


LGEA Presentation

Verona Board of Education

April 24, 2024



New Jersey's
Clean Energy Program

Lighting the way to New Jersey's Clean Energy Future

INTRODUCTIONS

- *Verona Board of Education*
 - Jorge Cruz
 - Henry Bottiglierie
 - Michael Boone
 - Diane DiGiuseppe
- NJ Clean Energy Program
 - Sarah Walters – LGEA Project Manager
 - Sara Neiss – LGEA Project Auditor
 - Michelle Rossi – ESIP Coordinator (BPU)

AGENDA

- The audit process overview
- Energy use & existing conditions
- Review of **E**nergy **C**onservation **M**easures (ECMs) identified & other recommendations
- Energy Savings Improvement Program (ESIP)
- Energy Efficiency Incentive Programs
- Questions regarding the draft audit report
- Next steps for Verona Board of Education

LGEA PROCESS

- Application Approval
- Initial Call
- Facility Interviews
- Audit
- Benchmarking & Analysis
- Draft Reports
- LGEA Presentation
- Final Reports



SITE VISIT & UTILITY ANALYSIS

Overview of Systems, Baseline & Existing Conditions:

- Building Envelope
- Lighting System
- HVAC and Mechanical Systems
- Plug Load Equipment
- Cooking & Refrigeration Equipment

Utility Consumption:

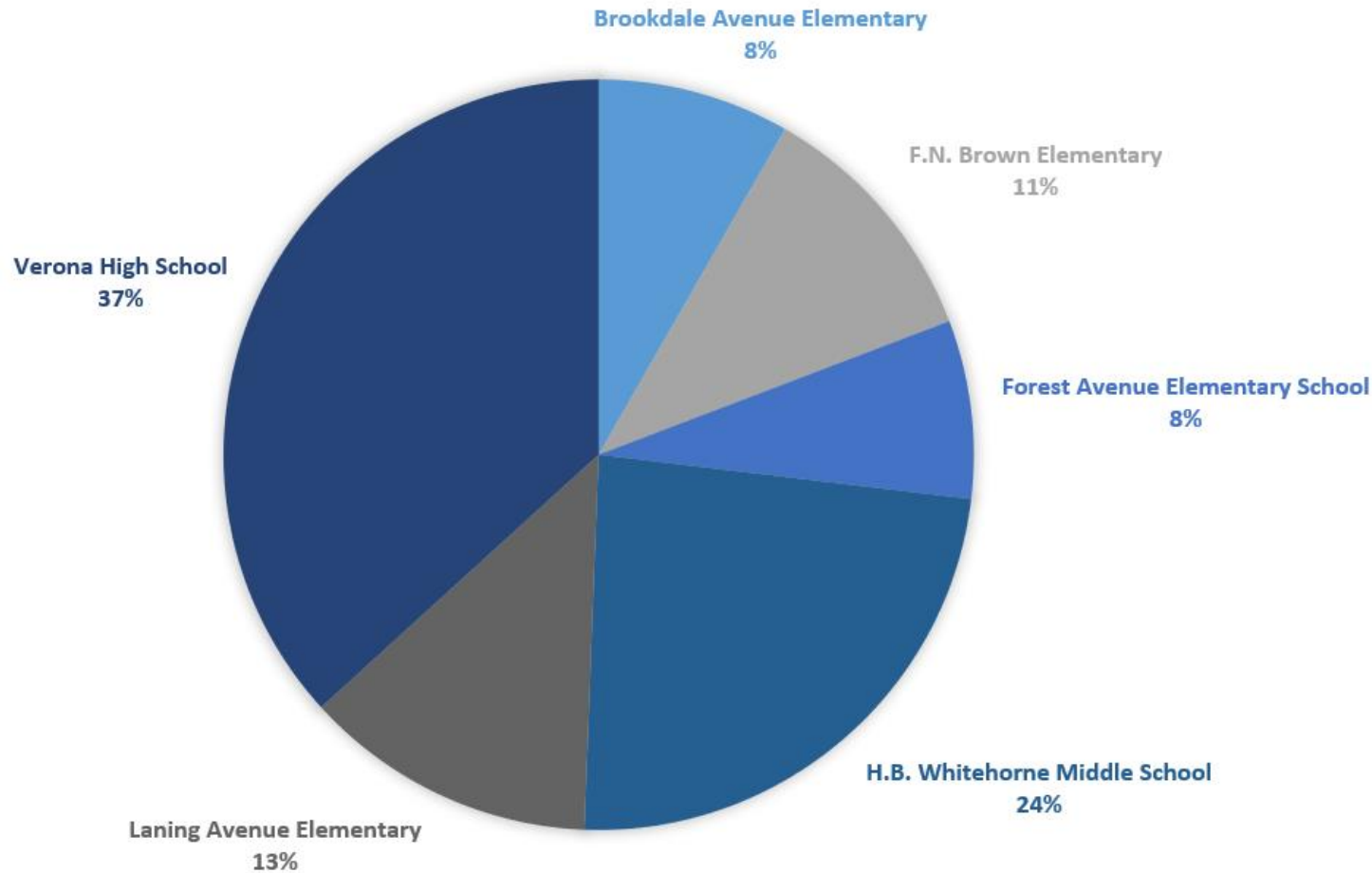
- Electric Consumption and Costs
- Natural Gas Consumption and Costs

Sites Visited/Analyzed

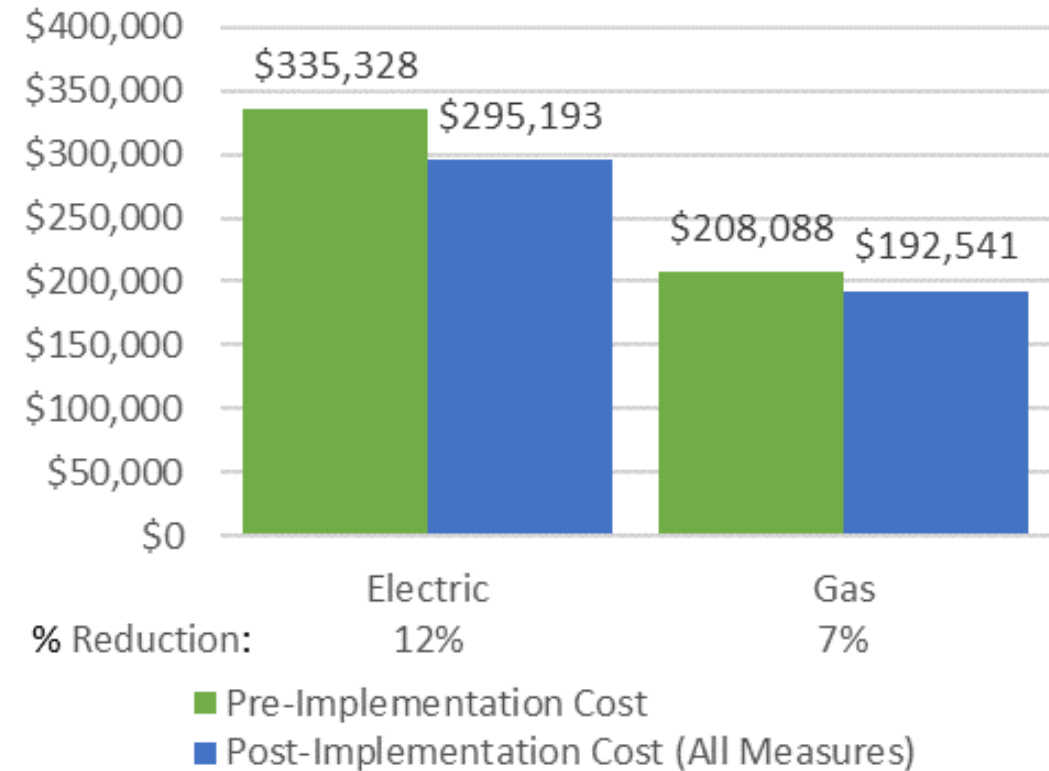
- Verona High School
- Brookdale Ave Elementary
- F.N. Brown Elementary
- Forest Ave Elementary
- H.B. Whitehorne Middle School
- Laning Ave Elementary

