CDM

Town of Clinton

Final Energy Audit Report

September 2010

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Executive Summary

As part of an initiative to reduce energy cost and consumption, the Town of Clinton (Clinton) secured the services of Camp Dresser and McKee (CDM) to perform an energy audit at their wastewater treatment plant and various facilities in the Town of Clinton in an effort to develop comprehensive Energy Conservation and Retrofit Measures (ECRMs).

CDM's energy audit team visited the facilities on February 4th and March 2nd 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 Clinton's wastewater treatment plant facility to offset the electrical energy usage. Specifically, the use of solar electric photovoltaic panels, combined heat and power co-generation systems, ground source heat pumps and wind turbines were investigated.

In addition to identifying ECRMs, an alternate third party supplier was contacted in an effort to identify further energy cost savings available for the Town of Clinton.. This is discussed further in Section 5. Additionally, there is potential for the Town of Clinton 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 factors such as wastewater system operational issues 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 facility, for the most recent 12 month period of May 2008 through April 2009, as presented in Section 3. These values can serve as a benchmarking tool, along with the building profile that has been established through the EPA's Portfolio Manager Program for the wastewater treatment plant and various town facilities, to quantify the reduction in electrical energy and natural gas usage following the implementation of the recommended ECRMs.

Table ES-1: Summary of Annual Energy Usage & Cost						
	Electrical Energy Use (kWH)	**Average Peak Summer Demand (kW)**	**Average Peak Winter Demand (kW)**	**Fuel Use for Entire Building (therms)**	**Cost for Electric Service**	**Cost for Fuel**
Municipal Building	164,480	33.48	43.44	1,992	$27,047	$3,623
Community Center	20,363	14.95	15.04	2,426	$3,995	$4,135
Waste Water Treatment Plant	1,411,120	*	*	8,786**	$224,021	$12,260
West End Well House 1	51,040	14.53	16.89	N/A	$8,715	N/A
Lebanon Well House 2	295,920	38.05	37.07	N/A	$45,853	N/A
Potterstown Well House 4	221,951	28.53	30.64	N/A	$34,491	N/A
Treatment Plant Well House 6	92,247	19.50	31.99	N/A	$14,877	N/A
Lilac Drive Well House 7	27,840	9.78	24.55	N/A	$5,084	N/A
Foxfire Booster Pump Station	31,760	19.60	13.00	N/A	$5,646	N/A
Beaver Brook Well House 11	163,840	52.18	50.81	N/A	$27,629	N/A
DPW-Barn Well House 12	468,640	61.63	61.49	N/A	$73,232	N/A
Hunts Mill Park Well House 15	435,360	65.20	71.08	233	$68,610	$551

* Note: Monthly bills were not available

** Note: Propane gas measured in gallons.

Wastewater Treatment Plant Processes

The following table, Table ES-2, presents the potential energy savings associated with installing variable frequency drives for the existing process air blowers and return activated sludge pumps.

Table ES-2: Wastewater Treatment Plant Processes- Process Air Blowers and Return Activated Sludge Pumps

Recommendation	Engineer's Opinion of Probable Construction Cost	Annual Energy Savings (kW-hrs)	Annual Energy Savings	Simple Payback (Years)
Alternative 4: New Variable Frequency Drives for Process Air Blowers	$281,800	257,500	$41,000	7.2
New Variable Frequency Drives for Return Activated Sludge Pumps	$47,000	45,645	$7,300	6.9

Water Wells and Hydropneumatic Stations

Although the Town of Clinton's energy costs currently do not reflect energy rates associated with on-peak/off-peak energy usage, the viability of off-peak pumping of production and booster pumping units in an effort to take advantage of potential reduced energy rates during off-peak time periods was evaluated in Section 4.2.1. This evaluation was performed to demonstrate the feasibility of pumping during off-peak hours should the Town decide to entertain an on-peak/off-peak operational protocol in the future in efforts to reduce energy costs.

The evaluation demonstrates that the wells in the water distribution system will be able to charge the two 2.5 million gallon Ground Storage Tanks during off-peak hours; however, augmentation of supply water will be required during peak periods of operation. To adequately determine if off-peak pumping is a viable option, further detailed water system analysis which includes a hydraulic model of the entire water system is required to determine the potential energy savings and to confirm that this operation protocol will not impose service quality issues in any of the higher or more remote areas of the distribution system.

