

# New Jersey's Clean Energy Program

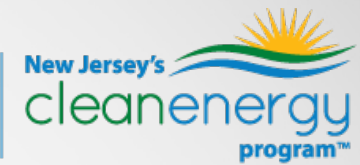
LGEA Exit Meeting for:  
*Lawrence Township Board of Education*

TRC Energy Services

November 6, 2018

# Introductions

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- Lawrence Township BOE
  - Tom Eldridge, Business Administrator
  - James Alberti, Director of Facilities
- NJ Clean Energy Program
  - Brian DeLuca, CEM – TRC Program Manager
  - Aimee Lalonde – TRC Auditor
  - Elizabeth Ebinger – TRC Account Manager

# Agenda

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- The audit process overview
- Energy use & existing conditions
- Review of **E**nergy **C**onservation **M**asures (ECMs) identified
- Questions or concerns regarding the draft audit report
- Overview of NJCEP equipment incentives
- Next steps for Lawrence Township BOE

# LGEA Process

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- Application Approval
- Scheduling Call
- Audit
- Benchmarking & Analysis
- Draft Report
- Exit Meeting Presentation
- Final Report

# Site Visit and Utility Analysis

## Overview of Systems, Baseline & Existing Conditions:

- Building Envelope
- Lighting System
- HVAC and Mechanical Systems
- PV System Generation

## Sites Visited/Analyzed

- High School
- Intermediate School

## Utility Consumption:

- Electric Consumption and Costs
- Natural Gas Consumption and Costs

# Benchmarking



## Lawrence High School

**ENERGY STAR® Statement of Energy Performance**

# 44

**ENERGY STAR® Score<sup>1</sup>**

**Lawrence High School**

**Primary Property Type:** K-12 School  
**Gross Floor Area (ft²):** 240,000  
**Built:** 1987

**For Year Ending:** July 31, 2017  
**Date Generated:** September 24, 2018

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information		
<b>Property Address</b> Lawrence High School 2525 Princeton Pike Lawrenceville, New Jersey 08048	<b>Property Owner</b> Lawrence Township BOE 2565 Princeton Pike Lawrenceville, NJ 08048 (800) 671-5418	<b>Primary Contact</b> Thomas Eldridge 2565 Princeton Pike Lawrenceville, NJ 08048 (800) 671-5418 telldridge@LTPS.org

Property ID: 0441256

Energy Consumption and Energy Use Intensity (EUI)			
<b>Site EUI</b>	<b>Annual Energy by Fuel</b>	<b>National Median Comparison</b>	
101.1 kBtu/ft²	Electric - Solar (kBtu) 1,526,780 (6%)	National Median Site EUI (kBtu/ft²)	96.5
	Electric - Grid (kBtu) 6,923,197 (28%)	National Median Source EUI (kBtu/ft²)	149.3
	Natural Gas (kBtu) 15,805,569 (65%)	% Diff from National Median Source EUI	5%
<b>Source EUI</b>		<b>Annual Emissions</b>	
156.3 kBtu/ft²		Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,541

**Signature & Stamp of Verifying Professional**

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

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Licensed Professional**

\_\_\_\_\_  
 ( ) - \_\_\_\_\_

**Professional Engineer Stamp (if applicable)**

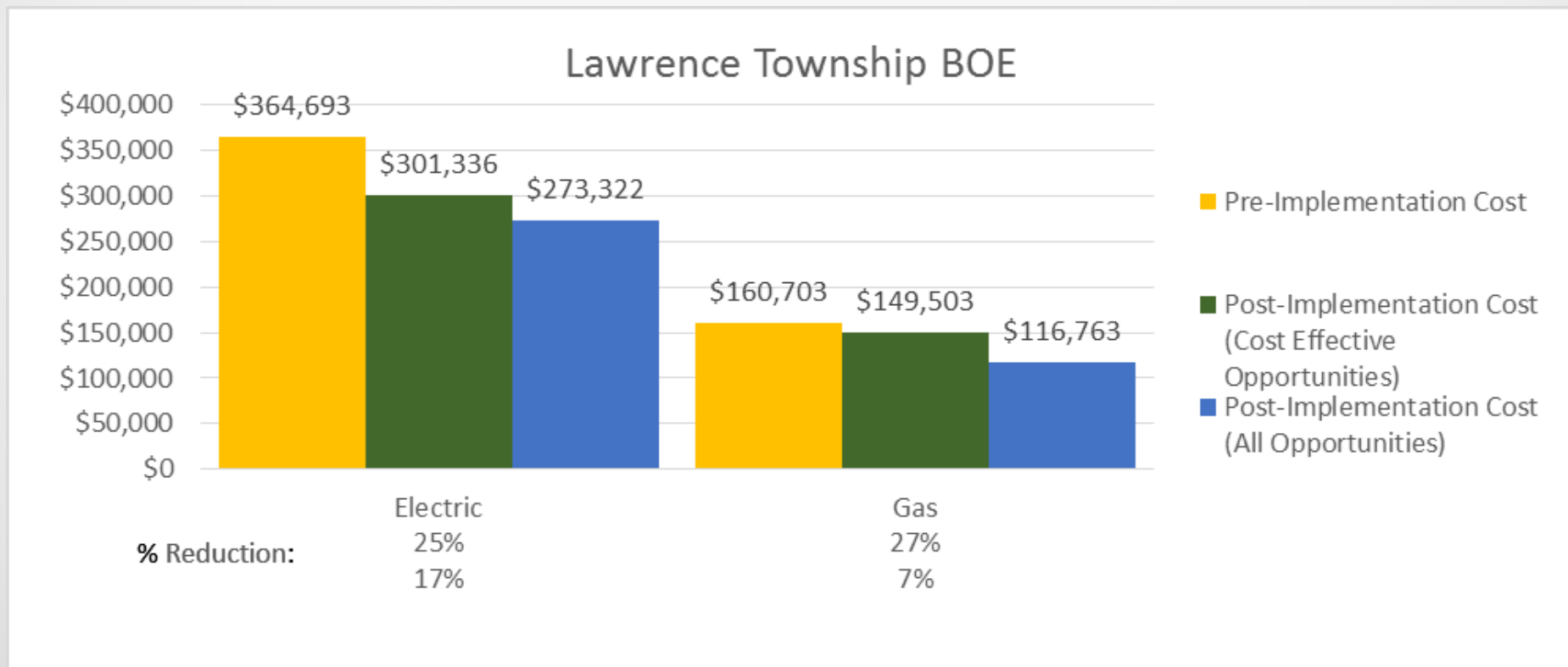
Building Name	ENERGY STAR Score
High School	44
Intermediate School	51

ENERGY STAR Scores are percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide.

