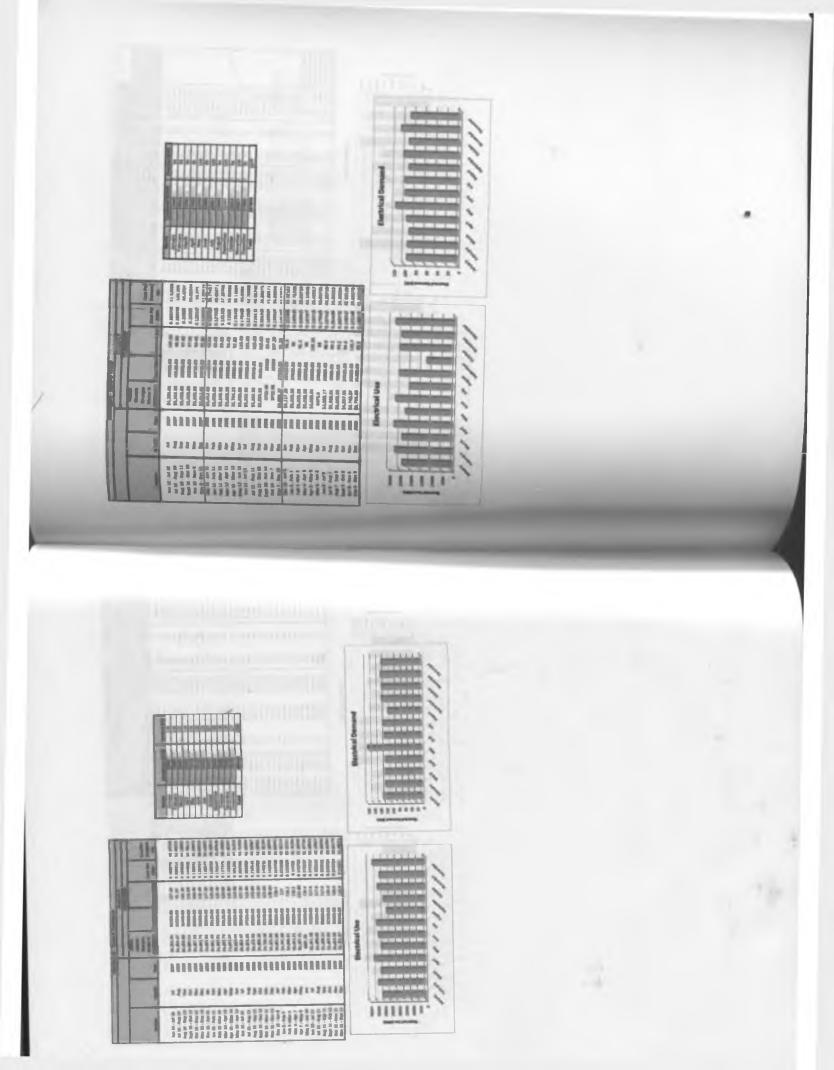
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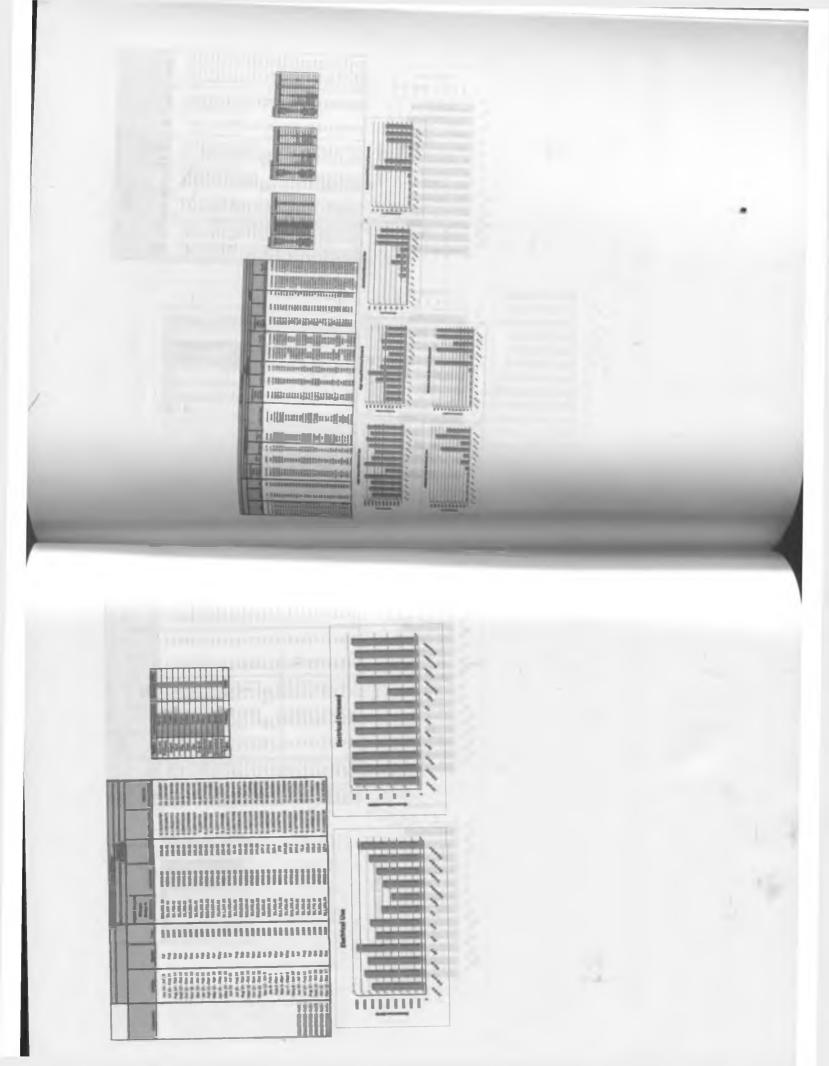
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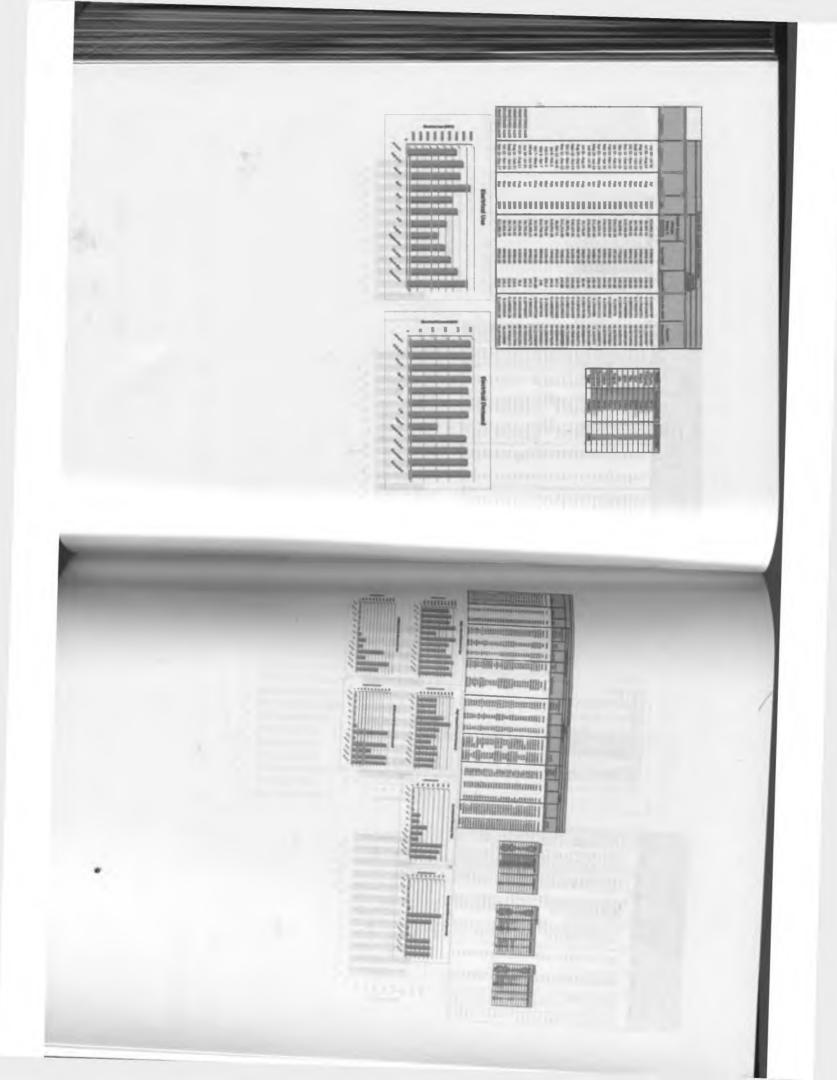
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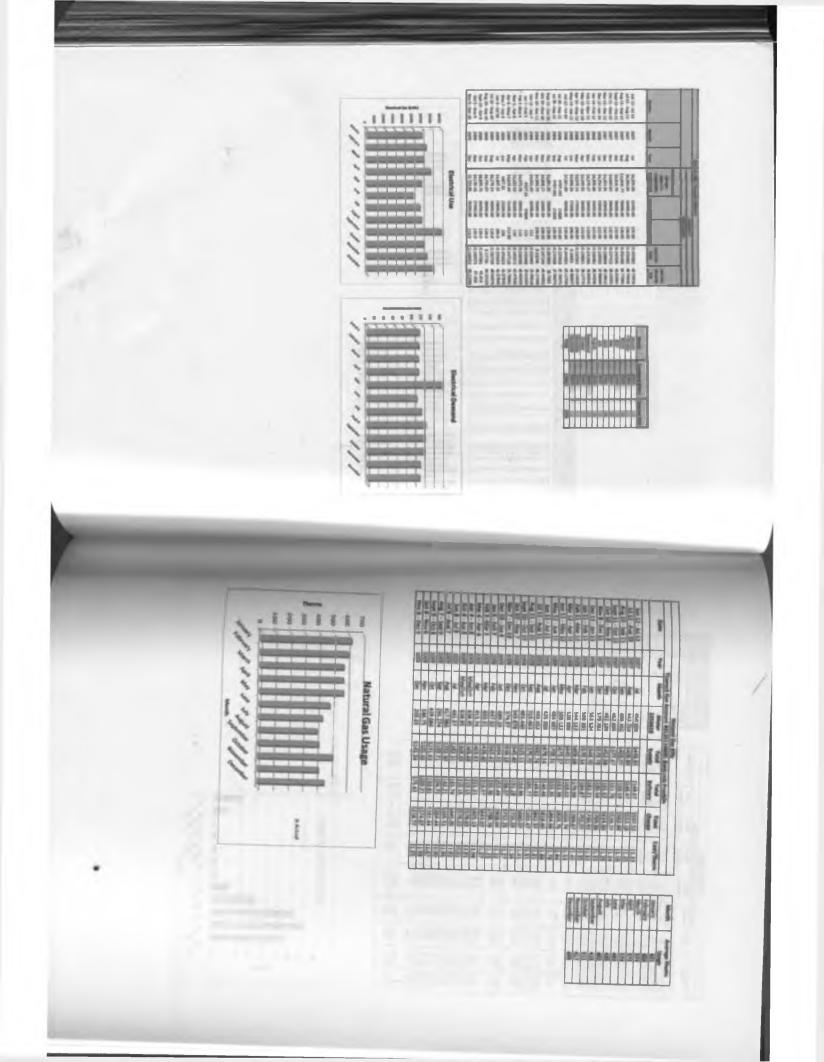


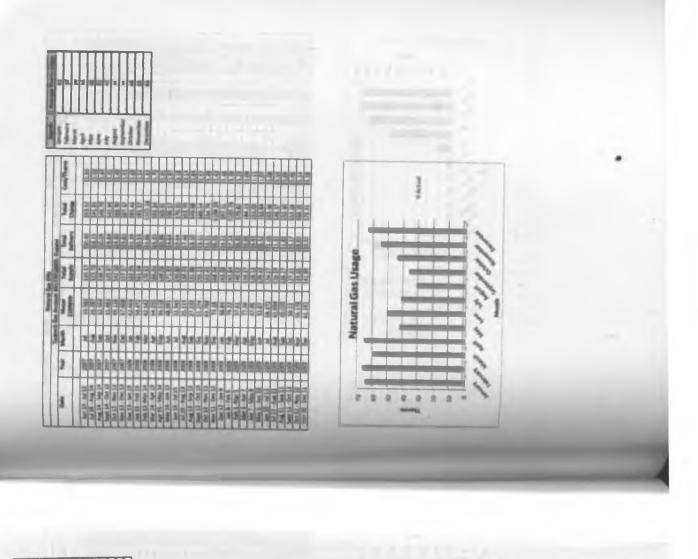






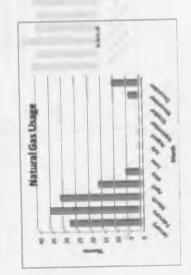


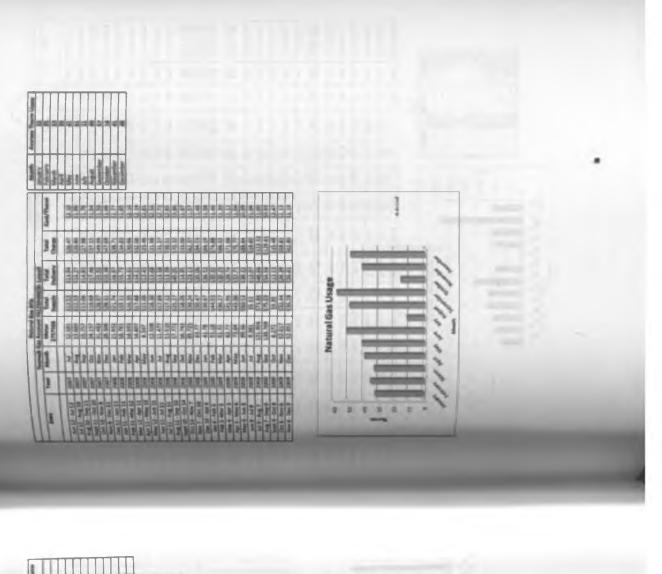


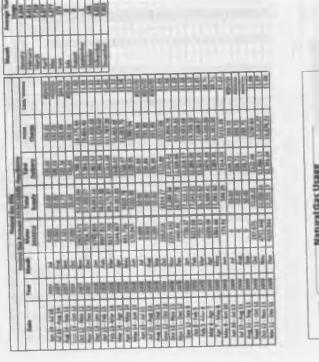


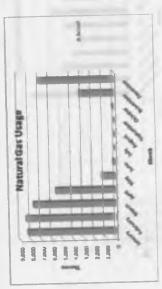
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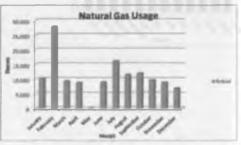




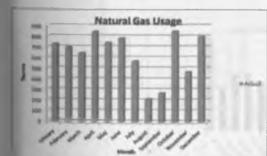


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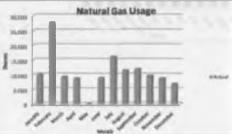


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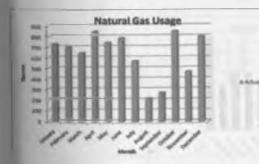
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Alley 13-April 15	1000	-	0.64	10.00	10.04	-212	Real Property lies	1,000,0000	Specific.	194.00	\$210.06	1.0	101.010	1016.78	14.5
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hept 10-014 13	200	288	12274-000	34246	ALL N	8.25.		100.00	20100	100.04	HILL R.		11546.9	21.346	1.11
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00.02-9er28	380	No.	CONTRACTOR	11200	8.28	DCM3		134,800	-	201.78	1111-16	01.0	18028-4	20,84	1.77
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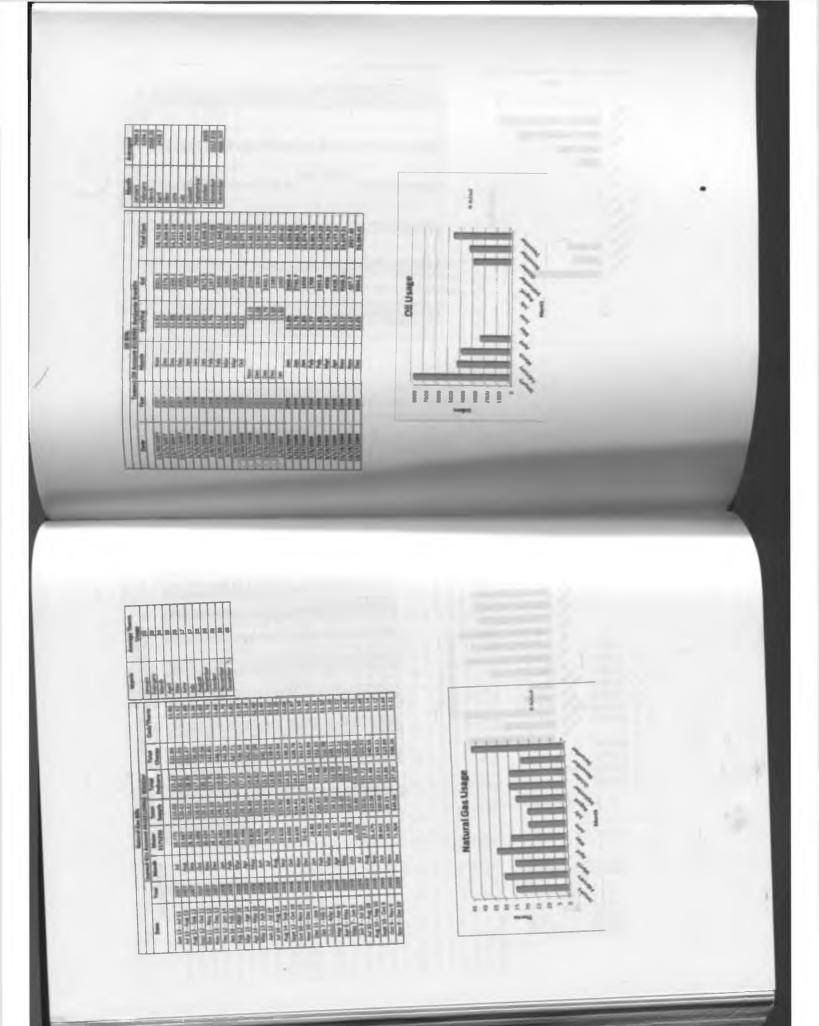


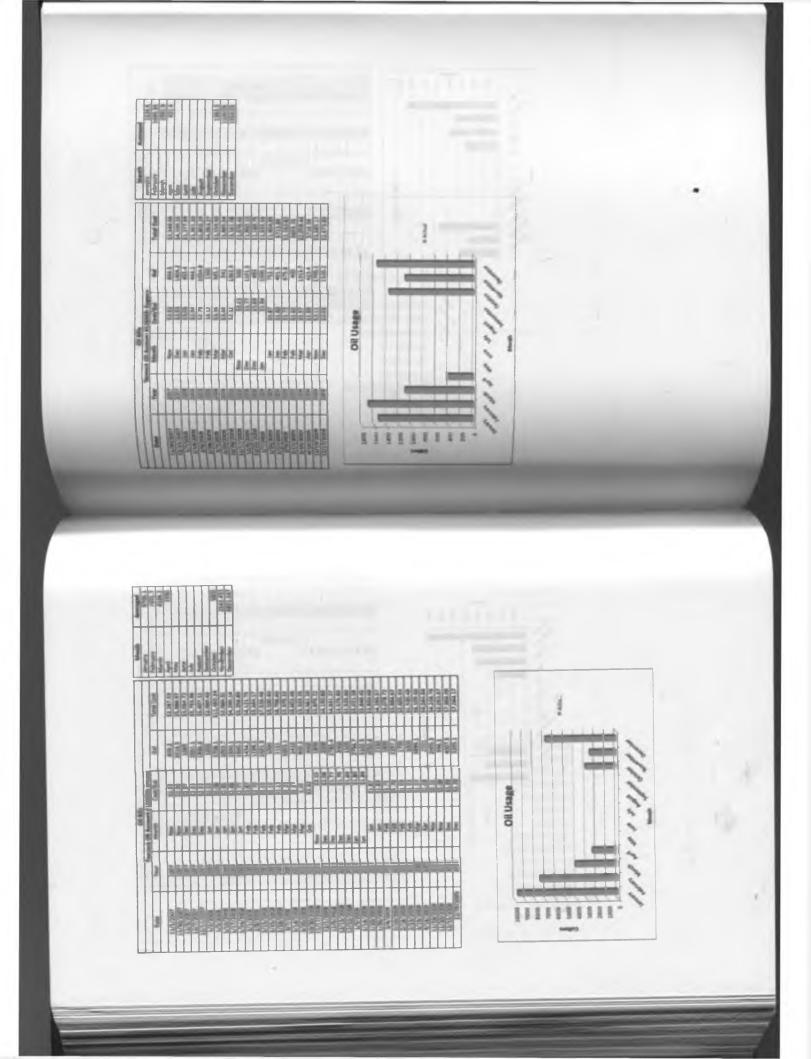
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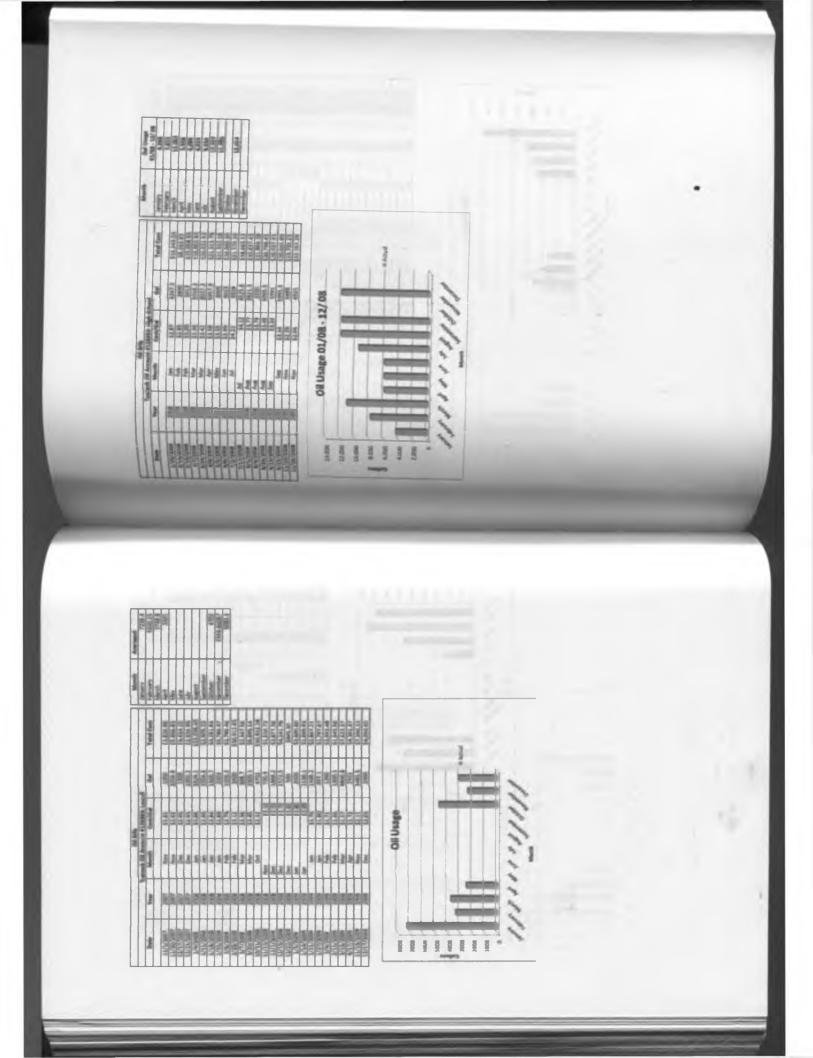


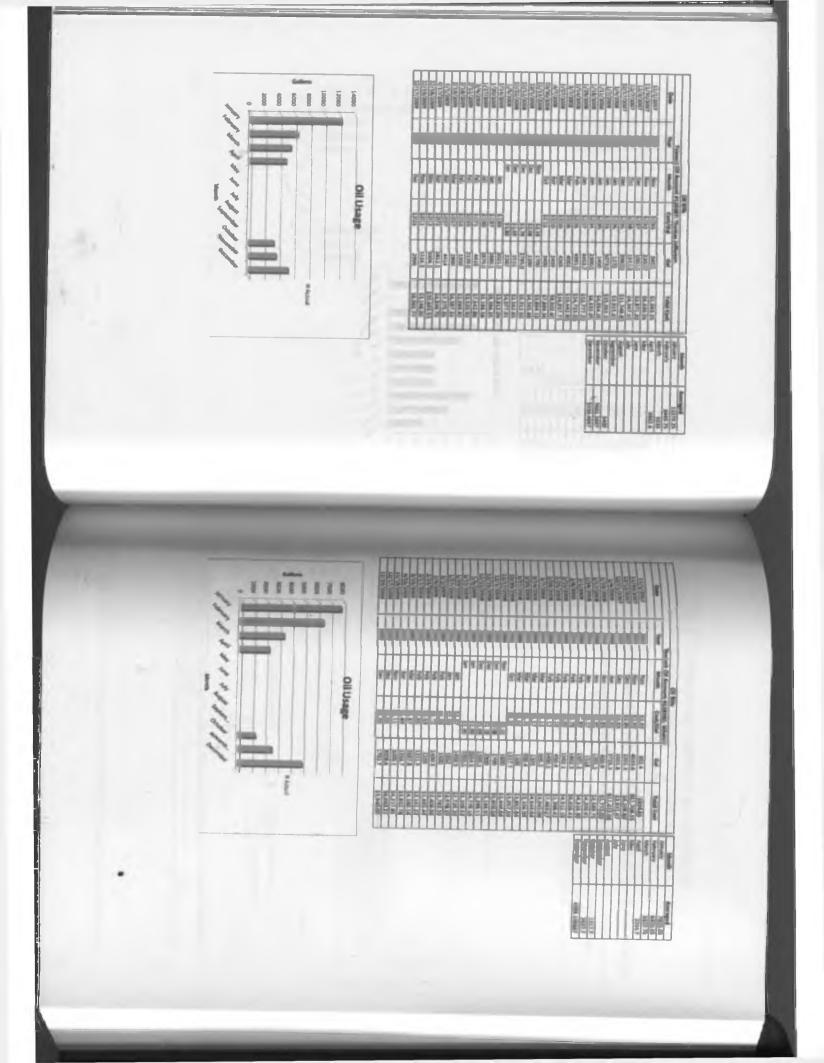
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APPENDIX B

STATEMENT OF ENERGY PERFORMANCE PORTPOLIO MANAGER REFERENCE SNEET

CMD No. 2010/2247



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STATEMENT OF ENERGY PERFORMANCE Benjamin Franklin Middle School

Building ID: 2244139 Fet 12-month Pariod Ending: November 30, 20091 Data SEP becomes Inaligible: N/A

Date BEF Generated: May D4, 2010

It Device Line of my visit to this building. I cartify	Frenkin Middle School F	nellity Owner Remeat Board of Educatio Manusch Street Remeat , NJ 07888	Primary Contast for this Pacifie Anthony D'Angelo I Memory D'Angelo Terreck , NJ 07006
Singly Use Binnonsy' many (and Purchase(KBIU) 2,081,009 Cir (No. 2) (tBiu) 4,189,879 Sis,009 53,009 Name (Desced on site energy use) 77 Simmon (Desced on site energy use) 778 Matter (Desced on site energy use) 109 Matter (Desced on site energy) 32% School 32% School 109 Matter (Desced on site energy) 32% Matter (Desced on site energy) 32% School 109 Matter (Desced on site energy) 101 Matter (Desced on site	Butt: 1957 B Floor Area (My): 100.202		
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109 National Average Source EUI 3256 School School <td></td> <td></td> <td></td>			
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	the second of the operation in some	in pass of party, harded finder	LIB is the manufacture and RDMA Lystems Handback for Sylling analysis

the survey of adapt. Name income in 19 and the lot Contra on Autor 10 tes for permeting scoregy data. PE Audity insuration, and residenties for 2029 and existences the Oractor, Californian Branguet Oracia, U.S., 2016 (2027), 1217 Parametersana. Ann., ant.