UTILITY BREAKOUT

Percent of Total Annual Energy Costs



Pre & Post Implementation Cost



BENCHMARKING

ENERGY STAR® Statement of Energy Performance

45
ENERGY STAR® Score¹

Laning Avenue Elementary
Primary Property Type: K-12 School
Gross Floor Area (ft²): 46,477
Built: 1919
For Year Ending: March 31, 2023
Date Generated: February 18, 2024

Property & Contact Information

Property Address	Property Owner	Primary Contact
Laning Avenue Elementary 18 Lanning Road Verona, New Jersey 07044	Verona Board of Education 121 Fairview Avenue Verona, NJ 07044 (973) 571-2029	Henry Bottiglierie, CEFM 121 Fairview Avenue Verona, NJ 07044 (973) 571-2029 hbottiglierie@veronaschools.org

Property ID: 30587129

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison
67.8 kBtu/ft ²	Natural Gas (kBtu) 2,390,559 (76%) Electric - Grid (kBtu) 761,213 (24%)	National Median Site EUI (kBtu/ft ²) 65.1 National Median Source EUI (kBtu/ft ²) 95.9 % Diff from National Median Source EUI 4%
Source EUI	Annual Emissions	
99.9 kBtu/ft ²	Total (Location-Based) GHG Emissions (Metric Tons CO2e/year) 195	

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: _____ Date: _____

Licensed Professional

Professional Engineer or Registered Architect Stamp (if applicable)

Site EUI
67.8 kBtu/ft²

Source EUI
99.9 kBtu/ft²

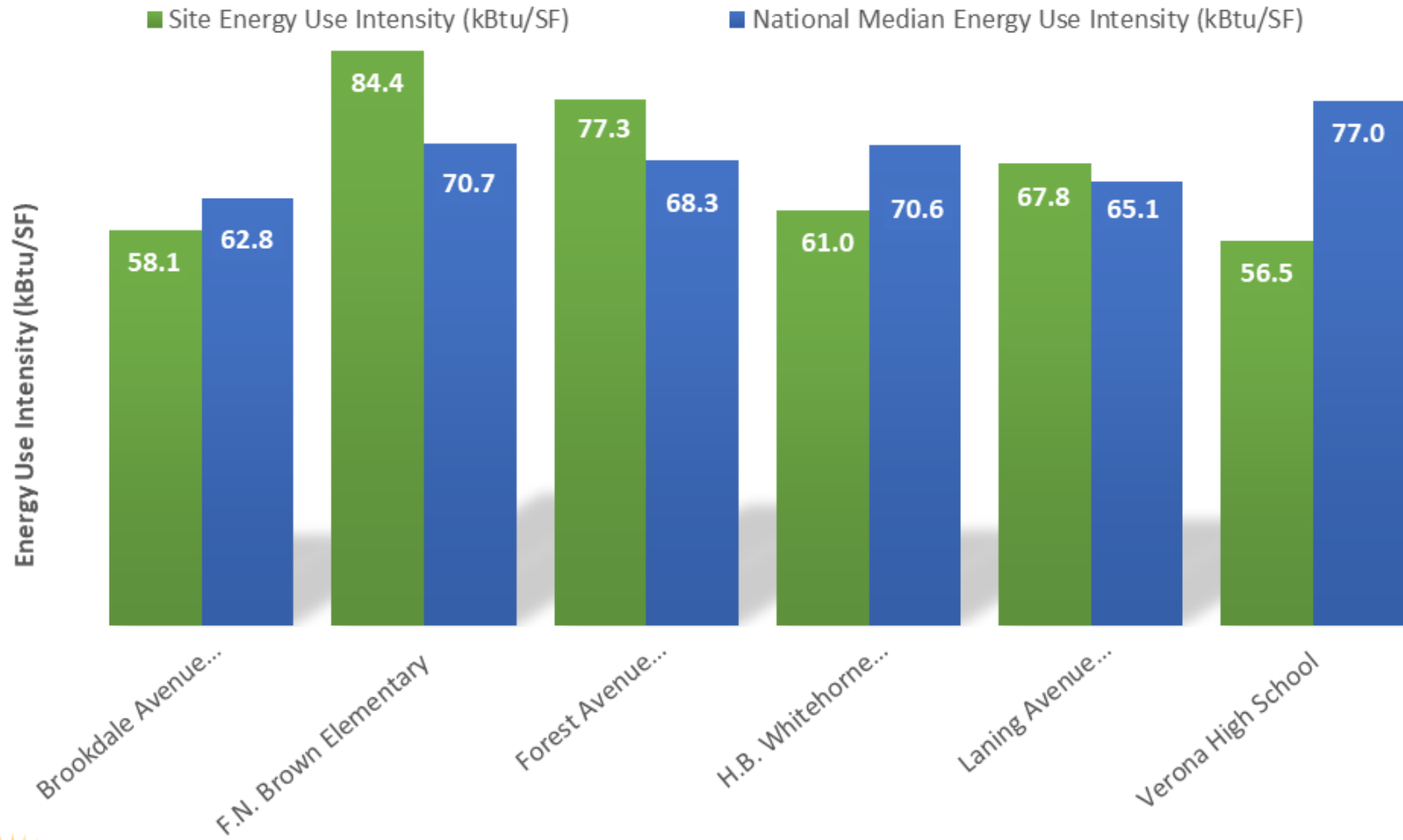
National Median Comparison

National Median Site EUI (kBtu/ft ²)	65.1
National Median Source EUI (kBtu/ft ²)	95.9
% Diff from National Median Source EUI	4%

