

New Jersey's Clean Energy Program

LG&A Exit Meeting for:
Montclair State University

April 11, 2018

Agenda



- Introductions
- Overview of LGEA process
- Energy use & existing conditions
- Review of **E**nergy **C**onservation **M**easures (ECMs) identified
- Questions regarding the draft audit report
- Overview of NJCEP equipment incentives
- Energy Savings Improvement Program (ESIP)
- Next steps for Montclair State University

Introductions

Montclair State University

- Ana Pinto: Director of Energy Management
- Kevin Johnson: Supervisor of Building Repairs II
- Mike Zanko: AVP, Capitol Planning & Project Management

NJ Clean Energy Program Team

- Brian DeLuca, CEM: LGEA Program Manager
- Vish Nimbalkar, PE: Lead Auditor
- Michael Roberts, PE: Senior Engineer
- Mike Thulen: ESIP Coordinator (BPU)

Process to Draft Report



- Application submitted to NJCEP
- Site Visit Performed
- Utility Analysis
- Baseline Condition
- Analysis
- Recommendations
- Report

All Sites Audited

Academic Facilities

- (3) Center for Clinical Services
- (4) Center for Environ. & Life Sciences
- (6) Chapin Hall
- (7) Calcia Hall
- (8) College Hall (Under Renovation)
- (11) Dickson Hall
- (16) Finley Hall
- (18) Alexander Kasser Theater
- (20) Life Hall
- (25) Morehead Hall
- (29) Richardson Hall
- (31) School of Business
- (32) Conrad J. Schmitt Hall
- (33) Science Hall
- (35) Speech Building
- (39) University Hall
- (41) Webster Hall

Dormitories / Residence Halls

- (1) Blanton Hall
- (2) Bohn Hall
- (12) Dinallo Heights
- (17) Freeman Hall
- (21) Machuga Heights
- (30) Russ Hall
- (38) Stone Hall
- (45) Count Basie Hall
- (49) 35 Clove Rd
- (52) Millicent Fenwick Hall
- (53) Hawk Crossings 100 - Falco
- (54) Hawk Crossings 200 - Accipiter
- (55) Hawk Crossings 300 - Buteo
- (65) Alice Paul Hall
- (67) Sinatra Hall
- (68) William Carlos Williams Hall

Student & Campus Services Facilities

- (24) Maintenance Building
- (26) Partridge Hall (Under Renovation)
- (40) University Police Dept.
- (10) Red Hawk Diner
- (13) Drop-In Center
- (15) Field House
- (19) Sprague Library
- (27) Panzer Athletic Center
- (34) Softball Stadium
- (36) Student Recreation Center
- (37) Student Center
- (44) Abbott & Costello Center
- (47) Ben Samuels Children's Center

Other Campus Facilities

- (5) Cogeneration Plant
- (14) Electrical Substation
- (22) Montclair District Energy Plant
- (9) Car Parc Diem
- (28) Red Hawk Deck

Historical Electricity Purchases

Electric Source	kWh/yr	%
PSE&G (electric substation)	6,200,000	11.5
PSE&G (other meters – mostly residence halls)	6,200,000	11.5
Cogeneration Plant	41,100,000	77.0
Total	53,500,000	

Electricity Savings from Proposed Measures

Building #	Proposed Savings kWh/yr
1 - 41	8,822,000
42 - 68	1,389,000
Total	10,211,000

- Total Savings from Proposed Measures 10.2 Million kWh/yr 19% of Current Use.
- Implementing all Proposed Measures will Reduce CHP Purchases ~2.0 Million kWh/yr.
- If all Proposed Measures are Implemented MSU will purchase ~4.8 Million kWh/yr from PSE&G for Buildings not served by Main Electric Substation.

Historical Natural Gas Purchases

Natural Gas Source	Therms/yr	%
Main Campus Service	374,061	55.9
Individual Meters	295,415	44.1
Total	669,476	

Natural Gas Savings from Proposed Measures

- 25,260 therms/yr or 3.7%

CHP Purchases as compared to *Commercial Building Energy Consumption Survey (CBECS 2012)*

Utility	MSU	CBECS	MSU / CBECS
Steam	84,226 Btu/sf	15,400 Btu/sf	550%
Chilled Water	49,170 Btu/sf	12,795 Btu/sf	380%

Campus values are much higher than the CBECS values, which is significant and indicates potential issues such as:

- Steam and Chilled Water Meters may be inaccurate.
- Possibility of Distribution Leaks.