ENERGY STAR[®] Data Checklist for Commercial Buildings

Please complete and size (i) a statistical and include it with the distribut signed Batement of Quergy Parliamenes. NOTE: You must check each test is indicate that each series a control. Of include a nate

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Home	Bergemin Franklin bilddle Skihool	ia ika iku oficial bulang name ia ka fapilayad in the ENERGY STAR Registry of Laboled Bulangs?		
Type	K-12 Bahaal	te this an accurate description of the space in		
Lacation	1315 Tell Root, Teanack. NJ 07866	In part address accurate and garaping? Correct weather normalization requires an pearste zip node		0
Bingle Dirustion	Single Facility	Dess the SEP represent a single system? SEPs cannot be submitted for multiple-building carryuses (with the samption of each card or childing's hospitals) nor can they be submitted as representing only a portion of a building		
Hiddle Bahnal (K-12 ()	(tool)			
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION OVERTICHE	NOTES	
Grees Floor Area	100.202 \$q. Pt	Date the square lockage include al supporting another such as libraris and transit norms used by safet, storage areas, advantageting areas, assesses, carveres, area shall any include the main face shall a cataging, the diffiel included in the total. Finally grace face area is not the scarve as location space, Leageble space is a advant of procession is a advant of procession is a advant of procession in a advant of procession and the advant of procession as a advant of procession as a advant of procession and the advant of procession as a advant of procession as a a		
Open Weekende?	No	Is this building remeatly open at all on the regularda? This includes activities beyond the orget conducted by mathematics, displaying, and assuring personant. Weatland activity sould include any give them the appear is used for demons, performances or other school or services and parts of the standard school or more assured. No building should angul ?par? for open readmins. If the building is poon the one of both of the readminst the ?par? her open performances to building is open at the other school or readminst. The building should angul ?par? for open readminst. The building is open the one of both of the readminst.	16	
Number of PCs	83	to this the number of personal oxerguters in the K12 School?		
Number of well-in write-	2	In this the total number of commandial well-in type measure and coolers? These units are typically found is storage and receiving areas.		
Presence of coshing feelilites	Yes	Deem tills school have a dedeated approvin huhich beel is propored and served is students? If the adheat tills speace in which hood by excludents is only a galag team and/or served is students, or has only a galag team and/or served is students, or has only a galag team is used by teachers and suff them the immerse is "vo".		d
Percent Casled	40 %	In this the percentage of the total flags space within the faulty that is served by mechanical cooling agapteent?		0
Personi Hasted	90 %	In this the percentage of the table flage space within the faulty that is served by mechanical heating equipment?		10
Mantha	12(Optional)	to the actual in operation for at least 8 months of the year?		10

Page 1 of 4

migh Suban/?	No	Is this building a high school (asaching grades 10, 11, and/or 12)? If the building lasches to high school students at all, the user about others (yes' to high school. For exempte, if the achool teaches to grades K-12 interventery-modes over high achool, the user should check yes' to high achool.	
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ENERGY STAR[®] Data Checklist for Commercial Buildings

Energy Consumption

04/04/2008

03/04/2008

01/07/2008

1311/2008

2200010 Concurrytion (Litte (Vencord Blu))

2256618 Concurrences (Instant)

Power Generation Plant or Distribution Utility Public Service Elec & Ges Co.

vol Type: Enstrially		
Met	er: 779019617 (kWh (thousand Well-he Space(s): Entire Facility Generation Method: Grid Purchase	ours))
Blart Date	End Data	Energy Line (1996 (thousand Well-house
10/06/2009	11/08/2008	63.820.00
08/10/2008	10/08/2008	68.240.00
08/08/2008	08/08/2008	00.008.10
07/10/2008	08/07/2008	\$3,280.00
0808/2001	07/08/2008	M.320.00
0404/2001	06/08/2008	1 (0.000.00
03/04/2008	04/03/2008	gil. 100.00
02/06/2008	03/03/2008	87,680.00
0.1/07/2008	02/03/2008	75.120.00
18/11/2008	01/06/2000	71,520.00
78819817 Consumption (1994 (thousand 199	E-houraj)	787.838.88
78015617 Consumption (18th (thousand Bts	90	2.010.001.04
stal Electricity (Gold Pargheses) Consumptio	n (Milliou (Milliousand Bibu))	2,019,301.84
n this the total Electricity (Grid Purchase) on Inciricity vasions?	noungel on at this building including of	
tual Type: Hataral Bas		
	lifeter: 2280018 (therma) Space(a): Entire Facility	
Bart Date	lind Data	Grungy Use (therms)
1 8/08/2008	11/08/2008	506.75
CB/10/2008	10/08/2008	438.87
0006/2008	00/08/2008	296 27
07/10/2008	06/07/2008	417.99
08/08/2009	07/08/2008	681.57

06/08/2008

04/03/2008

03/03/2008

02/03/2008

01/08/2008

1,277.81

£18.74

847.52

100 21

6.084.42

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net manual Gas Gaugingtian (Millio		005.442.00
pis the total Material Bot strengtingth	an at this hariding instanting all National Gas picture?	
Toront Clark Chi (see 2)		
Contraction of the second	Motor: 128368 (Gollans) Specu(s); Entre Facility	
Blart Date	End Date	Energy Use (Galana)
11/01/2000	11/39/2008	6.008.00
1001/2000	10/31/2000	0 80
0001/2000	09/39/2009	0.00
SUP 1/2000	09/31/2008	0 80
SN91/2008	07/31/2000	05.0
0001/2000	06/30/2008	0.80
0801/2009	06/31/2009	0.00
000172000	06/30/2000	2.438.70
03/01/2000	03/31/2008	4.038.00
00/01/2008	03/36/2008	3.001.00
91/01/2008	61/31/3008	8.404.18
1201/2008	12/21/2008	5.000.10
Consumption (Ballinna)		38,000.70
Gunnumption gillts (thousand B	Ina (J	4,100,676.78
i Fuel CO (No. 2) Concemption (121)	(Processed Bts))	4,108,676.78
ils îne total Fuel Cil (No. 2) consump ant?	New at this building including all Fuel Cit (No. 2)	
Runal Fuels	· · · · · · · · · · · · · · · · · · ·	
the Last terraproperties, indally circulate since	represent the solal energy use of this building? (district energy, generator fuel of) used in this facility	
In Solar and Prind Every the consumption track them along the solar sectors and the op-site of the systems want to reported.	include all an die soler andror end power konteil at . Inter er wied budeletors have been orrelad from tha	

Date

THE OWNER WATER OF

a sequent atom applying to the Entropy STAR.

Page-Lol 4

FOR YOUR RECORDS ONLY, DO NOT SUBMIT TO EPA.

Please keep this Facility Services for your own records: do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Feality

Berjamin Franklin Middle School 1315 Telt Road Teanack, NJ 07806

Facility Center Teansch Board of Education 1 Marrison Street Teeneck , NJ 07885

Primary Costast for this Facility Anthony D'Angelo 1 Merrison Bireat Teamack , NJ 07866

General Information

Beljamin Franklin Middle Boheti	
Gross Floor Area Excluding Parking: (N*)	100.202
Year Bult	1887
For 12-month Evaluation Period Ending Date:	November 30, 2008

Facility Roace Use Summary

think interf	
Aparen Type	If-12 Bahasi
Grans Finan Arnajit #)	100.303
Open Washinda ¹	Ha
Humber of PCs	- 18
Handar of web-in subgarable fitness units	- 2
Preserves of easiling Saddings	Yes
Persona Casebal	- 4
Percent Heated	85
Mardher	12
High Bahaal?	ite -
Boheat Chattat	Terrack

Energy Performance Comparison

	Explosition Person		Contraction		
Parlarmanan Matrice	Carround Centry Date 11/20/2008	Breaks	Pasting of 75	Yorget	Sectored Arrival
Energy Parlowance Railing	21	21	78	-	90
Energy Inpently					
84x (v0x.84)	77	12	- 48	1010	
Instead (Hitsoff)	146	142	88	NHA .	109
Enangy Cost			-		
Ryter	8 188 383.32	E 210.700.10	8 110.136.96	100	8 140,854 50
\$thijew:	\$1.05	01.10	8 1.10	1011	8145
Deservices Out Pressure					
MOGjelyeer	174	765	481	MA	890
ligitit and light		4	1 .	NA I	

Have then BYs of your building is defined as K-12 School. Plagas also beit your rolling assesses for all of the speake basis. The functional Reverge school your analysis of the speake building would have if your building load on a 11 mgs rolling of \$2.

Sintes:

o - The attitude to optimal d - A default value has been supplied by Postinin Manager

Statement of Energy Performance

2009

Benjemin Franklin Middle School 1316 Teft Road Teanack, NJ 07888

Portfolio Menager Building ID: 2244139

The energy use of this building has been measured and compared to other similar buildings using the Eastronmental Protection Agency's (EPA's) Energy Performance Boals of 1–100, with 1 being the least energy dictert and 100 the most energy efficient. For more information, visit energyster performance.

50

this building's score

-

This building uses 144 kBlu per source fost per year."

"Beaution statute acarty intensity for the 12 month justal Anding November 2008

al Ethermore

104

Buildings with a score of 75 or higher may quality for EPA's ENERGY STAR.

Date of our

The second second second design of a provide second s

Date Generated: 05/04/2010

SEPA

OMB No. 2080-0347



STATEMENT OF ENERGY PERFORMANCE **Bryant Elementary School**

Building ID: 2344795 For 12-month Period Ending: October 31, 20091 Date SEP becomes ineligible: N/A

Fastility Owner

1 Memoria Street

Teamed , NJ 07665

Teaneck Board of Education

Date SEP Generated: May Di, 2010.

Primary Contest for this Pacility

Anthony D'Angelo

Teaneck , NJ 07665

1 Marrison Street

Facility **Bryani Elementary School** 1 Tyron Avenue Teeneck, NJ 07886

Year Bullt: 1926 Green Floor Area (RI): 47,438

Energy Performance Rating² (1-100) 7

Ette Energy Use Burnmary* Electricity - Grid Purchase(KBtu) Fuel OI (No. 2) (LBtu) Natural Gas (IdBtu)* Total Energy (LBtu)	943,359 4,641,829 13,003 5,596,891	
Energy Intensity* Sile (LBlu/RAyr) Source (LBlu/RAyr)	518 100	
Emissions (based en sils energy uss) Greenhouse Ges Emissions (MiCO ₂ e/year)	486	
Electric Distribution Mility Public Service Elec & Ges Co		
National Average Comparison National Average Bite EUI National Average Bource EUI % Difference from National Average Source EUI Building Type	102 63% K-12 Sancoi	



Mosts Industry Standards" for Indoor Environm	neritel .	Mathew Gost
Conditions		11 Breich American Boulevard
Venillation for Acceptable Indoor Air Quality	WA	Lathern, NY 12110
Acceptable Thermel Environmental Conditione	MA	
Adequate Illumination	N/A	

> of the subscript Name of Street, 5

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EPA Form BBBD-18

ENERGY STAR[®] Data Checklist for Commercial Buildings

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CRITERION	VALUE AS ENTERED IN PORTFOLIO BANAGER	VERIFICATION QUESTIONS	NOTER	
making Name	Brjari Elementary Bancol	is the the clicked building name to be the ENERGY STAR Registry of Laboled		
Type	K-12 Skhool	Is this an accurate description of the space in memory of the space in		E
Louis	1 Tyren Avenue, Teeneck, NJ 07586	Is this address councils and samples." Correct star normalization requires an accurate sp		
tergie Mosthers	Bingle Facility	Data (Ho BCP) I a single structure motion-building computer (with the employed building care or present hospitals) nor can key last or present to the structure of a to		
and Distantiky (%)	C2 Skirtunity			
ENTERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUEETIONE	NOTES	
Omas Floor Area	47,638 Bq, Pt.	Does this require testings include of experting functions such as teleforms and break records and and any set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the head of the begin Finally great them are a net by great a based of set of the set of the head of the begin set of the set of the head of the begin set of the set of the head of the begin set of the set of the head of the begin set of the set of the head of the begin set of the set of the head of the begin set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the head of the set of the set of the set of the set of the head of the set of the set of the set of the set of the head of the set of the set of the set of the set of the head of the set of the set of the set of the set of the head of the set		
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The second second	10	to this the number of personal computers in the K12 Balacel?		
Algorithms for an o	0	In this like total number of conveying with in type freezent and coders? These units are typically level to storage and receiving areas		
Areason of	Yes	Dean Dis orheich have a dedicated space in which head to propered and served to disaberth? If the schael New secon in which food for elevations is only head sorth and/or served to students, or has only a genus part is used by teachers and defil then the senses is "vor".		
Particle Contrast	30 %	In Fig. So presentings of Pin Mar Space street the faulty that is served by mechanical anding component?		
Property and	80 %	In this the percentage of the later facer sense within the facility that is served by mechanical heating		
-	12(Optional)	In this stitute in equivalent for al land 8 member of the year?		

Page 1 of 4

ENERGY STAR[®] Data Checklist for Commercial Buildings

Committee Plant or Distribution Utility: Public Service Elec & Gas Co

	Motor: 725051215 (KWh (thousand Watt-ha Entro Facility Generation Method: une Purchase	Dure))
Blart Doll	End Date	Energy Use (2011 Strength of West)
00/12/2000	10/13/2008	23,800.00
00/12/2008	08/11/2008	19,200.00
g714/2009	08/11/2008	14,880.00
00/11/2008	07/13/2008	22,000 00
58/06/2008	06/10/2008	35.780.00
04/08/2009	06/08/2008	21,820,00
08/06/2008	04/07/2008	22.100.00
00/07/2009	03/04/2008	10,000,00
0100/2000	02/08/2008	23,840,00
12112/2009	01/08/2008	80,720.09
11122008	12/12/2008	80,000,00
Concurrention (KWh (thousand	d Well-hours)	346,000.00
Consumption (Billing (thousan		642,001.00
ricity (Buta Payahase) Consum	uption (killtu (ybourand ilitu))	842,001.00 842,001.00
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2000-008 Casaumption (thorma)	130.78
2000-006 Concumption (bBit (thestand Bit/))	13.078.08
Total Natural Gas Consumption (kills (theusand libs)	15,070.00
In this the last Natural Key Consumption of this building Including all Habard time maters 7	

Fuel Type: Fuel Oli (No. 2)

	Motor: 120302 (Gallean) Spece(s): Entry Facility	
Blart Detr	Grid Data	Energy Use (Callera
19/01/2009	19/31/2008	000
09/01/2009	09/30/2009	0.00
00/01/2009	08/31/2008	0.00
07/01/2000	07/31/2008	0.00
08/01/2008	06/30/2008	0.00
06/01/2009	06/31/2008	0.00
04/01/2008	04/30/2008	2,300.00
03/01/2008	09/31/2008	2.000.10
03/01/2008	02/28/2008	6.797.20
01/01/2009	01/31/2008	18.280.00
19/01/2008	13/31/2008	6.265.40
1 1/01/2008	11/30/2008	1,800.00
28382 Consumption (Ballines)		33,466.76
22362 Concumption (Hills (Housand Bha))		4,011,828.43
Total Pusi CE (No. 2) Cananimation (Millio (No	nunand (Stal)	4,041,929 43
is this the total Fuel Cill (No. 2) consumption maters?	at this building inclusing all Fuel (31 (Se. 2)	

Do the fuel consumption totals shown above represent the that energy use of this building?	
Phones confirm there are no additional fuels (destud energy, generator fuel all) used in this facility	

Papertal

On-this lader and tubed lowergs Do the fuel computation table therein therein include all pruste sates and/or using power logithed at your factify? Please early m Pail no on-alls actar or wind indefaultons have been availand from this lat. All on-alls systems must be reported.

Certifying Professional

(When applying for the EMERGY STAR, the Cartifying Plaste sized must be the same as the PE that signed and stamped the SEP.)

Date Name

Signature ______ Repairs a report of an applying in the DADADY strait

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

a sale this Facility Bernmany for your own records, do not submit a to EPA. Only the Balanniani of Energy Parts Data Checkles and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR

T Elementary School Tyron Automation

Facility Owner

Teaneck Board of Education 1 Marrison Street Teenedi , NJ 07665

Primary Content for this Pacifity Anthony D'Angelo 1 Memouri Elimet Teenack , NJ 07666

notinformation

sour Foor Area Excusing Parking: (R*)	47,438
the last	1828
Extended Evaluation Period Ending Date:	October 31, 2008

Facility Space Use Summary

States Street Street	
Agence Types	IC-12 Baland
Cannon Primer Areas(11.7)	47.438
Our Photo INT	765
THE OF A POS	10
and the second second second	
Paul sense of spatial plantings	Yee
Palasers Castled	20
Parallel Paramet	10
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and in case	Han
Indiana Chategor	Teerant

Energy Residences Comparison

	E-challe	er Parante	1	Gersen	-
Talances Street .	Current (Rooling Dawn Landstoner)	Manadawa State of Concession,	Rating of 15	Target	Reason Amongo
Ing Parlamente Rateg	7	4	15	NA I	- 10
All many	and the second se		-	-	
Bite (481/81)	118	118	0	NA	n
Brunos (Idlum)		178	10	16.4	102
No.				-	
£)ear	8 108,251.69	B ter att.at	\$ 50,947.89	NA	244,042,49
\$91pter	\$\$22	12.0	8107	ALA.	£1.38
Own Doctory					
MCU,eyear	48	808	1933	- 10.1	24
Applity and the second	- 10	11	8	NA	

To of your Buildings is chefreed on X-12 Exhest. Pleases with their your rating accounts for all of the species Baltich. The Eastmant Average instance (investme) memory data your building result have if your building test an exemption value of 62.

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is another to communi-terior structure together by Purchase Manager

Statement of Energy Perform<u>ance</u>

2009

Bryant Elementary School 1 Tyron Avenue Twanack, NJ 07898

Portfolio Menager Building ID: 2244795

100

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient, For more information, visit energystar gov/banchmark.

 Least Efficient
 Average
 Most Efficient

 This building uses 100 kBu per squares foot per year."
 Buildings with a boors of 75 or higher may qualify for EPA's ENERGY BTAR

SEPA ----

This building's

Data Generated 05/04/2010

CMB No. 30054347



STATEMENT OF ENERGY PERFORMANCE Eugene Field Administration Building

Building ID: 2244835 For 12-month Period Ending: November 30, 2009* Date SEP Decomes instiguing: N/A

Date 367 Generated: May Di. 2018

Tames Administration Building 1 James Breat Tames J. NJ 07005	Facility Owner Teansch Board of Education 1 Manison Street Teansch , NJ 07865	Primary Contest for this Facility Anthony D'Angelo 1 Manusch Screet Teanach - NJ 07666
Year Gull: 1965 Gross Place Area (NY) 24.877 Beorgy Parlemance Rating ⁺ (1-100) 82		
Tanatany - Grid Puschang(tBtu) Pad Ott (Mo. 2) (tälluu) Natural Gas (tälluu)* Tanti Energy (tälluu)	508,418 1,173,383 68,823 1,841,702	
finning later and a the state Witch have (Mitchaft Ryr)	74 131	
Emissione (based on site energy use) Greathouse Gas Emissions (MiCO,s/year)	161	Sterre of Certifying Professions
Public Distribution Littliny Public Barros Elec & Ges Co		Based on the conditions observed at the time of my viait to this building, I certify that the information contained within this
Average Comparison Average Bource (UI Contents from National Average Bource Type	112 199 EUI -34% Office	statement is accurate.
Mana Industry Stanutards* for Indoor Em	firorymental	Certifying Professional Methow Goes

A DECEMBER OF PORTING OF MODOLE PRANTING	THEFT	Matthew Goes
Azamatian for Acceptable Indoor Air Guality Azamatian Tharmal Environmental Conditions	NIA NIA	11 British American Bouleverd Lathern, NY 12110
indexing the second second	NUA	

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8.4.9 Anonymy Dire Hundred II: El cui Ras fann a 2 Anone Evolution for time for unitarity scarage days. PE Social researcher, and experience for SEP and content and an image of 2009. Send concerning indexesting Only and evolution in the Energy Content and Energy Plannet, 1 1, 214 (2017), 1287 Parameterspin Ann. Ann.

A NAME AND ADDRESS OF

ENERGY STAR* Data Checklist for Commercial Buildings

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Please complete and sign this checklest and instals it with the stampest, signed Balaneard of Serigs Performance NOTE. You need that such both initials had such used a comet, CR include a rule.

CHITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERFICATION OVERTIONS	AUTER	15
Building Name	Eugene Field Adhistrateston Building	9 Pills the califord huilding name to lea Peopleyed In the EMERGY STAM Regelly of Laboled Multisege?		
Type	Cilifos	In this an accurate description of the space in parentice?		F
Location	1 Mileritacon Street, Taaneeck . NJ 079855	In this procession waters and according to accord to the state of the		
Eingle Bructure	Bryte Fectily	Duate the VLP represents a single structure? (SDPs period as excerning to excerning builds compared (with the excerning) or display care or probability for the polyton of a building synearchical or or a polyton of a building		
Contraction Public	li (Dillo)			
CHITERON	PORTFOLIO MANAGER	VERIFICATION QUERTIONS	NOTES	D
Ordes Place Area	24.877 Bg. Pt.	Dotes that starters foculity insides all septonting buckloss stores and increase and starters used by staff, decays sterns, allocations areas. Lance starters and starters and and and and and starters and starters and and and and and starters and start for and and and and starters for a start. Frankly gene they send a st stated in the start. Frankly gene they send a st stated of prost boos send.		
Bagmandia Agroup	63 Hours	as the piller total mundeer of hours paraveled that free points genera in PSA constrained. This areas mouth piller and and the the building in occupant protection from when the building in occupant protection with a anomple for even piller of the buildings with a anomple for even piller of the year. "Overship from second, robus to the tube weekly nour for the schedule most often building.		
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Number of PCs	12	Is this the number of personal computers in the Ontary		
Persent Cooled	10% or more	In this the percentage of the table their space within the facility that is served by mediantical cooking septement?		
Persent Hanted	NPh of Them	to this the percentage of the table floor sploor within the faulty that is served by machanical functing suptement?		

ENERGY STAR* Data Checklist for Commercial Buildings

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	Meaker: 678004545 (IVWh (Ihousand Watt-hours)) Space(s): Entire Facility Generation Method: Orid Puschase	
Stert Dete	End Date	Energy Use (XSh (Nousered Well-des
toriazios	11/10/2008	13,440,00
501/21/02	10/15/2008	13,110.00
0012/2008	08/11/2008	10.0440.00
\$2114/2008	001112008	18,470.00
5021180	02/15/2008	16,350.00
09092008	08/10/2008	14,430.00
DATE: 2008	00/08/2008	14,760.00
storports	04/07/2008	18,120.00
EB9667008	03/06/2008	00'080'E1
Investors	03/09/2008	00'009'E1
12/19/2008	01/08/2008	11340.00
brancetti ATTA (Boundard)	(auto-track)	192,000.00
Instanti alla (housed	d Buj	548,549.40
othicity (Didi Purchase) Consump	tion (billio (thousand fittal)	545,545.40
Bir bela Barney (Crid Purchase)	consumption at this building including all	
at Name Cas		
	Meter: 2209809 (Themis) Spece(s): Errine Pacifity	
and Date	Erut Date	Evergy Use (Berna)
SOUT CLAS	11/10/2008	11.15
60121008	10/12/2008	10.13
80022008	08/11/2008	49.04
OTH A LOOP	600211160	10°.10
CON LIDES	07/13/2008	16.02
B&CACTOR -	6002/01/80	10.21
040953030	04/08/2008	W/D
0000000	04/07/2008	22
(50% ID)#	6005/0080	18/48
010062008	00/09/2008	14.21
- Inclusion	ALMANAA.	11 III

Charles and

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122

2261000 Consumption (therms)	631.48
2200000 Consumption (kSte (theseand Ste))	63,146.00
Tatal Natural Gas Consumption (Mills (Nousand Binj)	83,146.06
In this the total Hataral Gas concumption at this building including all Hataral Gas motors?	

	Motor: 128385 (Gallonn) Spece(s): Entre Facility		
Blart Date	End Oate	Energy Use (Bellens)	
11/01/2008	11/30/2008	1.700.10	
18/01/2009	10/31/2008	0.00	
08/01/2009	09/30/2008	0.00	
08/91/2008	08/31/2008	0.00	
07/01/2009	07/31/2008	0.00	
06/01/2009	08/30/2008	0.00	
06/01/2009	98/31/2008	0.00	
04/01/2009	04/30/2008	423.40	
03/01/2009	09/31/2008	1,313.70	
02/01/2009	02/29/2009	1.075 80	
01/01/2009	01/31/2008	2,153.70	
18/01/2009	12/21/2008	1,703.80	
128268 Commengelige (Ballines)	8,400.30		
120308 Consumption (bible (those and Bibl))	1,173,363.24		
Total Fuel Cill (No. 2) Commission (Mills (House		1,173.383.34	
In this the total Fuel Cill (ite. 2) consumption at molece?	this building including all Fuel Q8 (No. 2)		
P10/117			

Additional Family

Additional Facily	
Do the fusi consumption totall shown above represent the stall energy use of the building? Rease control there are no additional fuels (district energy, generator fuel all) used is this facility.	
	and the second se

On-Site Balar and Wind Brarge

And states made a state of the	
On the fuel computer totals shown above include all an alls solar and/or strid gauge igenied al	
your facility? Please contine that no on-site solar or wind insistinations have been omiged from this	
Int. All co-min systems must be reported.	

Certifying Professional

(When applying for the ENERGY STAR, the Cartilying Protectional must be the same as the PE that signed and classical the BEP.)

Name

1.001

Bignature Signature & regime also: subjety in the District state.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Checkles and Letter of Agreement need to be submitted to EPA. Only the Statement of Energy Performance Checkles and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR

Facility Second Field	Administration	Building
Adaption 20	07888	

Pasility Owner Teeneck Board of Education 1 Merrison Street Teeneck , NJ 07085

Primary Context for this Pecility Anthony D'Angelo 1 Manison Street Teanack , NJ 07886

neral Information

Const Frace Area Exclusing Parking: (R ²)	24.877
and the second s	1 DISU
County Evaluation Pariod Ending Date	November 30, 2008

Facility Sciece Use Summary

Address Strengthen	and the second s
Report Type	Office
Course Planar Areas(87)	24.877
TRACTOR DESCRIPTION	88
Manhaora ann Mante Mitall	47
Mandon of PCa	21
Paranet Cannot	10% or many
Manager Prophet	10% or many

Energy Performance Comparison

and the second second	Explosition Particula			Gerseway	
Performance Internet	Guine of (Builing Date 1 V38/3868) 62	(Braining Datas Corporations)	Rating of 71	Target	Rational Average
man Preformance Rating					
toral and					
Site (Miles/PT)	74	70	6	765	102
Sinorce (Mitur#1)	131	134	347	NA I	Val
ing the			-		
- Aller	5 44.527.44	\$ 47,005.00	\$ 80.301.40	NA	148,125,20
\$81year	81.60	\$1.00	\$2.02	NA	\$2.74
Name and Address of the Owner, or other				-	
MECO,priper	- 101	165	201	MA	279
NOD, ARISINA	1	7		84	**

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million is optimal and smartial laws suggind by Puthis hisroger

Statement of Energy Performance

2009

Eugene Field Administration Building 1 Memison Street Trenect , NJ 07666

Portfolio Manager Building ID: 2244835

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.

		This building's sources
1 Least Efficient	Average	To Most Efficient
This building uses 131 kBlu per	iquare fost per year."	Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR
1) fail fai announna amhann sainn ann a annartaí Polaithe Agaray i Mainneannaí a	nerved is gapplet and in anomarous with U.S. forsteads. Royal all energystar pro	Det of artification
EPA		

CMB No. 2019-2347



STATEMENT OF ENERGY PERFORMANCE Hawthorne Elementary School

Building ID: 2244841 Per 12-month Period Ending November 30, 20091 Data SEP becomes ineligible: N/A

Date SEP Generated: May 04, 2010

Perfility and Bemeriary Echool ST Vyche Lare Tenneck, NJ 07866

Fedility Owner Teanant Board of Education 1 Marrison Street Teeneck , NJ 07885

Primary Context for this Parallely Anthony D'Angelo 1 Marrison B Teanack , NJ 07686

Year Bull: 1825 Great Place Area (FP): 48.373

Energy Performance Rating? (1-100) 3

sto Energy Lies Exercises(kBtu) Goldinty - Grid Purchase(kBtu) returni Gas (kBtu)* Total Energy (kBtu)	1, 337,185 4,315,825 5,853,113
State Shaft Vy)	115 162
Constant Care in site chargy use) Geneticute Care Emissions (MCC),e/year)	433
Electric Distribution Utility Public Bervice Elec & Ges Co	
Average Comparison Average Bis EUI Average Bource EUI To Eliteric from National Average Bource EUI Instant Type	82 90 80% K-12 School

Stemp of Certif	ying Professio	mai
Based on the condit me of my visit to the the information or elaterment	building, I ca	tilly that

Certifying Professional Methew Goss 11 British American Bouleverd Lamon, NY 12110

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Advante Kuninston

Whit must be submitted to DYA writes 4 people of the Papert Diving date, down of the District Y 21x8 a net had write approved to reason trans (PA), In District 4 heads on that space arrange A apply 17 is the minimum to be support of the District Panel. Support Annual is a 10 method part.

Note Industry Dandards" for Indoor Environmental

Version for Acceptable Indoor Air Quality

Thermal Environmental Conditions

who for amounter based on Facility on workof (sig make load) are not merical to tells, arm and

or samily. Admittal Densing 10 by James surder, and EDMA Lighting Facebasis for Spring samily.