Site Name	ENERGY STAR® Score
Brookdale Avenue Elementary	57
F.N. Brown Elementary	32
Forest Avenue Elementary School	37
H.B. Whitehorne Middle School	64
Laning Avenue Elementary	45
Verona High School	77

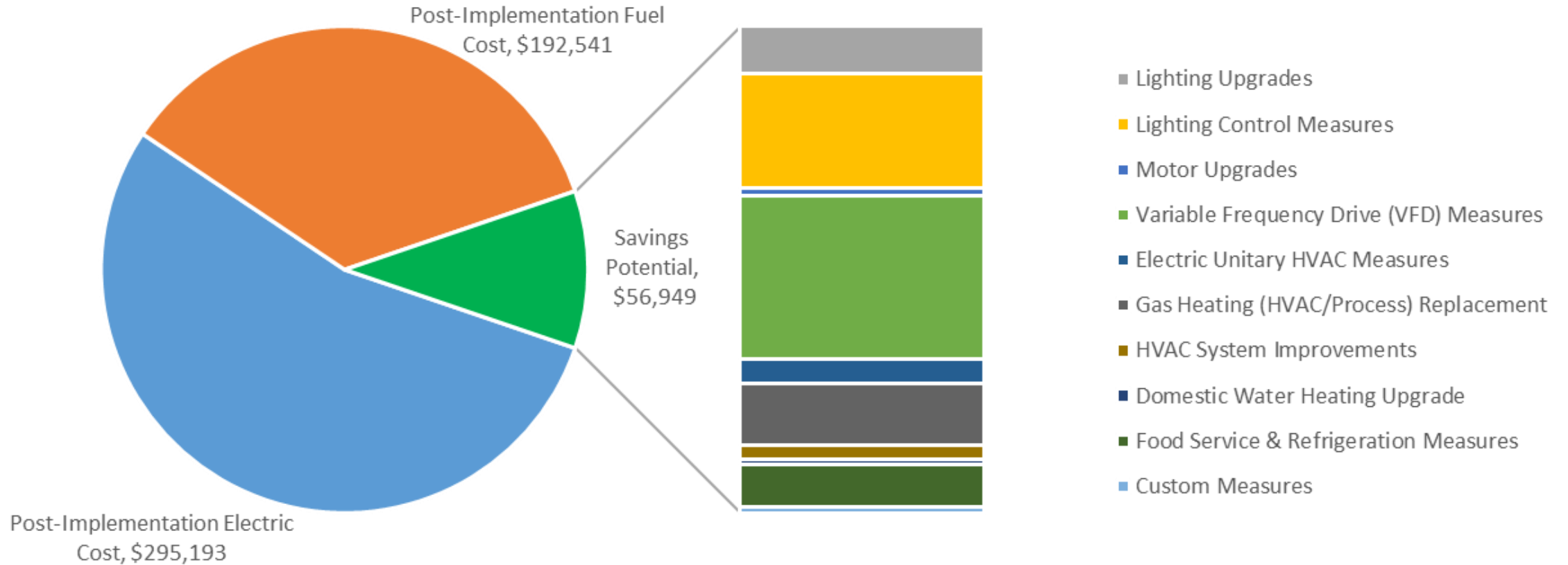
ENERGY STAR® scores are percentile ranking from 1 (least efficient) to 100 (most efficient). It compares your building's energy performance to similar buildings nationwide.

BENCHMARKING



ALL OPPORTUNITIES

Savings Potential



ALL OPPORTUNITIES (1 OF 2)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		33,258	13.0	-6.2	\$5,616	\$18,330	\$2,610	\$15,720	2.8	32,769
ECM 1	Install LED Fixtures	13,499	1.6	-2.2	\$2,345	\$6,580	\$700	\$5,880	2.5	13,334
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	728	0.4	-0.2	\$108	\$910	\$100	\$810	7.5	715
ECM 3	Retrofit Fixtures with LED Lamps	18,937	11.0	-3.8	\$3,147	\$10,750	\$1,810	\$8,940	2.8	18,628
ECM 4	Install LED Exit Signs	94	0.0	0.0	\$17	\$90	\$0	\$90	5.4	92
Lighting Control Measures		74,922	19.6	-15.7	\$13,373	\$100,970	\$28,490	\$72,480	5.4	73,612
ECM 5	Install Occupancy Sensor Lighting Controls	56,374	16.0	-11.8	\$10,163	\$69,730	\$9,480	\$60,250	5.9	55,388
ECM 6	Install High/Low Lighting Controls	18,549	3.5	-3.9	\$3,210	\$31,240	\$19,010	\$12,230	3.8	18,224
Motor Upgrades		4,298	1.3	0.0	\$815	\$33,200	\$0	\$33,200	40.7	4,328
ECM 7	Premium Efficiency Motors	4,298	1.3	0.0	\$815	\$33,200	\$0	\$33,200	40.7	4,328
Variable Frequency Drive (VFD) Measures		107,163	34.9	52.1	\$19,152	\$206,200	\$15,000	\$191,200	10.0	114,017
ECM 8	Install VFD on Variable Air Volume (VAV) Fans	17,151	6.6	0.0	\$3,123	\$35,200	\$2,500	\$32,700	10.5	17,271
ECM 9	Install VFDs on Constant Volume (CV) Fans	74,763	21.6	52.1	\$13,626	\$119,700	\$9,700	\$110,000	8.1	81,391
ECM 10	Install VFDs on Heating Water Pumps	5,035	0.8	0.0	\$853	\$21,500	\$400	\$21,100	24.7	5,071
ECM 11	Install Boiler Draft Fan VFDs	10,213	6.0	0.0	\$1,550	\$29,800	\$2,400	\$27,400	17.7	10,285

ALL OPPORTUNITIES (2 OF 2)