# Project Comparison

All Opportunities: 13.3 year simple payback

Cost Effective Opportunities: 4.7 year simple payback



# All Opportunities



Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>	<b>372,907</b>	<b>87.6</b>	<b>0.0</b>	<b>\$41,570.80</b>	<b>\$186,008.46</b>	<b>\$38,725.00</b>	<b>\$147,283.46</b>	<b>3.5</b>	<b>375,514</b>
Install LED Fixtures	18,276	2.1	0.0	\$2,194.36	\$34,973.48	\$3,605.00	\$31,368.48	14.3	18,404
Retrofit Fixtures with LED Lamps	354,630	85.5	0.0	\$39,376.44	\$151,034.98	\$35,120.00	\$115,914.98	2.9	357,110
<b>Lighting Control Measures</b>	<b>12,248</b>	<b>2.0</b>	<b>0.0</b>	<b>\$1,356.31</b>	<b>\$14,758.00</b>	<b>\$1,530.00</b>	<b>\$13,228.00</b>	<b>9.8</b>	<b>12,333</b>
Install Occupancy Sensor Lighting Controls	10,032	1.6	0.0	\$1,090.80	\$11,688.00	\$1,390.00	\$10,298.00	9.4	10,102
Install Daylight Dimming Controls	394	0.0	0.0	\$52.45	\$270.00	\$0.00	\$270.00	5.1	397
Install High/Low Lighting Controls	1,821	0.3	0.0	\$213.06	\$2,800.00	\$140.00	\$2,660.00	12.5	1,834
<b>Motor Upgrades</b>	<b>3,739</b>	<b>1.3</b>	<b>0.0</b>	<b>\$425.99</b>	<b>\$31,384.10</b>	<b>\$0.00</b>	<b>\$31,384.10</b>	<b>73.7</b>	<b>3,766</b>
Premium Efficiency Motors	3,739	1.3	0.0	\$425.99	\$31,384.10	\$0.00	\$31,384.10	73.7	3,766
<b>Variable Frequency Drive (VFD) Measures</b>	<b>148,034</b>	<b>61.2</b>	<b>0.0</b>	<b>\$16,278.21</b>	<b>\$138,775.55</b>	<b>\$14,200.00</b>	<b>\$124,575.55</b>	<b>7.7</b>	<b>149,069</b>
Install VFDs on Constant Volume (CV) HVAC	106,153	50.8	0.0	\$11,649.82	\$101,526.55	\$14,200.00	\$87,326.55	7.5	106,896
Install VFDs on Hot Water Pumps	40,370	8.7	0.0	\$4,427.42	\$31,233.70	\$0.00	\$31,233.70	7.1	40,653
Install Boiler Draft Fan VFDs	1,510	1.7	0.0	\$200.97	\$6,015.30	\$0.00	\$6,015.30	29.9	1,521
<b>Electric Unitary HVAC Measures</b>	<b>83,801</b>	<b>56.6</b>	<b>0.0</b>	<b>\$9,574.77</b>	<b>\$544,822.78</b>	<b>\$24,184.00</b>	<b>\$520,638.78</b>	<b>54.4</b>	<b>84,387</b>
Install High Efficiency Electric AC	83,801	56.6	0.0	\$9,574.77	\$544,822.78	\$24,184.00	\$520,638.78	54.4	84,387
<b>Gas Heating (HVAC/Process) Replacement</b>	<b>0</b>	<b>0.0</b>	<b>2,484.7</b>	<b>\$20,160.77</b>	<b>\$413,388.87</b>	<b>\$19,491.00</b>	<b>\$393,897.87</b>	<b>19.5</b>	<b>290,927</b>
Install High Efficiency Hot Water Boilers	0	0.0	2,122.1	\$17,273.08	\$338,959.53	\$7,891.00	\$331,068.53	19.2	248,471
Install High Efficiency Furnaces	0	0.0	362.6	\$2,887.69	\$74,429.34	\$11,600.00	\$62,829.34	21.8	42,456
<b>HVAC System Improvements</b>	<b>100,312</b>	<b>19.5</b>	<b>0.0</b>	<b>\$11,371.41</b>	<b>\$27,468.84</b>	<b>\$9,000.00</b>	<b>\$18,468.84</b>	<b>1.6</b>	<b>101,014</b>
Install Dual Enthalpy Outside Economizer Control	86,596	19.5	0.0	\$9,546.40	\$24,750.00	\$9,000.00	\$15,750.00	1.6	87,202
Implement Demand Control Ventilation	13,716	0.0	0.0	\$1,825.01	\$2,718.84	\$0.00	\$2,718.84	1.5	13,812
<b>Domestic Water Heating Upgrade</b>	<b>0</b>	<b>0.0</b>	<b>292.3</b>	<b>\$2,425.26</b>	<b>\$75,745.77</b>	<b>\$1,400.00</b>	<b>\$74,345.77</b>	<b>30.7</b>	<b>34,226</b>
Install High Efficiency Gas Water Heater	0	0.0	162.5	\$1,362.56	\$75,165.00	\$1,400.00	\$73,765.00	54.1	19,026
Install Low-Flow Domestic Hot Water Devices	0	0.0	129.8	\$1,062.70	\$580.77	\$0.00	\$580.77	0.5	15,200
<b>Food Service Equipment &amp; Refrigeration Measures</b>	<b>2,028</b>	<b>0.2</b>	<b>0.0</b>	<b>\$216.36</b>	<b>\$3,640.00</b>	<b>\$0.00</b>	<b>\$3,640.00</b>	<b>16.8</b>	<b>2,042</b>
Replace Refrigeration Equipment	2,028	0.2	0.0	\$216.36	\$3,640.00	\$0.00	\$3,640.00	16.8	2,042
<b>Plug Load Equipment Control - Vending Machine</b>	<b>8,059</b>	<b>0.0</b>	<b>0.0</b>	<b>\$902.47</b>	<b>\$1,150.00</b>	<b>\$250.00</b>	<b>\$900.00</b>	<b>1.0</b>	<b>8,116</b>
Vending Machine Control	8,059	0.0	0.0	\$902.47	\$1,150.00	\$250.00	\$900.00	1.0	8,116
<b>Custom Measures</b>	<b>81,879</b>	<b>0.0</b>	<b>2,654.9</b>	<b>\$30,084.52</b>	<b>\$459,745.00</b>	<b>\$0.00</b>	<b>\$459,745.00</b>	<b>15.3</b>	<b>393,310</b>
Building Envelope Weatherization	269	0.0	554.6	\$4,552.95	\$19,820.00	\$0.00	\$19,820.00	4.4	65,208
Computer Power Management Software	7,575	0.0	0.0	\$904.57	\$7,925.00	\$0.00	\$7,925.00	8.8	7,628
Retro-Commissioning Study & HVAC Improvements	24,834	0.0	700.1	\$8,225.57	\$72,000.00	\$0.00	\$72,000.00	8.8	106,981
Installation of an Energy Management System	49,201	0.0	1,400.2	\$16,401.43	\$360,000.00	\$0.00	\$360,000.00	21.9	213,493
<b>TOTALS</b>	<b>813,007</b>	<b>228.4</b>	<b>5,431.9</b>	<b>\$134,366.87</b>	<b>\$1,896,887.37</b>	<b>\$108,780.00</b>	<b>\$1,788,107.37</b>	<b>13.3</b>	<b>1,454,702</b>