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ENERGY STAR[®] Data Checklist for Commercial Buildings

to over the a building to qualify for the ENERGY STAR, a Projection (PE) must validate the antoneous of the data underlying the building's analyments were rained. This of a state to designed to provide as as a glatest survey of a property's physical and opending characteristics, as well as to total group provide states as a glatest survey.

Parase complete and sign dea sheeklist and testular it with the stamped, signed Statement of Energy Partynesisme. NOTE: You must sheek such don'to interest Part each value is compl. Of totake a rule.

CRITERION	PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	R
Building Name	Hauthome Elementary School	n the Section building name to be displayed in the ENERCY STAR Registry of Laboled Buildings?		Ē
Туре	K-12 Bohod	is this on eccurate description of the space in Summer 7		0
Location	201 Pycks Lane, Taenack, NJ 07066	In this address assurate and excepted? Correct weather normalization requires an assurate stp ands.		0
Bingle Bitusture	Single Facility	Dean dia SEP representa segin aputaro? SEPo carret lo autoritaria for materia-butaro carretato (viti the exception of acute care of children's hospitale) nor can they be admitted as		5
where Harning	pk-12 School)			
CRITERION	VALUE AS ENTERED IN POSTPOLIC MANAGER	VERIFICATION QUESTIONS	NOTES	R
Grous Flour Area	40,373 Bq. Pt.	Down this request leatings relating of expecting functions such as blockness and break norms used by staff, charge sneets, adversaringtics area, neutrations, corrections, adversaringtics area. The fact and staffing adverses abcald andly include the break boor area. That it concepts, inter staffin intervani pace between Rears data, find the indexed in the boat. Finally grapes fact area is not the seasche apace, Lamsster, species on a subset of your floor.		
Ogan: Washerds?	Pip	Is high building normally open at all on the weakents? This inductes activities largend the weak antibucted by resinances. Asymptotic conduction may then when the appear is used for diseases, performances or other satisfies or constantly activities. If the building is upon an the weakend as measure. The building should asked Type? for open instance. The building is upon an the weakend as		d
Number of PCs	20	is the the number of personal computers in the IK12 fieldool?		1
Hamber of unit-in Manifestication Lande	0	Is (Fig the total number of commandial wells in type Insume and coders? These units are typically found is storage and receiving areas.		1
Preserves of cooking facilities	Yes	Down (His school have a destination agains in which lead is propored and served is adulate? If the adulate like space is which found for adulation is control leagt earm and/or served to eludents, or has only a spacing that is used by teachers and staff from the preserve in Yoo"		G
Persont Cooled	20 %	Is Sig the percentage of the total flam space which the ballty that is served by mechanical cooling any percent?		G
Persent Heated	80 %	In the line percentage of the total floor open within the facility that is served by repolantical heating reputyment?		1
Man Per	(2(Oplines))	In this school in operation for at least 5 months of the year?		14

	No	Is this taileting a high school (beaching grades 10. 11, andror 12)? If the building teaches to high school dublication at all, the user shead dhack year' to high school?, for exempts, if the school teaches te grades K-12 (demantery/webbs and high school), the user should check year to an extend.	
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ENERGY STAR[®] Data Checklist for Commercial Buildings

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Energy Consumption

Power Deneration Plant or Distribution Unity: Public Barvics Elec & Gas Co

Fuoi Type: Elisticially	analysis and all and then be	une là
	er: 676004502 (kWh (thousand Watt-ho Spece(s): Entire Facility Generation Mathod: Grid Purchase	urs))
Start Date	End Data	Energy Use (kWh (thousand Wath-Inc.)
10/13/2009	11/11/2008	30,600.00
09/12/2008	10/12/2008	37,140.00
09/12/2009	09/11/2009	28.620.00
01714/2008	08/11/2008	24,220.00
08/11/2009	07/13/2009	37,380.00
05/06/2009	06/10/2009	34,140.00
04/08/2009	05/06/2008	35.340.00
03/05/2009	04/07/2009	26,660.00
02/98/2009	05/54(2008	28.100.00
01/09/2008	02/06/2009	31,290.00
12/15/2008	01/06/2008	25.920.00
\$75004502 Consumption (KWh (thousand Wat	t-bours)	3\$5,380.00
678904592 Consumption (Millio (thousand Bh	00	1,212,556.50
Tetal Electricity (Grid Purghane) Consumption	n (Millinu ((Ikousandi Bhui))	1,212,856.64
is this the total Electricity (Orld Purchase) co Electricity melancy?	nsurryllion at this building including all	
Paul Type: Natural Bas		

-	Meter: 2415218 (tharms) Space(s): Entre Facility	
Mart Cate	End Date	Energy Use (Burnst)
1013/2009	11/11/2006	4,731.45
09/12/2008	13/12/2008	237.08
09/12/2008	D9/11/2009	0.00
07/14/2009	06/11/2009	0.00
0611/2009	97/13/2008	0.00
05/09/2009	06/10/2008	173.91
04/08/2009	05/08/2008	1,881.68
03/05/2008	04/07/2008	6.009.96
0206/2008	03/04/2008	7,300.52
0.9/08/2008	02/05/2006	6,213.68
13/15/2008	01/08/2008	7,750.37

month.

constantion (Parma)	36,278.85
In 1971 Consumption (Albia (Decenand Div))	3,827,865.00
The second states Constant places (Kitta (Darosard Bite))	3.627,845.00
gen the tatal Natural Gas compungtion at this building including all Natural Gas meters?	
The back of the back shows which represent the back energy use of the backbary? In the protocol that are no additional back (district energy, generates back of) and in the backbary.	
The form and White Energy The form and prove locality income include all circuits under and of und power localited at a former comform that no on-site action or and installations have been confind from the second of Pieces confirm that no on-site action or and installations have been confired from the	

Cartifying Professional

AD ON ON 17

The service service and the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP]

Den _____

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FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records, do not submit it to EPA. Only the Statement of Energy Performance (SEP). Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility

Hawthorne Elementary School 201 Fycke Lane Teansck, NJ 07885 Facility Owner Teams & Board of Education 1 Manual Second Teamack , NJ 07865 Primary Contact for this Facility Anthony D'Angelo 1 Merman Street Teaneck , NJ 07886

k

General Information

-lewthome Elementary 521	lool
Gross Floor Arise Excluding Parking (ftr)	48,373
Year Bulk	1821
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Вриле Туре	K-12 Sident
Gross Floor Area(***)	48.573
Open Westworts?	10
Number of PCa	78
Number of walk-in relifigeration/hersonr units	
Preserve of cooking facilities	Ves
Percent Cooled	20
Paranti Hastini	40
Monthat	12
rligh School?	
Subar Deeper	Tearrack

Energy Performance Comparison

1	Evaluation Particits		Competition		
Parkermone Mettons	(Endley, Date 1920/2.004)	Burlin (Surry Date Of State)	Maring of TS	Target	Mational Accesso
Energy Performance Raing	3	3	n	164	80
Knergy Inscritty					
Bib (k/RaW)	115	m	48	164	61
Gouron (ArituAt)	162	1.79	17	RUA	80
Every Del					
Bywar	101.00.00	\$117,571,46	8-48.244.47	- 164	8.96.212.13
Billiyeer	\$2.25	\$ 2.38	50.64	NA	81.20
Generational Case (Incasarea					
MCO,elyear	431	401	785	MA.	234
kgCD,AR1yew	1	.v.	4	N/A	

More than 50% of your building to defined as 6-12 Schutz. Phases raise that your retirg eccesaria for all of the sciences listed. The failined Average callent in comage partnersers date your building would have if your building had an average rating of 50.

Minut

n - This shifts is systemal. d - A default value has been supplied by PuriBrie Merseper.

a constant carrier and some address of a second s

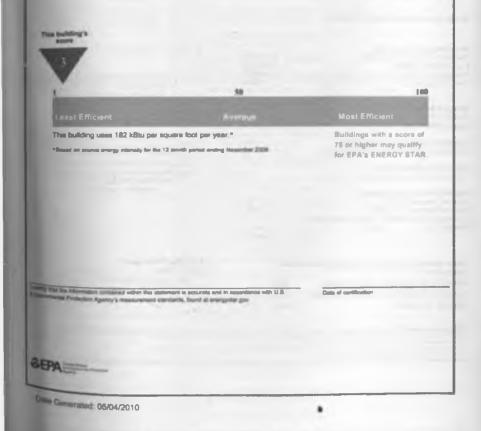
Statement of Energy Performance

2009

Hawthome Elementary School 201 Fycke Lane Teaneck, NJ 07888

Portfolio Manager Building ID: 2244841

The energy use of this building has been measured and compared to other similar buildings using the autonmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least an approximation of the most energy efficient. For more information, visit energystar.gov/benchmark.



CHIB No 2000-0347



STATEMENT OF ENERGY PERFORMANCE **Teaneck High School**

Building ID: 2244849 For 12-month Period Ending: October 31 20091 Date SEP becomes insights: N/A

Date SEP Generated: May 04, 2016

Faoility

Teeneck High School 100 Eizabeth Avenue Teeneck, NJ 07886

Facility Owner Teeneck Boent of Education 1 Mernson Street Teameck , NJ 07666

Primary Contact for the Facility Anihony D'Angelo **1 Merrison Street** Teeneck , NJ 07885

Your Built: 1934 Gross Floor Ares (NY): 215,808

Energy Performance Rating² (1-100) 25

Bite Energy Use Summary Electricity - Grid Purchase(kBtu) Fuel Oil (No. 2) (kBtu) Natura: Gas (kBtu) ⁴ Total Energy (kBtu)	6,414,683 1,666,226 14,089,978 22,171,089	
Energy Internety* See (kBlu/R*/yr) Source (kBlu/R*/yr)	N/A	
Emissions (based on sile energy use) Greenhouse Gas Emissions (MICO ₂ e/yeer)	NA	
Electric Distribution Utility Public Service Elec & Ges Co		
National Average Comparison National Average Site EUI National Average Source EUI	82 141	
% Difference from National Average Source EUI Building Type	K-12 School	



the information contained within this elatement is accurate.

Certifying Professional Matthew Goes Meets Industry Stands rds¹ for Indoor Environmental **11 British American Boulevard** Ventilistion for Acceptable Indoor Air Quality NA Lathem, NY 12110 N/A Acceptable Thermel Environmental Conditions NA

Name.

1. Approximation for the UNEXEDY of Sufficient to exceeding to Dirich where is strongly and the proved Longing wave. Assess of the Dirichler's Dirichler wave and the survey of the Dirichler's Dirichler's

The government setunction dee extrage two needed to fit and the form to Preserve trade to the time for strating energy date. PE for the magnetice, and net restring the SIPP and strategies associations for extra to the local date form commands betweening COM association (so the Columbia Cate date linestages Director, U.S. device for SIPP and Association (so the second second

EPA Form 5800-16

Conditions:

Adequate Illumination

ENERGY STAR[®] Data Checklist for Commercial Buildings

a part to a leading in calify for the Industry STAM, a Professional Engineer (PE) must values the security of the fails underlying the loading's arrange automatic stating. This checked is designed to possible as all a grown screency of a property's physical restations grown the fail and as fail to the energy automatic is a part the PE in the thereing the relevants that the building security (parts) are stored on Pipting's Manager.

There are and any the content of any first and the state of a state of a state of the state of t

CRITERION	PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	R
Building Horne	Teeneck High School	is the clicul hubbing name to be deplayed in the ENERGY STAR Registry of Labeled Bubbings?		
Тури	K-12 School	Is the an accurate description of the space in qualition?		
	100 Elizabeth Avenue Teanack, NJ 07085	In We address accurate and complete? Connect meanership romanic accurate an extension pa- code		
Begle Stutters	Single Facility	Does the SEP represent a single structure? SEPs connot be submitted for multiple-building computes (with the exception of sould care or children's haspitality nor can they be submitted as representing only a portion of a building		
A High School	(K-III IIulicet)			
CRITERION	PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
General Filteen Arres	215.000 Sq. Ft.	Dote this secure lactage include all supporting unctions such as fullcares and how areas y start, storage anala, adviruatinative areas or and that example anala, adviruatinative areas that that example a fullcare whould only include the base floor area that is cocupies. International (planuw) space between floors should not be included in the total, Finally gross floor areas is not the serve as feesable space, Lassable space is a advant of gross floor area.		
Danii Wasakarata 7	Yea	It this hubbling reveally open at all on the resthands? The includes activities beyond the each conducted by maintenance, cleaning, and occurity personnel. Weakend actively could includes any time when the space so used for cleanes, performances or other activat or community maintena. If the building in open on the weakend as part of the standard achedule during one or more persons. The building should ealerd Tyse? for open weakened. The Tyse? response should apply whether the building is open for one or both of the		
month of PCs	208	In the the number of personal computers in the K12 School?		
wents	2	Is the the total number of commercial walk-in type freasests and coolers? These units are typically found in storage and receiving areas.		
Preserves of making functions	Yes	Does this acheol have a doctoated space in which find is prepared and served to students? If the acheol has agees in which food for students is only large warm and/or served to students, or has only a gettay that is used by teachers and staff then the answer is "rea".		
Comiled	80 %	II that the percentage of the total floor space within the facility that is served by mechanical cooling systement?		
Paramet Healed	90 %	In this the percentage of the total floor space within the facility that is served by mechanical heating squapment?		
Barris	12(Optional)	In this school in operation for at least 8 months of the year?		

High School?

Yes

-

Its this building a high school (teaching grades 10, 11, and/or 12)? If the building teaching grades 10, and/or students at all, the user stroad check 'yes' to 'high school. For eaching is if the school teaches to grades X-12 intercommentations and high factors), the user should check 'yes' to 'high school, the user should check 'yes' to 'high

X

ENERGY STAR' Data Checklist for Commercial Buildings

Donasta Don

Annual Constant Plant or Distribution Utility: Public Service Elec & Gas Co

Met	er: 778014246 (kWh (thousand Watt-ho Spece(s): Entre Facility Generation Method: Grid Purchase	um))
Btart Date	End Data	Energy Une (kWh (thousand Well-hours)
08/11/2009	10/12/2000	167,777.00
08/12/2009	08/10/2008	182,748.00
07/14/2009	08/11/2008	158.334.00
08/11/2009	07/13/2008	173,805.00
05/08/2009	06/10/2009	203,936 00
04/08/2009	05/06/2009	171.07
89/05/2009	04/07/2008	205,965.00
02/06/2009	03/04/2008	147,647 00
91/08/2009	02/05/2008	154,999 00
12/14/2008	01/08/2008	127,374 00
11/12/2008	12/13/2000	171,463 00
1014248 Consumption (kWh (thousand Wat	(-hours))	1,713,887.87
70714249 Consumption (hBis (thousand Bis	1	5,848,100.05
and Electricity (Orid Purchase) Consumption	(hittu (thousand ittu))	6,848,100.06
this the total Electricity (Orld Purchase) cor Inditicity motors?	examplies at the building including all	
nill Type: Malaral Gas		

		Bpace(s): Entire Facility	Energy Use (therms)
	tert Data	End Date	Eventary com (mannes)
	/11/2009	10/12/2008	11,224.66
00	12/2009	08/10/2008	2,870.87
	/14/2009	08/11/2009	5,633.00
0	V11/2009	07/13/2000	17,724.04
	K08/2009	06/10/2009	17,724.04
04	KOB/2009	05/08/2008	0.00
	K06/2009	04/07/2009	17,328.08
0	V08/2009	03/04/2008	18,346.80
01	/08/2009	02/05/2008	22,828 81
13	14/2006	01/08/2009	18,894.67
11	/12/2008	12/13/2008	1,267.64

Page 3 of 4

		131,898.31	
138296 Consumption () Bits (thousand Bits))		13,103,831.00	
	Notor: 3106301 (therms) Spece(a): Entre Facility		
Start Date	End Data	Energy Line (therms	
08/11/2008	10/12/2000	125 33	
08/12/2008	08/10/2008	27 13	
07/14/2008	08/11/2008	7.30	
08/11/2008	07/13/2000	41.00	
05/09/2009	08/10/2008	108.34	
04/08/2008	05/08/2008	95.94	
03/05/2008	94/07/2008	129.63	
02/08/2008	03/04/2008	113.12	
01/08/2009	02/05/2008	103.99	
12/14/2008	01/08/2008	108 53	
11/12/2008	12/13/2008	140.08	
3106301 Consumption (Increa)		1,000.00	
MARSHI Commission () Bhy (they aread \$	hall i	105,005,00	
		105,000,00	
atel Natural Gas Consumption (1986) (th			
relat Natural Gas Consumption () Blu (th In this the total Natural Gas consumption	uos in arred filthe))		
Total Halunal Gao Consumption () Blu (th Is this the total Natural Gas consumption	uos in arred filthe))		
relat Natural Gas Consumption () Blu (th In this the total Natural Gas consumption	eckand Bitr)) a : Ohis building including all Hatural Gas maters? Meter: 128383 (Gallons)	13,200,030.00	
Total Halwool Gae Consumption () Blu (th Is this the total Halwool Gae consumption Fuel 3ype: Feer Oil (No. 2)	iscinand Bits)) s at this building including all Natural Gus maters? Meter; 128383 (Gallions) Epece(s): Entline Facility		
Total Halural Gas Consumption () Blu (th is this the total Halural Gas consumption Fool 3ype: Fool Oil (No. 2) Blant Date 11/01/2008	es name Bis;)) s at this building inclusing all Natural Gas maters? Meter: 128383 (Gollions) Bpace(s): Entire Facility End Date	13,200,630.00	
Total Halural Gas Consumption (Fills (th In this the total Natural Gas consumption Fuel Type: Fuel Off (No. 2) Blant Date 11/01/2008 128383 Consumption (Gellens)	Incluent Bits)) t at this building inclusing all Natural Qua maters? Biosor: 128383 (Gallions) Epece(s): Entite Facility End Data 11/30/2008	13,200,830.00	
Fuel Type: Fee Oll (No. 2) Blart Date	Incluent Bits)) teat this building inclusing all Natural Gas maters?	13,200,830.00	
Tetal Halural Gas Consumption () Blu (th is shis the total Natural Gas consumption Fuel Type: Fee Oil (He. 2) Blast Date 11/01/2008 128393 Consumption (Online) 128393 Consumption (billiu (these and Bl Total Fuel Oil (He. 2) Consumption (billiu	Incluent Bits)) teat this building inclusing all Natural Gas maters?	13,208,836.00	
Tetal Hinkard Cas Consumption (1984 (M In this the Iolal Holard Cas consumption Fiel Type: Fee OE (Ms. 2) Blart Data 11/01/2008 125383 Consumption (Gellens) 128383 Consumption (Idlitu (Measand Bi Total Faal Oli (Mo. 2) Consumption (Idlitu Is this the Intal Faal Oli (No. 2) consumption mature?	Inc.'s and Bits)) Is a tithis building inclusing all Natural Qua maters? Blocor: 128383 (Gollonns) Bpecn(s): Entline Facility End Date 11/30/2008 Ill/3 (thousand Bits)) Ill/3 Ill/	13,208,836.00	
Tetal Helsand Gas Consumption () Bits (th is ship the total Natural Gas consumption Fuel Type: Fee Oil (He. 2) Blast Date 11/01/2008 128393 Consumption (Oellons) 128393 Consumption (Alitis (Hessend Bit Total Fuel Oil (He. 2) Consumption (Bitts is this the total Fuel Oil (No. 2) consumption total Fuel Oil (No. 2) consumption bitts of the fuel Fuel Oil (No. 2) consumption mature?	Inc.'s and Bits)) Is a tithis building inclusing all Natural Qua maters? Blocor: 128383 (Gollonns) Bpecn(s): Entline Facility End Date 11/30/2008 Ill/3 (thousand Bits)) Ill/3 Ill/	13,200,030.00	
Tetal Helsand Gas Consumption () Bits (th is ship the total Natural Gas consumption Fuel Type: Fee Oil (He. 2) Blast Date 11/01/2008 128393 Consumption (Oellons) 128393 Consumption (Alitis (Hessend Bit Total Fuel Oil (He. 2) Consumption (Bitts is this the total Fuel Oil (No. 2) consumption total Fuel Oil (No. 2) consumption bitts of the fuel Fuel Oil (No. 2) consumption mature?	As is and Bits)) Is a table building inclusing all Network Cas maters? Blocor: 128383 (Colleans) Blocor(a): Entities Facility End Date 11/30/2008 (thousand Bits)) Ison at this building inclusing all Fuel Oil (No. 2) represent the total anargy use of this building?	13,208,836.00	

Certifying Professional (When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Allowing.	Dee		
Property.	and the second s	distant days	

Signature: Equators is regimer when appying for the Districtive prior.

Page 1 de

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

seep this Facility Summary for your own records: do not submit it to EPA. Only the Statement of Energy Performance Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Feoliky Teerack	High	School Avenue	
The state of the s	H.I C	7866	

Facility Owner Teeneck Board of Education 1 Merrison Street Teeneck , NJ 07666

Primary Contact for this Facility Anthony D'Angelo 1 Memeon Street Teeneck , NJ 07666

general information

Teeneck High School	
Flow Area Excluding Parking (ft*)	215,808
Tont Bull	1854
1 Com Landation Percent Ending Date:	October 31, 2008

Facility Roace Use Summary

al .
K-12 School
215 808
Van
200
2
Yes
90
80
12
Yes
Teamach

Energy Parformance Comparison

	Evaluate	n Paricula		Comparts	ons.
Partmuna Mairica	Current (Ending Date 10/31/2008)	(Ending Date 11/30/2008)	Patrag of 72	Terget	Patient Array
ine Parturnantie Pating	28	22	76	NIA	90
a read					
300 (\$30×97)	NA.	115		164	10
Rearce (Altuite)	A/A	109	NUA.	NA	141
9.54					
2/100	\$40.342.50	5.444.429.21	NA.	1978	164
Attract	\$2.23	11.04	NA	NA	NR
Case diversions					
MICO,syser	PMA .	2,248	NIA	PaiA	HAN
Here and Inter	ANA	10	PMA	NIA	HHA

plot statisting to defined as \$12 Scheek. Please while that your rating accounts for all of the spaces total. The Makinasi Average column presents from place tabilities enable have if your halding hast an average calling of \$0.

interaction is noticed.

Statement of Energy Performance

2009

Teanack High School 100 Elizabeth Avenue Teanack, NJ 07666

Portfolio Manager Euilding ID 2244849

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient, For more information, visit energystar gov/benchmark.

53

This building's starry

east Efficient

This building uses N/A kBlu per square foot per year."

*Based on source energy minimity for the 12 month period ending October 2005

Buildings with a accre of 75 or higher may qualify for EPA's ENERGY STAR

100

The Py that the information contained which this extension is accurate and in suscentiones with U.S. Environments "matching Agency's resourcement immemory, work of all suggesting gets

- 60

Data el cartilizat en

Date Generated: 05/04/2010

&EPA

CMIB No. 2260-0347



STATEMENT OF ENERGY PERFORMANCE Lowell Elementary School

Building ID: 2244844

For 12-month Period Ending: November 30, 20091 Date SEP becomes ineligible: N/A

Date SEP Generated: May 04, 2010

and Demethry School 025 Lincoln Place NJ 07866

Facility Owner Teaneck Board of Education 1 Memoor Street Teeneck , NJ 07568

Primery Contact for this Facility Anthony D'Angelo 1 Merrison Strest Teameta , NJ 07666

III34 Ploor Area (R9): 47,106

Inergy Performance Rating² (1-100) 18

Sta Energy Lise Burnmary ¹ Eustricity - Grid Purchess(kBlu) Fusi Od (No. 2) (KBlu) Natural George (kBlu) ⁴ Tatal Energy (kBlu)	897,168 3,296,772 75,681 4,268,621	
Basery fotosonity Sen politur (VZ) Seneros (VZ)ur(VZ)y)	91 136	
Initiations (based on sits energy use) Graphouse Ges Emissions (MiCO ₁ s/year)	383	Stamp of Certifying Professional
Linuitic Distribution Utility Putite Barvice Elec & Gas Co		Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this
National Average Comperison		etatement in accurate.
Nutarel Average Site EUI Natarel Average Source EUI	67	
Contraction Source EUI	100 30% K-12 School	
industry Elandarda ² for Indoor Environme	intel	Certifying Professional

sector and the sector		Matthew Goss
for Acceptable Indoor Air Quality Thermal Environmental Conditions	N/A. N/A. W/A.	11 British American Boulevard Latham, NY 12110

The second seco

The balances have sensed in 10 and the low in 2 hours includes the same to prove a sense sense to be the balance of the same to be and the

A Rows Madd. 18

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		te this the percentage of the total floor epoce within the tectity their is served by mechanical hosting appropriate	% 08	b-steel treatment
		admitiment? Its facility that is served by mechanical cooling is the facility that is served by mechanical cooling	% OZ	Parton Contra
		очто и толировато по	99 <u>A</u>	to conservit asidihasi gulikees
		In this the lots rearrant of carrants fail with in typically presents and coden? These units are hypothy found in advects and socienty areas	0	ni-ziew to testimulit alimu
E		K13 School? In the the number of personal computers in the	53	a 24 to red-mult
		end in sta in see y damman grittakud and a end brocych settivnica walkutoru antif ratuwa apou brei granaeto, isonamentam yd bestubroo aduba tabuco yt victa breatewit wartane walit ywa asabata buco yt victa breatewit i antiwa ewit ywa asabata buco yt victa breatewit i antiwa ewit ywa asabatakow adi no nego a prittaku afat i amateka erom no eno g vtub eluberita bratha wit to tau wigga bizoota earoqaen freefr inf amateka wigga bizoota earoqaen freefr inf amateka erdi to ritod to amo vdi nacio ei grabau anti	ФŅ	CasnadaeW negO
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		re coace and to nontenace character in and at	K-15 School	adil
		Buddhygrift Die Eleite Bie officiel faith of the digest of the faith of the state o	Lowell Elementary School	nung Bupping
8	BETON			CIRLEIRON

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for Commercial Buildings

ENERGY STAR' Data Checklist

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ENERGY STAR[®] Data Checklist for Commercial Buildings

Energy Conex mption

Power Generation Plant or Distribution Utility: Public Service Elec & Ges Co

Notor: 723001942 (kWh (thousand Watt-hours)) Space(s): Entre Facility Generation Method: Grid Purchese				
Start Data	Erul Dute	Energy Lise (1991 (theusand Watt-hours		
10/08/2008	11/08/2009	24,160.00		
09/10/2008	10/08/2008	27,880.00		
00/00/2009	08/08/2009	0.200.00		
07/10/2008	05/07/2009	8.900.00		
05/09/2009	07/08/2008	20.800.00		
05/07/2009	08/08/2008	24,980.00		
04/04/2009	05/06/2009	23,530 00		
03/04/2009	04/03/2008	28,640 00		
02/04/2008	03/03/2009	22,080 00		
01/07/2009	02/03/2008	25,540.00		
12/11/2008	01/06/2008	20,320 00		
28881842 Consumption (kWh (thousand Vist	(-hours))	236,228.00		
20001842 Consumption (kBbs (thousand Bbs	865,962.64			
Istal Electricity (Grid Purchase) Consumption	(tilliu (theusantil Biu))	805,802.64		
a this the total Electricity (Grid Purchase) cor Electricity maters?	noungtion at this building including all			

Fuel Type: Netural Gas

inest Date

Motor: 2415218 (therms) Space(s): Entire Facility	
End Date	-
11/08/2008	1

State 1 Press	End Date	Energy Use (therms)
10/68/2008	11/08/2008	52.02
08/10/2008	10/08/2009	6.27
06/08/2008	08/08/2009	138.77
07/10/2009	08/07/2008	121.96
06/09/2008	07/08/2009	1.31
05/07/2008	08/08/2009	88.88
04/04/2008	05/06/2009	73.04
03/04/2009	04/03/2009	63.77
02/04/2009	03/03/2009	51.32
01/07/2008	02/03/2009	51.10
12/11/2008	01/06/2009	41.78

Encourse the othermal

rspit Generangtins (iterres)		101.05	
and the second		00,005,00	
Gen Caracimpicon (ingle (inclusing die))		00,506.00	
the state Method Gas consumption at this building including all Natural Gas maters?			
al Type Paul OII (Hen. 2)			
	Meter: 128383 (Gelione) Spece(e) Entire Facility		
Stort Data	End Onte	Energy Une (Gallens)	
11/01/2009	11/30/2009	3.485.50	
10/01/2009	10/31/2009	0.00	
66/01/2009	09/30/2008	0.00	
08/01/2009	08/31/2008	0.00	
67/01/2009	07/31/2008	0 00	
08/01/2009	06/30/2008	0.00	
06/01/2009	05/31/2009	0 00	
04/01/2009	04/30/2009	2.801.00	
02/01/2009	03/31/2008	4,800.80	
02401/2009	02/28/2009	2.200.10	
01/01/2009	01/31/2009	6.035.40	
12/01/2008	12/31/2008	4,740.70	
363 Consumption (Callons)		23,783.80	
313 Concumption (hillis (thousand lits))		3,296,771.76	
ni Fuel Oil (No. 2) Consumption (kiltu (the	usand Blu))	3,296,771.78	
his the total Fuel Oil (No. 2) consumption a set 7	t this building including all Fusi Oil (No. 2)		
Frank Frank			
Fill Rati Consumption Intals shows above rente	ment the total energy use of the building? cl energy_generator fuel of) used in this facility.		

and several store strong ground at	
we not consumption totals shown above include all on ells solar and/or wind power located all	_
county? Places confirm that no on-site solar or wind materializes have been omitted from this	
The second	-

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I artifying Professional for the ENERGY STAR, the Cartifying Professional must be the same as the PE that agreed and atamped the SEP (

And the Analysis in the ENDROY STAR ___ Dete ___

FOR YOUR RECORDS ONLY, DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records, do not submit it to EPA. Only the Statement of Energy Performance (SEP). Data Chacilitat and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility

Lowell Elementary School 1025 Lincoln Place Teaneck, NJ 07885

Facility Owner

Teenack Board of Education 1 Memoor Street Teeneck , NJ 07866

Primary Contact for this Facility Anthony D'Angelo **1 Membon Street** Teenec< , NJ 07866

General Information

Lowell Elementary Scho	ai i i i i i i i i i i i i i i i i i i
Gross Floor Area Excluding Parking: (It')	47,108
Year Built	1854
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Lowell Bornariary		
Праса Тура	K-12 Bahadi	
Gross Floer Area(81)	47,106	
Open Weekends?	Na	
Number of PCa	23	
Norther of well-in wingerates (freezer) with	0	
Preserva of costing lectilies	Yes	
Percent Cooled	20	
Parcent Healed	90	
Marthar	12	
High School?	Ha	
Bohool District*	Teanach	

Energy Performance Comparison

	Evolutio	n Perioda		Comparts	ent .
Performent a Matrice	(Ending Data 11/30/2/308)	Baseline (Briding Calls 68/30/2008)	Rating of 71	Target	Halland Average
Energy Performance Rating	18	10	75	NiA	50
Energy internally					
San (Hitkelit)	91		52	Nith	87
Searce (Adhartir)	130	130	70	NiA	100
Energy Cost					
Symer	8 85.980.37	8 108,387 08	8 48 913.47	NMA	16.632
Sittiyeer	\$ 1.85	62.52	\$ 1.08	NA	\$1.30
Greent cuse Cas Estimaters					
MICO,etymer	363	300	220	NIA	201
ligCO,a/EHyper			1 1	NA	0

More them 50% of your building to defined as K-12 School. Please note that your reling accounts for all of the sames halfs. The National Average column in average partnerses data your building and have 6 your building had an average roling of 50

Anne

This attribute is splitted.
 A default value room many summer by Particles Managet.