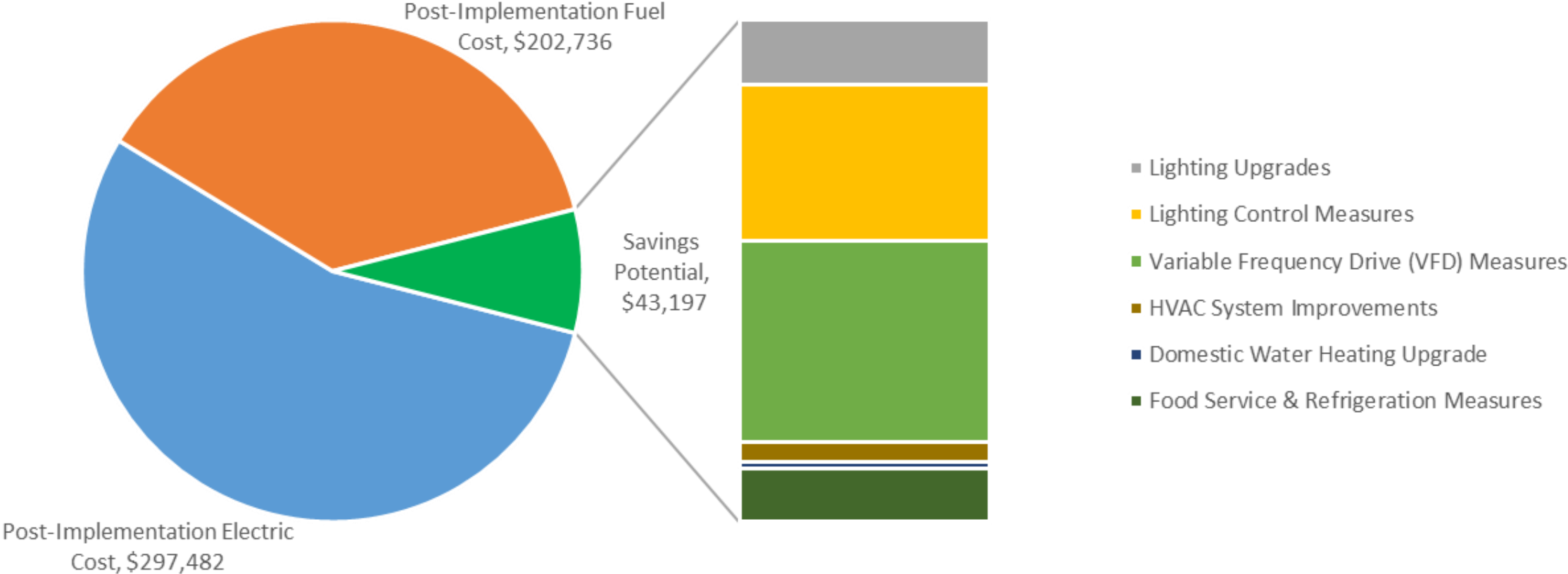
#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Unitary HVAC Measures		13,716	25.4	23.3	\$2,817	\$452,000	\$18,800	\$433,200	153.8	16,545
ECM 12	Install High Efficiency Air Conditioning Units	13,101	23.9	23.3	\$2,706	\$443,000	\$18,800	\$424,200	156.8	15,926
ECM 13	Install High Efficiency Heat Pumps	615	1.6	0.0	\$111	\$9,000	\$0	\$9,000	81.4	619
Gas Heating (HVAC/Process) Replacement		0	0.0	663.9	\$7,219	\$659,800	\$18,400	\$641,400	88.8	77,731
ECM 14	Install High Efficiency Hot Water Boilers	0	0.0	184.6	\$2,226	\$243,100	\$12,000	\$231,100	103.8	21,618
ECM 15	Install High Efficiency Steam Boilers	0	0.0	479.2	\$4,993	\$416,700	\$6,400	\$410,300	82.2	56,113
HVAC System Improvements		0	0.0	144.9	\$1,649	\$2,880	\$340	\$2,540	1.5	16,961
ECM 16	Install Pipe Insulation	0	0.0	144.9	\$1,649	\$2,880	\$340	\$2,540	1.5	16,961
Domestic Water Heating Upgrade		0	0.0	56.0	\$641	\$2,650	\$390	\$2,260	3.5	6,553
ECM 17	Install High Efficiency Gas-Fired Water Heater	0	0.0	4.7	\$57	\$1,600	\$100	\$1,500	26.5	550
ECM 18	Install Low-Flow DHW Devices	0	0.0	51.3	\$584	\$1,050	\$290	\$760	1.3	6,003
Food Service & Refrigeration Measures		11,910	2.0	246.1	\$5,033	\$56,050	\$6,740	\$49,310	9.8	40,812
ECM 19	Food Service Equipment Replacement	1,550	0.9	246.1	\$3,033	\$36,800	\$5,800	\$31,000	10.2	30,381
ECM 20	Refrigerator/Freezer Case Electrically Commutated Motors	805	0.1	0.0	\$157	\$1,490	\$160	\$1,330	8.5	811
ECM 21	Refrigeration Controls	348	0.0	0.0	\$52	\$2,060	\$80	\$1,980	38.3	350
ECM 22	Replace Refrigeration Equipment	9,207	1.1	0.0	\$1,792	\$15,700	\$700	\$15,000	8.4	9,271
Custom Measures		-19,308	0.0	206.0	-\$634	\$8,600	\$0	\$8,600	-13.6	4,677
ECM 23	Replace Gas Fired Water Heater with Heat Pump Water Heater	-19,308	0.0	206.0	-\$634	\$8,600	\$0	\$8,600	-13.6	4,677
TOTALS (ALL MEASURES)		225,958	96.2	1,370.5	\$55,681	\$1,540,680	\$90,770	\$1,449,910	26.0	388,006

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

COST EFFECTIVE OPPORTUNITIES

Savings Potential



COST EFFECTIVE OPPORTUNITIES

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		33,258	13.0	-6.2	\$5,616	\$18,330	\$2,610	\$15,720	2.8	32,769
ECM 1	Install LED Fixtures	13,499	1.6	-2.2	\$2,345	\$6,580	\$700	\$5,880	2.5	13,334
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	728	0.4	-0.2	\$108	\$910	\$100	\$810	7.5	715
ECM 3	Retrofit Fixtures with LED Lamps	18,937	11.0	-3.8	\$3,147	\$10,750	\$1,810	\$8,940	2.8	18,628
ECM 4	Install LED Exit Signs	94	0.0	0.0	\$17	\$90	\$0	\$90	5.4	92
Lighting Control Measures		74,922	19.6	-15.7	\$13,373	\$100,970	\$28,490	\$72,480	5.4	73,612
ECM 5	Install Occupancy Sensor Lighting Controls	56,374	16.0	-11.8	\$10,163	\$69,730	\$9,480	\$60,250	5.9	55,388
ECM 6	Install High/Low Lighting Controls	18,549	3.5	-3.9	\$3,210	\$31,240	\$19,010	\$12,230	3.8	18,224
Variable Frequency Drive (VFD) Measures		96,105	30.0	52.1	\$17,355	\$154,500	\$13,800	\$140,700	8.1	102,882
ECM 8	Install VFD on Variable Air Volume (VAV) Fans	17,151	6.6	0.0	\$3,123	\$35,200	\$2,500	\$32,700	10.5	17,271
ECM 9	Install VFDs on Constant Volume (CV) Fans	71,961	20.4	52.1	\$13,192	\$110,300	\$9,500	\$100,800	7.6	78,568
ECM 11	Install Boiler Draft Fan VFDs	6,994	3.0	0.0	\$1,040	\$9,000	\$1,800	\$7,200	6.9	7,043
HVAC System Improvements		0	0.0	144.9	\$1,649	\$2,880	\$340	\$2,540	1.5	16,961
ECM 16	Install Pipe Insulation	0	0.0	144.9	\$1,649	\$2,880	\$340	\$2,540	1.5	16,961
Domestic Water Heating Upgrade		0	0.0	51.3	\$584	\$1,050	\$290	\$760	1.3	6,003
ECM 18	Install Low-Flow DHW Devices	0	0.0	51.3	\$584	\$1,050	\$290	\$760	1.3	6,003
Food Service & Refrigeration Measures		9,130	1.7	246.1	\$4,620	\$44,940	\$6,280	\$38,660	8.4	38,013
ECM 19	Food Service Equipment Replacement	1,550	0.9	246.1	\$3,033	\$36,800	\$5,800	\$31,000	10.2	30,381
ECM 20	Refrigerator/Freezer Case Electrically Commutated Motors	610	0.0	0.0	\$128	\$740	\$80	\$660	5.2	614
ECM 22	Replace Refrigeration Equipment	6,969	0.8	0.0	\$1,459	\$7,400	\$400	\$7,000	4.8	7,018
TOTALS		213,415	64.3	472.6	\$43,197	\$322,670	\$51,810	\$270,860	6.3	270,241