ECM Summary – By Category

Measure Type	kWh Savings	MMBtu Savings	Cost Savings	Installed Costs	Simple Payback
Lighting Upgrades	5,694,932	0	\$ 855,776	\$ 2,781,583	3.3
Lighting Controls	2,213,875	0	\$ 216,159	\$ 681,654	3.2
Motor Upgrades	83,410	0	\$ 13,978	\$ 156,533	11.2
Variable Frequency Drives	1,439,554	0	\$ 232,007	\$ 406,370	1.8
HVAC Replacements	702,661	1,672	\$ 154,135	\$ 1,731,626	11.2
DHW Upgrades	12,180	889	\$ 24,775	\$ 107,918	4.4
Food Service	9,780	0	\$ 1,643	\$ 17,066	10.4
Plug Loads	74,709	0	\$ 11,911	\$ 15,640	1.3
TOTAL	10,231,100	2,562	\$ 1,510,384	\$ 5,898,390	3.9

ECM Summary – All Measures

Energy Conservation Measure All Evaluated Measures	Annual Electric Savings (kWh)	Chilled Water Savings (Ton-Hr)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual Steam Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades	5,694,932	0	924	0	0	0	855,776	3,058,533	276,950	2,781,583	3.3	5,776,847
Install LED Fixtures	345,265	0	57	0	0	0	55,419	201,495	25,675	175,820	3.2	347,680
Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,811,049	0	303	0	0	0	301,440	963,901	74,080	889,821	3.0	1,830,446
Retrofit Fixtures with LED Lamps	3,497,119	0	560	0	0	0	492,345	1,849,140	177,195	1,671,945	3.4	3,556,934
Install LED Exit Signs	41,498	0	3	0	0	0	6,572	43,997	0	43,997	6.7	41,788
Lighting Control Measures	2,213,875	0	227	0	0	0	216,159	894,204	212,550	681,654	3.2	2,236,735
Install Occupancy Sensor Lighting Controls	583,233	0	96	0	0	0	88,137	582,688	75,177	507,511	5.8	593,528
Install Daylight Dimming Controls	7,141	0	1	0	0	0	1,013	2,250	1,630	620	0.6	7,191
Install High/Low Lighting Controls	1,623,500	0	130	0	0	0	127,008	309,266	135,743	173,523	1.4	1,636,016
Motor Upgrades	83,410	0	14	0	0	0	13,978	156,533	0	156,533	11.2	83,993
Premium Efficiency Motors	83,410	0	14	0	0	0	13,978	156,533	0	156,533	11.2	83,993
Variable Frequency Drive (VFD) Measures	1,439,554	0	210	0	0	0	232,007	490,185	83,815	406,370	2	1,449,620
Install VFD on Variable Air Volume (VAV) HVAC	388,707	0	46	0	0	0	65,314	112,806	17,275	95,531	1.5	391,425
Install VFDs on Constant Volume (CV) HVAC	469,238	0	107	0	0	0	74,607	196,382	40,140	156,242	2.1	472,519
Install VFDs on Chilled Water Pumps	419,203	0	49	0	0	0	64,861	121,838	21,600	100,238	1.5	422,134
Install VFDs on Hot Water Pumps	69,740	0	7	0	0	0	11,658	33,823	0	33,823	2.9	70,228
Install VFDs on Cooling Tower Fans	92,666	0	0	0	0	0	15,568	25,337	4,800	20,537	1.3	93,314
Electric Unitary HVAC Measures	58,953	0	25	0	0	0	9,713	233,684	11,393	222,290	22.9	59,366
Install High Efficiency Electric AC	58,706	0	25	0	0	0	9,671	218,365	10,873	207,492	21.5	59,117
Install High Efficiency Packaged Terminal AC/HP	247	0	0	0	0	0	42	15,318	520	14,798	356.4	249
Electric Chiller Replacement	637,566	0	373	0	0	0	84,727	929,971	100,280	829,691	9.8	642,023
Install High Efficiency Chillers	637,566	0	373	0	0	0	84,727	929,971	100,280	829,691	9.8	642,023
Gas Heating (HVAC/Process) Replacement	0	0	0	1,665	13	1,677	12,385	244,962	23,126	221,836	17.9	196,769
Install High Efficiency Hot Water Boilers	0	0	0	1,665	0	1,665	12,292	236,579	21,926	214,653	17.5	194,911
Install High Efficiency Furnaces	0	0	0	0	13	13	93	8,383	1,200	7,183	77.0	1,858
HVAC System Improvements	6,142	84,520	0	8	1,250	1,258	47,310	457,809	0	457,809	9.7	190,044
Implement Demand Control Ventilation	6,142	84,520	0	8	1,118	1,126	45,128	456,765	0	456,765	10.1	170,739
Install Pipe Insulation	0	0	0	0	132	132	2,182	1,044	0	1,044	0.5	19,304
Domestic Water Heating Upgrade	12,180	0	0	889	985	1,874	24,775	107,918	0	107,918	4.4	260,568
Install Low-Flow Domestic Hot Water Devices	12,180	0	0	889	985	1,874	24,775	107,918	0	107,918	4.4	260,568
Food Service Equipment & Refrigeration Measures	9,780	0	1	0	0	0	1,643	18,016	950	17,066	10.4	9,848
Replace Refrigeration Equipment	9,780	0	1	0	0	0	1,643	18,016	950	17,066	10.4	9,848
Plug Load Equipment Control - Vending Machine	74,709	0	0	0	0	0	11,911	15,640	0	15,640	1.3	75,231
Vending Machine Control	74,709	0	0	0	0	0	11,911	15,640	0	15,640	1.3	75,231
TOTALS FOR ALL EVALUATED MEASURES	10,231,100	84,520	1,774.0	2,561.7	2,247.4	4,809.1	\$1,510,384	\$6,607,455	\$709,065	\$5,898,390	3.9	10,981,044