Statement of Energy Performance

2009

Lowell Elementary School 1025 Lincoln Place Teansck, NJ 07666

Portfolio Manager Building ID: 2244844

The energy use of this building has been measured and compared to other similar buildings using the subcommental Protection Agency's (EPA's) Energy Parlomance Scale of 1–100, with 1 being the least energy attoint and 100 the most energy efficient. For more information, viait energystar.gov/benchmark.

-

This building's score

and contents

This building uses 136 kittu per equare fout per year.*

"Based on shares arrange intensity for the 12 month period analog November 2008

Buildings with a score of

75 or higher may qualify for EPA's ENERGY STAR.

100

The bar has convergence common ensure the summaries is an applied by according with U.S.

Date of savification

unter Gemeralant. 05/04/2010

SEPA



STATEMENT OF ENERGY PERFORMANCE **Thomas Jefferson Middle School**

Building ID: 2244879 For 12-month Period Ending: November 30, 20081 Dete SEP becomes insligible N/A

Facility Owner

1 Memoon Street

Teeneck , NJ 07666

Teeneck Board of Education

Date SEP Generaled: May 04, 2010

Primary Contact for this Facility

Anthony D'Angelo

1 Merrison Street Teeneck , NJ 07985

Facility Thomas Jellerson Middle School 655 Tenneck Roed

Teeneck, NJ 07886

Yeer Built: 1958 Green Floor Ares (R9: 105,216

Energy Performance Rating² (1-100) 30

Elaciricity - Gind Purchaee(t/Btu) Fuel Oll (No. 2) (t/Btu) Netural Ges (t/Btu)* Total Energy (t/Btu)	2,537,875 5,687,892 797,893 9,023,460
Energy Intensity ⁴ Sila (kBlu/R?lyr) Source (kBlu/R?lyr)	86 143
Emissions (based on alls energy use) Greenhouse Gas Emissions (MICO,e/year)	847
Electric Distribution Utility Public Service Elec & Ges Co	
National Average Comparison National Average Sde EUI Netional Average Source EUI % Difference from National Average Source EUI Building Type	72 120 19% K-12 School



Certifying Professional Matthew Goss 11 British American Bouleverd Lethem, NY 12110

Conditions:

Adequate Illumination

NA

N/A

NA

Meets industry Standards⁴ for Indoor Environmental

Ventilation for Acceptable Indoor Air Quality

Acceptable Thermel Environmental Conditions

Applications for the DMINOT STAM must be solverilled to DFA white 4 reaches of the Protect Ending data. Availed of the DMINOT STAM to use final over the EPA Energy Pertonance fielding is based on table available arrange. A vallet of the tite entirement is the eligible for the DMENOT STAM. Makes regression memory consumptions, annualized in a 1-5 climetic partial. Makes filler makes to while of extends the a Collection partial. Makes filler makes to while of extends the a Collection partial. Makes filler makes to while of extends the a Collection partial. Makes filler makes to while on the collection of the December of the Max with adjustments inside for seconds on Facility as made Water Memory and another processing of the Collection partial. Based on Maketing 420/4008 Transled G2 for westighters for accessing interview or castly. ADMING December 01 for the make extends on the State Lighting the ar sunty. Advited thermal SE for burnel contex, and ESteh Lipting vanished for spling to

experiment for reducing the formula of affect (seed or strain his is of these contracts to deep for complex crossing sizes. Fill builds remarking and constitute the MEP's and security of the filly (security for the security of the filly (security for the security of the filly (security for the security for the security of the filly (security for the security for the security for the security of the secu

EPA Form 0900-16

ENERGY STAR[®] Data Checklist for Commercial Buildings

e par le a ladding la quathy for the LINEF QY STAR, a Problement & gyment (*) must validate line accuracy of the same second o

and any set of the second second second second second second second of face by Performance.

CHITERION	PORIFOLIO MANAGER	VERIFICATION QUESTIONS	HOTES	
Building Harns	Thomas Julianson Maxim School	In Par the official building name to be diaphysic in the ENERGY STAR Registry of Labeled Buildings?		
Туря	K-12 School	le this an accurate description of the space in quantion?		
Location	655 Teeneck Road, Tranack, NJ 07888	In this address accurate and complete? Correct weather normalization requires an accurate zip onde.		
ingia Structure	Single Fectility	Does it is SEP represent a single structura? SEIPs cannot be submitted for multiple-building compuses (with the exception of acuits care or phildren's hospitals) nor can they be submitted as representing only a portion of a build ng		
International Votes	dei Statucei (N12 School)			
	VALUE AS ENTERED IN PORTFOLIO NANAGER	VERFICATION QUESTIONS	HOTES	
mes Floer Area	105,216 3q. Ft.	Does this square footage hickeds all supporting functions such as blockers and break rooms used by staff adverge mass, administrative areas, alwestore, starroutle, sins, rent shafts, stc. Also note that existing artiums should civily include the hease floor ones that it could be interestited (planum) space between floors should not be included in the total. Finally groups floor area is not the same as feasable space. Leasts the space is a subtast of groos floor area.		E
THE Brackwards?	No	In the sublicing memory and an entry of the weather conducted by meantenerous, dia snarg, and encarity personnel. Weatend activity could include any lim is when the spaces is used for classes. performances or other school or community activities. If the building is open on the weatend as part of the standard schedule during one or more encarides. The building should ested ?yee? for open weatend to building is open on the weatend apply whether the building is open for one or both of the weatend during.	-	
and a PCs	127	Is this the number of personal computers in the K12 School?		
inter of web-in terminetreezer trice	3	is the total number of commercial well-in lage freezers and coolers? These units are typically found in storage and receiving areas.		
Processo of societies	Yee	Dense this school have a dedicated space in which food is prepared and served to students? If the school has space is which food for students is only hopt warm and/or served is students, or has only a galley that is used by teachers and staff then the present is "no"		
Artes Cooled	50 %	In this the percentage of the total floor spece within the facility that is served by mechanical cooling equipment?		
Break Healed	90 %	In this the percentage of the total floor space within the facility that is served by mechanical hitsting separates?		
Elone/s	12(Optional)	In this sched in operation for at least 8 months of the year?		

Page 1 of 4

High School?	Ma	11, analor 12/7 If the building teaching grades 12, 11, analor 12/7 If the building teaching to high actual industries at all, the salar should death lyint' in high actual' for assessme. In genetics K-12 (alternationy/invadile and high minute), the same should check year to	
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page 2 de

ENERGY STAR[®] Data Checklist for Commercial Buildings

CANADA AND

12/13/2008

Constration Plant or Distribution Utility: Public Service Elec & Gas Co

	Memr; 778015616 (kWh (thousand Wati-ho Spece(s): Entire Facility Generation Method: Gnd Purchase	wire))
Start Date	Ered Date	Energy Use (kWh (theusend Wati-hours
10/13/2009	11/10/2008	68,400.00
28/12/2008	10/12/2009	98.280.00
08/12/2009	08/11/2008	46,080.00
37/14/2009	08/11/2008	31,820.00
06/11/2009	07/13/2009	\$1,840.00
35/0a/2009	06/10/2008	68,400 00
34/08/2009	05/08/2008	59,780.00
20/05/2009	04/07/2008	68.800.00
32/06/2009	03/04/2008	61,200.00
31/08/2009	02/06/2008	73,440.00
12/13/2008	01/08/2009	36,920.00
Consumption (kWh (thousand)	Well-hours))	121,040.00
Consumption () Ets (Incusand	2.200.110.40	
		and a second second
		2,200,116.48
Wicky (Grid Purchase) Consump		
arisity (Grid Purchase) Consump	tion (killtu (th ousand ilt u))	
antaity (Grid Purchase) Co.source Inc. Black Icity (Grid Purchase)	tion (killtu (th ousand ilt u))	
antaity (Grid Purchase) Co.source Inc. Black Icity (Grid Purchase)	tion (kBtv (howend Btv)) consumption at this building including all Manage 3340902 (therms)	
arristy (Brid Purchase) Co tauny 4 mail (Bristischy (Brid Purchase) 7 mailer 7 7 Mailer 1	tion (kBtu (housend Btu)) consumption at this building including all Mater: 3340902 (therms) Space(s): Entire Facility	2,200,116.48
anticity (Brid Purchase) Co touring 4 tous Black tothy (Brid Purchase) 9 malest 7 7 Malent Cos Blant Date	tion (kBtu (housend Btu)) consumption at this building including all Mater: 3340902 (therms) Desceive): Entire Facility End Date	2,200,116.48
Intrody (Brid Purchase) Consump I and Blackstoty (Brid Purchase) Produce 7 Produce 7 Intern Easte IDent Easte IDent Scope	tion (kilbu (thousand litu)) consumption at this building including all Masse: 3340902 (thorma) Bacceta): Entire Facility End Date 11/10/2008	2,200,116.48
Interiory (Brid Purchase) Consump Interior Black Schy (Brid Purchase) Interior Black Interior Black Interior Black Interior Black Interior Black Interior Black Interior Black Interior Black	tion (kBtu (thousand Btu)) consumption at this building including all Messer 3340902 (therms) Brace(s): Entire Facility End Date 11/10/2008 10/12/2009	2,200,116.48
Internet (Brief Purchase) Consump Internet Black Schy (Grief Purchase) Featured Geo Barri Bala 19113/2009 Dir12/2009 Dir12/2009	tion (kBbs (thousand Bbs)) consumption at this building including at Marine: 33409822 (therms) Brace(a): Entre Facility End Date 11/10/2008 10/12/2008 08/11/2008	2,200,116.48
Ministry (Brid Purchase) Consump I and Black Schy (Brid Purchase) Fischeric Con Black Schy (Brid Purchase) Fischeric Con Black Schy Black Schw Black Schy Black Schy Black Schy Black Schw Black Schy Black Schy Black Schw Black Schy Black Schy Black Schw Black Schy Black Schw Black Schw	tion (kilbu (thousand litu)) consumption at this building including at Matter 3340982 (therms) Descente): Entre Facility End Date 11/10/2008 08/11/2008 08/11/2008	2,200,116.48 2,200,116.48 Energy Like (therms) 401.57 507.57 406.30 511.80
Black Schy (Grid Purchase) Consump I was Black Schy (Grid Purchase) Product Cons Black Schy (Grid Purchase) Product Cons Black Schy Blirit School Blirit School Bli	tion (kBits (housend Bits)) consumption at this building including all Matter: 3340902 (therms) Based(s): Entire Facility End Date 11/10/2008 10/12/2008 08/11/2008 07/13/2008	2,200,116.48 2,200,10,10 4,00 4,01,07
Ministry (Brid Purchase) Consump Ministry (Brid Purchase) Ministry (Brid Purchase) Ministry (Brid Ministry (Brid Ministry) Ministry Ministr	tion (kBits (housend Bits)) consumption at this building including all	2,200,116.48 2,200,116.48 2 200,116.48 2 2 2 200,116.48 2 400,00 401,57 400,30 507,57 400,30 511.80 663,79 701.42
Introly (Brid Purchase) Consump Internet State Internet Stat	tion (killitu (thousand litu)) consumption at this building including at 	2,200,116.48 2,200,10,10 4,01,57 5,01,100 5,01,000 5,0000 5,000 5,0000 5,000 5,0000

01/08/2008

Page 3 of 4

887.85

3340082 Consumption (therms)	7,124.30
3340062 Consumption (bibls (thousand Bbs))	712,438.00
Total Netural Ges Consumption (KBtu (theusand Btu))	712,430.00
In this the total Natural Gas consumption at this building including all Natural Gas metern?	

Fuel Type: Fuel Oil (No. 2)

		Meter: 128387 (Gallons) Space(s) Entire Facility	
	Start Data	End Date	Lenergy Use (Gallong
	11/01/2009	11/30/2008	6.521.00
	10/01/2009	10/31/2008	0.00
	09/01/2009	09/30/2009	0 00
	06/01/2009	08/31/2008	0 00
	07/01/2009	07/31/2000	0.00
	06/01/2009	08/30/2008	0.00
	05/01/2009	05/31/2008	0.00
	04/01/2008	04/30/2009	7.228.20
	03/01/2008	03/31/2009	2,800.00
	02/01/2009	02/28/2009	7,898.60
	01/01/2008	01/31/2009	10,052.80
	12/01/2008	12/31/2008	6,511.80
128387 Ce	noumption (Gallona)		41,011.40
128387 Co	neumption (kBtu (thousand Btu))		8,007,801,87
Total Fuel	Oll (No. 2) Consumption (kBtu (the	unand Btu))	5,007,001.57
Is this the total Fuel OI (No. 2) consumption at this building including all Fuel OII (No. 2) maters?			

difficient Funds	
o the fuel consumption totals shown above represent the total energy use of the building? lease confirm there are no additional fuels (detrict energy, generator fuel off) used in this facility.	

Do the fuel consumption totals shown above include all on-ets salar and/or wind power logate	d al i
your facility? Please confirm that no on-elesector or wind installations have been omitted from	this .
Net. All on-site systems must be reported	

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Protectional must be the same as the PE that agred and stamped the SEP]

Name:		_	-	_	
Signation	-			_	

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

the Facility Summary for your own records, do not submit it to EPA. Only the Statement of Erergy Performance one Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Middle School	Teeneck Board of Education
The second Read	1 Merrison Street
Tuesda NJ 07666	Teeneck , NJ 07666

Primary Contact for this Facility Anthony D'Angelo 1 Memoor Street . NJ 07666

al Information

Thomas Jef erson Middle Se	chool
Come Floor Ares Excluding Parking (ftr)	105,216
General	1958
13 menth Evaluation Period Ending Date:	November 30, 2009

Facility Owner

Facility Space Use Summary

and Type	K-12 Bohno
The Past Ares(R2)	108.216
Patronise and	No
and a PCa	127
and a set of the set o	3
status of easting inclines	Yes
Caminal Caminal	80
right Posted	90
	12
COLO P	He
these Chatter	Teanach

Energy Performance Comparison

	Eviluti	at Paritula		Companies	ma .
winimama Mairica	Current (Ending Date 11/30/2009)	li sa sin s Ending Da e 06/30/2018)	Raing of 25	Torget	Terranda Same
	30	25	75	NA	
-					
Sim (1886-91)	80	10	80	NA	72
Baurce (1884-89)	143	181	84	NA	120
Creat				-	
Syme	8 198,824 13	\$ 240,101.30	\$ 130,571.07	NA	\$ 100,001.01
10-iper	8188	\$ 2 37	81.24	NA	81.90
Inter Gas Erransers					
MICO aryser	847	881	500	MA	711
million and a second					

A state of the state of the

and made in spinoral ment when fairs transmission by Particles Manager.

Statement of Energy Performance

2009

Thomas Jefferson Middle School 655 Teeneck Roed Teeneck, NJ 07666

Portfolio Manager Building ID: 2244879

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.

<image>

Date Generated, 05/04/2010

OMB No. 2080-0347



STATEMENT OF ENERGY PERFORMANCE Whittier Elementary School

Building ID: 2244581 For 12-month Period Ending: November 30, 20091 Date SEP becomes ineligible: N/A

> **Facility Owner** Teaneck Board of Education

1 Memoon Street

Teeneck , NJ 07866

Data SEP Generated: May 04, 2010

Primary Contact for this Facility

Anthony D'Angelo

Teeneck , NJ 07666

1 Merrison Street

Cartificing Projectional

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Comentary School the Ment Englewood Avenue NJ 07566

The Ru It: 1921

Entry Parlamence Rating? (1-100) 15

son Energy Use Summary' Englishty - Grid Purchass(kBlu) 	1,267,811 3,860,478 34,633 5,152,922	
Emergy Information Sing (EBD=:IRR)yr) Sing (EBD=:IRR)yr)	93 148	
Emissions (based on site energy use) Creationse Gas Emissionis (MICO,elyeer)	478	Biamp of Certifying Professional
Restric Distribution Utility		Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.
Automal Average Comparison Nutrial Average Ste EUI Humai Average Source EUI Humai Average Source EUI Humain Average Source EUI	66 105 41% K-12 School	

Construction Standards" for Indoor Environm	netici	Matthew Gose
Weilation for Acceptable Indoor Air Quality	NA	11 Brillet American Boulevard Leihem, NY 12110
Conditions	NA	
And the Summation	N/A	

The ORE NUCL TEAH mean tax action that the UPA sature of execution of the Team of the Performance Pears of based or band assume average. A single of 20 is the near the energy concerning the averaging the tax 1 to entitie period. Which is come of vacuum as a single tax to period. But the other the tax and the team of a single band, are concerned in Africa and adjustments in the Hange symmetry and the 14 for each period. The Based symmetry and the tax 1 for each period. date. Assert of the ENERGY STAR is our final and sear to the alighter for the ENERGY STAR. of Sum LPA. ------

seein many for advances based on Facility up some

card fill for transmit contact, and 2004 Lighting Hardcard for hybring sports:

The second processing the second is of and the last of function includes for these for second participation. Plants research and controls on the Plant includes the function of the second participation of the second particip

ENERGY STAR[®] Data Checklist for Commercial Buildings

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In order for a building in quality for the EMERGY STAR, a Probassion Engineer (PE) must validate the accuracy of the data underlying the building a arways performance rating. The character is designed to provide an advogance summary of a property's physical and operating observationales. As well as to test energy committees, to assist the PE in double shocking the information that the building ensure or operator has ordered risk Perifole Manager.

Please complete and sign this checklist and include II with the stangest, signed Balanset of Baargy incremenses NOTE. You must check each ben to indicate that each volue to correct, OR include a rate.

CRITERION	PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Name	Whilier Elementary School	In this the clicks building name is he deployed in the ENERGY STAR Registry of Labeled Subdings 7		1
Туря	K-12 School	In this an actumits description of the space in pressure?	1	
Localion	481 West Englawood Avenue, Teanack, NJ 07886	In this address accurate and complete " Correct weather normalization requires an accurate zip code.		1
Bingin Binachara	Single Facility	Down this SEP represent a single structure? SEPs cannot be submitted for multiple-building compuses (with the exception of acute care or children's hespitals) are can they be submitted as representing only a portion of a building		ļ
in the Researching (F	G 12 Schoel			
CRITERION	VALUE AN ENTENDE IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	HOTES	
Grees Floor Area	56,118 Rq. PL	Uses the square lising risks al supporting bridges such as blockers and pract rooms used by staff, storage areas, advantative areas, advances, canvous, india that anisting arruns should only include the base floor area that it accurate, incarpilled (planum) space between floors should not be included in the total. Finally gross floor area is not be some as inset sha space. Leasable space is a subset of gross floor area.		4
Open Weekende?	No	In this building normality open at all on the vestmands? This includes activities beyond the work conducted by maintenence, clearing, and accurity pernovnet. Weekend activity could includes my time when the special is used for cleanes, performances or other actual ar community activities. If the building is upon on the weekend as part of the standard schedule during one or more linescene, the building should select 7yes? for open weekends. The Tyes? response should apply whether the building is open for one or both of the meakends.		- E
Number of PCs	20	Is this the number of personal computers in the K12 School?		
ants	0	In this total number of commercial walk-in type freaters and coders? These units are typically found in storage and receiving areas.		q
Presence of cooking facilities	Ven	Does this school have a deducated space in which food a property and served to students? If the school has space in which food for students is only tapl werm and/or served to students, or has only a galay that is used by teachers and staff then the arrower is "no".		a
Percent Cooled	40 %	In this the percentage of the total fiber space within the facility that is served by mechanical cooling separated?		1
Percent Heated	90.95	In the the percentage of the total floor space within the facility was is nerved by mechanical heating approach.		13
Months	12(Optional)	In this school in operation for at least 8 months of the year?		12

Page Loca

n .	No	In this building a High solution (teaching grades 10, 11, and/or 12)7 H the hulleting teaches to high actual students at all, the user sheat check yes to high actual: For exempts, if the school teaches K-12 (elementary/models and high actuals), the user should check yes to high		
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ENERGY STAR' Data Checklist for Commercial Buildings

2

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Enc & Gen Co

	B003529 (IkWh (thousand Wati-ko Spece(s): Entire Facility neration Method: Grid Purchase	ныга))
Start Date	End Date	Energy Use (1999 (Bewaard Watt-hours)
10/10/2008	11/08/2008	27,400.00
09/11/2009	10/08/2008	34,200 00
08/11/2009	08/10/2008	38,000.00
07/11/2009	08/10/2009	34,000.00
06/10/2009	07/10/2008	23.000.00
05/08/2009	06/09/2008	23,000.00
04/07/2009	05/07/2008	31,400.00
03/05/2008	04/08/2008	38,000.00
02/08/2009	03/04/2009	28,800.00
01/08/2009	02/05/2009	30,800,00
12/12/2008	01/07/2008	28,200.00
78003529 Consumption (INWh (thousand Wall-hour	332,600.00	
78983529 Consumption (kBtu (thousand Btu))	1,124,831.20	
atal Electricity (Grid Purchase) Consumption (killity	1,134,831.20	
this the total Electricity (Grid Purchase) consump Instricity maters?		

Fuel Type: Hetural Gan

Meter 3175230 (therms) Space(s): Entire Facility

	approver, and a second	
Blart Data	End Data	Energy Los (therms)
 10/10/2008	11/08/2009	14.57
08/11/2008	10/09/2008	30.64
 08/11/2008	08/10/2009	36.48
 07/10/2000	08/10/2008	17 72
 08/13/2009	07/08/2009	16.65
 05/08/2008	08/12/2009	18.74
 04/07/2008	05/07/2009	31.30
03/05/2008	04/08/2009	40.77
02/05/2009	03/04/2009	22.00
01/08/2008	02/05/2009	34.50
 12/12/2008	01/07/2009	18.80 Page 3

Consumption (therma)		298.28
THE REPORT OF THE PARTY OF THE	11	28,820.00
Ges Cansumption (IIII tu (Indu	iand Bhiji	20,020.00
e total Natural Gas consumption al	Esin huilding including all Natural Gan maters?	
e: Fuel Cill (No. 2)		
	Motor: 128381 (Calions) Space(s): Entire Facility	-
Start Date	End Data	Energy Line (Gollone)
11/01/2009	11/30/2009	2.000.10
10/01/2009	10/31/2008	0.00
2001/2009	08/30/2009	0 00
38/01/2009	08/31/2008	0.00
07/01/2009	07/31/2008	0.00
38/01/2009	06/30/2008	0.00
35/01/2009	05/31/2008	0.00
04/01/2009	04/30/2008	2,264.70
03/01/2009	03/31/2000	2,067 80
02/01/2009	02/28/2009	5,311 80
01/01/2009	01/31/2008	8.558.80
12/01/2008	12/31/2008	6,960.10
moumption (Gallons)		27,763.18
intemption (kilite (theorem) ilite))		3,800,478,22
Oil (No. 2) Consumption (kills) (th	ounand Btu))	3,808,478 22
total Fuel Oll (No. 2) consumption	at this building including all Funt Oil (He, 2)	
Puels		
	seent the latel energy use of this building?	

a continue there are no additional fuels (district energy generator fuel oil) used in this locally

The local sector was a sector with the sector of the secto		
the consumption totals shown above include all on-site actor undror wind power located at		 1
These continues to an ele soler or wind in defetors have been availed from the	1	
the sector sector is the reported.		

Date:

Countring Professional

The for the ENERGY STAR, the Certifying Protestional must be the same as the PE that signed and stamped the SEP (

state any one for the Indiana State.

FOR YOUR RECORDS ONLY, DO NOT SUBMIT TO EPA.

Please tasp this Facility Summery for your own records, do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklut and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility Whiter Elementary School 491 West Englewood Avenue Teeneck, NJ 07866

Facility Owner Teansck Board of Education 1 Merrison Street Teeneck , NJ 07565

Primery Contact for this Facility Anthony D'Angelo 1 Memeon Street Teeneck , NJ 07886

General Information

Winter Elementary School	2
Gross Floor Area Excluding Parking (ftr)	55,118
Your Buill	121
For 12-month Evaluation Paned Ending Data:	November 30, 2009

Facility Space Use Summary

Whitter Elementary									
Spect Type	K-12 School								
Gross Plater Area(112)	ME 118								
Cipant (Weekamate?	Na								
Humber of PCa	28								
Number of some in comparison to some									
Presence of costing facilities	Yes								
Percent Cooled	40								
Paranti Hanind	90								
Marther	12								
High School?	Na								
School District*	Tearach								

Energy Performance Comparison

	Eviation	n Pelada	Camparisons				
Performance Matrice	(Exting Date 11.00/2009)	Kenning Date 11/00/20201	Rating of 75	Tanget	Matimut Average		
Energy Performance Rating	18	15	1 75	1414	80		
Koney reasoly							
Site (Alburity)		85	52	404	-		
Sinrow (http://www.	348	548	12	NEA.	121		
Frange Case				-	and the second s		
Syuw	\$ 108,088,11	\$ 105,558 11	\$ 54,679,18	HIA	\$ 75.038.07		
\$-Exiyear	\$ 5.82	\$1.42	\$ 3.07	N/A	\$1.30		
Garman lies Dreamy			1	-			
MOOJeryee	478	478	285	NA.	940		
kgCO,elitriyeer				(suk	8		

More then 50% of year training is softwal as K-O Sottass. Please role that your tailing assume to all of the taxous lated. The Hadered Average solution preservery performance date your training would have 6 your tailing had an average uning of 50. Meneri

a - Tris athitude is optimum. d - A default obtain has been supplied by Portfolio Merceger.

Statement of Energy Performance

2009

Whittier Elementary School 491 West Englewood Avenue Teeneck, NJ 07666

Portfolio Manager Building ID: 2244881

The energy use of this building has been measured and compared to other similar buildings using the infronmential Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy influent and 100 the most energy efficient. For more information, viail energystar gov/benchmark.