In addition to on-peak/off-peak pumping, an additional water system evaluation was performed in Section 4.2.2 to identify potential energy savings associated with operating the water distribution system at a reduced hydraulic energy grade line. The evaluation demonstrates that if the hydraulic energy grade line is reduced by 10 pounds per square inch, the potential annual energy cost savings is approximately

$7,370.00. Table 4-11 demonstrates potential energy savings at various reductions to the hydraulic energy grade line.

The actual ability to reduce the hydraulic energy grade line is greatly dependent upon the details of the water distribution system and in particular how service in the higher elevations of the system can be maintained with an appropriate level of service. It is therefore recommended that a more detailed water distribution system analysis be undertaken that would provide a more precise investigation into the ability, constraints, limitations, and benefits of a reduction in water supply pressure provided from each of the well stations.

Building Lighting and HVAC System ECRMs

The following table, Table ES-3, presents the ranking of recommended ECRMs identified for the building lighting and HVAC systems based on the simply 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 period for each recommended ECRM. The ECRMs are ranked based on payback period.

Table ES-3[1]
Ranking of Energy Savings Measures for Building Lighting, HVAC Systems & Building Envelope

Overall Ranking (Based on Simple Payback)	Site	Total Cost	Anticipated Annual Energy Savings	Annual Fiscal Savings[3]	Simple Payback (Years)
1	Lighting Replacement – Municipal Bldg	$4,882	9,553 kWh	$1,629	3.00
2	Lighting Replacement - WWTP Control Bldg	$6,410	12,263 kWh	$2,080	3.08
3	Lighting Replacement – Lilac Dr. Well House	$195	339 kWh	$62	3.15
4	Lighting Replacement – DPW Barn Well House 12	$262	456 kWh	$77	3.40
5	Lighting Replacement – West End Well House 1	$27	39 kWh	$7	3.86
6	Thermostat Replacement – Municipal Bldg	$5,000	6,000kWh 142 therms	$1,216	4.11
7	Lighting Replacement – Well House 6	$184	247 kWh	$42	4.38
8	Lighting Replacement – Lebanon Well House 2	$27	39 kWh	$6	4.50
9	Lighting Replacement – Potterstown Well House 4	$27	39 kWh	$6	4.5
10	Thermostat Replacement – Community Center	$1,250	180 therms	$252	4.96

Table ES-3[1] Ranking of Energy Savings Measures for Building Lighting, HVAC Systems & Building Envelope					
Overall Ranking (Based on Simple Payback)	**Site**	**Total Cost**	**Anticipated Annual Energy Savings**	**Annual Fiscal Savings[3]**	**Simple Payback (Years)**
11	**Lighting Replacement – WWTP Outside Equipment**	$21,843	26,907 kWh	$4,335	5.04
12	**Lighting Replacement – Beaver Brook Well House 11**	$290	308 kWh	$54	5.37
13	**Lighting Replacement – Community Center**	$6,842	5,610 kWh	$1,161	5.89
14	**Lighting Replacement –Booster Pump-Foster Wheeler**	$472	432 kWh	$71	6.65
15	**Lighting Replacement – Blower Bldg**	$1,192	944 kWh	$156	7.64
16	**Window Replacement – Lebanon Well House #2**	$500	428 kWh	$64	7.81
17	**Lighting Replacement – Pump Station Bldg**	$419	304 kWh	$50	8.38
18	**Window Replacement – Lilac Dr. Well House #7**	$3,000	1,712 kWh	$308	9.74
19	**Window Replacement – West End Well House #1**	$3,000	1,712 kWh	$291	10.30
20	**Unit Heater Replacement – Blower Building**	$3,900	263 therms	$368	10.59
21	**Air Conditioning/Heat Pump Replacement – Control Bldg**	$14,310	7,913	$1,266	11.30
22	**Lighting Replacement – Fox Fire Station #2**	$262	95 kWh	$18	14.55
23	**Air Conditioning/Heat Pump Replacement – Municipal Bldg**	$28,759	12,194	$1,951	14.74
24	**Lighting Replacement – Hunts Mill Park Well House #15**	$785	285 kWh	$48	16.35
25	**Furnace Replacement – Municipal Bldg**	$9,400	237 therms	$427	22.01

1. 'Total Cost' takes into account any applicable rebates.
2. Savings assume all building heat provided by natural gas, at current natural gas aggregate rate per therm
3. 'Annual Fiscal Savings' takes into account maintenance costs.

Motor Upgrades and VFD Addition ECRMs

Section 4.5 of the report provides for an economic evaluation of upgrading selected motors to premium efficiency, and adding VFDs to pumps that are currently utilizing other forms of starters.