* - All incentives presented in this table are included as placeholders and are based on previously run state rebate programs. Contact your utility provider for details on current programs

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

VERONA HIGH SCHOOL

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			4,574	5.8	-1	\$946	\$3,630	\$610	\$3,020	3.2	4,496
ECM 1	Retrofit Fixtures with LED Lamps	Yes	4,574	5.8	-1	\$946	\$3,630	\$610	\$3,020	3.2	4,496
Lighting Control Measures			32,083	7.5	-7	\$6,635	\$35,050	\$7,840	\$27,210	4.1	31,522
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	26,343	6.7	-6	\$5,448	\$27,460	\$3,220	\$24,240	4.4	25,882
ECM 3	Install High/Low Lighting Controls	Yes	5,740	0.8	-1	\$1,187	\$7,590	\$4,620	\$2,970	2.5	5,640
Motor Upgrades			2,781	0.7	0	\$582	\$18,300	\$0	\$18,300	31.4	2,800
ECM 4	Premium Efficiency Motors	No	2,781	0.7	0	\$582	\$18,300	\$0	\$18,300	31.4	2,800
Variable Frequency Drive (VFD) Measures			24,741	4.2	52	\$5,819	\$40,200	\$2,800	\$37,400	6.4	31,019
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	23,843	4.1	52	\$5,631	\$35,900	\$2,700	\$33,200	5.9	30,114
ECM 6	Install VFDs on Heating Water Pumps	No	898	0.1	0	\$188	\$4,300	\$100	\$4,200	22.3	904
Unitary HVAC Measures			6,530	9.6	7	\$1,448	\$171,300	\$7,200	\$164,100	113.3	7,351
ECM 7	Install High Efficiency Air Conditioning Units	No	6,530	9.6	7	\$1,448	\$171,300	\$7,200	\$164,100	113.3	7,351
HVAC System Improvements			0	0.0	55	\$678	\$660	\$80	\$580	0.9	6,479
ECM 8	Install Pipe Insulation	Yes	0	0.0	55	\$678	\$660	\$80	\$580	0.9	6,479
Domestic Water Heating Upgrade			0	0.0	16	\$196	\$240	\$80	\$160	0.8	1,876
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	16	\$196	\$240	\$80	\$160	0.8	1,876
Food Service & Refrigeration Measures			9,130	1.7	86	\$2,969	\$21,040	\$2,780	\$18,260	6.2	19,300
ECM 10	Food Service Equipment Replacement	Yes	1,550	0.9	86	\$1,382	\$12,900	\$2,300	\$10,600	7.7	11,667
ECM 11	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	610	0.0	0	\$128	\$740	\$80	\$660	5.2	614
ECM 12	Replace Refrigeration Equipment	Yes	6,969	0.8	0	\$1,459	\$7,400	\$400	\$7,000	4.8	7,018
TOTALS (COST EFFECTIVE MEASURES)			69,630	19.1	202	\$17,054	\$96,520	\$14,090	\$82,430	4.8	93,787
TOTALS (ALL MEASURES)			79,839	29.5	209	\$19,273	\$290,420	\$21,390	\$269,030	14.0	104,842

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

BROOKDALE ELEMENTARY

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			3,202	0.5	0	\$492	\$1,840	\$320	\$1,520	3.1	3,183
ECM 1	Install LED Fixtures	Yes	1,480	0.0	0	\$229	\$710	\$100	\$610	2.7	1,491
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	201	0.1	0	\$31	\$130	\$10	\$120	3.9	197
ECM 3	Retrofit Fixtures with LED Lamps	Yes	1,520	0.5	0	\$232	\$1,000	\$210	\$790	3.4	1,495
Lighting Control Measures			5,157	1.2	-1	\$786	\$10,270	\$3,090	\$7,180	9.1	5,067
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	3,078	0.9	-1	\$469	\$7,440	\$1,400	\$6,040	12.9	3,024
ECM 5	Install High/Low Lighting Controls	Yes	2,079	0.3	0	\$317	\$2,830	\$1,690	\$1,140	3.6	2,043
Variable Frequency Drive (VFD) Measures			6,068	1.7	0	\$940	\$18,800	\$400	\$18,400	19.6	6,111
ECM 6	Install VFDs on Constant Volume (CV) Fans	No	2,803	1.2	0	\$434	\$9,400	\$200	\$9,200	21.2	2,822
ECM 7	Install VFDs on Heating Water Pumps	No	3,265	0.5	0	\$506	\$9,400	\$200	\$9,200	18.2	3,288
Unitary HVAC Measures			1,474	4.9	6	\$304	\$91,200	\$4,700	\$86,500	284.7	2,216
ECM 8	Install High Efficiency Air Conditioning Units	No	1,474	4.9	6	\$304	\$91,200	\$4,700	\$86,500	284.7	2,216
Gas Heating (HVAC/Process) Replacement			0	0.0	78	\$945	\$122,200	\$6,000	\$116,200	123.0	9,166
ECM 9	Install High Efficiency Hot Water Boilers	No	0	0.0	78	\$945	\$122,200	\$6,000	\$116,200	123.0	9,166
HVAC System Improvements			0	0.0	8	\$96	\$270	\$40	\$230	2.4	934
ECM 10	Install Pipe Insulation	Yes	0	0.0	8	\$96	\$270	\$40	\$230	2.4	934
Domestic Water Heating Upgrade			0	0.0	9	\$112	\$1,740	\$140	\$1,600	14.3	1,086
ECM 11	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	5	\$57	\$1,600	\$100	\$1,500	26.5	550
ECM 12	Install Low-Flow DHW Devices	Yes	0	0.0	5	\$55	\$140	\$40	\$100	1.8	536
Custom Measures			-7,484	0.0	80	-\$194	\$2,900	\$0	\$2,900	-14.9	1,831
ECM 13	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-7,484	0.0	80	-\$194	\$2,900	\$0	\$2,900	-14.9	1,831
TOTALS (COST EFFECTIVE MEASURES)			8,359	1.8	11	\$1,429	\$12,520	\$3,490	\$9,030	6.3	9,720
TOTALS (ALL MEASURES)			8,417	8.3	180	\$3,480	\$249,220	\$14,690	\$234,530	67.4	29,593