 Image: Image:

Generated 05/04/2010

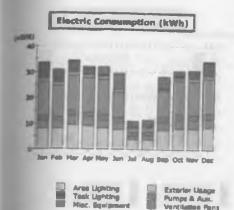
APPENDIX C

EQUEST MODEL RUN SUMMARIES

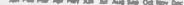
6

regard/flam: Bryard Elementary School - Georine Design









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Exterior Usage Pumpe & Aust. Ventilation Parts	Water Heating Ht Pump Supp.
--	--------------------------------

Refrigeration Heat Rejection Spece Ceoling

Centrik Consumption (Light 1998)

	Jan	100	-	Apr	1000	diam'r.	24	-	-	-	-	_	
NUMBER OF COMM	6.04	8.04	6.07	0.4	3.36				- Sector		They	Dev	Tubal
man factory.				0.48		5.85	2.01	2.39	4.34	1.47	0.02	8.04	19.91
Real Specific and					-		-		-	-	-		
Street Front					*	+.							
	6.09	4.01	4.05	2.32	6.55	0.05	-	-	0.15	0.92			-
MT Dupp.	sh.					-			- A-0	11.11.2	3.18	5.25	27.41
THE DAY	1.30	1.41	1.70	1.90	1.17							· · · · · ·	-
Vent. Carra	13.37	12.08				1.13	0.48	6.45	1.44	1.16	1.24	1.41	14.33
Person & Aury			13.30	12.94	13.37	9.95	1.82	1.91	10.29	13.37	12.94	13.30	130.00
	3.44	1.20	1.87	2.84	1.81	1.63	1.35	1.35	1.64				
FAL Lings				+					a	1.04	1.05	1.96	19.60
THE EASE	3.14	3.00	3.09	3.54						-	1	T -	
Titals Lights			20.000	al a gene	3.20	2.98	1.00	1.56	3,54	3.26	3.26	3.42	35.70
Arts Links					-	-	+	-					
and the second 2	7.96	- 7.84	9.37	8.87	6.12	7.57	3.77	3.00	7.60	8.32			
the second se	30.43	30.66	34.12	31.08	31.85	29.26	10.91				0.27	8.67	10.62
							44.91	11.53	28.10	38.26	38.71	34.12	134.39

Fes Censumption (Bts #800,000,000)

Space Cool	- April	10	Her	Apr	HIN	- Jan	Jul	Ang	-	-	Here	-	in the second
and a state												-	29694
COMPANY OF THE OWNER.	91												-
Second Second				0	0			9		-			
and the second second											-	4	
CONTRACTOR OF TAXABLE PARTY.	1.00	0.87	0.60						61	-	•	0	
States.				0.37	0.00	ELD1	-	-	0.02	0.15	1 .01	8.00	4.00
and the second second		-				-					and we will		4.44
COLUMN COLUMN	-												
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CONTRACTOR OF	-							~					
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and the second second	-												
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	1.09	- 프루	0.60	0.37	0.338	0.01	0		8.82	0.15	0.00	1.00	4.00

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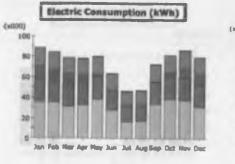
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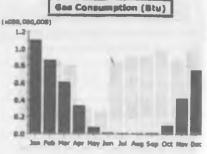
Hardhly Brangy Consumption by Endure

Page 1

Project/Run: Banjamin Franklin - Basalina Desian

Run Desa/Time: 83/26/18 @ 14 34





	Area Lighting Test Lighting Misc. Equipment	Estator Usage Peraps & Aux. Vestilation Fans	Water Heating Ht Purep Supp.	Reingeration Heat Rejection
_	Amer of a building	 Vereinagen Pans	Spece Heeting	Space Cooling

Electric Consumption (Mith x000)

and the second	Jan	Peb	Ber.	Apr	Hay	No.	24	Aug	Sec.	Out	Aber	Des	Water
Space Code		0.02	0.00	6.10	0.40	9.88	0.00	1.00	0.78	0.40	0.16	0.03	6.94
Meant Rutjact.		1.1	1										
Hefrigeration.			× .									- 5	
Space Heat	6.68	6.61	0.00									1.444	
ere Supp.			+										8.04
Hot Weter	+						-				•	1	
Vont. Fens	38.14	17.08	15.99	15.32	14.65	15.15	12.91	13.27	16.83	16.05	17.16	16.20	190.14
Pumps & Aus.	11.00	10.61	11.30	8.77	2.23	8.34	0.62	0.00	0.61	3.99	0.95	11.41	00 a1
Ext. Usage	-	1000									W- 2.2	11-04	
Piec Boulp	32.48	26.31	20.01	21.00	33.62	11.40	16.15	16.34	33.41	23.42	32.63	20.01	248 51
Tanh Lights							-			-		-	None 21
Area Lights	35.68	38.63	31.20	32.70	37.00	27.58	16.32	16.03	33.63	17.00	37.49	31.30	324.07
Total	85.55	86.47	78.14	77.96	60 67	63.31	46.32	47.45	72.46	81.00	06.40	79.46	887.39

Gas Concumption (Bis m000,000,000)

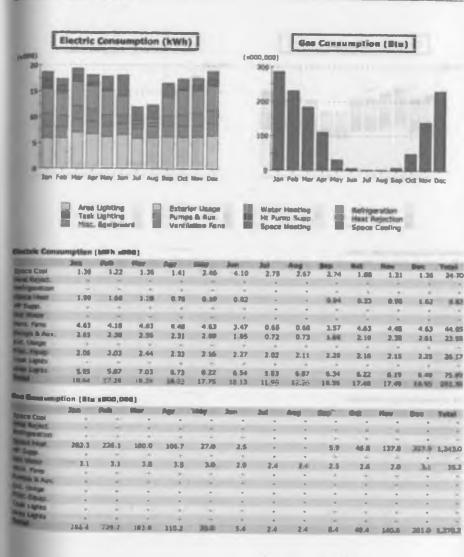
	Jan	Pab	Har	Apr	May	Jun	2nd	Anna	-	Ont	Hev	-	Tatal
Tipace Copl		1.1											and the second second
Photo Reject.		-					-						
Antriperation							-				*		
Space Heat	1.08	0.04	0.50	8.23	0.05				1.00		0.46	8.78	4.07
HP Supp.	10.4		1.0								for and	0.70	10.00
Plot Water	6.02	6.02	0.02	9.62	8.02	0.01	2.81	10.0	0.01	6.62	8.02	8.62	0.20
Vent, Fans										_	B-MK	10.002	
Pumps & Aux.		1.0								2			
Ext. Litage													
MILL Equip.	0.05	0.00	8.08	8.00	8.60	0.00	0.65	3.88	5.00	1.0.00	6.10	6.05	6 00
Tank Lights	×.	1.1		-						-	0.00	640	
Area Lights	÷.										-		
Yetal	5.08	0.05	6.68	8.33	0.00	0.02	0.01	8.65	6.62	4.14	0.42	6.75	4.39

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OLEARAN PROPERTY.

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Page 1

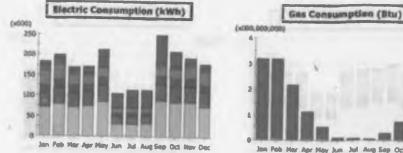
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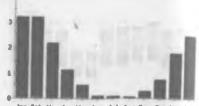
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Jan Pab Her Apr Hey Jun Jul Aug Sep Oct Nev Dec

 Anno Lighting Task Lighting Misc. Biguipment	 Enteritor Usage Pamps & Aux. Ventilation Fans	 Water Heating Ht Persp Supp. Spece Heating	- 8	Refrigeration Heat Rejection
 Contraction of the second second	 PERMANENT PARK	 Signaco Meating		Space Cooling

Electric Consumption (24Wh x000)

States of the second se	348	Pale	Mar	Apr.	Max	Des .	Jat	Aug	840	det.	Nev	-	44.0
Space Caol	7.7	8.6	8.2	16.4	41.5	28.4	-16.0	42.2				Que:	THU
Helet Reject.				84	84	8.2	13		72.4	37.3	13.6	8.4	18.2
Ratingevation -								9.9	11	#2			4.5
Space Heat	15.1	15.8	10.0	4.7	3.5	24	84	8.4	i	47	95	10.3	82.4
HAT Supp. Hat Water	5	-	0	+			~	-	3	-			1.77
Vent. Fava	34.6	36.3	38.7	28.7	25.5	18.4	9.5	10.4	21.5	22.1	26.6	28.4	ini
Pumps & Aux.	19.2	28.1	38.1	17.5	18.0	8.7	5.1	0.2	19.7	17.9	19.1	18.1	285.4
Ext. Usage		1.1				*	-		×.			100	
Hesi, Rovip. Tasli Liptes	8.3	28.7	38.3	26.4	41.3	15.7	384	28.0	41.5	41.7	41.0	36.0	48.4
Ares Lights	65.7	75.4	19.7	73.5	84.5	38.5	28.5	36.8		84.5	-	73.4	785.1
Tatal	382.7	199.1	165.0	179.9	212.4	105.1	Lisa	112.0	248.5	790.0	194.4		2,100.0

Gas Consumption (Btu x008,000.000)

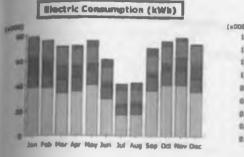
	366	Pab	Hinr	Aar	Hay	Jun	344	A			Martin		
Space Cast							-	Aug	Sep.	-	Hav	Dec	Tutaf
Heat Rejout.								*				<i>c</i>	
Rel-Igeration				5								1.0	
Spirite Heat	3.11	1.09	2.00	1.45	0.47	6.05	0.06	6.05				1	4.0
HP Sales.	10	1				and the second			6.23	0.65	1.73	2.30	1.0
Rot Water	8.00	2.08	5.07	6.47	9.47	0.43	840	0.03	0.04	0.05	0.02	8.06	0.65
Vers. Fam										8.00			
Forners & Auto.	•			-				-	•		•	-	
Ext. Unager		0											
Mar. Rold-	8.00	0.30	2.00	0.00	0.90	0.00	8.00	1.40	8.00	1.40	8.00	4.04	8.61
Task Lights					1.00			1.1					
Area Lights	-								-		-		
Total	3.38	3.17	2.14	1.02	8.54	6.10	0.87	3.07	8.38	8.72	1.76	2.05	15.04

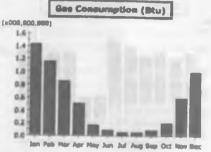
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	Task	Lighting Lighting Equipme		Pump	ior Usage a & Aux. lation Far		Ht Put	Heating mp Supp Heating		Heat I	tration lejection Cooling		
Endels Con-	rumption (k	-	0										
	Jan	848	Har	444	Bar	her	24	Aug	-		-	-	
E Cool	0.01	0.17	0.53	1.90	4.70	6.04	5.30	5.34	3.06	0.0	(Berr	Dec	Tatat
Mit Royal	¥.									4.99	3.76	8.81	35.86
Amproxity													
State Name	+												
HP Supp	1.1												
Het Weter	10 M												
State Party	16.63	15.56	14.01	13.38	13.38	11.99	10.35	10.50	12.76	13.30	13.95	14.52	
Party & ALE.	11.76	11.54	11.40	0.55	4.25	3.19	3.14	2.54	3.49	4.96	8.34		199 42
Are, Margar							-		0.10	4.24		11.30	40.57
THE COMP.	11.05	M.53	10.52	10.05	12.38	0.41	6.31	6.45	11.11			-	-
Task Adjusts 1						-	-			12.31	15 30	10.96	125 82
Area Cranut.	38.38	37.34	33.14	24.60	48.01	20.00	36.00	17.12			-	1.5	
THEN	70.95	75.04	69.70	70.35	74.64	10.53	40.00	41.52	四.5	48.01	30.82	34.87	206.25
								41.3%	48.57	74.38	76.97	71.95	601.6
Res Connero	Hins (Bis s	000,000,	0003										
	Jan	Path	Har	Apr	Har	Jun	24	Ave	-			-	-
Space Cool	-						- ·		-	-	Here	Dec	Tales
THE REAL		1.0								•			
Subdivision in which the		10										· 	•
or large	1.41	1.13	6.83	0.40	8.34	0.07	0.00	0.00	0.07	6.18	0.57	0.00	5.66
TR Name	- 4	-									4.91	-	2.34
States.	0.40	6.63	6.62	0.02	6.63	0.03	0.01	8.63	0.02	1.02	0.02	0.03	0.25
Parent of	· #	-						-					Arriton.
Parages & Auto					p						-		
The Local Division in which the	9						-						•
State Sugar	8.69	0.00	8.08	8.80	0.00	0.00	0.00	8.00	1.0	1.00	0.00		
Tank Laples												8.68	6.83
Contra Linguistic								-	1		-		*
-	1.40	1.16	0.05	0.01	8.17	0.00	0.00	0.06				-	
					a. e.		w.mai	0.00	6.65	16.0	9.99	1.60	6.23

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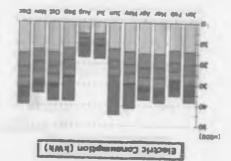
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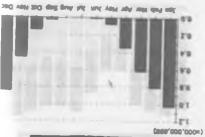
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Mac. Equip.	6.32	-	-			17	*	-		*	~		
apail. Sel		6179	95'9	12.1	-	2.74	5.48	212	TOTE	58.0	127	158	8.69
Party & April 1			64.9	10.0	18.9	224	410	9610	3.60	29'b	DE'E	18.8	6.66
Marile . Shark	96'9	124	46.9		-	-	0	-	-				
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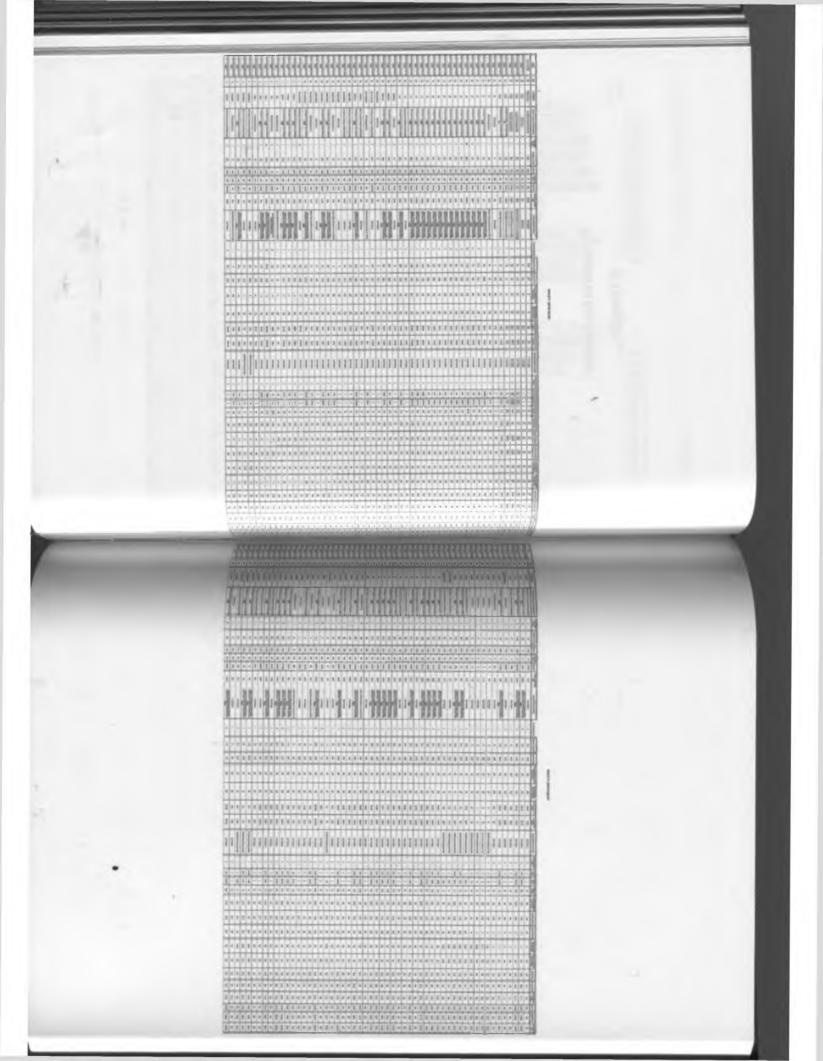
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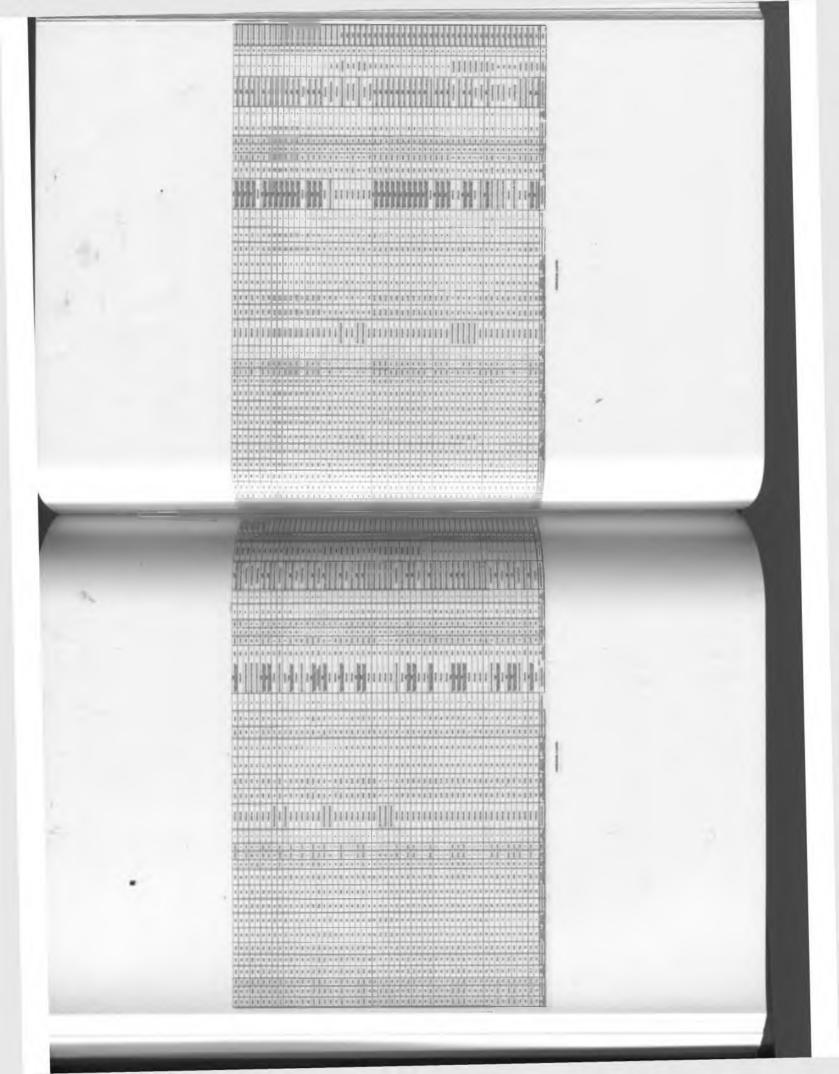


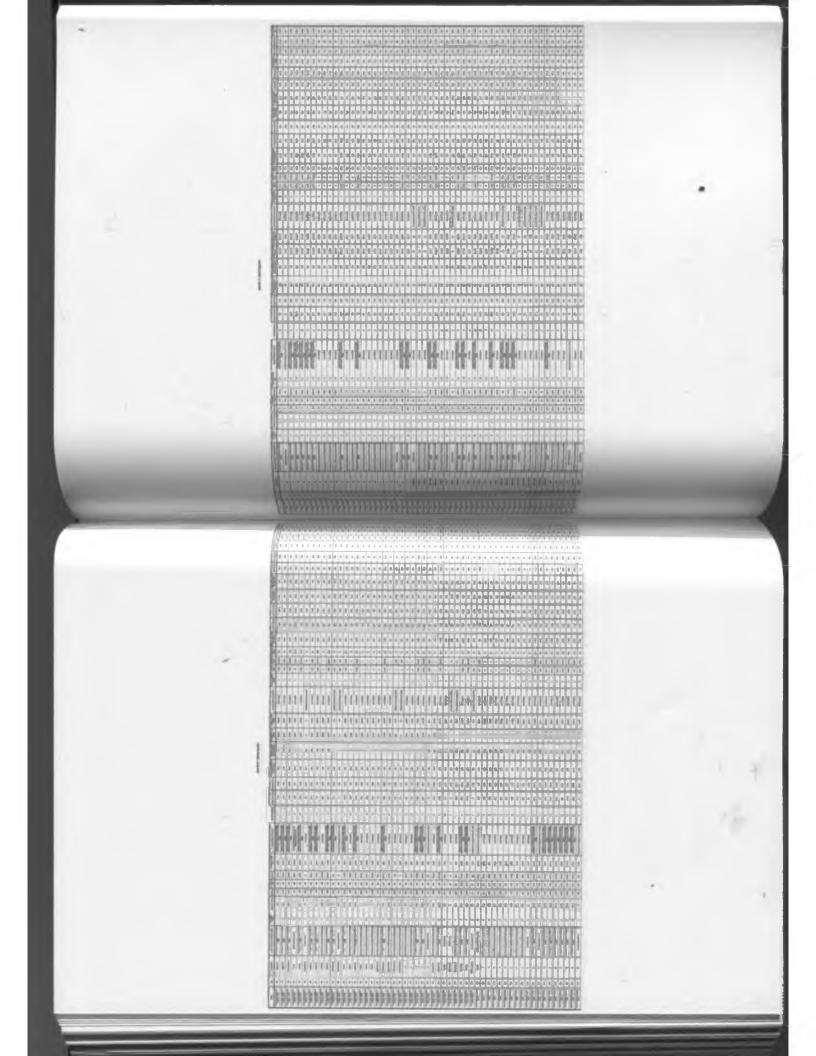
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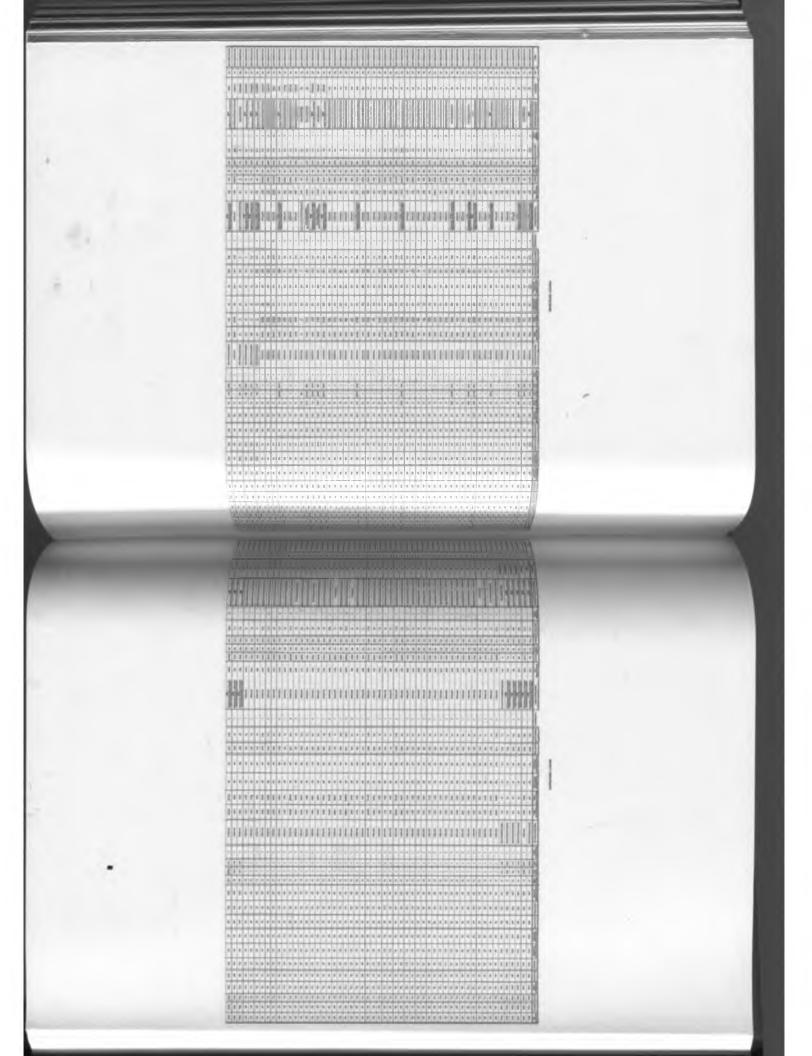