Table ES-4 includes a simple payback analysis for the upgrade of motors, and addition of VFDs.

Table ES-4[1]
Ranking of Energy Savings Measures for Motor Upgrades

Overall Ranking (Based on Simple Payback)	Site	Total Cost[1]	Anticipated Annual Energy Savings (kWh)	Annual Fiscal Savings[2]	Simple Payback (Years)
1	WWTP Outside Equipment	$5,037	7,018	$1,123	4.5
2	Well House #6	$855	1,129	$181	4.7
3	WWTP Control Building	$13,195	11,788	$1,886	7.0
4	Fox Fire Station 2	$14,833	11,125	$2,003	7.4
5	Hunts Mill Park Well House #15	$5,293	4,396	$703	7.5
6	Lilac Dr. Well House #7	$10,299	7,418	$1,335	7.7
7	WWTP Filter Building	$7,285	5,810	$930	7.8
8	Lebanon Well House#2	$5,293	4,396	$659	8.0
9	WWTP Pump Station Bldg	$15,296	11,882	$1,901	8.1
10	DPW Barn Well House #12	$4,508	3,124	$500	9.0
11	Beaver Brook Well House #11	$654	364	$62	10.6
12	Booster Pump Foster Wheeler	$9,094	4,854	$777	11.7

1. 'Total Cost' takes into account any applicable rebates.
2. Annual Fiscal Savings accounts for maintenance costs.

Renewable Energy ECRMs

Co-Generation

The feasibility study to implement combined heat and power cogeneration systems at the Town's wastewater treatment plant was not conducted as the plant does not employ the anaerobic digestion process to stabilize collected sludge and therefore digester gas is not available as potential fuel. Furthermore, there is no natural gas service for the wastewater treatment plant that can be used as fuel for a combined heat and power cogeneration system.

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. An ideal location for a wind turbine is 20 feet above any surrounding object within a 250 foot radius. In general this relates to a property size of one acre or more. In addition, an average of 9 mph wind speed is required to 'fuel' the wind turbine. On-site wind power generation is not recommended for this wastewater treatment plant facility as there is insufficient available area to install wind turbines to generate a reasonable amount of electricity to provide for an attractive simple payback period. Additionally, feasibility studies at the wastewater treatment plant to determine wind speed have not been performed to confirm if adequate wind speeds exist to power wind turbines. It is expected that a wind turbine system would require a high initial investment, including feasibility studies, material and labor costs, installation, and lifetime maintenance costs and would not generate enough energy savings to result in an attractive payback period.

Ground Source Heat Pump System

Ground source heat pumps utilize the relatively constant temperature of underground water sources to reject or supply heat to the interior space. Water is pumped through a loop that runs from the underground source to heat pumps at the building level. Depending on the time of year and building demand, these heat pumps use the ground source loop as a heat source or a heat sink. Typically, ground source heat pump systems are most efficient when used in spaces that have similar heating and cooling loads, as the same loop and heat pumps are used for both cooling and heating. For wastewater treatment plant facilities, the heating and cooling loads are essentially unequal with most of the cooling in plant process areas achieved by ventilation of outdoor air to meet code requirements. Furthermore, as a water conservation measure, the cooling medium for a proposed ground source geothermal system will likely consist of treated plant effluent, which, although treated, will tend to foul heat transfer components as a result of inherent microbiological organisms present in the cooling media. Potential fouling of heat transfer components will result in increased maintenance efforts and system outage. Ground source heat pump systems are often very costly to install due to the high cost of test boring and drilling wells. Due to this, the largely unbalanced heating and cooling demands at wastewater treatment plants, and the potential fouling of heat transfer components, CDM anticipates that installation of a ground source heat pump system would not prove cost-beneficial.

Solar Energy

Section 4.6. of the report provides for an economic evaluation of roof mounted and canopy mounted solar systems that were evaluated to be installed at the WWTP. The evaluation covered the economic feasibility of the Town of Clinton 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-5, it would benefit Clinton to further investigate the installation of a solar energy system at the WWTP. This is primarily based on the initial upfront capital investment required for a solar energy system installation and the 7.82 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.

Table ES-5
Ranking of Energy Savings Measures Renewable Energy Technologies

Overall Ranking	Parameter	Total Cost[1]	Estimated Annual SREC Revenue	Anticipated Annual Energy Savings	Annual Fiscal Savings[2]	Simple Payback (Years)
1	**Canopy Mounted PV Systems**	$783,960	$74,483	148,965 kWh	$23,834	7.97
2	**Roof Mounted PV Systems**	$248,160	$25,489	50,978 kWh	$8,156	7.38

3. 'Total Cost' takes into account any applicable rebates.
4. Annual Fiscal Savings accounts for maintenance costs.