\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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



# Cost Effective Opportunities\*



*\*Opportunities considered cost effective have a payback period less than the expedited life of the measure*

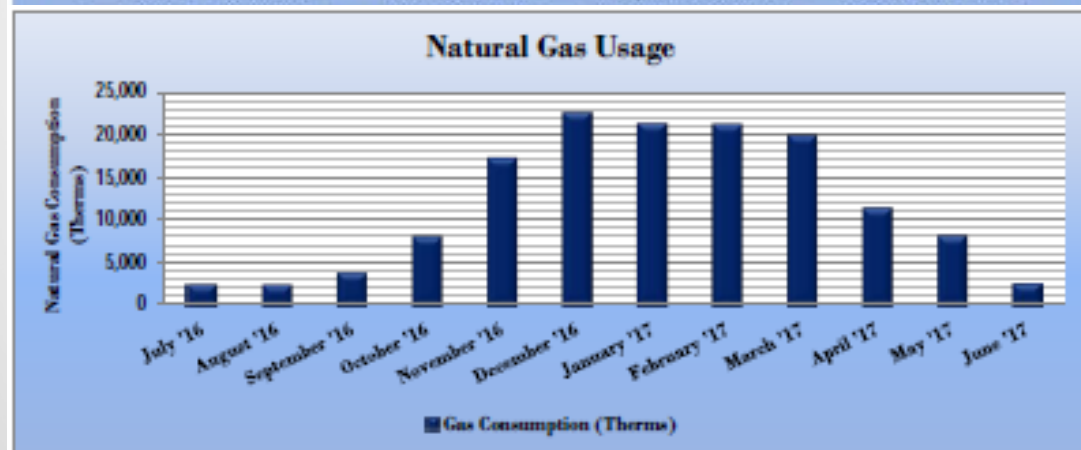
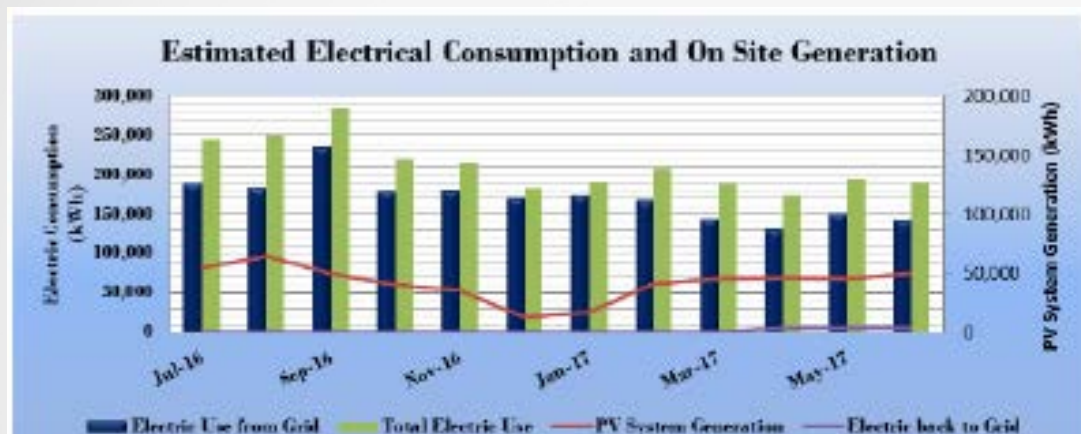
Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
Lighting Upgrades		372,907	87.6	0.0	\$41,570.80	\$186,008.46	\$38,725.00	\$147,283.46	3.5	375,514
ECM 1	Install LED Fixtures	18,276	2.1	0.0	\$2,194.36	\$34,973.48	\$3,605.00	\$31,368.48	14.3	18,404
ECM 2	Retrofit Fixtures with LED Lamps	354,630	85.5	0.0	\$39,376.44	\$151,034.98	\$35,120.00	\$115,914.98	2.9	357,110
Lighting Control Measures		11,479	1.7	0.0	\$1,254.01	\$12,328.00	\$1,215.00	\$11,113.00	8.9	11,559
ECM 3	Install Occupancy Sensor Lighting Controls	9,263	1.3	0.0	\$988.50	\$9,258.00	\$1,075.00	\$8,183.00	8.3	9,328
ECM 4	Install Daylight Dimming Controls	394	0.0	0.0	\$52.45	\$270.00	\$0.00	\$270.00	5.1	397
ECM 5	Install High/Low Lighting Controls	1,821	0.3	0.0	\$213.06	\$2,800.00	\$140.00	\$2,660.00	12.5	1,834
Motor Upgrades		2,716	0.5	0.0	\$289.87	\$14,169.68	\$0.00	\$14,169.68	48.9	2,735
ECM 6	Premium Efficiency Motors	2,716	0.5	0.0	\$289.87	\$14,169.68	\$0.00	\$14,169.68	48.9	2,735
Variable Frequency Drive (VFD) Measures		129,762	40.9	0.0	\$13,847.04	\$86,236.45	\$9,400.00	\$76,836.45	5.5	130,670
ECM 7	Install VFDs on Constant Volume (CV) HVAC	93,927	34.0	0.0	\$10,022.99	\$62,216.35	\$9,400.00	\$52,816.35	5.3	94,583
ECM 8	Install VFDs on Hot Water Pumps	35,836	6.9	0.0	\$3,824.05	\$24,020.10	\$0.00	\$24,020.10	6.3	36,086
HVAC System Improvements		13,716	0.0	0.0	\$1,825.01	\$2,718.84	\$0.00	\$2,718.84	1.5	13,812
ECM 9	Implement Demand Control Ventilation	13,716	0.0	0.0	\$1,825.01	\$2,718.84	\$0.00	\$2,718.84	1.5	13,812
Domestic Water Heating Upgrade		0	0.0	129.8	\$1,062.70	\$580.77	\$0.00	\$580.77	0.5	15,200
ECM 10	Install Low-Flow Domestic Hot Water Devices	0	0.0	129.8	\$1,062.70	\$580.77	\$0.00	\$580.77	0.5	15,200
Plug Load Equipment Control - Vending Machine		8,059	0.0	0.0	\$902.47	\$1,150.00	\$250.00	\$900.00	1.0	8,116
ECM 11	Vending Machine Control	8,059	0.0	0.0	\$902.47	\$1,150.00	\$250.00	\$900.00	1.0	8,116
Custom Measures		25,102	0.0	1,254.7	\$12,778.52	\$91,820.00	\$0.00	\$91,820.00	7.2	172,189
ECM 12	Building Envelope Weatherization	269	0.0	554.6	\$4,552.95	\$19,820.00	\$0.00	\$19,820.00	4.4	65,208
ECM 13	Retro-Commissioning Study & HVAC Improvements	24,834	0.0	700.1	\$8,225.57	\$72,000.00	\$0.00	\$72,000.00	8.8	106,981
TOTALS		563,742	130.6	1,384.5	\$73,530.42	\$395,012.20	\$49,590.00	\$345,422.20	4.7	729,795