*Estimated incentives shown are conservatively based on SmartStart

ECM Summary – High Priority

Energy Conservation Measure All High Priority Measures	Annual Electric Savings (kWh)	Chilled Water Savings (Ton-Hr)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual Steam Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades	5,694,932	0	924	0	0	0	855,776	3,058,533	276,950	2,781,583	2.0	5,734,751
Install LED Fixtures	345,265	0	57	0	0	0	55,419	201,495	25,675	175,820	3.2	347,680
Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,811,049	0	303	0	0	0	301,440	963,901	74,080	889,821	3.0	1,823,712
Retrofit Fixtures with LED Lamps	3,497,119	0	560	0	0	0	492,345	1,849,140	177,195	1,671,945	3.4	3,521,571
Install LED Exit Signs	41,498	0	3	0	0	0	6,572	43,997	0	43,997	6.7	41,788
Lighting Control Measures	2,213,875	0	227	0	0	0	216,159	894,204	212,550	681,654	3.2	2,229,354
Install Occupancy Sensor Lighting Controls	583,233	0	96	0	0	0	88,137	582,688	75,177	507,511	5.8	587,311
Install Daylight Dimming Controls	7,141	0	1	0	0	0	1,013	2,250	1,630	620	0.6	7,191
Install High/Low Lighting Controls	1,623,500	0	130	0	0	0	127,008	309,266	135,743	173,523	1.4	1,634,852
Motor Upgrades	78,080	0	13	0	0	0	13,082	135,319	0	135,319	10.3	78,626
Premium Efficiency Motors	78,080	0	13	0	0	0	13,082	135,319	0	135,319	10.3	78,626
Variable Frequency Drive (VFD) Measures	1,439,554	0	210	0	0	0	232,007	490,185	83,815	406,370	2	1,449,620
Install VFD on Variable Air Volume (VAV) HVAC	388,707	0	46	0	0	0	65,314	112,806	17,275	95,531	1.5	391,425
Install VFDs on Constant Volume (CV) HVAC	469,238	0	107	0	0	0	74,607	196,382	40,140	156,242	2.1	472,519
Install VFDs on Chilled Water Pumps	419,203	0	49	0	0	0	64,861	121,838	21,600	100,238	1.5	422,134
Install VFDs on Hot Water Pumps	69,740	0	7	0	0	0	11,658	33,823	0	33,823	2.9	70,228
Install VFDs on Cooling Tower Fans	92,666	0	0	0	0	0	15,568	25,337	4,800	20,537	1.3	93,314
Electric Unitary HVAC Measures	46,597	0	17	0	0	0	7,828	136,678	6,943	129,735	16.6	46,922
Install High Efficiency Electric AC	46,597	0	17	0	0	0	7,828	136,678	6,943	129,735	16.6	46,922
Electric Chiller Replacement	637,566	0	373	0	0	0	84,727	929,971	100,280	829,691	9.8	642,023
Install High Efficiency Chillers	637,566	0	373	0	0	0	84,727	929,971	100,280	829,691	9.8	642,023
Gas Heating (HVAC/Process) Replacement	0	0	0	1,637	0	1,637	12,060	228,321	20,926	207,394	17.2	191,618
Install High Efficiency Hot Water Boilers	0	0	0	1,637	0	1,637	12,060	228,321	20,926	207,394	17.2	191,618
HVAC System Improvements	4,000	80,576	0	0	1,194	1,194	44,753	389,838	0	389,838	8.7	178,834
Implement Demand Control Ventilation	4,000	80,576	0	0	1,062	1,062	42,570	388,794	0	388,794	9.1	159,529
Install Pipe Insulation	0	0	0	0	132	132	2,182	1,044	0	1,044	0.5	19,304
Domestic Water Heating Upgrade	12,180	0	0	889	985	1,874	24,775	107,918	0	107,918	4.4	260,568
Install Low-Flow Domestic Hot Water Devices	12,180	0	0	889	985	1,874	24,775	107,918	0	107,918	4.4	260,568
Food Service Equipment & Refrigeration Measures	9,780	0	1	0	0	0	1,643	18,016	950	17,066	10.4	9,848
Replace Refrigeration Equipment	9,780	0	1	0	0	0	1,643	18,016	950	17,066	10.4	9,848
Plug Load Equipment Control - Vending Machine	74,709	0	0	0	0	0	11,911	15,640	0	15,640	1.3	75,231
Vending Machine Control	74,709	0	0	0	0	0	11,911	15,640	0	15,640	1.3	75,231
Custom Measures	0	0	0	0	0	0	0	0	0	0	0.0	0
TOTALS FOR ALL HIGH PRIORITY MEASURES	10,211,272	80,576	1,764.5	2,525.9	2,179.0	4,704.9	\$1,504,722	\$6,404,622	\$702,414	\$5,702,208	3.8	10,897,396