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

*** - Negative payback explained in section 4.8

F.N. BROWN ELEMENTARY

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			1,531	0.9	0	\$272	\$1,960	\$390	\$1,570	5.8	1,504
ECM 1	Retrofit Fixtures with LED Lamps	Yes	1,438	0.9	0	\$255	\$1,870	\$390	\$1,480	5.8	1,413
ECM 2	Install LED Exit Signs	Yes	94	0.0	0	\$17	\$90	\$0	\$90	5.4	92
Lighting Control Measures			4,909	1.9	-1	\$872	\$12,330	\$3,400	\$8,930	10.2	4,823
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	3,697	1.6	-1	\$656	\$8,960	\$1,560	\$7,400	11.3	3,632
ECM 4	Install High/Low Lighting Controls	Yes	1,212	0.3	0	\$215	\$3,370	\$1,840	\$1,530	7.1	1,191
Motor Upgrades			107	0.0	0	\$19	\$3,400	\$0	\$3,400	176.5	108
ECM 5	Premium Efficiency Motors	No	107	0.0	0	\$19	\$3,400	\$0	\$3,400	176.5	108
Variable Frequency Drive (VFD) Measures			13,854	6.9	0	\$2,491	\$29,400	\$3,100	\$26,300	10.6	13,951
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	12,283	5.1	0	\$2,209	\$18,700	\$2,700	\$16,000	7.2	12,369
ECM 7	Install Boiler Draft Fan VFDs	No	1,571	1.8	0	\$282	\$10,700	\$400	\$10,300	36.5	1,582
Unitary HVAC Measures			935	2.2	0	\$168	\$29,600	\$800	\$28,800	171.3	941
ECM 8	Install High Efficiency Air Conditioning Units	No	320	0.7	0	\$58	\$20,600	\$800	\$19,800	343.9	322
ECM 9	Install High Efficiency Heat Pumps	No	615	1.6	0	\$111	\$9,000	\$0	\$9,000	81.4	619
Gas Heating (HVAC/Process) Replacement			0	0.0	100	\$1,071	\$160,400	\$6,400	\$154,000	143.8	11,653
ECM 10	Install High Efficiency Steam Boilers	No	0	0.0	100	\$1,071	\$160,400	\$6,400	\$154,000	143.8	11,653
HVAC System Improvements			0	0.0	51	\$549	\$1,230	\$130	\$1,100	2.0	5,974
ECM 11	Install Pipe Insulation	Yes	0	0.0	51	\$549	\$1,230	\$130	\$1,100	2.0	5,974
Domestic Water Heating Upgrade			0	0.0	3	\$29	\$80	\$10	\$70	2.4	320
ECM 12	Install Low-Flow DHW Devices	Yes	0	0.0	3	\$29	\$80	\$10	\$70	2.4	320
Custom Measures			-5,909	0.0	63	-\$385	\$2,800	\$0	\$2,800	-7.3	1,426
ECM 13	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-5,909	0.0	63	-\$385	\$2,800	\$0	\$2,800	-7.3	1,426
TOTALS (COST EFFECTIVE MEASURES)			18,723	7.9	52	\$3,931	\$34,300	\$6,630	\$27,670	7.0	24,990
TOTALS (ALL MEASURES)			15,427	12.0	215	\$5,086	\$241,200	\$14,230	\$226,970	44.6	40,700

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

*** - Negative payback explained in section 4.9

FOREST AVE ELEMENTARY

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$) *	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			909	0.3	0	\$123	\$290	\$20	\$270	2.2	893
ECM 1	Retrofit Fixtures with LED Lamps	Yes	909	0.3	0	\$123	\$290	\$20	\$270	2.2	893
Lighting Control Measures			3,940	1.1	-1	\$533	\$9,360	\$2,500	\$6,860	12.9	3,871
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	2,813	0.8	-1	\$380	\$6,550	\$970	\$5,580	14.7	2,764
ECM 3	Install High/Low Lighting Controls	Yes	1,127	0.2	0	\$152	\$2,810	\$1,530	\$1,280	8.4	1,107
Variable Frequency Drive (VFD) Measures			5,853	2.4	0	\$806	\$19,500	\$400	\$19,100	23.7	5,894
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	4,204	1.2	0	\$579	\$9,400	\$200	\$9,200	15.9	4,234
ECM 5	Install Boiler Draft Fan VFDs	No	1,649	1.2	0	\$227	\$10,100	\$200	\$9,900	43.6	1,661
Unitary HVAC Measures			187	0.6	0	\$26	\$10,100	\$400	\$9,700	376.8	188
ECM 6	Install High Efficiency Air Conditioning Units	No	187	0.6	0	\$26	\$10,100	\$400	\$9,700	376.8	188
Gas Heating (HVAC/Process) Replacement			0	0.0	106	\$1,282	\$120,900	\$6,000	\$114,900	89.6	12,452
ECM 7	Install High Efficiency Hot Water Boilers	No	0	0.0	106	\$1,282	\$120,900	\$6,000	\$114,900	89.6	12,452
Domestic Water Heating Upgrade			0	0.0	4	\$47	\$130	\$30	\$100	2.1	458
ECM 8	Install Low-Flow DHW Devices	Yes	0	0.0	4	\$47	\$130	\$30	\$100	2.1	458
Custom Measures			-5,915	0.0	63	-\$55	\$2,900	\$0	\$2,900	-52.7	1,420
ECM 9	Replace Gas Fired Water Heater with Heat Pump Water Heater****	No	-5,915	0.0	63	-\$55	\$2,900	\$0	\$2,900	-52.7	1,420
TOTALS (COST EFFECTIVE MEASURES)			9,054	2.5	3	\$1,282	\$19,180	\$2,750	\$16,430	12.8	9,456
TOTALS (ALL MEASURES)			4,975	4.4	172	\$2,761	\$163,180	\$9,350	\$153,830	55.7	25,177