Recommended ECRMs

Table ES-6 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 ES-6: Recommended ECRM's[1]

Total Engineer's Opinion of Probable Construction Cost	Projected Annual Energy Savings (kWH or therms)	Projected Annual Fiscal Savings	Simple Payback Period (years)
$204,880	161,123 kWh 822 therms	$28,003	7.3

1. Does not include costs or energy savings associated with Solar Energy System.

Section 1
Introduction

1.1 General

As part of an initiative to reduce energy cost and consumption, the Town of Clinton has secured the services of Camp Dresser and McKee (CDM) to perform an energy audit at various municipal buildings, remote water well houses, hydropneumatic stations, and for the wastewater treatment plant 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 and evaluate renewable/distributed energy measures;
- Develop the energy audit report.

Figure 1.1-1 is a schematic representation of the phases utilized by CDM to prepare the Energy Audit Report.

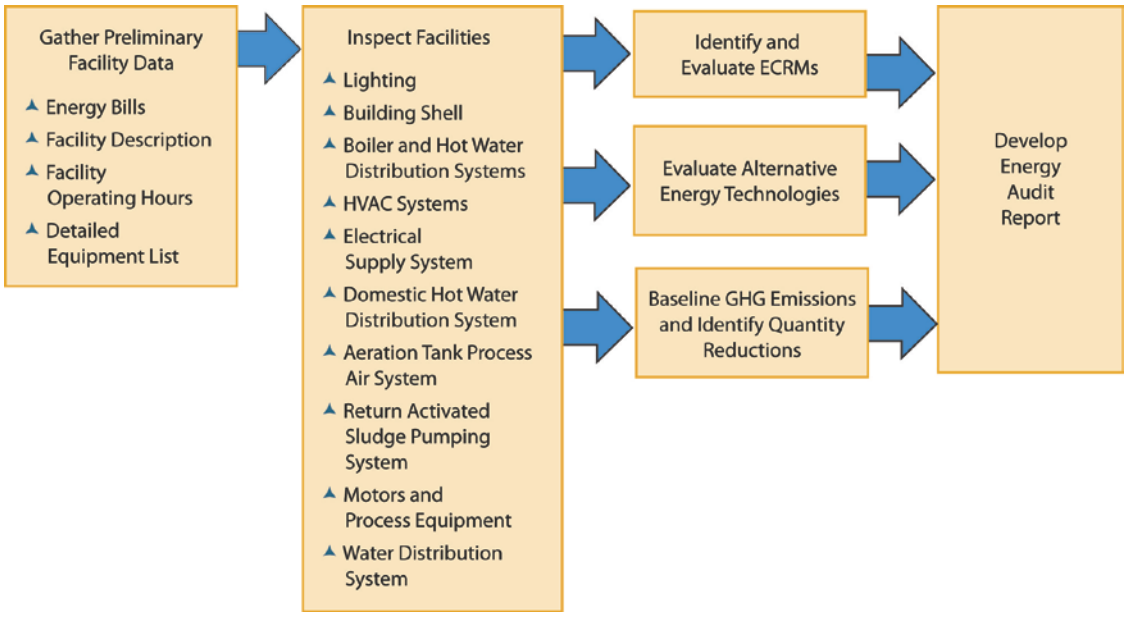


Figure 1.1-1: Energy Audit Phases

1.2 Background

The Town of Clinton operates a water system made up of seven Well Houses, three Hydropneumatic pumping booster stations (including wells and hydropneumatic tanks), and two distribution system water storage tanks.

The wells and well houses are broken down as follows: West End Well House #1, Treatment Plant Well House #6, Clinton Point Well House #3A, Lebanon Well House #2, Potterstown Well House #4, Hydropneumatic Well Station #7, Barn Well House #12, Beaver Brook Well House #11, Foster Wheeler Hydropneumatic Station #14, Well House #15, Fox Fire Hydropneumatic Station #2.

The town has two water storage tanks: one serving the main service area, and the other serving a small portion of the system. The main service area water storage tank is located within Clinton Township, outside of the Town of Clinton. The tank has a 2.5 MG capacity. The tank has a height of 45' with an approximate diameter of 97'. This is an existing tank that is currently in use by the Town of Clinton. A second storage tank will be installed in the same location as the current tank and will have the same dimensions as the current tank. A smaller, 1 MG tank is used for Booster Pump Well #7 to serve the low elevation, valley area surrounding the tank.