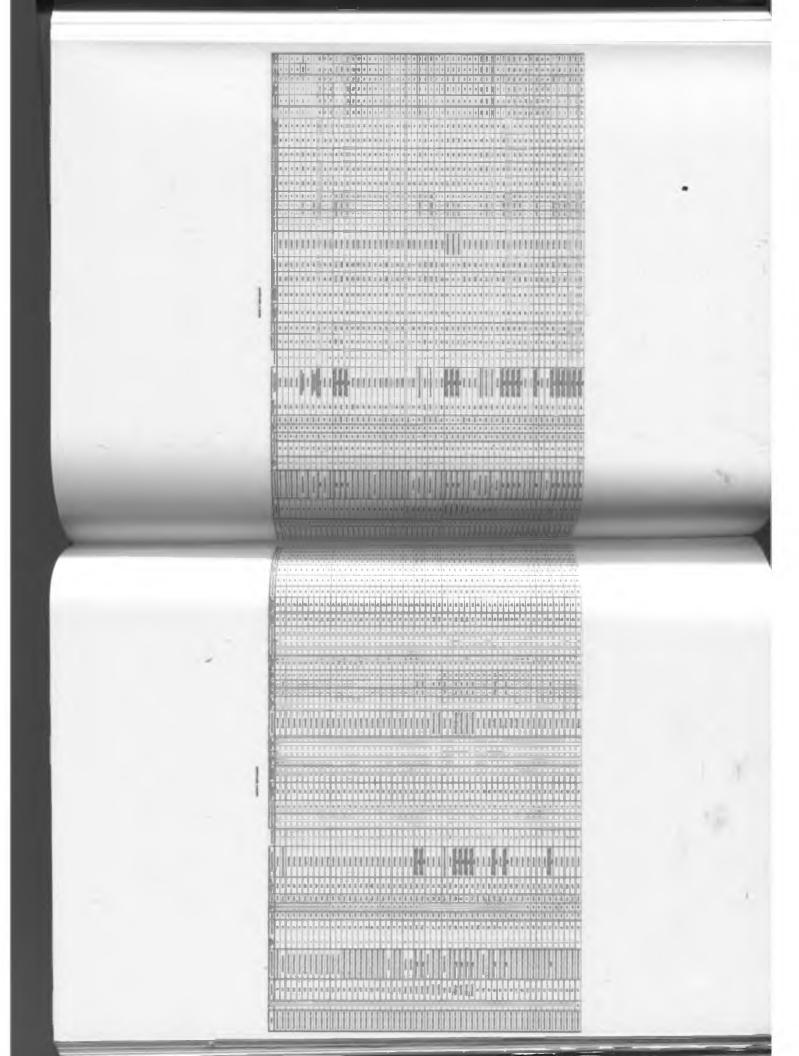




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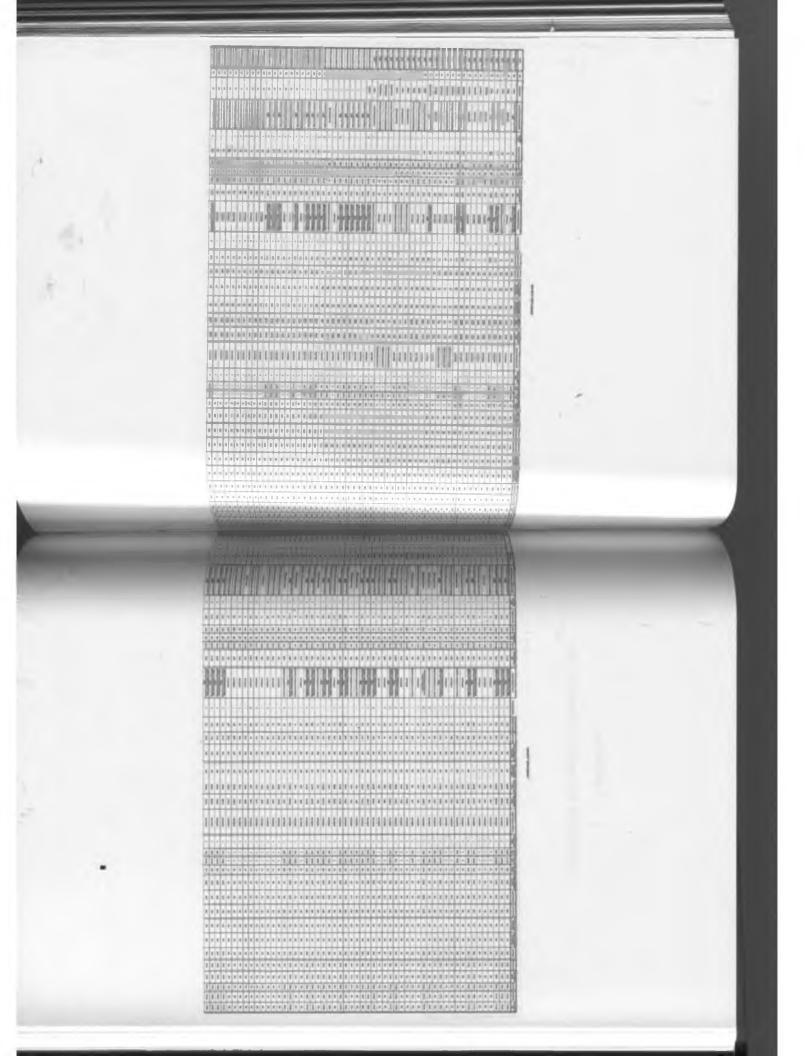
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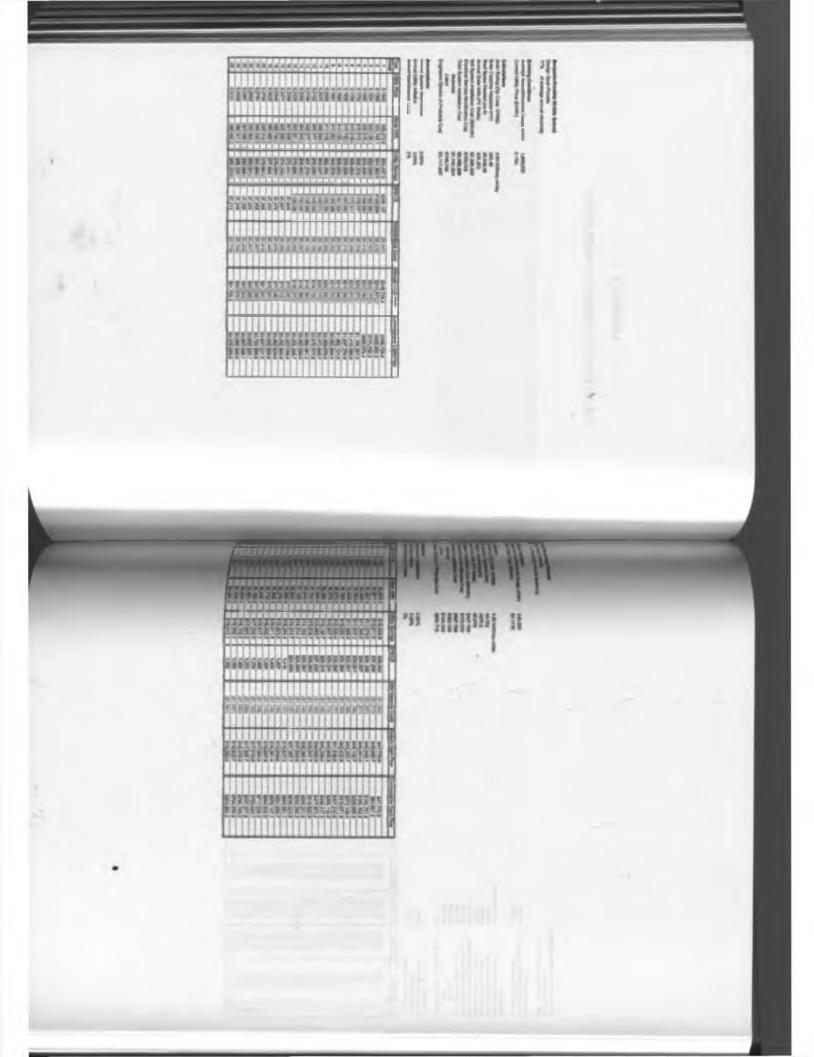
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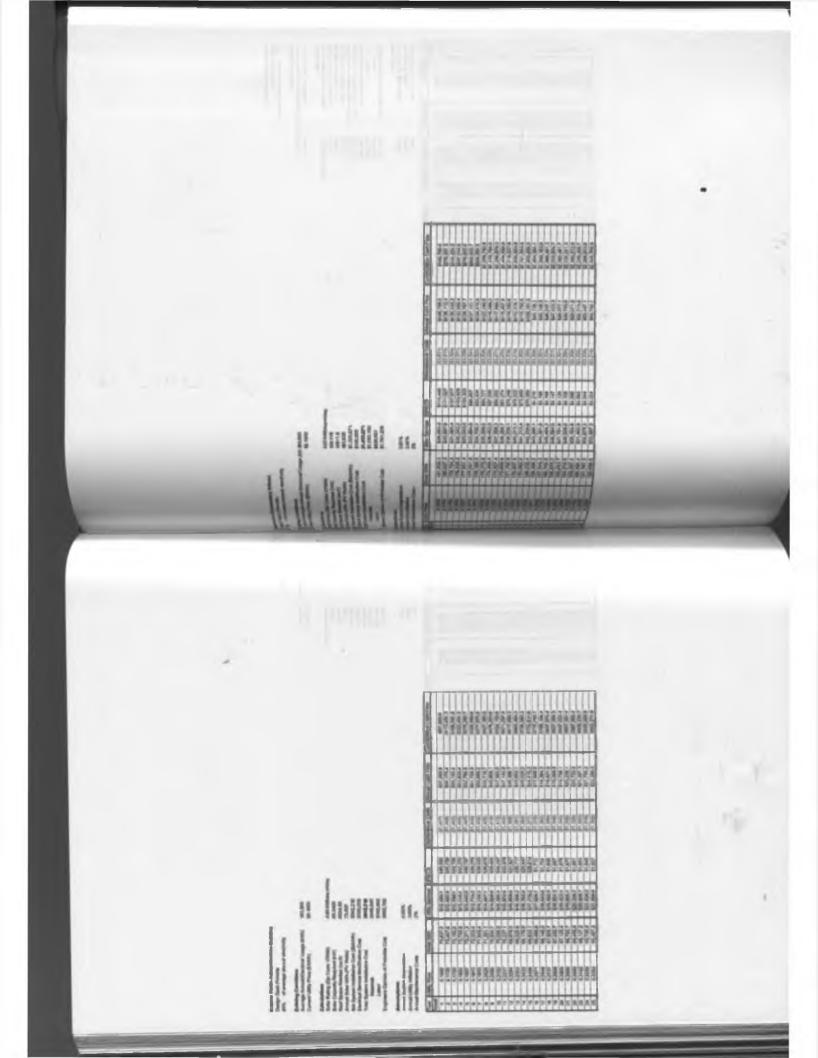


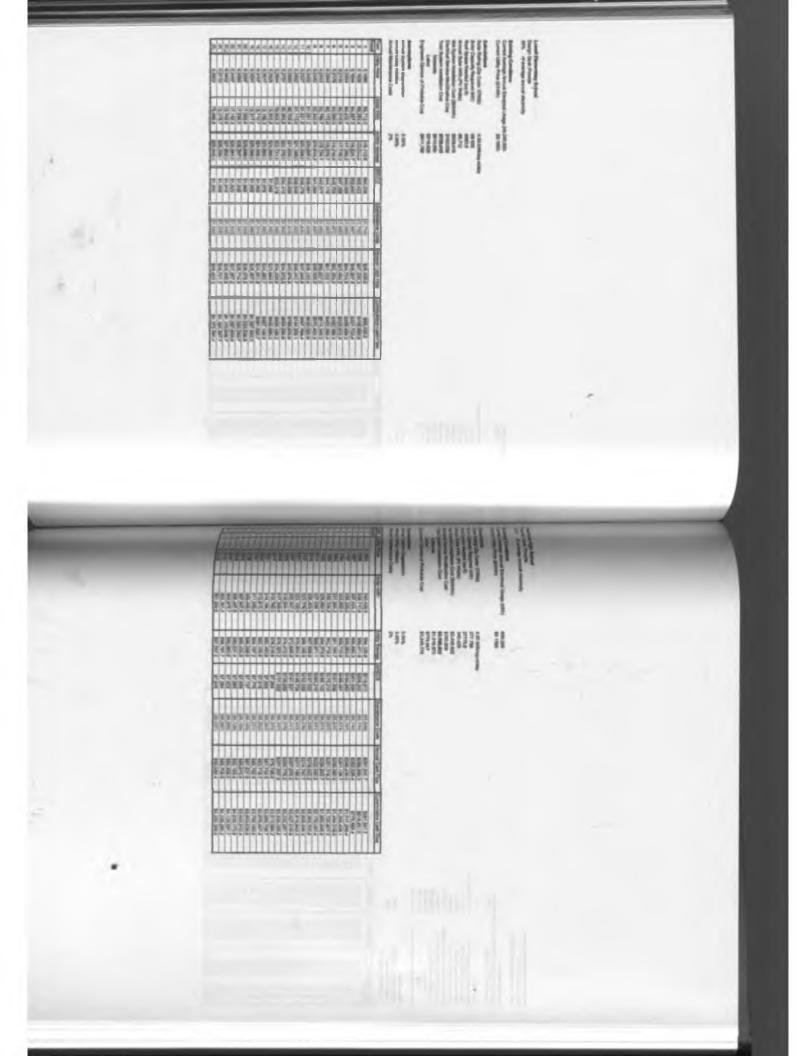
APPENDIX E

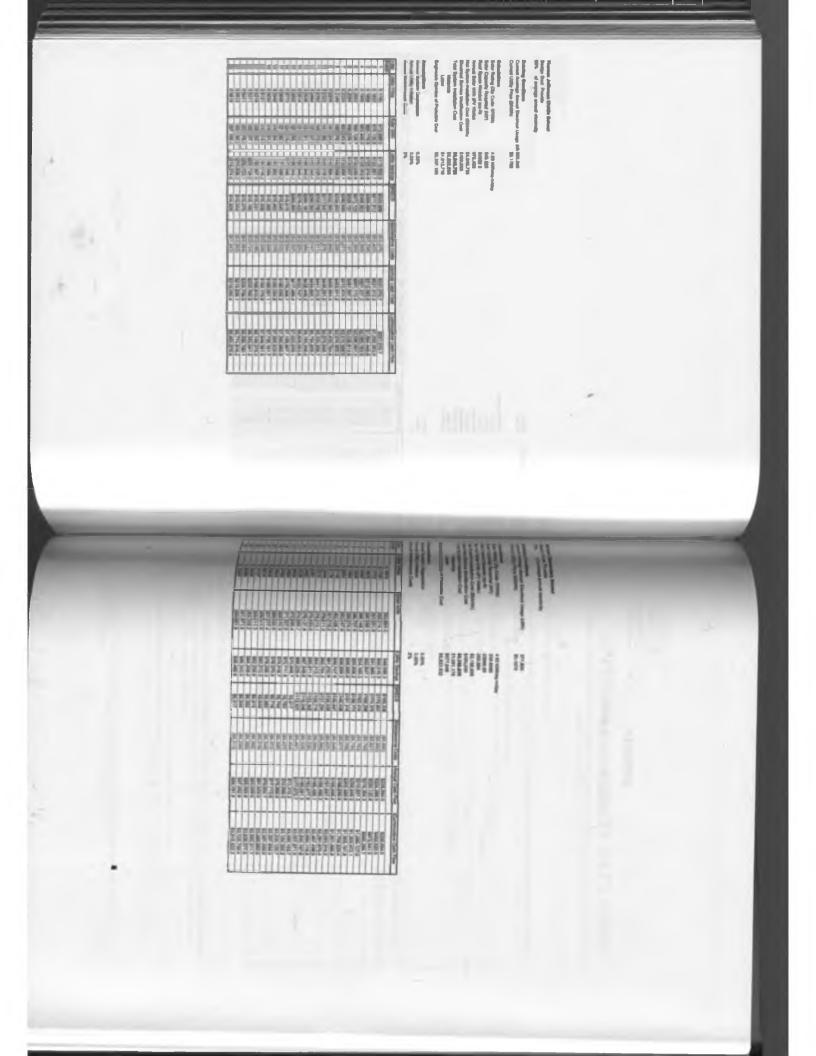
SOLAR ENERGY FINANCING WORKSHEET

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	-		14	-			-	and the set	-	-	1.00	-	-1-1	1.1	- 24		1.54	654	ΞL	243	-4-2		-		-	1.00
-	1.00		1.8			-[-]	-	-		-2-	1		-1-1	100-1	-334		1.2.1	151	-	-		1.1.7	1.1	2	-	
_	1.14		-		-	-1-1	-	Concession in which the Person of the Person			-	-	-6-6	1004	1.52.6	-	-	144		4.4	1.1.1	1.0	4	1.1		1.000
and a		-			1.1	1-1	-	State State of the local division of the loc						1000	1.55		1.0.0	151	-		5.1.2					P













Complete one Facility Data Form for <u>such</u> building. If you are weiting to energy audit multiple buildings, complete one Facility Data Form for each.

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program

Paci	ity Name Benjamin P	rankin Middle Schoo	1		
	t Address 1315 Tait Road			County Bergen	
City	Teanack.			Sinte New Jersey	Zie 87008
3 m	lty's Description ry Structure m 5 - 8			_	
Teta	i Sq Pt	Your Dulk		rs/Wash Oncepted	Number of Employum
and the second second	0,202	1967	90		105 emp / 676 students
	fing Type (Check out	y are of the following	12	r	
	Emergency Service			Garage	
	Center/Meeting Ha	WLibrary		Offices	
	Recrustion/Enterts	inment/Parks		Religious	
	School			School: College	
	Water Transmit	maping		Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's margy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel

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The Data Below is for the [2 Month Period: 7 / 1 / 0 8 to 6 3 0 9 8

Person 1 of 2 Personal 17, 2000 Local Government Every Audit Program



Electric Utility Name & Account Name	or(a)
PBEAG #42 008 678 18	
Amand hWh Upp	Annual Electricity Cast
992,09C	\$136,841,27
Max Begamer kW	Max Winter 199
See attached document	See attached document

NATURAL GAS

Natural Gas Utility Name & Amount Number(s)	
PBEAG #42 008 678 18	
Anneal Use in They une	Annual Natural Gas Cost
0,082.267	\$8,403.43

FUEL OIL

Fuel Oil Utility Name & American (4)		
Alled #128386		
Agement Use in Gallage Assess Paul Oll Cost		
30,082.70	856,321.93	

PROPANE

Propane Utility Name & Assosal Numb	(u)	
Not Applicable		
Ansual Use in Galleon	Assessi Propage Cast	
		1

OTHER

In this section please indicate any other fiel type that the facility uses, such as: solar energy, wind anergy, bio-fuel, cogeneration, fuel colls.

Linher Fuel Type: Not Applicable	Carrie
Annual Energy Use (Indicate units)	Annual Energy Cost

STAFF USE ONLY

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A Charles and a start of the second start of the	5. C		11.20

Page 2 of 2 Pateriary 17, 3000 Loos Genermant Energy Audit Program

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Complete one Facility Data Form for <u>each</u> building. If you are seeking to energy audit multiple buildings. complete one Facility Data Form for each

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Pacility Name Bryant Elementary School					
	t Address Tryon Avenue			County Borgen	
City	Teeneck			Blate New Jersey	Zip 07805
1 84	ity's Description ny Structure ne Pro-K & K	<u> </u>			- 11-
Tele	Ng Pt	Your Balli	Het	Week Despied	Number of Employees
47	,436	1926 (1948,1952,1997)	80		76 emp. / 385 students
	ling Type (Check out)	ner of the following):			
	Emergency Services			Garage	
	Conter/Meeting Had	VLibrary		Offices	
	Recreation/Entertai	nmont/Parks		Haligious	
	School			School: College	
	Water Transment/Framping			Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include value is fuel.

The Data Balaw is for the 12 Month Period: 7 / 1 / 0 8 to 6 / 3 0 0 0

Figure 1 of 2 Fiscancery 17, 2009 Local Covernment Energy Audit Program

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Einstrie Utility Name & Ascoutt Naminejji		
PREAG #65 828 671 05		
Annani kWh Use	Anonal Riectulity Cast	
201,040	\$45,770.43	
Max Batamor KW	Max Winter hW	
lies stached document	Ene ettached decument	

NATURAL GAS

Nataral Gas Littley Name & Account Number(s)	
PBEAG #65 828 671 05	
Assessi Liss in Thereas	Annual Natural Gas Cost
134.882	6288 .17

FUEL OIL

Fuel Oil Utility Name & Ancount Number(s	9	
Alled #128362		
Anneni Use in Gallans	Annual Faul Of Cost	
36469.70	000,337.71	

PROPANE

	Propinio Utility Name & Accusat Nambur(a)
l	Not Applicable
	Annani Use in Gallens Antani Propana Cost
ł	

OTHER

In this section please indicate any other fuel type that the facility uses, such as solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Feel Types Not Applicable	-
Annani Energy Use (indicate adia)	Antinil Energy Cost

STAFF USE ONLY

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Page 2 of 2 Paterusry 17, 2008

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Complete one Facility Data Form for each buildings. (f you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facil	By Name Eugene Fil	id Administration Bu	liding		
	t Address 1 Merrison Street			County Bergen	
Chy	Teeneck			State New Jersey	2/m 07886
2 910	its's Description by Structure al Administration Of	loss			
	i ilig Pt	Year Bull		rs/Wask Orcupied	Number of Employees
_	A77	1955 y one of the following	85		47 employees
	Diellan -			T	
	Emirgency Service			Gerage	
	Contervitioning Ha	Milbrary		Offices	
	Recruction/Enterta	isment/Parks		Raligious	
	School			School: College	
	Water Trestment/Pumping			Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month partial available. In order to gain a complete picture of the facility z energy use, be zure to include all types of energy used by the facility. Do not include vehicle fuel.

The Bota Below is for the 12 Month Period: 7 / 1 / 0 8 to 0 / 3 0 0 0

February 17, 2008

Local Government Ermagy Autor Program

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Electric Utility Name & Account Numberid	\
PBEAG #65 900 523 01	
Annuni kWh Une	Ancest Electricity Cost
179,610	\$30,848.81
Mes Summer kW	Met Winter KW
line siteched document	See attached document

NATURAL GAS

Natural Gas Utility Name & Amount ?	(control)	
PBEAG #85 900 523 01		
Annual Use in Therms Answel Natural Geo Cost		
648.98	\$916.28	

FUEL OIL

Fuel Oil Utility Name & Account Numberie	0
Alled #128385	
Annual Line in Cantinua	Antesi Pail Of Cast
9,297.5	\$17,170.33

PROPANE

Propane Utility Name & Ascount Numb	ar(a)
Not Applicable	and the second se
Annual Line in Gallans	Annual Property Cast

OTHER

In this section please indicase any other field type that the facility uses, such an solar energy, wind energy, bio-fuel, cogeneration, fiel cells

Other Paul Type: Not Applicable	
Aununi Energy Ups (Indixata autia)	Ansual Energy Cast

STAFF USE ONLY

Data Received		Project No.	-	 Robert
	- V-			
			The second s	



Complete one Facility Data Form for <u>each</u> building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Pacili	Hawthorne	Elementary School			
	r Address 101 Fycke Lane			County Bergen	
Chy	Teensck			Bactor Netw Jaccory	72ap 07866
1 840	ny's Description ny Structure 16 1 - 4		_		
Tetal In Pt Year Bull 49,373 1925 (1950, 1907)		Hours/Wask Cocupied		Number of Regleyess 60 emp / 342 students	
	ing Type (Check out	y one of the following):			
	Emergency Service			Garage	
	Custor/Monting Mol/Library			Offices	
	Recreation/Enterininment/Parks			Religious	
	School			Sease: Callege	
	Water Treatment/P	u naping		Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gotn a complete picture of the facility's energy use, he sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Paried: 7 / 1 / 0 8 to 8 / 3 8 0 9

Page (of 2 February 17, 2008 Louis Government Energy Audit Program

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Electric Utility Name & Account Number(s)	
PBEAG #67 562 643 03	· · · · · ·
Annual kWh Line	Annual Electricity Cort
414,450	\$63,843.93
Max Semmer kW	Max Winter kW
See allached document	Bee attached document

NATURAL GAS

Natural Gas Utility Name & Account P	(umher(s)
PBEAG 887 582 643 03	
Angual Use in Thereis	Amerani Nataral Gas Cost
41,287.56	647,485.61

FUEL OIL

Fuel Oil Utility Nums & Account Number(i) Not Applicable	
Annual Use in Gullens	Ann=ni Fadi Olj Cost

PROPANE

Fraguna Utility Name & Account Namber(1)	
Not Applicable	U()
Anumal Use in Gallens	Autual Propage Cost

OTHER

In this section please indicate any other fuel type that the facility uses, such an solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Feel Type: Not Applicable	
Assumal Energy Use (indicate units)	Agninal Energy Cost

STAFF USE ONLY Data Received Project No. 10.11

Page 2 of 2 Fabruary 17, 2008

Local Government Energy Arida Property

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Complete one Facility Data Form for <u>each</u> building, if you are seeking to energy audit multiple buildings, complete one Facility Data Form for each

FACILITY INFORMATION

Places complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name Lowel Elementary School					
Btreet Add ress 1025 Lincoln Place			County Borgan		
City Teenock			State New Jersey	Zip 07666	
Finitility's Description 2 Biory Structure Grades 1 - 4					
	i Mig Pl	Year Badt		w/Week Ourupied	Number of Employees
the second second	,105	1934 (1998)	80		61 mmp / 305 utudents
	ing Type (Chesk and	y one of the following):			
	Emergency Service			Gerege	
	Caster/Mosting Ho	Wildersry		Officie	
	Recreation/Entertainment/Paris			Raligious	
	School			Behool: Collage	
	Water Trantment/P	waping		Others	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel

The Data Below is for the 12 Month Paried: 7 / 1 / 0 8 to 6 / 3 0 0 9

Page 1 of 2 Peterwary 17, 2008 Load Government Energy Audit Program

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Bestele Utility Name & Account Nami	int(1)
PREAG #05 900 523 01	
Annual kWh Unp	Anunal Electricity Cool
122,480	\$46,721.38
Max Summer KW	Nas Winter KW
Bas stached document	Bee attached document

NATURAL GAS

Natural Gas Utility Name & Account State	100001
PSE&G #05 900 523 01	
Assessi Use in Therms	Amouni Natural Gas Cost
17,257.80	\$785.00

FUEL OIL

Fuel Oil Utility Name & Amount Number	
Alled #128363	
Annest Use in Gillion	Ammai Find Off Cost
25,680.90	847,910.42

PROPANE

ſ	Propins Usility Hame & Assess Numberg)	
	Hot Applicable	
F	Agental Use in Gallons	Annual Propage Cast
Į.		

OTHER

In this section please indicate any other feel type that the facility uses, such as: solar energy, wind energy, bio-feed, cogeneration, fuel colls.

Other Faul Type: Not Applicable	0
Annual Energy Une (Indicate unit)	Agnual Knorgy Caul

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Page 2 of 2 Fabruary 17, 2008

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Local Government Brungy Audit Program

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Complete one Facility Data Form for <u>each</u> building, if you are weeking to overgo audit multiple buildings, complete one Facility Date Form for each.

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Fadi	By Name Teeneck H	igh Bahaol			
	t Address 100 Elizabeth Avenu			County Borgen	
City Teeneck				State New Jersey	23p 07900
3 84	hy's Description ny Structure no 9 - 12				
Total lig Pl Year Ball		Henro Work Otcopied		Number of Employees	
-	6,808 ling Type (Check and	1927-34 (1956, 1976) y one of the failewing:	110		187 emp. / 1,410 etellent
	Emergency Services			Carnge	
Conter/Meeting Hold/Library			Offices		
	Berrollen Telerislement/Farls			Religious	
	1 Behavi			School: College	
	Weter Treatment/Pumping			Other:	

ENERGY DATA

Please complete the energy information below for the must recent 12 month period available, in order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fiel

The Data Below is for the 12 Month Period: 7 / 1 / 0 8 to 8 2 0 8 8

Page 1 of 2 Palmary 17, 2009 Local Contention of Content Party Property



Electric Utility Name & Amount Name	
PBEAG #42 003 120 18	
Annual kWh Las	Anappal Effect delity Cont
1,695,896	8206,316.62
Max Summer kW	blas Winter kW
line stached cocument	Bee attached socument

NATURAL GAS

Natural Gas Little	v Name &	Account Number(t)

	PSEAG #42 003 120 18 (Motor 1) PSEAG #05 783 594 08 (Motor 2)	
ļ	Assent Use in Therms	Anseel Natural Gas Cost
	1,102.407 (Meter 1) 116,185.3 (Meter 2- 8/86-7/09)	\$1,425.36 (Mater1) \$121,524.85 (Meter2 B/08-7/09)

FUEL OIL

Fuel Oil Utility Plane & Accust Number(s)	
Alled #128393	
Aussel Use in Guilees	Annual Fuel OB Cost
* 45,580 7 (7/1/08-12/1/99) switched to gas	* \$149,446.88 (7/1/08-12/1/09) exitched to gas

PROPANE

Propine Utility Name & Account Number	(8)
Not Applicable	
Amusal Use in Gollous	Annual Property Cost

OTHER

In this section plasme indicate any other final type that the facility unon, such an solar energy, wind energy, bio-fuel, cogeneration, fuel cells

Other Fael Type: Not Applicable		
Annani Energy Use (indicate adits)	Annual Energy Cast	

STAFF USE ONLY

Date Received:	Project No.	17234
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Complete one Facility Data Form for each building. If you are sooking to energy audit unabiple built complete one Facility Data Form for each

FACILITY INFORMATION

Birg	et Adrives 100 Elizabeth Ar			Centry Bargen	
Chy Teeneck				Bists New Jersey	Zip 07005
ław	eational Football Imbel: Il Sq Ft.	laid / Stadium - 4 light po Games and Marching B Year Built	and & Ches	riander Precise for 1 m/Werk Occapied	Number of Empl
N/A 1996 Building Type (Check only one of the following			t = 9, Ocl-Nov = 25	NVA	
Buil	ding Type (Check				
	Emergency Ser			Garage	
	T	rviens		Gerege Offices	
	Emergency Ser Center/Montin	rviens			
	Emergency Ser Center/Montin	viens g Half-Library		Offices	

ENERGY DATA

Please complete the energy information below for the most recent 12 month partial available. In order part at a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel

The Data Below is for the 12 Manth Period: 7 / 1 / 0 6 to 0 3 0 0 9

February 17, 2008

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.



Electric Littlity Name & Ascount Numb	ur(z)
PBEAG #66 806 170 04	
Annuni kWh tim	Annel Manufally Cost
8,100.80	\$7,848.28
Nas Summer kW	Max Winter kW
line attached document	See attached document

NATURAL GAS

Natural Gas Littley Name & Account Numbur(s)

distant.	A notice the	
PROF	Applicable	

Annual Use in Therms

FUEL OIL

Puni Oli Utility Plane & Account Number(g) Not Applicable Annuel Use in Gallese Annuel Puel dill Cast

Annual Natural Gas Cest

PROPANE

Propins Utility Name & Account Numb	Har(s)
Not Applicable	
Annual Use in Gallens	Antoni Propose Cast

OTHER

In this socian please indicate any other fuel type that the facility uses, such an solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fast Type: Not Applicable		
Anneal Energy Une (Indicata units)	Aptual Energy Cast	-

Date Received

Contraction of the local division of the loc		
Page 2 of 2		
Fallnutry 17,	2008	

Prand No



Complete one Facility Data Form for each building. If you are seeking to energy audit multiple buildings. complete one Facility Data Form for each.

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program

Fasti	ily Name Teenedk Hi	gh School - Athietic Field -	Score	board		
Street Address 100 Elizabeth Avenue				Creatly Bergen		
City	City Teenock			State New Jarsey	Zip 07006	
17	ty's Duncription					
Faal House	all Games for the Ma a, which is used for 2	Storage	mber	Also power & sight	ng tor Press Box and Film	
1	Ng Pi	Ymr Bull	Enner# mit Occupied Number of Empl		Ramber of Employees	
N/		1000	Bapi	t-Nov = 9 N/A		
H ill	ing Type (Chesk and	r one of the following):				
	Emorgency Service			Gerage		
	Catter/Meeting Hall/Library			Office		
	Recreation/Entertainment Parks			Religious		
	3 School			School: College		
	Water Treatment/P	v mping		Other:		

ENERGY DATA

Please complete the energy information below for the most recent 12 month puriod available. In order to gain a complete picture of the facility's energy use, he sure to include all types of energy used by the facility. Do not include vehicle fuel

The Data Below is for the 12 Manth Period: 7 / 1 / 0 8 to 8 9 0 8 9

February 17, 2008

Local Dovernment Energy Audit Program

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ELECTRICITY

Electric Utility Name & Assount Number(e)	
PBEAG #87 473 383 04	
Assess kWh I me	Amuni Electricity Cont
1,304	\$1,816.79
Mas Summer kW	Mm. Winter kW
ins stached document	See stached document

NATURAL GAS

l	Nataral Gas I willy Name & Account	Number(s)
	Not Applicable	
	Assessi Use in Thorms	Anone Natural Gas Cost

FUEL OIL

Paol Off Utility Name & Account Number	(1)
Not Applicable	
Annual Use in Gallers	Annual Fuel (H Cest

Annual Propage Cost

PROPANE

Propton Utility Name & Account Number(s)

Not Applicable

Annual Use in Gallens

OTHER

In this section please indicate any other fuel type that the facility uses, such as solar energy, wind energy, bio-fuel, cogeneration, fuel cells

Other Puel Type:		_
Not Applicable		
A		_
Annual Lowgy Live (Indicate units)	Ansteal Loargy Cost	

STAFF USE ONLY

Data Received	 Project Ha :	-
		-

Page 2 of 2 Fabruary 17, 2009 Local Covernment Energy Audit Program

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APPENDIX C - FACILITY DATA FORM

Complete one Facility Data Form for <u>each</u> building. If you are seeking to every oudit multiple buildings, complete one Facility Data Form for each.