*Estimated incentives shown are conservatively based on SmartStart

ECM Summary – Not Recommended

Energy Conservation Measure All Not Recommended Measures	Annual Electric Savings (kWh)	Chilled Water Savings (Ton-Hr)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual Steam Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Motor Upgrades	5,329	0	1	0	0	0	896	21,214	0	21,214	23.7	5,366
Premium Efficiency Motors	5,329	0	1	0	0	0	896	21,214	0	21,214	23.7	5,366
Electric Unitary HVAC Measures	12,357	0	8	0	0	0	1,884	97,006	4,451	92,555	49.1	12,443
Install High Efficiency Electric AC	12,110	0	8	0	0	0	1,843	81,688	3,931	77,757	42.2	12,194
Install High Efficiency Packaged Terminal AC/HP	247	0	0	0	0	0	42	15,318	520	14,798	356.4	249
Gas Heating (HVAC/Process) Replacement	0	0	0	28	13	41	325	16,642	2,200	14,442	44.4	5,151
Install High Efficiency Hot Water Boilers	0	0	0	28	0	28	232	8,259	1,000	7,259	31.3	3,293
Install High Efficiency Furnaces	0	0	0	0	13	13	93	8,383	1,200	7,183	77.0	1,858
HVAC System Improvements	2,142	3,944	0	8	56	63	2,557	67,971	0	67,971	26.6	11,210
Implement Demand Control Ventilation	2,142	3,944	0	8	56	63	2,557	67,971	0	67,971	26.6	11,210
Custom Measures	0	0	0	0	0	0	0	0	0	0	0.0	0
TOTALS FOR NOT RECOMMENDED MEASURES	19,828	3,944	9.4	35.9	68.3	104.2	\$5,662	\$202,833	\$6,651	\$196,182	34.6	34,170

Not-recommended measures refers to energy saving upgrades that do not offer a payback within their respective measure life but may provide other benefits.

- Replacement of equipment close to, at or past rated measure life
- Comfort
- Sustainability

PROGRAM PORTFOLIO



ELIGIBLE SECTORS

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

PROGRAMS

Equipment Rebates:

- **Retrofit – Existing Buildings (SmartStart)**
- **New Construction (SmartStart)**
- **Direct Install – Small Business**
- Large Energy Users

Whole Buildings:

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

Energy Generation:

- Combined Heat and Power (CHP) and Fuel Cells

*Programs in **Red** text are potential incentive programs to pursue as identified in the audit reports

Recommended NJCEP Incentives



- SmartStart Buildings (i.e Retrofit – Existing Buildings)
- Direct Install

Willdan Energy Solutions

Robert Vidaurre

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rvidaurre@willdan.com

- Pay for Performance (P4P)