\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

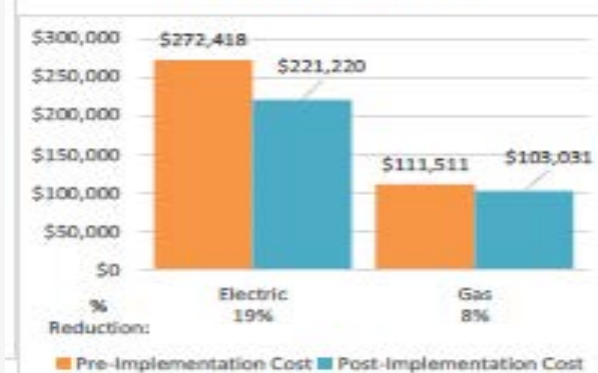
# High School Overview

## Existing Utility Use



## Project Comparison

**Figure 2a – Potential Post-Implementation Costs (High Priority Measures)**



**Figure 3b – Potential Post-Implementation Costs (All Evaluated Measures)**



# High School Considerations

- Main O&M Concerns: Boilers, Unit Ventilators & HVAC Controls
- Highlights of Opportunities:
  - Highest % Reduction of Total Use: **High Efficiency Hot Water Boilers**
  - Greatest % Savings of End Use: **Retrofit Fixtures with LED Lamps**
  - Quickest Payback Period: **Low Flow DHW Devices**

- High Potential for a PV System  
Evaluated for over the Main Parking Lot

- No Potential for Combined Heat and Power (CHP) System

Potential	High	
System Potential	375	kW DC STC
Electric Generation	446,764	kWh/yr
Displaced Cost	\$38,870	/yr
Installed Cost	\$1,267,500	