The wells were assumed to run 24 hours a day, pumping at a capacity needed to meet the demands of the day. The distribution system is broken down even further with the use of hydropneumatic booster pump stations. These stations (3 in total - #7, #14, and #2) serve the area that they surround. The Town of Clinton also owns and operates a wastewater treatment facility located in Clinton, New Jersey. The facility receives wastewater from the Town of Clinton.

The Clinton plant currently receives about 1.33 MGD of wastewater and is rated for an average flow of 2.03 MGD. The wastewater treatment plant utilizes a series of systems to treat wastewater. Influent is first directed through bar screening, aeration, and then fine screening. Flow from fine screening is conveyed to aeration and clarification where a return activated sludge process is utilized for the removal of ammonia, BOD_5 and suspended solids. Treated effluent receives UV disinfection and is ultimately discharged to the South Branch of the Raritan River. Sludge generated from the wastewater processes is directed to a gravity thickener, sludge holding tank, and belt filter press before being hauled off site.

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.

Significant energy savings may be available with retrofits to the buildings' envelopes, heating and cooling systems and lighting systems. It should be noted that the magnitude of energy savings available is not only dependent on the type of treatment process and delivery systems in use, but also on the age and condition of the equipment and the capital available to implement major changes. Therefore, with the growing demands for electricity and the increased cost for this electricity, feasible alternatives for reducing energy consumption and operating costs must be evaluated on a case-by-case basis.

The purpose of this energy audit is to identify the various critical processes and pumping systems within the wastewater treatment plant facility and water distribution system that are major consumers of electrical energy and are clear candidates for energy savings measures. In addition, potential energy producing systems such as combined heat and power co-generation, solar electric, ground source heat pumps, and wind energy systems to be located at the wastewater treatment plant were also evaluated. A discussion on these technologies is included in Section 4 Energy Conservation and Retrofit Measures (ECRM).

The existing process systems that have been identified for possible energy savings retrofits include the following:

Wastewater Treatment Plant

- Aeration System;
- Return Activated Sludge Pumps
- Building HVAC Systems;
- Building Lighting Systems.

Water Wells and Hydropneumatic Stations

- On-Peak verses Off-Peak Pumping of Well Pump Stations;
- Reduction in Hydraulic Energy Grade Line.

In addition to identifying ECRMs and the potential for on-site energy generation, alternative third party suppliers were contacted in an effort to identify further cost savings available for the Authority, by switching service providers. This is discussed further in Section 5.

Section 2
Facility Description

2.1 Municipal Building

Description of Building Envelope

The Municipal Building is a two-story brick structure with attic that consists of the Town Hall and Police Department. The original building dates back to 1896 and was dedicated as Town of Clinton Municipal Building in 1959. In 1991, a mirror image structure was built to provide additional space for the Town's Police Department, Mayor's Office and Council Room. The total building area is estimated at 10,000 square feet.

Given the age of the building, both the brick walls and built-up roof appear to be in good condition. Some wood trim deterioration is present on the outside of the old section that needs to be checked for leakage and painted. Also, windows on this section are old, single pane with wood frames; however they are equipped with non-operable storm windows. In the new section the windows are double-pane in very good condition.

Description of Lighting

The existing lighting system consists of 2X4 (2, 3, and 4 lamp), 4X4 (6 lamp), 2X2 (2 lamp), 1X4 (2 lamp), 2-foot (2 lamp), 4-foot (2 lamp) linear fluorescent fixtures, along with compact fluorescent fixtures. All of the fluorescent fixtures at this facility already have energy efficient T-8 lamps with electronic ballasts. For increased energy efficiency, the current fixtures can be retrofitted with even higher efficiency T8 lamps and ballasts. Currently, most of the fixtures in the building are on during the day although efforts are made to keep light use to a minimum. There are no occupancy sensors in use.

Description of Building HVAC

In the new section there are two gas-fired furnaces that are used to heat the Police Department and Council Room. Each furnace is equipped with a split system air conditioner for cooling. In the old section, heating and cooling is provided by two split system heat pumps equipped with electric heaters. Air distribution system consists of a ductwork that has motorized dampers controlled by non-programmable thermostats. The units are approximately 18 years old with the exception of two condensing units that were replaced in 2004 and 2008. Additional HVAC equipment includes electric cabinet heaters near entrance doors and a small number of electric baseboards.