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enroliment in the Program.

	Thomas Je	flerson Middle School			
	4 Address 655 Teeneck Road			County	
-	Teeneck			Sinto New Jerney	21p ()7685
3 84	ky's Dwerlption sy Stuckers as 5 - 8				
Total Ng Ft Your Ball 106,210 1060		Henry Wash Campbel		Number of Employees	
		y one of the following):			55 emp. / 627 eludents
	Emergency Service			Gerage	
	Conter/Monting Ma	Mulhrary		Office	
	Revention/Entertainment/Parks			Religious	
K	lichool			School: College	
	Water Treatment/P	'emping		Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Pariad: 7 / 1 / 0 8 to 6 / 3 0 0 0

Page 1 of 2 Fabruary 17, 2009 Long Covernment Analysis - was -

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ELECTRICITY

Electric Utility Name & Ascount Number	(m)
PSEAG #42 003 988 18	
Assani kWh Uss	Answal Electricity Cost
760,720	\$122,936.61
Max Snumer kW	Mas Winter kW
Bee altached document	Bee siteched document

NATURAL GAS

Natural Gas Utility Name & Account Number(s)

POEAG #42 003 968 16

Amstel Use in Therms	Answel Natural Gas Cost
7,363 257	88.940.85

FUEL OIL

Fast Oil Utility Name & Amount Humbs	Man.
Alled #128367	
Annual Use in Gallone	Answei Puel Oli Cest
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Prophen Utility Name & Accust Number(s)	
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Auseni Use in Gallone	Antual Propose Cost

OTHER

In this section please indicate any other fuel type that the facility uses, such as solar energy, wind energy, bio-fuel, cogeneration, fuel cells,

Other Faul Type: Not Applicable	
Annani Knorgy Use (indicate units)	Antuni Energy Cost

STAFF USE ONLY

Data Received	Project No.		 112-20
	-	-	 1100

Page 2 of 2 . February 17, 2009 Local Government Energy Audit Program

CTRC



APPENDIX C - FACILITY DATA FORM

Complete one Facility Data Form for <u>each</u> building, if you are seeking to energy audit multiple buildings, complete one Facility Data Form for each

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Paul	whither Ele	Imantary School			
	t Adires 191 West Englewood	I Avenue		County Bargan	
Chy	Teeneck			New Jersey	22ap 07666
2 84	ing's Description ary Structure as 1 - 4				
H	1 Big Pl 5,118	Ymr Bull 1921 (1948,1952,1997)	illeu 90	re/Wash Complet	Number of Employees 65 orep. / 402 students
	ing Type (Chesk and	y one of the following):			
	Emergency Service			Garage	
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R	ficheel			Echant: Callage	
	Water Trentmant/P	a mping		Other:	

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available, in order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel

The Buts Below is for the 12 Month Period: 7 / 1 / 0 8 to 6 / 3 8 0 9

Page 1 of 2 Patersary 17, 2009 Loss Government Energy Audit Program

CIRC

8



ELECTRICITY

Electric Utility Name & Account Number(p) PSEAG #65 182 086 03	1
Annual kWh Use	Anotal Einsteidig Cost
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ling Bommer I/W	Max Winter kW
Ene stached document	Bee ellached document

NATURAL GAS

Hataral Gas Littley Name & Account Nas	nhor(s)
PBEAG #86 128 016 03	
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PUEL OIL

Fuel Oil Litility Name & Account Num	der et a)
Alled #128381	
Annual Une in Callins	Antrei Fuel Ol Cest
28,680 70	\$62,358.57

PROPANE

Propinie Utility Name & Account Number(s)

Not Applicable

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OTHER

In this section placese indicate any other fuel type that the facility uses, such as. solar energy, wind energy, bio-fuel, cogeneration, fuel cells

Other Pael Type: Not Applicable	
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STAFF USE ONLY

Date Recound	 Protect No.

Page 2 of 2 Pepruary 17, 2008

Local Government Energy Audit Program

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APPENDIX G

NJ SMARTSTART INCENTIVES INFORMATION AND WORKSHEETS



2010 Prescriptive Lighting Application

Customer Information				
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Capacity	Cenart Name			llenoge Val	road No	Padaral Tas	(E))
Revest Address	Chy	Blate	100		Tolophone H.	ui .	Fast No.

Contractor/Vend	for Information (if diffe	rent from Paye	v)	Read As	
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Building Type (circle one)

Research Prince (Schen Bernstein Connecting College: Delevance Delevance: Headra Harpert Machine League Headr Conne Research League Headr Research and Lado Estate League (Direc League (Direc Research R

Prescriptive Lighting Incentive

S_____ Total incentive (per attached worksheet calculations)
Note: Prescriptive Lighting Worksheet must accompany this application.

100.00

Specific Program Repairements

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- At regains hims and hat
- A Design of the second R. LEU BA

2 Payer Information is filled out and a W-9 form of the payer in included

- Annufacturer's specification shows for proposed technology are included
- A copy (all pages) of a recent month's utility bill is included

ACKNOWLEDGEMENT

CUSTOMER'S SIGNATUR	£		An appeng 1 with the 1 bars and continued and append to the prob- ting of the probability of the 1 bars and the probability of			
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Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager

New Jorney's Clean Energy Program

c/o TRC Energy Services

900 Routs 9 North, Suite 104 + Wandbridge, NJ 07896

Phone: 866-657-6278 + Pan: 732-855-0422

Visit our web site: NJCleanEnergy.com/ssb

New Joing Describes' Robing West successor assessed. Use of the most without the provinces of the New Joing Descript of Halls Vallant, Ullis of Chao Kongy is publicled ø Requirements' address in change

NJ SmartStart Buildings®

Program Terms and Conditions

Definitional

Conign Incontives - Incontives that may be offered to design prefermionals by the Program.

Basian Environ - Environ that may be offered to design professionals under the Program.

Tearge-ZERcions Manazeta - Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commendated Industrial Program (New Jersey SmartStart Buildings).

New Jarray Utilitian - The regulated electric and/or gas utilities in the State of New Jorney. They are: Atlantic City Electric, Jarray Teneral Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethown Gas, PSEBG, and Bawh Jorney Gas

Administrator - New Jerrey Board of Public Utilities. Office of Clean Energy

Participating Castomers - These non-residential electric and/or gas service sustainess of the New Jaracy Utilities who participate in the Program.

Product Installation or Equipment Installation - Installation of the Energy-Efficient Measures.

Market Manager - TRC Energy Services.

Program - The Commercial and Industrial Energy-Efficient Construction Program (New Jossey SmartStart Buildings) allowed Secon by the New Jamey Board of Public Utilitian, Office of Claan Energy pursuant to state regulatory approval under the New Jamey Electric Discusses and Energy Competition Act, NJSA 48.3–49, or mg.

International Control of the State of the St

Appendix and Eligibility Process - The Program pays incontives after the installation of qualified energy efficient measure that ters pre-approved (for exceptions to this condition, please raise on "Encoptions for Approval".) In order to be eligible for Program institution, a Contempor, or an egent (constructor/vendor) authorized by a Contempor, must submit a properly completed application The package must include an application signed by the customer; a complete (current) utility bill, and technology and mean facturer's cut shown (where appropriate). This information must be submitted to the Market Manager before encounters in Applications for measures that are solf installed by customers must be estimized by the customer and see the self-If the measure, however, the customer may elect to amign payment of the incentive to the sales vender. This application partners ment he received by the Market Manager on or before December 31, 2010 in order to be eligible for 2010 incentives. The Market Imager will review the application package to determine if the project is aligible for a Program Incentive. If aligible, the Common Will measive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed 🗷 Order for the approval to remain in effect. Upon receipt of an approval letter, the Contensor may then precord to install the Dipment listed on the approved application, Equipatent installed prior to the date of the Market Manager's approval latter is an upble for an incentive. The Market Manager reserves the right to conduct a pro-inspection of the facility prior to the insulation of Tipment. This will be done prior to the increase of the approval letter. All equipsions must be purchased within 12 to the second secon Replication. Any Consumer marrier amon who purchases equipment prior to the receipt of an incentive approval inter and at bisfor own rich.

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Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finder Indusit an invoice for the purchase of the equipment (material cast must be broken out from latter counts), and any other respond Please refer to the Program Cuide on the NJClean Energy com/wh website for the complete Application and Eligibility Process

The Market Manager reserves the right to varify sales transactions and to have reasonable access to Participating Cattomer's facility to impact both pre-axisting product or equipment (if applicable) and the Energy-Efficient Manager installed under this Program, either prior to issuing incentive or at a later time.

Energy-Efficient Measures must be installed in buildings lacened within a New Jorney Utilities' service servicely and designated on the Participating Customer's incentive application. Program facentives are available for qualified Energy-Efficient Measures as lined and described in the Program materials and incentive applications. The Participating Customer must ultimelisty own the equipment, either through an up-front purchase or at the oud of a short-arm laner. Design facentives are available to design professionals an described in the Program materials and applications. A different and separate agreement must be unacted by participating design professionals to be eligible for this type of incentive. The design professional dos not need to be head in New Jorney.

Equipment preserved by Participating Costances through another program affered by New Jerrey's Class Energy Program as the New Jerrey Utility, and applicable, is not eligible for insentions through this program. Costances who have not contributed to the Samutal Benefits Charge of the applicable New Jerrey Utility are not be algebbe for insentions offered through this program.

Incentive America - Program Incentives will equal either: a) the approved Program Incentive America, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is law, as determined by the Market Manager. Products offered at no direct cost to the customer are indigible. Incomplete application subminions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to \$600,000 per utility accesses in a calendar year. Contact the Market Manager regarding any questions.

Tax Linhility – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Contourse as a result of the payment of Program Jacontives. All Participating Contourses must supply their Federal Tax Identification number or social security number to the Market Manager on the application form in order to receive a Program Incentive. In addition. Participating Contourses most also provide a Tax Charance Form (Business Assistance or Incentive Charance Cortificate) that is dated within 90 days of equipment installation.

Enderwaynet - The Market Managor and Administrator do not underse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warrantin - THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT. AND/OR SERVICES RENDERED AS PART OF THIS FROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUTACTURER OR VENDOR, CONTACT YOUR VENDOR/SERVICES PROVIDER POR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Linkitty – By virtue of participating in this Program, Participating Commerce agree to waive any and all claims or damages against the Market Manager as the Administrator, except the receipt of the Program Inconsive. Participating Commerce agree that the Market Manager's and Administrator's linking, in connection with this Program, in limited to paying the Program. Incommittee specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any last public, special, public, consequential ar incidental damages or for any other damager under this Program shall be individual, and not joint and/or several.

Anignment - The Participating Customer may assign Program Incentive payments to a specified vender.

Participating Contamor's Cortification - Participating Customer cartifies that ha/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is tree and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination - The New Jersey Board of Public Utilisias reserves the right to antend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement - I have read, understood and an in compliance with all rules and regulations concerning this incontive program I contrify that all information provided in convent as the base of my knowledge, and I give the Market Manager parasisson to abare my records with the New Jorney Board of Public Utilities, and contractors it selects to manage, courdinate ar evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access in my property to inspect the installation and performance of the technologies and installations that are digible for incentives under the guidaines of New Jersey's Clean Energy Program.



2010 Prescriptive Lighting Incentive Worksheet

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Mall or fax your application pockage DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Emergy Program No TRC Emergy Services 900 Route 9 North. Suite 104 - Woodbridge, NJ 07096 Phone: 866-657-6278 + Fax: 732-845-0422

Visit our web site: NJCleanEnergy.com/ssb

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NJ SmartStart Buildings®

Program Terms and Conditions

Definitional

Design Incentives - Incentives that may be offered to damps professionals by the Program.

Design Services - Services that may be offered to design professionals under the Program.

Der gr-Efficient Manutres - Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commend Industrial Program (New Jorany SmartStart Buildings).

New Jurney Utilities - The regulated electric and/or gas utilities in the State of New Jerney. They are: Atlantic City Electric, Jerney erral Power & Light, Rockland Electric Company. New Jerney Natural Gas, Elisabethtown Gas, PSERG, and South Jerney Gas.

Administrator - New Jerrey Board of Public Utilities. Office of Clean Energy

Terricipating Customers - Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in

Product Installation or Paragreenet Installation - Installation of the Energy-Efficient Measures.

Market Manager - TRC Energy Services.

The Commercial and Industrial Energy-Efficient Construction Program (New Jorney Smertiltert Buildings) allowed by the New Jerny Board of Public Utilisian, Office of Clean Energy purvuent to state regulatory approval under the New Electric Discount and Energy Composition Act, NJSA 40.3-49, at seq.

Treasure Incontinue - Refere to the amount or level of incentive that the Program provides to Participating Costamore personness. The Program edited herein (see description usage "Incentive Associa" heading).

Impran Offer - Program Incontives are available to non-residential rotal sloctric and/or gas service customers of the New Jorum Unlittle identified abave. Program Incontives for new construction are available only for projects in areas designated for growth in the Bate Plan. Public school (K-12) new construction projects are exampted from this restriction and are sligible for new Program improve throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth aren by referring to the Innert Growth Lacator available from the HMPA website or contact the Market Manager if you are uncertain alumn project

Application and Eligibility Process - The Program pays incestives after the metallation of qualified energy efficient measures that Bers pro-approved (for exceptions to this condition, please refer to "Exceptions for Approval") In order to be eligible for Program interests a Continue, or an agent (contractor/vandor) authorized by a Contouner, must submit a properly completed application The package must include an application signed by the customer; a complete (current) stillty bill; and technology worksheet imanufacturer a cut about (where appropriate). This information must be submitted to the Market Manager before equipment in mailed. Applications for measures that are solf installed by customers must be submitted by the customers and not the asks vember in the measure, heavever, the customer may elect to group payment of the measures to the adex vendor. This application package the received by the Market Manager on or before December 31, 2010 is order to be eligible for 2010 incentives. The Market will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Commun into its a mapproval letter with the estimated authorized incentive amount and the date by which the equipment must be interilled mentar for the approval to remain in effect. Upon receipt of an approval latter, the Customer may then proceed to install the listed on the approved application. Equipment installed prior to the date of the Market Manager e approved letter a m the for an incentive. The Market Manager removes the right in conduct a pre-inspection of the facility prior in the installance of This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 menths of date Il application. Any Castamer and/or agent who purchases equipment prior to the receipt of an incentive approval letter date on at his/her own risk.

Impliants for Approval - The Application and Eligibility Process pertains to all projects except for these involving other Unnerg IVAC or Mater having an incentive assount less the \$5,000. These measures, at this recentive level, may be installed without prior proval. In addition, but at the sole discretion of the Markot Manager, surgency replacement of equipront may not require a prior proval determination and letter, in such cases, places notify the Markot Manager of suchhemergencies as unity as put lifts, disc. **Proval determination and letter**, in such cases, places notify the Markot Manager of suchhemergencies as unity as put lifts, disc.

The Installation A second – After installation is completed, the Customer, or an agent authorized by the Customer, d submit an involce for the purchase of the equipment (material cost must be broken out from labor costs), and any status as specified on the equipment application or in the Market Manager's initial approval letter. Please refer to the Program Guide on the NJCleanEsergy.com/seb website for the complete Application and Eligibility Process

The Market Manager reserves the right to verify asks transactions and to have reasonable accuss to Participating Contomer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Massures installed under this Program, either prior to issuing incestives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jerusy Utilities' service servicery and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as linted and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term beas. Design hopestives are available to design professionals as described as the Program materials and applications. A different and separate agreement must be executed by participating design professionals as the eligible for this type of isopetive. The design professional sets are available to be based in New Jeresy.

Equipment presented by Participating Castemars through another program efford by New Jerney's Class Barryy Program or the New Jerney Utilities as applicable, is not eligible for immetions through this program. Castemary who have not contributed to the Serietal Banglis Charge of the applicable New Jerney Utility are not be alsolde for immetions effects through this program.

Incentive America – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Manaure, whichever is less, as determined by the Market Manager. Produces offered at no direct cost to the customer are inslightly. Incomplete application sylminisms, applications requiring inspections and unanticipated high values of activities may cause processing delays. Program Incentives are limited to \$500,000 per unlity account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability - The Market Manager will not be emponsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incensives. All Participating Customere must supply their Federal Tax Identification number or social accurity number to the Market Manager on the application form in order to receive a Program Incentive. In addition, Participating Customere must also provide a Tax Clearance Form (Business Amistance or Incentive Clearance Certificate) that is deted within 90 days of outputsmost installation.

Endormament - The Market Manager and Administrator do not endorme, support or recommend any particular manufacturer, product or system design in presenting this Program.

Warrantin - THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROCRAM, KITHER EXPRESS UT OR IMPLICITLY, NO WARANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSION OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR PITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR, CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE, AND WARRANTIES.

Limitation of Liability - By virtue of participating in this Program, Participating Contonners agree to waive any and all claims or damages against the Market Manager or the Administrater, except the receipt of the Program Jaconsive, Participating Conteners agree that the Market Manager's and Administrater's liability, in connection with this Program, Jaconsive, Participating Conteners specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, partice, consequential or incidental damages or fair any other damages or claims connected with or results from participation in this Program. Further, any liability attributed to the Market Manager under this Program shall be individual and not joint and/or several.

Amignment - The Participating Customer may assign Program Incentive payments to a specified vender.

Participating Castamar's Cartification - Participating Customer certifies that he/she purchased and installed the equipment lated in their application at their defined New Jersey location. Participating Customer agrees that all information is two and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement - I have read, understood and an in compliance with all rules and regulations concerning this incentive program I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to shart my records with the New Jerney Beneri of Public Utifies, and contractors it solect to manager, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable account to my property to impact the insufficient and gerformance of the technologies and installations that are eligible for incestives under the guidelines of New Jerney's Clean Energy Program.

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2010 Lighting Controls Application

Customer Information				
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Building Type (circle one)

5

Cologia Cologia

lighting Control Incentive

Total Incentive (per attached worksheet calculations)

04.675

Note: Lighting Controls Incentive Worksheet must accompany this application.

Specific Program Requirements

- Please refer to the Program Could for additional applicable technical requirements. Including operial requirements for lighting controls.
 Include the mergefacturer's specification sheet with the application
- package and stall or fax directly to the Commercial and Market Manager.
- All lighting controls at gifter for incontiven must be UL listed.
 Lighting control increasion are only available for control of oligible mergy efficient lighting features.
 If most than one oligible factures, the incontive paid will be far the lighting the news eligible features.
- the name signifie target, the incentive paid will be for the lighting control device that yields for larget incentive only. 6. Occupancy Sensor Cantrils focuting facilities only: # There is no increative avsiliable for occupancy sensors installed in a space where they are prohibited by state or local building or safety code. Additionally, no iccountive is slightle for occupancy sensors in the following spacefic spaces in all cases instruments installed in a Counter state of the code. Additionally, no iccountive is slightle for occupancy sensors in the following spacefic spaces in all cases instruments were stated (or non-state of the state of the state of the state of the state of the lobbing, and characterize area. tobbins, and closets/morage areas,

 - lobbies, and closerumocage arwa. Il nominive will only be med for eligible accupancy amore (OSW & OSR) controlling at inset 2 eligible lighting futures and, for OSR installations, a minimum total connectual land of 180 watts. Incentives will only be paid for eligible OSR1 occupancy sensates controlling eligible futures when the constrallad souriagt is greater to be the operation. than 180 watth.
 - = Occupancy sensors with manual overvide to the "ON" position are ineligible for

Payes Information is filled out and a W-9 form of the payee is included

- C Manufacturor's specification shows for proposed technology are included
- A copy (all pages) of a recent month a utility bill in included
 - ACKNOWLEDGEMENT

NUMBER OF STREET

By sec. I vertify that I have read, understand and sees to the Specific Program Bayerseman/Terms and Castims as limit in this term. I will see for approval a property completed application parkage, see includes this second set of the property completed application and address as utility bill seen much name and address as application.)

Control Device Type	Incestive per Unit
OSW - Occupancy Sensor Wall Mounted (Existing facilities unly)	\$20 per control
OSR - Occupancy Sensor Remote Mounted (Existing facilities only)	\$36 per control
DLD - Plusreetnt Davlight Dimming	\$25 per fixture controlled
DLD - Pluorescent Daylight Dimming (Office Applications)	\$60 per fixture controlled
OHLF - Occupancy Controlled High-Law with Step Ballast	\$25 per fixture controlled
OSRH - Occupancy Senaor Remote Morented	SS6 per control
OHLH - Occupancy Controlled High-Law with Step Ballan	\$75 per fucture controlled
DDH - Daylight Dimming	\$75 per future controlled

Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Energy Program

c/o TRC Energy Services

900 Route 9 North, Suite 104 + Wandbridge, NJ 07095

Phone: 866-657-6278 . Fax: 732-865-0422

Visit our web site: www.NJCleanEnergy.com

of the olds work without the previous of the New Jerry Rand of Public Utilizes Office of Linux Europy is problem. New Jersey Sancelines Buildings & in a . 6

- 7. High Law Controls (OHLF and OHLH):
 - Incontiven will not be paid for high-live controls on eleptic Researcement fixtures where devight dimming controls can be 11 Ja
- Reconsection tracts molegoed. = [accessive well not be paid for spaces smaller than 250 equator is a lacensive well not be paid for spaces well in the more than 50% of " Increasives available only when "high level."
- I (nessive are not available for the following spaces stairs are elevators, corridors/halls ays, or labbies
- " OHLP will control fartures that have a ballast factor loss than 1 a

- COR INF. INC. and of 240 works.

 - Dimming shall be constructed as a support at 4 or more levels.
 Incentive will be paid only for alighte daylight dimming control
 restances designed in accordance with IESNA practice as deforered
 IN INCENT AND A Constructed on Practice of Daylighting
 DLD will construct flattures that have a balant factor loss than (.g.tor
 Tabe and 1.14 for 7.84
 - Tota and 1.14 for T-B.
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NI SmartStart Buildings®

Program Terms and Conditions

Definitions:

Durige Incentives - Incentives that may be offered to design professionals by the Program.

During Hervices - Hervices that may be offered to design professionals under the Program.

Banage-Efficient Manageres - Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Communicational Industrial Program (New Jorsey SmartStart Buildings).

New Jersey Utilizing - The regulated electric and/or gas utilities in the State of New Jersey, They are: Athenic City Electric, Jersey Control Power & Light, Rochland Electric Company. New Jersey Natural Gas, Elizabethtewn Gas, PSE&G, and South Jersey Gas.

Administrator - New Jersey Board of Public Utilizies. Office of Clean Knorgy

Participating Contourns - These non-residential electric and/or gas service out more of the New Jerey Utilities who participant in the Program.

Product Installation or Equipment Installation - Installation of the Energy-Efficient Measures.

Market Manager - TRC Energy Services.

Program - The Commercial and Industrial Energy-Efficient Construction Program (New Jorney SmartStart Buildings) afford Inrein by the New Jorney Board of Public Unition, Office of Class Energy pursuant to state regulatory approval under the Texa Jorney Electric Discount and Energy Composition Act, NJSA 48/3-49, at seq.

Program Insuntives - Refers to the amount or level of incentive that the Program provides to Participating Customers permanents the Program offered herein (see description under "Incentive Amount" heading).

Program Offer - Program Incentives are available to non-residential retail abetric and/or gas service customers of the New Jamas Unities Moniford above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-13) new construction projects are exampted from this restriction and are slightle for new Program Immittees throughout the State. Customers, or their trade alline, can determine if a location is in a designated growth area by referring in the Emert Growth Lacator available from the HMPA website or contact the Market Manager if you are uncertain about proper-

Regularition and Eligibility Process - The Program pays incentives after the installation of qualified energy efficient second and erry per approved (for exceptions to this condition, please refer to "Exceptions for Approval") In order to be eligible for Pregram Immutives a Customer, or an agent (contractor/vondor) authorized by a Customer, must submit a properly completed application pathage. The pachage must include an application signed by the customer: a complete (current) utility hill: and technology and manufactures a cast aborts (where appropriate). This information must be submitted to the Market Manager before equipment in Installed. Applications for measures that are will installed by customers must be submitted by the customer and not the sales of the manuary, however, the customer may elect to arrige payment of the insentive to the select vender. This application package must he received by the Market Manager un or before December 31, 2010 in order to be eligible for 2010 incentives. The Market Manager will review the application package to determine if the project is eligible for a Program Incensive. If eligible, the Conserve The Paceive as approved letter with the estimated authorized incentive amount and the date by which the equipment must be resulted marder for the approval to remain in affect. Upon receipt of an approval latter, the Cantomer may then proceed to install the mulphern hand on the approved application. Equipment installed prior to the date of the Market Manager a approval latter in the myble for an incontion. The Market Manager emprose the right in conduct a pre-inspection of the facility prior in the insurance of repriperent. This will be done prior to the insuance of the approval fatter. All equipment must be purchased within 12 member of date I application. Any Customer and/or agant who purchases equipment prior to the receipt of an incousive approvel lower does an ot bis/her own risk.

for Approval The and Eligibility Process partains to all projects ancopt for those involving sider Using HVAC or Matars having an incentive set less than \$5,000. These measures at this incentive level, may be installed without prior val, in addition, but at the cole of the Market Manager, encorgoncy replacement of equipment may not require a preval determination and letter. In the set of the market Ma

Post Installation Approach - After installation is completed, the Casterner, or at apost authorited by the Contoner, must findles and schools as invalue for the purchase of the appiperent (material cost must be broken out from labor same), and any other required inconsecution as apoptified on the equiperent application or in the Market Manager's initial approval letter. Please refer to the Program Guide on the NJClean Energy com/who website for the complete Application and Eligibility Process

The Market Manager reserves the right to verify sales transactions and to have researable access to Participating Customer's facility to impact both pre-axisting product or equipment (if applicable) and the Energy-Efficient Measures installed under this Program, eithre prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on participating Customer's iscentive application. Program Incentives are available for qualified Energy-Efficient Measures as lineed and described in the Program enterials and incentive applications. The Participating Customer must litimately site the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be sequenced described and the program materials and applications. A different and separate agreement must be security design professional and separate agreement must be security. The design professional can be added to be based in New Jersey.

Towns presently Participating Contenues through another program affered by New Jerney's Class Barryy Program in the New Jerney Utilities as applicable, is not eligible for summires through this program. Continues who have not contributed to the Second Baufits Charge of the applicable New Jerney Utility are not be aligible for summires offered through this program.

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Tax Linhility - The Market Manager will not be responsible for any tax liability that may be imposed an any Participating Customers as a result of the payment of Program Incentives. All Participating Customers must supply their Federal Tax Identification number or social ascurity number to the Market Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Closenace Form (Business Amistance or Incentive Closenace Cortificate) that is dated within 90 days of equipment installation

Endorsement - The Mariet Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in premoting this Program.

Warranting - THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT. AND/OR BERVICE'S RENDERED AS PART OF THIS PROCRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY. EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/BERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability - By virtue of participating in this Program. Participating Contomers agree to waive any and all claims or damages against the Market Manager or the Administrator, accept the receipt of the Program Incontive. Participating Customers agree that the Market Manager is and Administrator is biblify: in connection with this Program, in limited to paying the Program. The Program Incontive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, he liable for any lost profile, gamitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability is tributed to the Market Manager under this Program shall be individual said not joint and/or several.

Antigement - The Participating Contomor may assign Program Incentive payments to a specified wonder.

Participating Contourse's Cartification - Participating Contours certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Contemer agrees that all information is true and that he/she hes conformed to all of the Program and equipment requirements listed in the application.

Termination - The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Progress Incentive levels) or terminate this Program without pelor or further notice.

Acknowledgement - I have read, understood and an in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it solates to manager, coordinate or evaluate the NJ SmartRart Buildings Program. Additionally, I allow mesonable access to my property to inspect the installation and performance of technologies and installation that are eligible for incentives under the guideless of New Jersey's Clean Energy Program.

And Personnel Name



2010 Lighting Controls Incentive Worksheet

customer Information Facility Mahree Dist Belowinst Check have it makiple and almost are being and added to one projectivability Lighting Controls Information Watts Controller per Dysle Rationa Type Controlled s of Unite" Incomtion a of Hatama Controlled Tutal (D z B) per Devica (Water into CARTA (Jump, Til 28 . 4 174 4 x 108 - MA Lines, Til Castleman Mirror A. CHIR 8.85 . ¥ 111 1+14-54 large Clina 410 10 1.00mp. 78 18(2) 275 MIA. -114 A+SIL-Call N Lbn.F 14-14 14 NA 15 115 12 + 521 - 5700; Condition A N DEAL Adamp. T3 251 511 A+35-50% Vendous 5 . 9 FBW and UBB, image pander of named devices for (201) and (2007) reserve total scalar-bulance secondark for (2011) per OOPI, panet total vanishes of Despres secondark. Tedal

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automates.