# High School



Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>			<b>305,434</b>	<b>60.1</b>	<b>0.0</b>	<b>\$32,593</b>	<b>\$115,824</b>	<b>\$24,665</b>	<b>\$91,159</b>	<b>2.8</b>	<b>307,570</b>
ECM 1	Install LED Fixtures	Yes	9,012	0.9	0.0	\$962	\$15,654	\$1,605	\$14,049	14.6	9,075
ECM 2	Retrofit Fixtures with LED Lamps	Yes	296,422	59.1	0.0	\$31,631	\$100,170	\$23,060	\$77,110	2.4	298,495
<b>Lighting Control Measures</b>			<b>10,374</b>	<b>1.5</b>	<b>0.0</b>	<b>\$1,107</b>	<b>\$10,858</b>	<b>\$1,215</b>	<b>\$9,643</b>	<b>8.7</b>	<b>10,446</b>
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	9,263	1.3	0.0	\$988	\$9,258	\$1,075	\$8,183	8.3	9,328
ECM 4	Install High/Low Lighting Controls	Yes	1,111	0.2	0.0	\$119	\$1,600	\$140	\$1,460	12.3	1,118
<b>Motor Upgrades</b>			<b>2,716</b>	<b>0.5</b>	<b>0.0</b>	<b>\$290</b>	<b>\$14,170</b>	<b>\$0</b>	<b>\$14,170</b>	<b>48.9</b>	<b>2,735</b>
ECM 5	Premium Efficiency Motors	Yes	2,716	0.5	0.0	\$290	\$14,170	\$0	\$14,170	48.9	2,735
<b>Variable Frequency Drive (VFD) Measures</b>			<b>129,762</b>	<b>40.9</b>	<b>0.0</b>	<b>\$13,847</b>	<b>\$86,236</b>	<b>\$9,400</b>	<b>\$76,836</b>	<b>5.5</b>	<b>130,670</b>
ECM 6	Install VFDs on Constant Volume (CV) HVAC	Yes	93,927	34.0	0.0	\$10,023	\$62,216	\$9,400	\$52,816	5.3	94,583
ECM 7	Install VFDs on Hot Water Pumps	Yes	35,836	6.9	0.0	\$3,824	\$24,020	\$0	\$24,020	6.3	36,086
<b>Electric Unitary HVAC Measures</b>			<b>59,801</b>	<b>39.1</b>	<b>0.0</b>	<b>\$6,381</b>	<b>\$455,146</b>	<b>\$20,348</b>	<b>\$434,798</b>	<b>68.1</b>	<b>60,219</b>
	Install High Efficiency Electric AC	No	59,801	39.1	0.0	\$6,381	\$455,146	\$20,348	\$434,798	68.1	60,219
<b>Gas Heating (HVAC/Process) Replacement</b>			<b>0</b>	<b>0.0</b>	<b>1,600.0</b>	<b>\$12,742</b>	<b>\$307,812</b>	<b>\$11,600</b>	<b>\$296,212</b>	<b>23.2</b>	<b>187,337</b>
	Install High Efficiency Hot Water Boilers	No	0	0.0	1,237.4	\$9,854	\$233,383	\$0	\$233,383	23.7	144,881
	Install High Efficiency Furnaces	No	0	0.0	362.6	\$2,888	\$74,429	\$11,600	\$62,829	21.8	42,456
<b>HVAC System Improvements</b>			<b>74,995</b>	<b>16.9</b>	<b>0.0</b>	<b>\$8,003</b>	<b>\$20,750</b>	<b>\$7,250</b>	<b>\$13,500</b>	<b>1.7</b>	<b>75,519</b>
	Install Dual Enthalpy Outside Economizer Control	No	74,995	16.9	0.0	\$8,003	\$20,750	\$7,250	\$13,500	1.7	75,519
<b>Domestic Water Heating Upgrade</b>			<b>0</b>	<b>0.0</b>	<b>61.4</b>	<b>\$489</b>	<b>\$301</b>	<b>\$0</b>	<b>\$301</b>	<b>0.6</b>	<b>7,189</b>
ECM 8	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	61.4	\$489	\$301	\$0	\$301	0.6	7,189
<b>Food Service Equipment &amp; Refrigeration Measures</b>			<b>2,028</b>	<b>0.2</b>	<b>0.0</b>	<b>\$216</b>	<b>\$3,640</b>	<b>\$0</b>	<b>\$3,640</b>	<b>16.8</b>	<b>2,042</b>
	Replace Refrigeration Equipment	No	2,028	0.2	0.0	\$216	\$3,640	\$0	\$3,640	16.8	2,042
<b>Plug Load Equipment Control - Vending Machine</b>			<b>6,447</b>	<b>0.0</b>	<b>0.0</b>	<b>\$688</b>	<b>\$920</b>	<b>\$200</b>	<b>\$720</b>	<b>1.0</b>	<b>6,492</b>
ECM 9	Vending Machine Control	Yes	6,447	0.0	0.0	\$688	\$920	\$200	\$720	1.0	6,492
<b>Custom Measures</b>			<b>78,170</b>	<b>0.0</b>	<b>2,403.6</b>	<b>\$27,484</b>	<b>\$447,635</b>	<b>\$0</b>	<b>\$447,635</b>	<b>16.3</b>	<b>360,149</b>
ECM 10	Building Envelope Weatherization	Yes	212	0.0	303.3	\$2,438	\$11,620	\$0	\$11,620	4.8	35,725
	Computer Power Management Software	No	3,924	0.0	0.0	\$419	\$4,015	\$0	\$4,015	9.6	3,951
ECM 11	Retro-Commissioning Study & HVAC Improvements	Yes	24,834	0.0	700.1	\$8,226	\$72,000	\$0	\$72,000	8.8	106,981
	Installation of an Energy Management System	No	49,201	0.0	1,400.2	\$16,401	\$360,000	\$0	\$360,000	21.9	213,493
<b>TOTALS FOR HIGH PRIORITY MEASURES</b>			<b>479,780</b>	<b>102.9</b>	<b>1,064.8</b>	<b>\$59,678</b>	<b>\$311,929</b>	<b>\$35,480</b>	<b>\$276,449</b>	<b>4.6</b>	<b>607,809</b>
<b>TOTALS FOR ALL EVALUATED MEASURES</b>			<b>669,728</b>	<b>159.2</b>	<b>4,065.0</b>	<b>\$103,840</b>	<b>\$1,463,292</b>	<b>\$74,678</b>	<b>\$1,388,614</b>	<b>13.4</b>	<b>1,150,370</b>