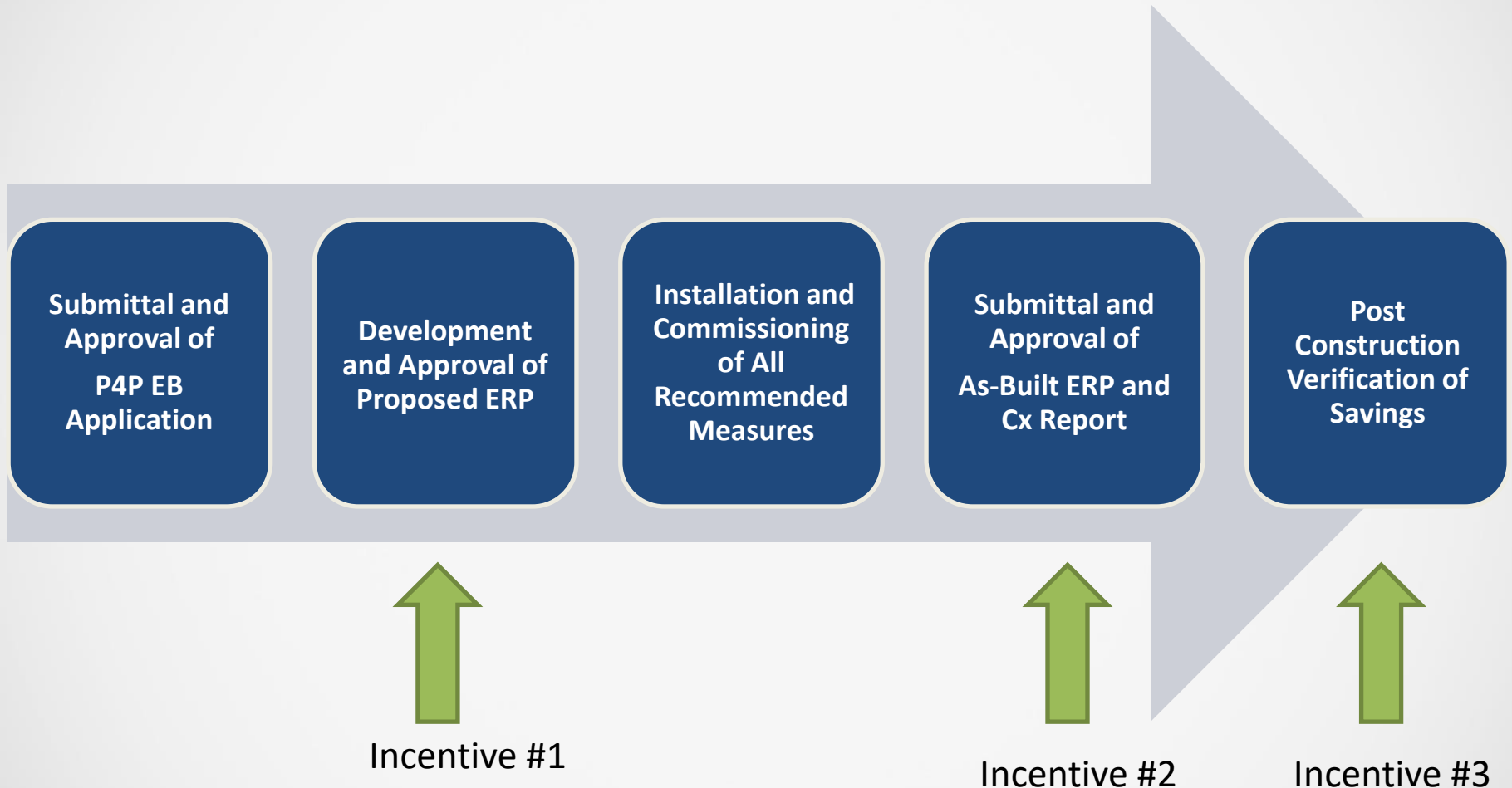
SmartStart Prescriptive: Overview

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

Direct Install: Overview

- 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 a peak electric demand ≤ 200 kW **(Per utility meter, per building)**
- 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 cap
 - \$250,000 per entity cap
- Participating contractors provide support and process all paperwork
- Fast turnaround time: Average length of time for job completion (4-6 months)