- Please refer to the Program Code for additional applicable technical requirements including special requirements for lighting controls.
 Include the manufactures' appellication above with the application package and mean fermity to the Commercial/Industrial Machet Manager.

- All lighting control eligible for interactive must be UL limit.
 Highing control increasing end weaklish for control of eligible energy relation lighting fraters.
 If more than one alighbe Editing control device is anational with the same eligible Fisher, the increasing interactive paid will be the fisher device in a statistic for an energy for the same eligible for the same eli
- lobbies, and cleasts/storage areas.
- ¹⁰ Incontrast will only be paid for slightle OSRDI nonquery sensors costrolling slightle forures when the costrollind sentage is presser than 180 wars. Intentions will only be paid for vispilat occupancy sensors (OSW it OSR) constrolling at loss? 2 vigpile lighting futures and for OSR installations, a minimum total connected load of 100 watts.
- ¹⁰ Occupancy sensors with manual severide to the "ON" pendium ary inslightle for incensive.

- High-Low Controls (OHLP and OHLH):
- ¹⁰ Issuerives will not be paid for high-few controls on elegible. These avec factores where digitight domining controls can be affectively readingsel.
 ¹¹ Issuerives will not be paid for space smaller than 200 square (as 11 Issuerives well not be paid for space smaller than 200 square (as 12 Issuerives well-hole only when "how level" is no more than 10% of high local.
- II Jacassieve are not available for the following spaces entrony, alevators correlates halfways, or follows.
- a OHLP will control flatners that have a buffast factor loss that 12 for T-fa and 1.14 for T-fa.
- at OFILIT will sustain features that have a halfour factor growthy dyn or equal to 1.0 for 7-th and 1.16 for 7-th. Daphight Dimening Consteads for Higglide Perturgent In Interesting will make be paid for singlide deplight dimening controls in Baseneties will make be applied halfourt with a meximum total control of preventing at them 4 adaptive halfourt with a meximum total control of half of 260 weats.

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- to DOM will seened fictures that have a hallost factor growter (t., or equal to 1.9 for T-fits and 1.14 for T-fits.

Lighting Control Prescriptive Incentives*

Control Device Type	Incentire per Unit
OSW - Occupancy Sensor Wall Mounted (Existing facilities only)	\$20 per control
OSR - Decupancy Sensor Remote Maunted (Existing facilities only)	\$35 per control
DLD - Flooresent Daylight Dimning	\$25 per fasture controlled
DLD - Pharesecut Daylight Dimoning (Office Applications)	\$50 per listure controlled
OHLF - Occupancy Controlled High-Low with Step Ballast	\$25 per listure controlled
OSRH - Occupancy Sensor Remote Mounted	\$35 per control
OHLH - Occupancy Controlled High-Low with Step Ballast	\$75 per fisture controlled
DDH - Daylight Dimming	\$75 per fisture controlled

Mail or fax your application package DRECTLY to the Commercial/Industrial Market Manager

900 Route 9 North Same 104 • Woodlyidge, NJ 07095 New Jersey's Clean Energy Program o's TRC Energy Services

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions

Basign Incentions ntives that may be offered to design profes ale by the Program.

During Services - Services that may be affered to design professionals under the Propus.

Earry-Efficient Massaure - Any divice eligible to receive a Program Incentive payment through to NJ Chan Earry Commercial at Industrial Program (New Jerney SmartStart Buildings).

tum Jersey Utilishe - The regulated electric and/or gas willines in the State of New Jensy. They are Atlantic Cay Electric, Jensey Cound Power & Light, Bockland Electric Company, New Jersey Natural Cas, Elizability and StateC, and Sanah Jersey Cas.

aninistrator - New Jersey Board of Public Utilisies, Office of Clean Energy

Surgisipating Conservers - There non-residential electric and/or gas service continents of the New Joney Utilizies who participate in Mill Proprove

when Installation or Equipment Installation - Installation of the Energy-Efficient Heasers

Barket Manager - TRC Energy Services.

Program - The Commercial and Industrial Energy-Difficient Construction Program Okes Jamey Sauthers Buildings) alliered largen by the New Jenney Based of Public Utilians, Office of Clean Energy pursuant to ease regulary approval woder the New Jenney Electric Discount and Energy Computing Act. NJSA 483-48, at any.

Strugtum Insunitives – Refers to the amount or level of incensive that the Program provides in Passivering Commerce permanents for Program offened herein (not incertigation under "homeine Amount" baseling).

Program Office – Program Incontives are available to non-revisiontial retail electric using gas series transmorted the New Jarwy Unites identified shows. Program Incontives for new construction are available only for projects is own designated. For growth in the Base Plan. Public wheel (X-12) new construction projects are exempted from the manipulate pair or displayed for growth in securities throughout the State. Consenses, or their rush affects can determine if a longest is in a singular growth area by reliant matter Snare Growth Looster available from the HMFA vehicle or constart the North Manager if pix or uncertain about project

(b) Obtained and Elightilly Process - The Program pays incentives after the insolution of quarket increase of the property of the comprised (for exceptions to the combined by a Canasar, was also in algolity in Program (for exceptions) in the property of the contract and the specific of the property of the contract and the specific of the property of the property of the contract of the property of the property of the property of the contract of the property of the propery a higher own risk.

Supplicant for Appended – The Application and Eligibility Process pertains in all process parage for these involving either United WAC in Means having an increative annual less the \$2,000. These measures at this invasive load, may be invasible visible appear environd. In addition, has at the sole discretion of the Warket Managers reasoners of quotients and requires a prior environd dimensionizers and letter. In each many place multip the Warket Manager's task same priors are only as parallels, that we hyphracides will many be sent in that was not pre-approved.

we TamaBaishon Agguerand – After installarian is complemed, the Customer, or at appro-enforcing in the Customer, must Enable and submit an invoice for the purchase of the equipment (metrial cust must be broken up from hine curst), and my other required assumed as specified on the equipment application or in the Nucleat Manager's mini apprend term.

Visit our web site: www.NJCleanEnergy.com

Phone: 866-667-6778 • Part 732-866-0472

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Please refer to the Program Guide on the NJCleaseEurrgy.com/asb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have resonable access to Participating Customer's facility to impact both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures installed under this Program, either prior to issuing incentives or at a later time.

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Resignent preserved by Participating Castemers through another program offend by New Jersey's Close Energy Program or the New Jersey Utilities applicable, is not eligible for investion. through this program. Casternary and have a conservated to the Societal Bengles Charge of the applicable New Jenny Utility are not be digitle for insentions offered through the program.

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Lomitation of Lishility - By virtue of participating in this Program, Participating Contomers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the ressist of the Program Incentive Participating Contempor agree that the Market Manager's and Administrator's liability. in connection with this Program, is limited to paying the Program Incretive specified. Under no circumstances shall the Market Manager, its representatives, or mebcentractors, or the Administrator, he liable for any lost profits, special, punitive, consequential or incidental damages or far any other damages or claims connected with or resulting from participation to this Program. Further, any liability attributed to the Market Manager under this Program shall be individual and not joint and/or several.

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New Jersey Clean Energy Program

Technical Worksheet - Solar Electric Equipment Information

Places carefully read all of the following information, With the help of your installation Contractor, fully complete Please cervicity reactions and the stacked rechnical Worksheet for Solar Electric Equations A through D, as applicable, of the stacked Technical Worksheet for Solar Electric Equations as the New Jersey Clean Energy Program Robete Application Form.

GENERAL TERMS AND CONDITIONS

Intervent. I to reveal of the date the New Jersey Clean Energy Program (NICEP) approved the Final Approximation the mechane date of the equipment. Program procedures and rebains are subject to change or cancellation without makes.

To guality for a rabele. Applicant must comply with all Program Eligibility Requirements, Tamp and Conditions, and Instances in Requirements. and submit a completed Pre-installation Application Perm. For more information about the New Jersey Clean Energy Pression Regal metadance in conception additional or ferme, alteaut are www.pictumentrep.org.or of all DS-NJSMART

INSTALLATION REQUIREMENTS

coupment installation must make the following minimum requirements in order to qualify for payment under the provision of the Ecopyment installation must be instantly installation of the second and the bootstand, but they must be documented by the second program proposed changes to the requirements will be considered, but they must be documented by the second program and the Cosh Energy Program: proceed charges to the requirements are not all-encompassing and are intended only to address the second or branches and approved by the NJCEP. These requirements are not all-encompassing and are intended only to address the second or branches are address to a second or branches are address to ad salety and elliciency standards.

A Code Regulamenta

a complete the provisions of the National Electrical Code and at other applicable local, state and Complete come a Comparison of

2. All required permits must be properly obtained and partial.

 The NUCEP Inspector must be performed before the least Building Code Enforcement Office. If not, the may deby the
 All regulated inspections must be performed (i.e., ElectricativeEC, Local Building Code Enforcement Office, etc.) complexor we proving a diffe NEC, an impochen by a state licensed dispital impactor is regulatory

8. Solar Electric Modulo Array

- Modules must be U., Light and must be properly statefied according to menufacture is instructions
- 2. The mentionum amount of curlight eventable year-round on it daily basis should not be abstructed. All applications must

dmum singuré d'aunigre available yest-reast un a very serve arcora ren tra algoirle avay. Très analysis de la sammad by using the New Jersey Clean Power Estimator on the program website www.risep.com

stang the new Jenery Legen Forme seminater to the property with restance in the property of a minimum design threshold, helding in the estimated eyelem production using PVWATTS:

roduction using IPVWATTS: • Stop electric prev chartellons requite that the colouisted system output must be at least 80% of the default super sectores for IPVWate, Additionally, all individual series climati of modules output must be at least 70% of the default output

• For building inagrated solar electric systems (i.e., part of the building envelope graterials are comprised of the States components), the estimated system pulped must be 40% of the default subput satisfied by PVWATTE.

- 4. Bystem using must be installed in accordance with the provisions of the NEC.
- 5 All modules material is a series string must be installed in the same plane.

C. Invertier and Contail.

- 1 The inverter and postalls must be property installed according to manufacturer a instructions.
- 2 The investor must be petilled as compliant with the requirements of IEEE 529 for small photovoltaic systems and with its years
- 3. The system should be seuroped with the following visual indicators and/or controls
- On/off partsh Operating mode sating indextor AC/DC over surrent protection Operating status indicate

 ONlight suition - Openating mode saming industry - Notice over survey providing that the should be energized by the server panets and junction boxes industing that the should be energized by the server panets. Staron independent of using privided power.

- 5. Operating instructions must be posted on or oper the system, or on the with leadings operation and memberance dogs

Consisting Nutricolons must be posted an or sport the symmity or on the true symptom operation (renter or deptay) must a
 systems must have monitoring capability that a ready accounties to the owner. This monitor (renter or deptay) must a
 matrix terms of a system of the system of the

P Control Parse to Scient Electric Array Wire Funs

Areas where wring passes through cesings, walls or other areas of the building must be property restored, booled

A bits considering the must be copper (Borne geometric may be made for stuminum writing, approval must be new and a state of the state transering departments prior to acceptance.)

3. Thermal leavision on grace where writing is tradition must be replaced to "as found or better condition." Access doors to there are an must be proceedy analysis and gasketed.

- Connections must be property made, insulated and weather-protected
- All wiring must be elected to the system components by the use of strem rules's or cable clemps, unless recipeed in the
- All outside witing myst be rated for wet conditions analytic encased in liquid-light cenduit.
- Provided on any winny located in areas with patented high ambient temperature must be reled at 90° C or higher
- all writing splitters must be contained in UL-approved workbases
- EAR Sentes III Applicative I
 - The nateries must be installed according to the merufacturer's instructions.
 - 2 Instancy terminate must be adequately protected from accidental context.
- A DC mated over agreet gotection must be provided in accordance with the provisions of the NEC.

Personal Assessivy 2008

New Jersey Clean Energy Program Technical Worksheet – Solar Electric Equipment Information

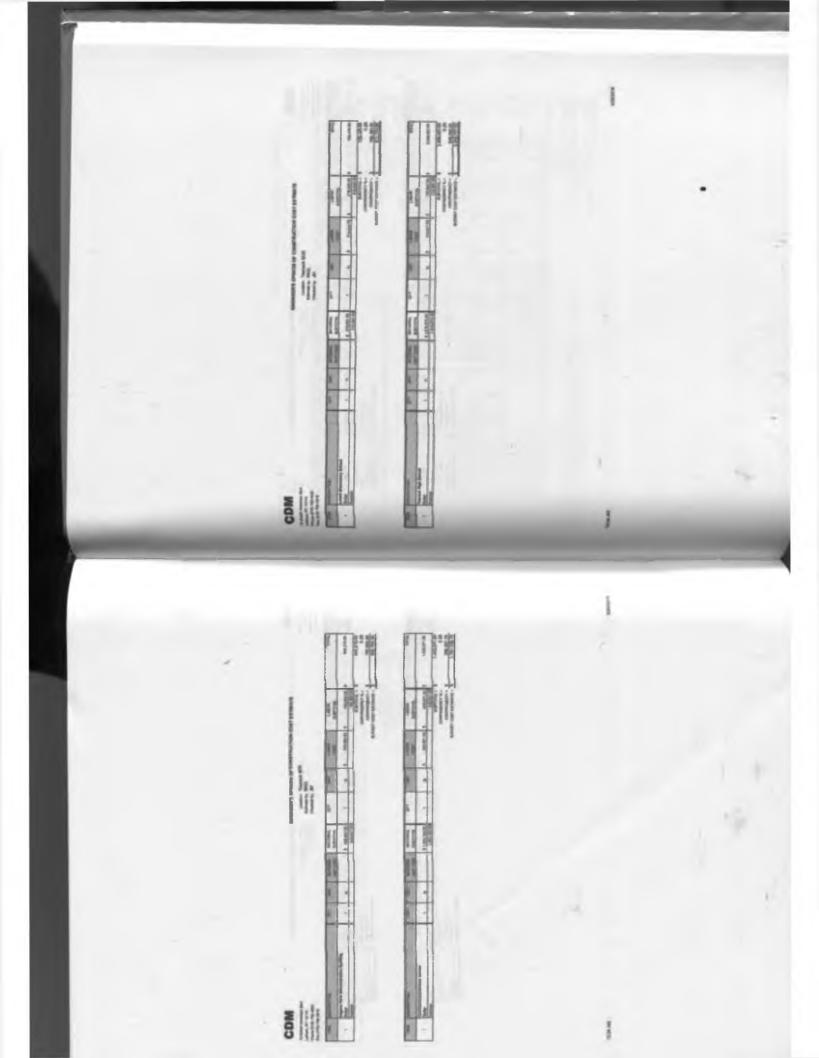
Original Application Data	Revised Application Date
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(Corresponding to Retails Application Form)	(Assignat by the NJBPL)
A: EQUIPMENT INFORMATION	Construction of the Institution
1. Solar Electric Module Manufacturer	Madule Model Number
	anditions) Number of Modules
3. Total Army Output: DC Wate (No. of Modules	* Denote Bellev)
4. Inverter Menufacturer	Inverter Micdel Number
5. Inverter a Continuous AC Rating	AC Watta Number of Inverters
	Jour AC Rating x Number of Inverters)
7. Inverter's Peak Efficiency: (Refer to menulecturer's	
B: PROPOSED INSTALLATIONANTERCONNECT	TON INFORMATION
1. Solar Electric Array Lossilion: _ Rooflop _ Pole Mount or Ground 1	
2. Solar Electric Module Orientation: degrees (e.g. 180	deeree micratic eruit)
Note: In Central New Jersey, magnetic pouth compase	mading in 18 detroop and of two couth
3. Solar Electric Module TR: degrees (e.g., Ret mount	= 0 degraet vertical mount = 80 degraes)
4 Solar Electric Module Tracking Flated Stanle auto Double-auto	a new construction of the Additional to
5. Inverter Location: Indoor Outdoor Location:	
5 Utility-Accessible AC Disconnect Switch Loosten	
7. System Type and Mode of Operation	
Utility interactive (permissionpable of beck feeding the me	Her) (_ with bellery beckup)
Dedicated dirouit, utility power as backup (transfer ewitch	(win hallery cheroing)
Bland-elone (avelem confined to an independent circuit, r	no utility beenup) (_ with bettery charging)
C: INCENTIVE REQUEST CALCULATION	
1. Bystem reted output (Bestion A, line 3 abova): DC	Wate
2 Incentive Calculation (Criticiae appropriate intentive assess - Bystein Partici	Oversition Contemport
Residential Appliance that partiers Energy Effetency Audit	Commercial, Form, Public and Man-Profit
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Residential Applicants that do not seriers Georgy Efficiency Audit	
b. 0 to 10,000 Wates x \$1.55/Watt =	
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	80.000 Watts = 8 Not eligible for rebates
d. Total Rabate Calculation: I	Total Rebate Calculation:
3. School Applicants: Maximum Annual School Rebuilt: 8 Per Public School applicants, enter the leaser rate from ep. 6 or the Enterd Applic	
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4. Total Installed Bystem Cost: 8. (Eighte initiality system cost induces all countries, containing and applicable cost	
5. Requested insertive (Enter the appropriate value from C2. b or o	
D: WARRANTY INFORMATION	
1. Modular: Yeatra al. Parcent of Bateri Power Outrus	
1. Module: Years al Percent of Rated Power Output	2 InventorYears 3 Installation:Years

APPENDIX H

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COSTS

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

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APPENDIX 1

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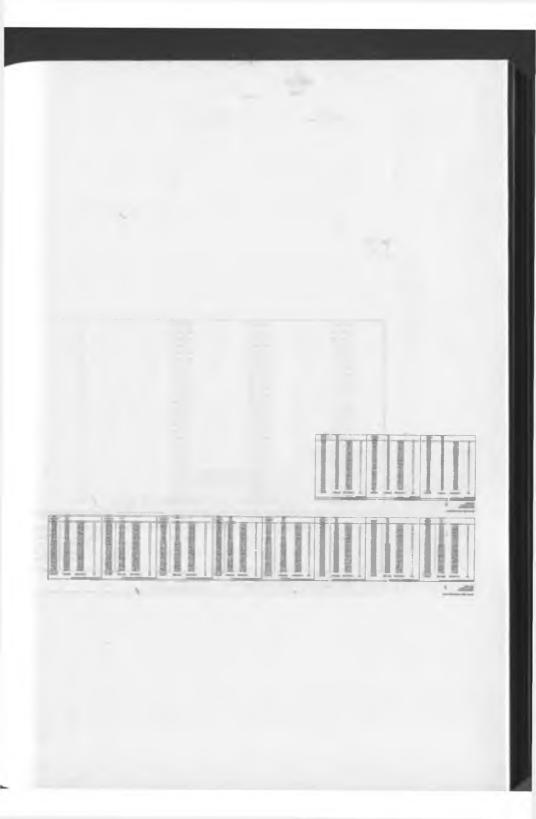
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APPENDIX J

WINDCAD MODELS

WindCad Turbine Performance Model

WES Tulipo Wind Turbine, Grid - Intertie

Prepared For: Site Location:

Teeneck School District

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Deta Source NASA Atmospheric Science Deta Center Date 3/24/2010



Inputs:

Ave. Wind (m/s) =	4.03
We bull K =	2
Site Altitude (m) =	0
Wind Shear Exp. =	0,180
Anom. Height (m) =	20
Tower Height (m) =	20
Turbulence Factor =	8.0%

Results:

Nesults.	
Hub Average Wind Speed (m/s) =	4.03
Air Density Factor =	0%
Average Output Power (kW) =	0.44
Daily Energy Output (kWh) =	10.5
Annual Energy Output (kWh) =	3,817
Monthly Energy Output =	316
Percent Operating Time =	55.0%

Wind Speed Bitt (m/s)	Penner (IVW)	Wind Probability (1)	No INV CV	Wellsull Calculations:
1	0.00	8.29%	0.000	Wind speed probability is calculated as
2	0.00	18.05%	0 000	Walkd carve de tred by the average of
3	0.08	18.87%	0.012	apoel and a shace lactor, K. To issue
4	0 22	17.88%	0.040	a broken down and "beng" of 1 m/s in a
6	0.48	14.41%	0 070	(Column 1). For each wind speed bin.
8	0.88	10.11%	0.000	Column 2)) a multiplied by the Webul
7	1.43	8.28%	0.000	apand probability (1 Column 3) Thus on
	1.98	3.44%	0.086	product (Not W, Column 4) a the
	2 28	1.00%	0.038	and the light to everage turbine power of
10	2.30	0.74%	0.018	of these contributions in the average
11	2 42	0.29%	0 007	power output of the turbre on a contine
12	2.30	0.10%	0.002	24 hour, been
13	2 38	0.03%	0.001	Best results are achieved using annuel
14	2 36	0.01%	0.000	monthly everage wind speeds. Use of a or hourly everage speeds is not
15	2 02	0.00%	0 000	mcommendad.
16	1 80	0.00%	0 000	
17	1.63	0.00%	0 000	
18	1.30	0.00%	0 000	
18	1.21	0.00%	0.000	1
20	0.87	0.00%	0.000	
DB, EWC	Toluin	90 18%	0.436	11

WindCad Turbine Performance Model

WES Tulipo Wind Turbine, Grid - Intertie

Site Location: Data Source:	NASA Atmospheric Science Data Center
Dete:	3/24/2010



inputs:	Results:	
Ave. Wind (m/s) = 5.82	Hub Average Wind Speed (m/s) =	5.82
We bull K = 2	Air Density Factor =	0%
Site Altitude (m) = 0	Average Output Power (kW) =	0.95
Wind Shear Exp. = 0.180	Daily Energy Output (kWh) =	22.8
Anem. Height (m) = 20	Annual Energy Output (kWh) =	8,316
Tower Height (m) = 20	Monthly Energy Output =	693
Turbulance Fector = 80%	Percent Operating Time =	75.1%

Heibuli Performance Calculations

Wind Speed (m/s)	Power (ICM)	Wind Protochery (f)	Net IN CY	Weltooll Calculations:
1	0 00	4.57%	0.000	Wind speed probability is calculated as a
2	0.00	8 52%	0 000	Webuil curve defined by the everage wind
3	0.08	11 37%	0 007	speed and a shape factor, K. To factment proch-weet integration, the wind speed range
4	0.22	12.07%	0.028	a broken down mis "bins" of 1 m/s in wells
5	0.40	13 09%	0.084	(Column 1). For each wind speed bin
6	0.88	12.09%	0 107	Column 2)) is multiplied by the Welbul wind
7	1.43	10.41%	0.148	speed probability (f. Column 3). This cross
6	1.90	0.30%	0 168	product (Not W, Column 4) in the
	2.28	0.33%	0.144	contribution to average turbine power output
10	2 30	4.61%	0,108	contributed by wind speeds in that ten. The of these contributions is the average
11	2 42	3 04%	0 073	power output of the turbine on a continuous
12	2.30	1.94%	0.046	24 hour beam
13	2.30	1.17%	0 028	monthly everage wind speeds. Use of daily
14	2.36	0.67%	0.018	or hourly average speeds a not
16	2 02	0.38%	0 007	recommended
16	1.80	0.19%	0 003	
17	1.63	0.08%	0 002	
18	1.38	0.04%	0 001	
18	1.21	0.02%	0.000	
20	0.97	0.01%	0.000	
I BWC	Totels	99 60%	0.948	

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WindCad Turbine Performance Model

WES Tulipo Wind Turbine, Grid - Intertie

Site Location: Date:

Prepared For: Teansck School District

Data Source: NASA Atmospheric Science Data Center 3/24/2010



inputs:

Ave. Wind (m/s) =	5.01
We bull K =	2
Bite Altitude (m) =	0
Wind Bhear Exp. =	0.180
Anem. Height (m) =	20
Tower Height (m) =	20
Turbulence Factor =	8.0%

Results:

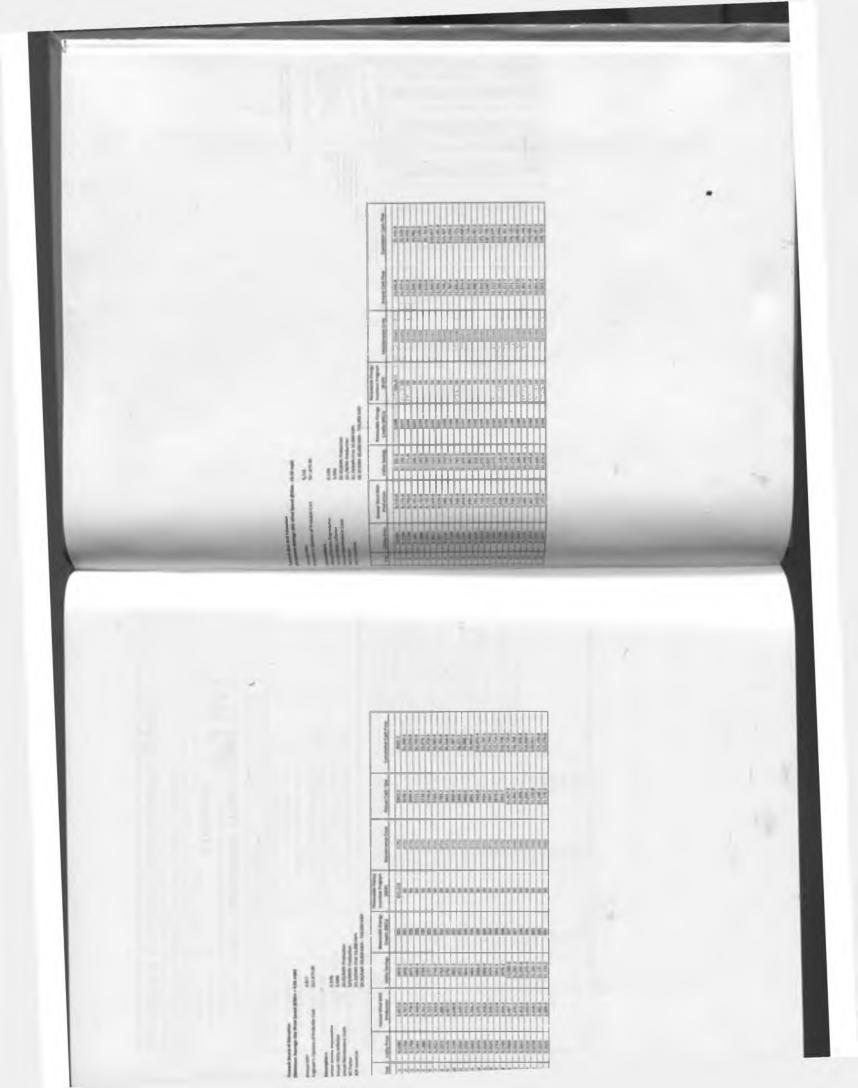
results.	
Hub Average Wind Speed (m/s) =	5.01
Air Density Factor =	0%
Average Output Fower (kW) =	0.72
Delly Energy Output (kWh) =	17.4
Annual Energy Output (kWh) =	6,345
Monthly Energy Output =	529
Percent Operating Time =	68.0%

Weibull Performance Calculati

Wind Speed film (m/s)	Prawer (10%)	Wind Probability (7)		Walkof Calculations:
1	0.00	6 12%	0.000	Wind speed probability is calculated as a
2	0.00	11.13%	0.000	Walkel curve de ined by the average wind
3	0.06	14.28%	0.008	spread and a shace factor, K. To facilitate
4	0.22	18.24%	0.034	in broken down min "here" of 1 m/s in which
6	0.40	14 34%	0 070	(Column 1). For each wind speed lan,
	0.00	12 10%	0.107	ensite tenterus sensi turbine power (W
7	1.43	8.41%	0.134	2]) a multiplied by the Walkat word robability (f. Column 3). The cross
	1.00	8.70%	0 133	product (Hal W. Column 4) a the
1	2.28	4.41%	0 100	contribution to average turbers power output
10	2 30	2 00%	0.084	contributed by wind speeds in that bin. The mark of Press contributions is the average
11	2.42	1.82%	0.037	power output of the turbins on a continuous
12	2.30	0.80%	0.019	24 hour, been
18	2.30	0.40%	0.000	Sent results are achieved using annual or
14	2.36	0.18%	0.004	I manifely average used speeds to follow
15	2 02	0.08%	0.002	
10	1.80	0.03%	0.001	
17	1 63	0 01%	0.000	
18	1.30	0.00%	0 000	
19	1.21	0.00%	0 000	
20	0.87	0.00%	9.000	
KOB, HINKC	Totare	99.47%	0.734	

APPENDIX K

WIND FINANCIAL WORKSHEETS



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