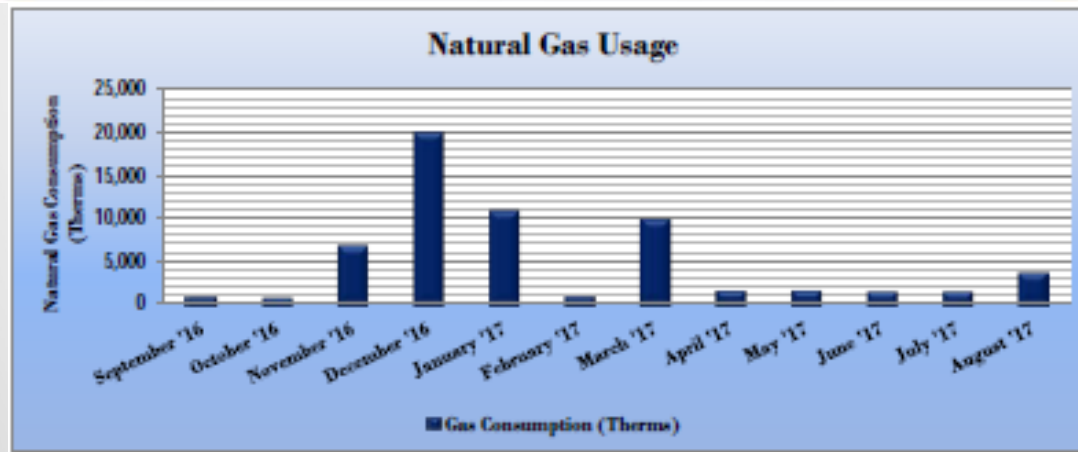
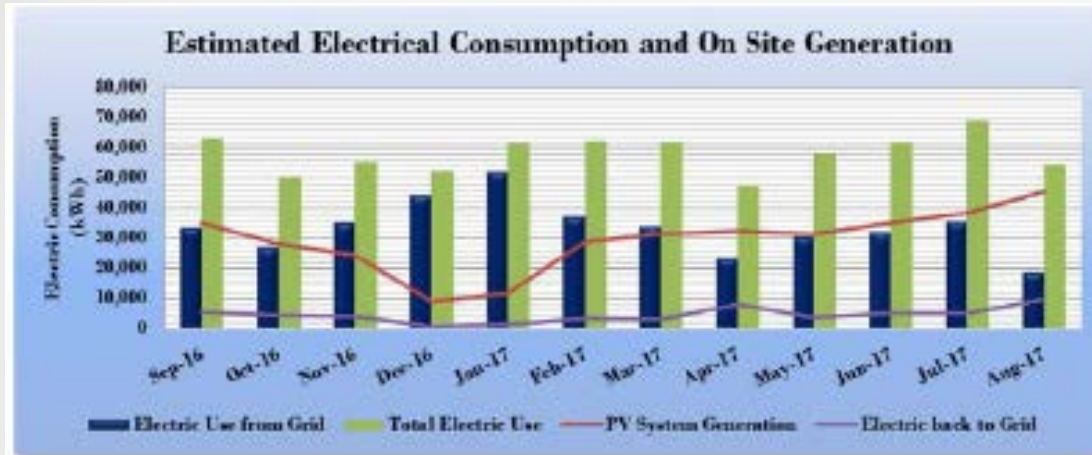
\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

# Intermediate School Overview

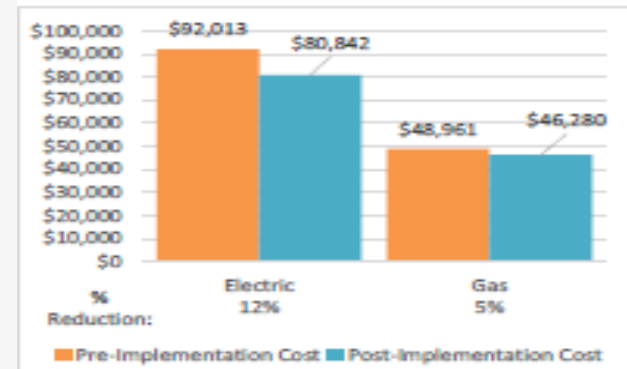


## Existing Utility Use

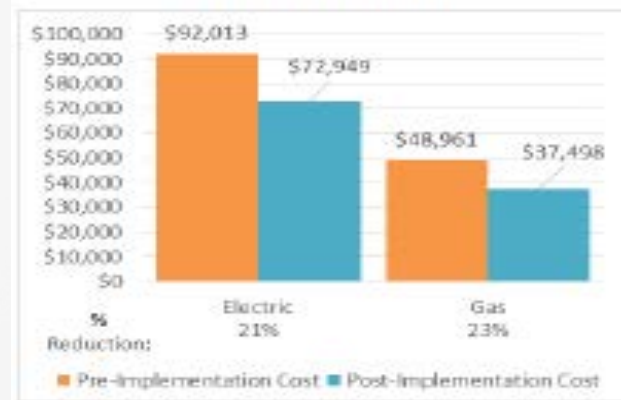


## Project Comparison

**Figure 3a – Potential Post-Implementation Costs (High Priority Measures)**



**Figure 2b – Potential Post-Implementation Costs (All Evaluated Measures)**





# Intermediate School Considerations

- Main O&M Concerns: Boilers, Unit Ventilators & HVAC Controls
- Highlights of Opportunities:
  - Highest % Reduction of Total Use: **High Efficiency Hot Water Boilers**
  - Greatest % Savings of End Use: **Retrofit Fixtures with LED Lamps**
  - Quickest Payback Period: **Low Flow DHW Devices**

Potential	Low	
System Potential	175	kW DC STC
Electric Generation	131,678	kWh/yr
Displaced Cost	\$11,460	/yr
Installed Cost	\$591,500	