On average, the building is occupied 45-50 hours per week. HVAC units in the old section are equipped with analog clocks to allow for both occupied and un-occupied operating modes; however the clocks appear to be non-functional.

Manufacturer & Model Number	**Unit Description**	**Size**	**Fuel**	**Age/Condition**
Reznor HXE150-8-2E SN: AUE66H5N32596	Furnace	150,000 Btu/hr input, 2000 cfm	Gas	N/A (assumed 1991), good condition
Carrier 58GP-125 SN: 3091A01998	Furnace, 2 units	125,000 Btu/hr each	Gas	1991, approaching end of useful life
Carrier 40RT012530 SN: 0395406	Fan coil unit	16 kW	Electric	1991, approaching end of useful life
Carrier 40BA000300 SN: 0391166	Fan coil unit	2 x 9.8 kW	Electric	1991, approaching end of useful life
Carrier 38AC012430 SN: D397079	Heat pump	8.75 tons	Electric	1991, approaching end of useful life
Carrier 38ARQ008 SN: 0404G20048	Heat pump	7.3 tons, 10.4 EER 93,000 Btu, 3.2 COP	Electric	2004, very good condition
Carrier 38BA009550 SN: 3091G13003	Condensing unit	8.5 tons	Electric	1991, approaching end of useful life
Carrier 24ABR360 SN: 1608E06643	Condensing unit	5 tons	Electric	2008, very good condition

2.2 Community Center

Description of Building Envelope

The Community Center is a one-story structure with a loft and basement. It consists of a gym, kitchen, office and a multipurpose room. It is mostly used for sports activities, exercise classes, and as a learning center. The building envelope consists of vinyl siding, pitched asphalt shingle roof and double pane windows with vinyl frames. The age of the building is not known and, as per Town personnel, it was originally used as a barn. The total building area is estimated at 6,880 square feet.

Description of Lighting

The existing lighting system consists of 4-foot (2 and 4 lamp) linear fluorescent fixtures as well as metal halide, mercury vapor, and incandescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. The metal halide, mercury vapor, and incandescent fixtures should also be upgraded to higher efficiency standards. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated using two gas-fired furnaces rated at 125 MBH each. There is no cooling in the building except for a single window air conditioner used in the upstairs office. During regular week days the building is typically occupied for a couple of hours in the morning and then 5-6 hours in the evening for a total of 55-65 hours per week. The HVAC unit is controlled through a non-programmable thermostat.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Comfortmaker NTG9125FKA2 SN:L974963184	Forced air furnace (2 units)	125,000 MBH each	Gas	1997, good condition.
N/A	Window AC	Approx. 1 ton	Electric	N/A
Whirlpool EE3J40RD045V SN:0348109765	DWH	4,500 watts	Electric	2003, good condition

2.3 Wastewater Treatment Plant

2.3.1 Manhole #9-11

All raw sewage and septage flow entering the Wastewater Treatment Plant (WWTP) is collected in Manhole #9-11. Septage flow travels by gravity to the manhole from a 10′ 3″ deep septage receiving tank that is 19′ 4″ long by 15′ wide. The septage receiving tank has a normal air flow of about 80 scfm to thoroughly mix the septage to prevent septic conditions. All supernatant, filtrate and backwash flows from various unit processes are directed back to the head of the plant via manhole #9-11.

2.3.2 Bar Screen and Influent Wet Well

Wastewater and septage flow from manhole #9-11 is conveyed by gravity to the influent wet well located in the basement of the WWTP Control Building. The wet well is made of two (2) individual concrete compartments. The dimensions of the compartments are 10′-0″ by 8′-4″ and 10′-0″ by 4.8′, respectively, with each compartment being 27.7 ‘deep. Each compartment is equipped with a hand-cleaned manual bar screen to remove large debris. The wet well also contains a stainless steel course bubble diffused aeration system for odor control and mixing of the wet well contents. Wastewater is transferred from the wet well to fine screens by two (2) variable speed centrifugal pumps. The pumps are each driven by a 60HP motor.

From the fine screens, flow is conveyed by gravity to a flow distribution box where it joins with returned activated sludge (RAS) flow and is then conveyed to the aeration tanks.

2.3.3 Aeration Tank Process Air System

The aeration system consists of twelve (12) aeration basins of varying sizes. Effluent from the primary clarifiers and return activated sludge enters the aeration tanks through a flow distribution box and the flow is distributed among two (2) aeration trains with basins labeled A-1 through A-6 on one train and B-1 through B-6 on the other. Below summarizes the dimensions of these basins. Each basin had a side water depth of 11′.