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

**** - Negative payback explained in section 4.7

H.B. WHITEHORNE MIDDLE SCHOOL

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			10,907	3.4	-2	\$1,603	\$6,550	\$660	\$5,890	3.7	10,770
ECM 1	Install LED Fixtures	Yes	1,419	0.0	0	\$211	\$2,730	\$150	\$2,580	12.2	1,429
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	527	0.3	0	\$77	\$780	\$90	\$690	8.9	518
ECM 3	Retrofit Fixtures with LED Lamps	Yes	8,961	3.1	-2	\$1,315	\$3,040	\$420	\$2,620	2.0	8,824
Lighting Control Measures			19,124	5.4	-4	\$2,803	\$24,180	\$8,530	\$15,650	5.6	18,789
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	14,022	4.1	-3	\$2,055	\$13,200	\$1,590	\$11,610	5.6	13,776
ECM 5	Install High/Low Lighting Controls	Yes	5,102	1.3	-1	\$748	\$10,980	\$6,940	\$4,040	5.4	5,013
Motor Upgrades			1,284	0.5	0	\$191	\$7,500	\$0	\$7,500	39.3	1,293
ECM 6	Premium Efficiency Motors	No	1,284	0.5	0	\$191	\$7,500	\$0	\$7,500	39.3	1,293
Variable Frequency Drive (VFD) Measures			36,566	12.2	0	\$5,439	\$49,900	\$5,500	\$44,400	8.2	36,822
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	29,572	9.2	0	\$4,398	\$40,900	\$3,700	\$37,200	8.5	29,779
ECM 8	Install Boiler Draft Fan VFDs	Yes	6,994	3.0	0	\$1,040	\$9,000	\$1,800	\$7,200	6.9	7,043
Unitary HVAC Measures			2,465	3.3	4	\$404	\$59,200	\$2,200	\$57,000	141.2	2,904
ECM 9	Install High Efficiency Air Conditioning Units	No	2,465	3.3	4	\$404	\$59,200	\$2,200	\$57,000	141.2	2,904
Gas Heating (HVAC/Process) Replacement			0	0.0	380	\$3,922	\$256,300	\$0	\$256,300	65.3	44,460
ECM 10	Install High Efficiency Steam Boilers	No	0	0.0	380	\$3,922	\$256,300	\$0	\$256,300	65.3	44,460
HVAC System Improvements			0	0.0	22	\$230	\$520	\$70	\$450	2.0	2,609
ECM 11	Install Pipe Insulation	Yes	0	0.0	22	\$230	\$520	\$70	\$450	2.0	2,609
Domestic Water Heating Upgrade			0	0.0	18	\$183	\$330	\$100	\$230	1.3	2,072
ECM 12	Install Low-Flow DHW Devices	Yes	0	0.0	18	\$183	\$330	\$100	\$230	1.3	2,072
Food Service & Refrigeration Measures			2,780	0.3	160	\$2,064	\$35,010	\$3,960	\$31,050	15.0	21,513
ECM 13	Food Service Equipment Replacement	Yes	0	0.0	160	\$1,651	\$23,900	\$3,500	\$20,400	12.4	18,713
ECM 14	Refrigerator/Freezer Case Electrically Commutated Motors	No	195	0.0	0	\$29	\$750	\$80	\$670	23.1	196
ECM 15	Refrigeration Controls	No	348	0.0	0	\$52	\$2,060	\$80	\$1,980	38.3	350
ECM 16	Replace Refrigeration Equipment	No	2,237	0.3	0	\$333	\$8,300	\$300	\$8,000	24.0	2,253
TOTALS (COST EFFECTIVE MEASURES)			66,597	21.0	194	\$11,909	\$105,380	\$18,360	\$87,020	7.3	89,775
TOTALS (ALL MEASURES)			73,126	25.1	577	\$16,840	\$439,490	\$21,020	\$418,470	24.9	141,231

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

LANING AVE ELEMENTARY

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			12,135	2.1	-3	\$2,180	\$4,060	\$610	\$3,450	1.6	11,923
ECM 1	Install LED Fixtures	Yes	10,600	1.6	-2	\$1,904	\$3,140	\$450	\$2,690	1.4	10,414
ECM 2	Retrofit Fixtures with LED Lamps	Yes	1,535	0.5	0	\$276	\$920	\$160	\$760	2.8	1,509
Lighting Control Measures			9,709	2.4	-2	\$1,744	\$9,780	\$3,130	\$6,650	3.8	9,539
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	6,421	1.9	-1	\$1,154	\$6,120	\$740	\$5,380	4.7	6,309
ECM 4	Install High/Low Lighting Controls	Yes	3,288	0.6	-1	\$591	\$3,660	\$2,390	\$1,270	2.1	3,231
Motor Upgrades			126	0.1	0	\$23	\$4,000	\$0	\$4,000	174.7	127
ECM 5	Premium Efficiency Motors	No	126	0.1	0	\$23	\$4,000	\$0	\$4,000	174.7	127
Variable Frequency Drive (VFD) Measures			20,080	7.7	0	\$3,657	\$48,400	\$2,800	\$45,600	12.5	20,221
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	17,151	6.6	0	\$3,123	\$35,200	\$2,500	\$32,700	10.5	17,271
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	2,058	0.9	0	\$375	\$5,400	\$200	\$5,200	13.9	2,072
ECM 8	Install VFDs on Heating Water Pumps	No	872	0.2	0	\$159	\$7,800	\$100	\$7,700	48.5	878
Unitary HVAC Measures			2,126	4.7	7	\$467	\$90,600	\$3,500	\$87,100	186.6	2,945
ECM 9	Install High Efficiency Air Conditioning Units	No	2,126	4.7	7	\$467	\$90,600	\$3,500	\$87,100	186.6	2,945
HVAC System Improvements			0	0.0	8	\$96	\$200	\$20	\$180	1.9	966
ECM 10	Install Pipe Insulation	Yes	0	0.0	8	\$96	\$200	\$20	\$180	1.9	966
Domestic Water Heating Upgrade			0	0.0	6	\$74	\$130	\$30	\$100	1.4	742
ECM 11	Install Low-Flow DHW Devices	Yes	0	0.0	6	\$74	\$130	\$30	\$100	1.4	742
TOTALS (COST EFFECTIVE MEASURES)			41,053	12.0	10	\$7,592	\$54,770	\$6,490	\$48,280	6.4	42,512
TOTALS (ALL MEASURES)			44,176	16.9	17	\$8,241	\$157,170	\$10,090	\$147,080	17.8	46,462

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

ENERGY EFFICIENT BEST PRACTICES



- Reduce Air Leakage
- Close Doors and Windows
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Use Fans to Reduce Cooling Load
- Use Window Treatments/Coverings
- Clean and/or Replace HVAC filters
- Check and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Plug Load Controls
- Water Conservation

See individual reports for specific EE Best Practices by building

WATER BEST PRACTICES



- Leak Detection and Repair
- Toilets and Urinals
- Faucets and Showerheads
- Commercial Kitchen Equipment
- Laundry Equipment
- Cooling Towers
- Steam Boiler System
- Pools and Spas