- Low Potential for a PV System

Evaluated for over the Main Parking Lot

- No Potential for Combined Heat and Power (CHP) System

# Intermediate School



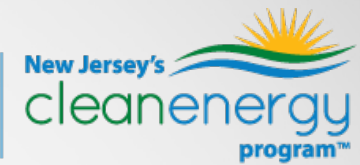
Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>			<b>67,472</b>	<b>27.5</b>	<b>0.0</b>	<b>\$8,978</b>	<b>\$70,185</b>	<b>\$14,060</b>	<b>\$56,125</b>	<b>6.3</b>	<b>67,944</b>
ECM 1	Install LED Fixtures	Yes	9,264	1.1	0.0	\$1,233	\$19,319	\$2,000	\$17,319	14.0	9,329
ECM 2	Retrofit Fixtures with LED Lamps	Yes	58,208	26.4	0.0	\$7,745	\$50,865	\$12,060	\$38,805	5.0	58,615
<b>Lighting Control Measures</b>			<b>1,874</b>	<b>0.5</b>	<b>0.0</b>	<b>\$249</b>	<b>\$3,900</b>	<b>\$315</b>	<b>\$3,585</b>	<b>14.4</b>	<b>1,887</b>
	Install Occupancy Sensor Lighting Controls	No	769	0.3	0.0	\$102	\$2,430	\$315	\$2,115	20.7	774
ECM 3	Install Daylight Dimming Controls	Yes	394	0.0	0.0	\$52	\$270	\$0	\$270	5.1	397
ECM 4	Install High/Low Lighting Controls	Yes	711	0.2	0.0	\$95	\$1,200	\$0	\$1,200	12.7	716
<b>Motor Upgrades</b>			<b>1,023</b>	<b>0.8</b>	<b>0.0</b>	<b>\$136</b>	<b>\$17,214</b>	<b>\$0</b>	<b>\$17,214</b>	<b>126.5</b>	<b>1,030</b>
	Premium Efficiency Motors	No	1,023	0.8	0.0	\$136	\$17,214	\$0	\$17,214	126.5	1,030
<b>Variable Frequency Drive (VFD) Measures</b>			<b>18,272</b>	<b>20.3</b>	<b>0.0</b>	<b>\$2,431</b>	<b>\$52,539</b>	<b>\$4,800</b>	<b>\$47,739</b>	<b>19.6</b>	<b>18,399</b>
	Install VFDs on Constant Volume (CV) HVAC	No	12,227	16.8	0.0	\$1,627	\$39,310	\$4,800	\$34,510	21.2	12,312
	Install VFDs on Hot Water Pumps	No	4,535	1.9	0.0	\$603	\$7,214	\$0	\$7,214	12.0	4,566
	Install Boiler Draft Fan VFDs	No	1,510	1.7	0.0	\$201	\$6,015	\$0	\$6,015	29.9	1,521
<b>Electric Unitary HVAC Measures</b>			<b>24,000</b>	<b>17.5</b>	<b>0.0</b>	<b>\$3,193</b>	<b>\$89,677</b>	<b>\$3,836</b>	<b>\$85,841</b>	<b>26.9</b>	<b>24,168</b>
	Install High Efficiency Electric AC	No	24,000	17.5	0.0	\$3,193	\$89,677	\$3,836	\$85,841	26.9	24,168
<b>Gas Heating (HVAC/Process) Replacement</b>			<b>0</b>	<b>0.0</b>	<b>884.7</b>	<b>\$7,419</b>	<b>\$105,576</b>	<b>\$7,891</b>	<b>\$97,685</b>	<b>13.2</b>	<b>103,589</b>
	Install High Efficiency Hot Water Boilers	No	0	0.0	884.7	\$7,419	\$105,576	\$7,891	\$97,685	13.2	103,589
<b>HVAC System Improvements</b>			<b>25,317</b>	<b>2.6</b>	<b>0.0</b>	<b>\$3,369</b>	<b>\$6,719</b>	<b>\$1,750</b>	<b>\$4,969</b>	<b>1.5</b>	<b>25,494</b>
	Install Dual Enthalpy Outside Economizer Control	No	11,601	2.6	0.0	\$1,544	\$4,000	\$1,750	\$2,250	1.5	11,683
ECM 5	Implement Demand Control Ventilation	Yes	13,716	0.0	0.0	\$1,825	\$2,719	\$0	\$2,719	1.5	13,812
<b>Domestic Water Heating Upgrade</b>			<b>0</b>	<b>0.0</b>	<b>230.9</b>	<b>\$1,936</b>	<b>\$75,445</b>	<b>\$1,400</b>	<b>\$74,045</b>	<b>38.2</b>	<b>27,037</b>
	Install High Efficiency Gas Water Heater	No	0	0.0	162.5	\$1,363	\$75,165	\$1,400	\$73,765	54.1	19,026
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	68.4	\$574	\$280	\$0	\$280	0.5	8,011
<b>Plug Load Equipment Control - Vending Machine</b>			<b>1,612</b>	<b>0.0</b>	<b>0.0</b>	<b>\$214</b>	<b>\$230</b>	<b>\$50</b>	<b>\$180</b>	<b>0.8</b>	<b>1,623</b>
ECM 7	Vending Machine Control	Yes	1,612	0.0	0.0	\$214	\$230	\$50	\$180	0.8	1,623
<b>Custom Measures</b>			<b>3,708</b>	<b>0.0</b>	<b>251.3</b>	<b>\$2,601</b>	<b>\$12,110</b>	<b>\$0</b>	<b>\$12,110</b>	<b>4.7</b>	<b>33,161</b>
ECM 8	Building Envelope Weatherization	Yes	57	0.0	251.3	\$2,115	\$8,200	\$0	\$8,200	3.9	29,484
	Computer Power Management Software	No	3,652	0.0	0.0	\$486	\$3,910	\$0	\$3,910	8.0	3,677
<b>TOTALS FOR HIGH PRIORITY MEASURES</b>			<b>83,962</b>	<b>27.7</b>	<b>319.7</b>	<b>\$13,853</b>	<b>\$83,083</b>	<b>\$14,110</b>	<b>\$68,973</b>	<b>5.0</b>	<b>121,986</b>
<b>TOTALS FOR ALL EVALUATED MEASURES</b>			<b>143,278</b>	<b>69.3</b>	<b>1,366.9</b>	<b>\$30,527</b>	<b>\$433,595</b>	<b>\$34,102</b>	<b>\$399,493</b>	<b>13.1</b>	<b>304,332</b>

\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

# Measures for Further Investigation

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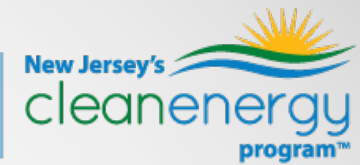
- Building Envelope Weatherization
- Computer Power Management Software
- Retro-Commissioning Study & HVAC Improvements
- Installation of an Energy Management System
- Pneumatic Control Upgrade to Direct Digital Controls (DDC)
- Window AC Unit Plug Controllers
- Fan Coil Unit & Unit Ventilator Upgrades with EC Motors
- Installation of Energy Recovery Unit Ventilators
- Install an Automatic Pool Cover
- Install a Solar Thermal System for Pool Heating
- PV System Installation in Parking Lots
- CHP System Installation

*Could be evaluated during next phase to ensure eligibility in P4P*



# Energy Efficient Best Practices

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- 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 practices by building*

# Clean Energy Program Portfolio



## ELIGIBLE SECTORS

Commercial, Industrial, Government, Non-Profit,  
Institutional and Multifamily

## INCENTIVE PROGRAMS

### Equipment Rebates:

- SmartStart Retrofit
- SmartStart New Construction
- Direct Install
- Large Energy Users

### Whole Buildings:

- Pay for Performance Existing Buildings
- Pay for Performance New Construction

### Energy Generation:

- Combined Heat and Power (CHP)