Aeration Basins	Length (ft)	Width (ft)
A-1, A-2	35	35
B-1, B-2	42	35
A-3, B-3	55	35
A-4, A-5	42	24
B-4, B-5, A-6, B-6	28	24

There are four (4) blowers that serve the two aeration trains, each equipped with a 50Hp motor. The facility currently does not use dissolved oxygen (DO) control to decrease the amount of air that is delivered to the trains not variable frequency drives to vary the speed and air output from the blowers.

Flow from the aeration tanks is conveyed by gravity through a flow distribution box to final clarification.

2.3.4 Final Clarification

There are four (4) circular final clarification tanks at the wastewater treatment plant. Clarifier #1 and Clarifier #2 have diameters of 35' and 49.5', respectively, with a side water depth of 8'. Clarifiers #3 and #4 are both 55' diameter tanks with a side water depth of 12'.

The final clarifiers each contain a skimming device to remove floating material and convey the material to the scum tank. Settled sludge is collected at the bottom of each clarifier by a sludge rake collection mechanism and conveyed through a 6-inch diameter suction line to the clarifier underflow wet well.

Effluent from each clarifier flows over a weir and under a scum baffle as it is conveyed to the wet well in the clarifier effluent pump station.

2.3.5 Wet Well Pumps and Media Filters

The clarifier effluent wet well contains two (2) variable speed centrifugal pumps that convey wastewater to granular media filters. Each of these pumps has a capacity of 3,000gpm at 47ft TDH and is driven by a 60HP motor. The granular media filter is composed of sand and anthracite and is 43' long by 11' wide. The filter is equipped with six (6) 3Hp backwash pumps.

2.3.6 UV Disinfection and Post Aeration

Beyond the effluent pump station and granular media filters, wastewater is conveyed to ultraviolet disinfection and post aeration. Post aeration increase the dissolved oxygen concentration of the wastewater prior to discharge to satisfy effluent dissolve oxygen permit limits. The post aeration system consists of thirty two (32) membrane disk diffusers. Following post aeration, the wastewater is disinfected with UV lamps and discharged into the South Branch of the Raritan River.

2.3.7 Solids Handling

2.3.7.1 Return and Waste Activated Sludge Pumping Systems

There are two (2) return activated sludge (RAS) pumps that convey RAS from the final clarifiers to the aeration tanks. The pumps are manufactured by Gormann-

Rupp and are equipped with a 20Hp motor. The pumps each have a capacity of 1,410 gpm at 25 ft TDH.

The two (2) waste activated sludge (WAS) pumps are the same at the RAS pumps, but convey flow from the final clarifiers to the gravity thickener.

2.3.7.2 Gravity Thickener

The gravity thickener is a 30' diameter tank with a 10.3' side water depth. The thickener contributes to reducing sludge volume by concentrating the sludge. The tank is covered and contains an odor control unit.

Sludge from the thickener is transferred to the sludge holding basin by a 3Hp diaphragm pump.

2.3.7.3 Sludge Holding Basin

The sludge holding basin is a 35' diameter tank with 8' side water depth. Thickened sludge, as well as sludge from the scum tank, is conveyed here. The basin is aerated by ten (10) coarse bubble diffusers.

2.3.7.4 Waste Sludge Pumps and Belt Press

The thickened sludge from the sludge holding basin is transferred to a belt press by two (2) dewatering progressive cavity pumps. Each pump is driven by a 5Hp motor. Prior to reaching the belt filter press, polymer is added to achieve coagulation.

The belt filter press consists of a fine screen conveyor. The filtrate and washwater from the press is conveyed back to Manhole #9-11, while the sludge cake is conveyed to a dumpster and hauled off -site.

2.3.8 Control Building

Description of Building Envelope

This is a one-story structure with a basement built in 1969. The main floor consists of an office, break room, control room, laboratory, shop and blower room. The basement has two subfloors and houses several pumps and motors, HVAC equipment and motor control center. It is mostly occupied 5 days per week for 1 shift and on weekends as necessary (lab tests).

The building envelope consists of brick siding, pitched asphalt shingle roof and single pane glass windows with vinyl frames and storm window inserts. As per facility personnel, the age of the roof is approximately 25 years. The total building area is

estimated at 5,165 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 2X4 (4 lamp), 2X2 (2 lamp), 4-foot (2 lamp), 8-foot (2 lamp), linear fluorescent fixtures as well as metal halide, mercury vapor, and incandescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with a propane-fired hot water boiler rated at 375 MBH. There are four heating zones and each zone in controlled by a non-programmable thermostat. Hot water is circulated to five unit heaters and a number of baseboard radiators. The boiler is equipped with a controller that can vary supply water temperature based on outside air temperature (outdoor air reset).