- Laboratory and Medical Equipment
- Water Metering and Submetering
- Vehicle Washing
- Single Pass Cooling System
- Landscaping and Irrigation
- On-Site Alternative Water Sources



See individual reports for specific Water Best Practices by building

MEASURES FOR FUTURE CONSIDERATION

- Retro-Commissioning Study
- Upgrade/Replace Energy Management System
- VRF Systems
- Replace Smooth V-Belts with Notched Synchronous Belts
- Heating System Conversion from Steam to Hot Water
- Upgrade to a Heat Pump System

EV CHARGING STATION POTENTIAL

NJCleanEnergy.com/EV

Know your EV Charging Stations



LEVEL 1



4-6 miles/hour
Replenish Rate



7-30 hours for full charge

Approximate time to charge a battery*

CHARGE
110/120V

LEVEL 2



10-20 miles/hour
Replenish Rate



2-10 hours for full charge

Approximate time to charge a battery*

CHARGE
208/240V

DIRECT CURRENT (DC) FAST CHARGING*



120-200 miles/hour
Replenish Rate



20-90 minutes for full charge

Approximate time to charge a battery*

CHARGE
480V or 208V

*dependent on the size of the battery

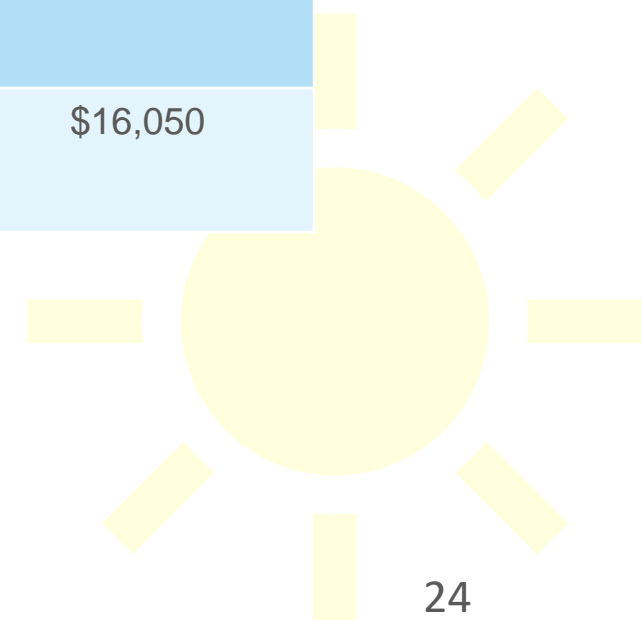
Site	Potential
Verona HS	HIGH
Brookdale Ave	Medium
F.N. Brown	Medium
Forest Ave	Medium
H.B. Whitehorne	Medium
Laning Ave	HIGH



SOLAR ENERGY GENERATION POTENTIAL

NJCleanEnergy.com/renewable-energy

	Verona HS	F.N. Brown	HB Whitehorne	Laning Ave
<i>Potential:</i>	HIGH	Medium	HIGH	HIGH
<i>System Potential: (kW)</i>	182	67	113	74
<i>Electric Generation: (kWh per year)</i>	216,829	79,822	134,625	88,161
<i>Displaced Cost: (per year)</i>	\$45,400	\$14,350	\$20,020	\$16,050



FINANCING MECHANISM: ESIP

NJCleanEnergy.com/ESIP

ENERGY SAVINGS IMPROVEMENT PROGRAM (ESIP)

- Energy Performance Contracting = NJ ESIP Program
- A creative tool and financing mechanism that allows public entities to make energy efficiency improvements without impacting their budgets
- Administered by the NJBPU
- Project is paid for with the value of its own energy savings
- 2 Options: Lease Purchase Loan or Bond
- 15 or 20 year pay back term
- NJBPU Approved Incentive Programs
 - Utility or NJCEP
- Can be combined with Federal/State Grants
- No upfront capital expenses
- No referendum or impact to tax payers



ENERGY SAVINGS IMPROVEMENT PROGRAM

NJCleanEnergy.com/ESIP



ESIP Intake Form

Get informed;
Begin the process



Preliminary Energy Audit

Free LGEA
or
other ASHRAE Level II
Audit



Select Path

ESCO, Hybrid or DIY Model;
Local Public Contract Law
Public School Contract Law
Compliance



Investment Grade Energy Audit

Prioritize Needs ;
Select Project's ECM's



Energy Savings Plan

Must be Cash Flow Positive;
Purchase Savings Guarantee?
Third Party Verification

Submitted for
BPU
Approval

ENERGY SAVINGS IMPROVEMENT PROGRAM

NJCleanEnergy.com/ESIP

FOR MORE INFORMATION

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C&I ENERGY EFFICIENCY PROGRAMS

NJCleanEnergy.com

LOCAL
GOVERNMENT
CUSTOMERS

COMMERCIAL &
INSTITUTIONAL
CUSTOMERS

LARGE
ENERGY
CUSTOMERS

EXISTING BUILDINGS

MEASUREMENT & AUDITS

FREE Energy Audits



RETROFITS

Prescriptive & Custom Rebates

Direct Install

Engineered Solutions

And more from
your local utility!



Incentives up
to \$4 million
for eligible projects



NEW CONSTRUCTION

Prescriptive & Custom
Rebates for New
Construction and
Gut Rehabs

Pay for Performance
incentives for
buildings over
50,000 sq. ft.



DISTRIBUTED ENERGY RESOURCES

Combined Heat & Power
and Fuel Cell Installation
Incentives

Microgrid Development

Battery Storage

Muni EV Fleets



Key:
Programs run by investor-owned utility companies



Programs run by NJCEP



UTILITY RUN ENERGY EFFICIENCY PROGRAMS*

NJCleanEnergy.com/Transition

PRESCRIPTIVE & CUSTOM REBATES:

- Individual high efficiency equipment rebates for renovation, remodeling, and equipment replacement
- Flexibility to do a little or a lot
- No size requirement

DIRECT INSTALL:

- Turn-key retrofit program to replace outdated and inefficient equipment including, lighting, HVAC, refrigeration, etc.
- The facility must have an average electric peak demand <200kW in the previous year to qualify

ENERGY MANAGEMENT :

- Includes the Building Tune-up (BT), Retro-commissioning (RCx), and Strategic Energy Management (SEM) subprograms. These subprograms offer a comprehensive mix of custom energy-savings measures such as basic HVAC tune-ups, building systems tune-ups, controls' calibration, diagnostic testing, and installation of measures to enhance your building's energy performance and savings.

ENGINEERED SOLUTIONS:

- Comprehensive, whole-building approach to saving energy
- The facility must have an average electric peak demand >200kW in the previous year to qualify

**Other programs may be available to you. Check with your Utility Provider to see a full list of offering and what you may be qualified for.*



UTILITY RUN ENERGY EFFICIENCY PROGRAMS

PSE&G

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THANK YOU