## OTHER PROGRAMS

### Renewable Energy Generation:

- SREC Registration Program (SRP)

\* eligible programs are highlighted in yellow

# Solar Energy Generation Potential



	Lawrence High School	Lawrence Intermediate School
<i>Potential:</i>	<b>HIGH</b>	<b>Low</b>
<i>System Potential:</i>	375 kW	
<i>Electric Generation:</i>	446,764 kWh per year	
<i>Displaced Cost:</i>	\$38,870 per year	

For more information on the SREC Registration Program (SRP) please visit:

<http://www.njcleanenergy.com/renewable-energy/programs/solar-renewable-energy-certificates-srec/new-jersey-solar-renewable-energy>

# SmartStart: Overview

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- Two types of incentives for high efficiency equipment installation:
  - Prescriptive
  - Custom
- Project Categories:
  - New Construction
  - Renovation
  - Remodeling
  - Equipment Replacement
- Project pre-approval required for lighting and custom measures
- Incentives up to \$500,000 per electric account & \$500,000 per natural gas account
- Specific incentives and individual applications for Lighting, HVAC, VFDs, Refrigeration, Controls and more!

[www.NJCleanEnergy/SSB](http://www.NJCleanEnergy/SSB)

# Direct Install: Overview

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- Turn-key retrofit program to replace outdated and inefficient equipment, including lighting, HVAC, refrigeration, etc.
- Open to Small to Mid-Sized Commercial and Industrial facilities with an average electric demand  $\leq 200$  kW
- Provides incentives of up to 70% of the installed cost
- Incentives are paid directly to the contractor
  - Customer only pays remaining 30% of installed cost
  - \$125,000 project/building cap
  - \$250,000 per entity cap (up to \$500,000 if using ESIP)
- Participating contractors provide support and process all paperwork
- Fast turnaround time: Average length of time for job completion (4-6 months)

# Direct Install:

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## Participating Contractor

**Tri-State Light & Energy, Inc.**

Alan Rhode

610-789-1900 x226

[asr@tsle.com](mailto:asr@tsle.com)

# Pay for Performance: Overview

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- Comprehensive, whole-building approach to saving energy in existing or new facilities
- Qualification based on energy consumption, energy savings and measure types
- Customer chooses from network of pre-approved ***Participating Partners***
- Incentives paid in three installments at milestones
  - Incentives up to \$2 million per project (\$4 entity cap/year)
    - \$1 million for electric measures
    - \$1 million for gas measures
  - Incentives up to 50% of total project cost

# Pay for Performance: Process



Submittal and  
Approval of  
Application

Development  
and Approval of  
Energy  
Reduction Plan  
(ERP)

Installation of  
Recommended  
Measures

Submittal and  
Approval of  
As-Built ERP and  
Cx Report

Post  
Construction  
Verification of  
Savings

Incentive #1  
*fixed between  
\$3,750-\$25,000*

Incentive #2  
*up to 25%  
project cost*

Incentive #3  
*up to 25%  
project cost*

1 year



# Pay for Performance: Details



Incentive #1: Energy Reduction Plan			
Incentive Amount:		\$0.15	per sq ft
Minimum Incentive:		\$3,750	
Maximum Incentive:		\$25,000	or 50% of facility annual energy cost
Incentive #2: Installation of Recommended Measures			
Minimum Performance Target:		15%	
Electric Incentives	Base Incentive based on 15% savings:	\$0.09	per projected kWh saved
	For each % over 15% add:	\$0.005	
	Maximum Incentive:	\$0.11	
Gas Incentives	Base Incentive based on 15 % savings:	\$0.90	per projected Therm saved
	For each % over 15% add:	\$0.05	
	Maximum Incentive:	\$1.25	
Incentive Cap:		25%	of total project cost
Incentive #3: Post-Construction Benchmarking Report			
Minimum Performance Target:		15%	
Electric Incentives	Base Incentive based on 15% savings:	\$0.09	per projected kWh saved
	For each % over 15% add:	\$0.005	
	Maximum Incentive:	\$0.11	
Gas Incentives	Base Incentive based on 15% savings:	\$0.90	per projected Therm saved
	For each % over 15% add:	\$0.05	
	Maximum Incentive:	\$1.25	
Incentive Cap:		25%	of total project cost

# Recommended NJCEP Incentives per Building



Entity Name	SmartStart	Direct Install	Pay For Performance
High School	X		X
Intermediate School	X	X	X

## Energy Savings Improvement Program (ESIP)

- Provides alternative financing for energy savings projects at public institutions. Value of energy savings leveraged to pay for cost of EE projects over a 15 year contract. Does not count as debt/require voter approval.
- Requires an audit as 1<sup>st</sup> step (LGEA satisfies requirement)
- ESIP participation question on LGEA application
- Program administered directly by BPU

## ESIP Process

## New Jersey's Clean Energy Program Interaction

Initial Energy Audit completed  
for entity building(s)

Local Government Energy Audit  
(LGEA) may be used to meet  
this requirement

Entity issues ESIP RFP (previously  
approved by BPU) and selects ESCO  
or DIY approach

Investment Grade Energy Audit completed  
and Energy Savings Plan (ESP)  
developed

P4P Energy Reduction Plan (ERP),  
Direct Install, or SmartStart application  
recommended submittal time frame

Third party review of ESP

Review and approval of ESP  
by Board of Public Utilities (BPU)

Entity adopts ESP,  
determines guarantee



# FOR MORE INFORMATION

## ESIP

**Mike Thulen**

ESIP Coordinator

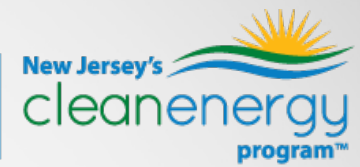
Office: 609-777-3338

Cell: 732-330-2419

[ESIP@bpu.nj.gov](mailto:ESIP@bpu.nj.gov)

# Questions

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# FOR MORE INFORMATION

**Visit** [NJCleanEnergy.com](http://NJCleanEnergy.com)

**Call** (866) NJSMART

**Jim Friedl**

Outreach Manager

732-855-6543

[jfriedl@trcsolutions.com](mailto:jfriedl@trcsolutions.com)