P4P EB: Process



P4P EB: Incentives



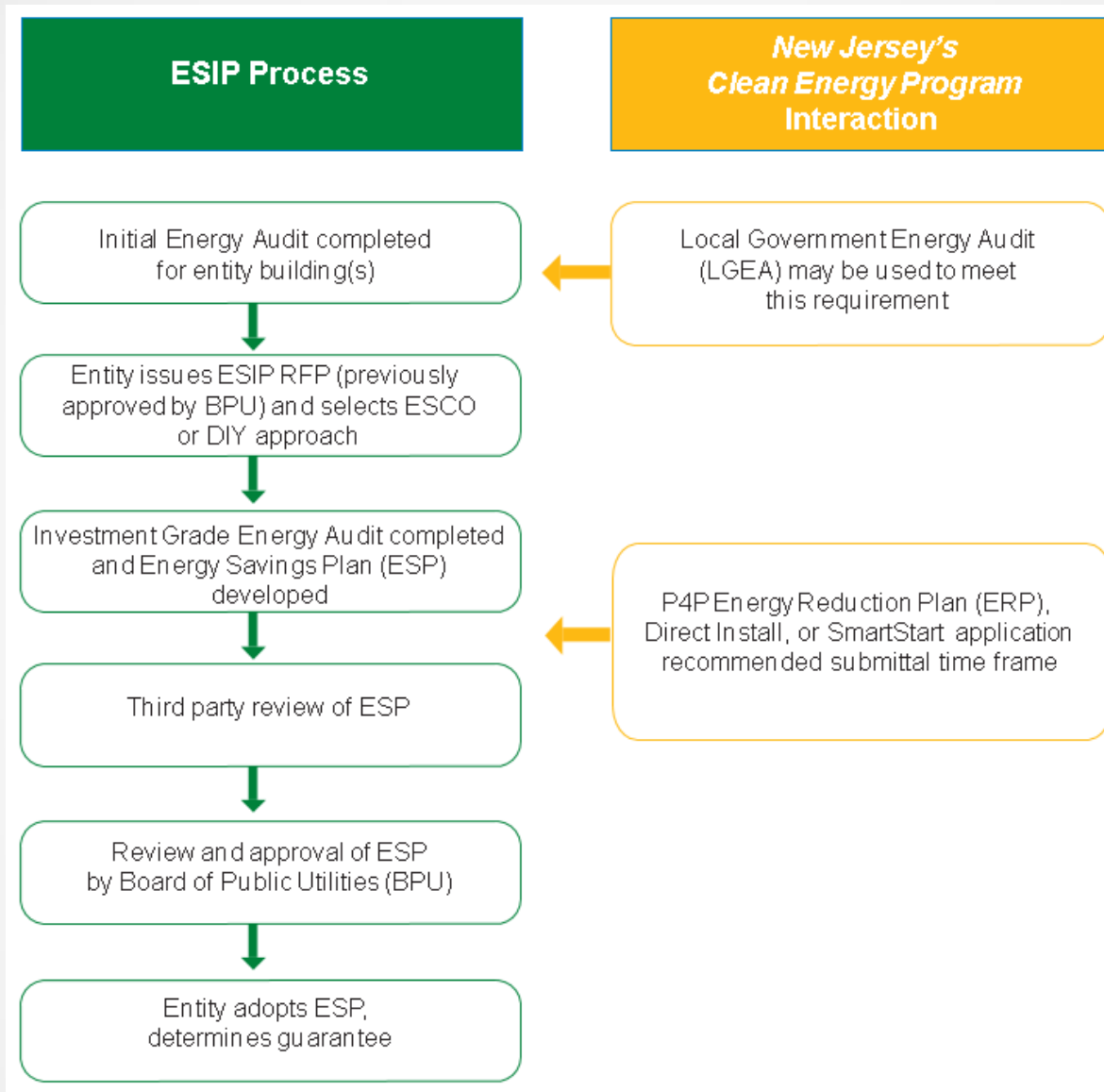
Incentive #1: Energy Reduction Plan			
Incentive Amount:		\$0.15	per sq ft
Minimum Incentive:		\$7,500	
Maximum Incentive:		\$50,000	or 50% of facility annual energy cost
Incentive #2: Installation of Recommended Measures			
Minimum Performance Target:		15%	
Electric Incentives	Base Incentive based on 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

Utility meter needed for each individual building to qualify for P4P Program.

Energy Savings Improvement Program (ESIP)



- Program administered directly by BPU
- 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 or require voter approval.
- Requires an audit as 1st step (LGEA satisfied this requirement)



FOR MORE INFORMATION

ESIP

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Questions



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FOR MORE INFORMATION

Visit NJCleanEnergy.com

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