Cooling is provided to the office, break room and lab only via two split system air conditioners rated at 3.5 and 4 tons respectively and controlled by digital thermostats. The air handling units for these air conditioners are located in the building attic and could not be accessed during our audit. Air ventilation includes two exhaust fans; one located in the pump room and the second in the wet well area. These fans are used most of the time.

Manufacturer & Model Number	**Unit Description**	**Size**	**Fuel**	**Age/Condition**
Burnham K-5006B SN: 7740992	HW boiler	375 MBH input 300 MBH output	Propane	1995, good condition
ILG Industries	HW unit heater	21,100 Btuh (3) 66,000 Btu (2)	Electric / HW	N/A, approaching end of useful life
Carrier 38EH048 SN: 2886F65131	Condensing unit	4 tons	Electric	1986, passed life expectancy
Carrier 38YMA042 SN: 2992E05149	Condensing unit	3.5 tons	Electric	1992, approaching the end of useful life

2.3.9 Filter Building

Description of Building Envelope

This is a one-story metal, insulated structure on slab (no basement or attic) with metal roof. It is approximately 17 years old (built in 1993). The inside of the building consists of a single room that houses filter tanks and one belt press. There are two large garage doors and no windows. The building is mostly un-occupied and is only briefly visited during one shift to operate the press. The total building area is estimated at 4,532 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of low bay high pressure sodium fixtures. Due to the low wattage of the fixture, an upgrade to a more efficient lighting system would yield minimal energy savings and return on investment therefore a retrofit strategy is not recommended. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with two propane-fired unit heaters each rated at 200 MBH. There is no cooling equipment. The building is also equipped with two exhaust fans typically used temporarily when an operator or maintenance crew is present.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Reznor	Unit heater (2 units)	200 MBH input 158 MBH output	Propane	N/A, good condition
Exhaust Fan	Exhaust fan	N/A	Electric	1993 (estimated) good condition

2.3.10 Blower Building

Description of Building Envelope

This is a one-story metal, insulated structure on slab (no basement or attic) with metal roof. It is approximately 24 years old (built in 1987). The inside of the building consists of a single room that houses four blowers and two emergency generators. There is one large garage door (insulated) and no windows. The building is mostly un-occupied. The total building area is estimated at 1,925 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) industrial hood fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

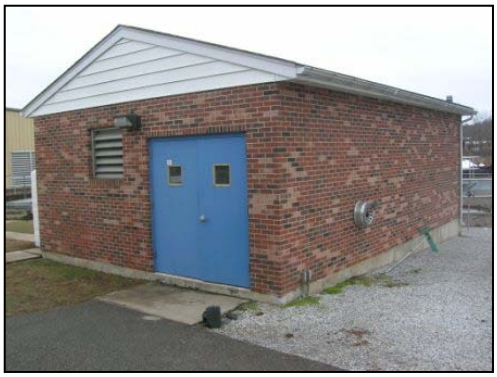
Description of Building HVAC

The building is heated with one propane-fired unit heater rated at 150 MBH. There is no cooling equipment. The building is also equipped with one exhaust fan that is rarely used.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Trane GPPC015AEC SN: A87E07007	Unit heater	150 MBH input 115.5 MBH output 77% eff.	Propane	1987, approaching end of useful life
Exhaust Fan	Exhaust fan	N/A	Electric	1987 (estimated) good condition

2.3.11 Control Effluent Pump House

Description of Building Envelope



This is a one-story brick building with asphalt shingle roof that was built in 1993. The inside of the building consists of a single room. There is only one, double-pane windows. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 825 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) vapor tight fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with one electric unit heater rated at 5.6 kW. There is no cooling equipment. In addition, there is one exhaust fan for ventilation that is typically not used.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Qmark MUH072	Unit heater	5.6/7.5 kW 208/240 V	Electric	2003, good condition
Exhaust Fan	Exhaust fan	N/A	Electric	1993 (estimated) good condition

2.4 Water System Wells and Hydropneumatic Stations

The Town of Clinton operates a water system made up of nine Well Houses, three Hydropneumatic pumping booster stations (including wells and hydropneumatic tanks), and two distribution system water storage tanks.

The wells and well houses are broken down as follows: West End Well House #1, Treatment Plant Well House #6, Clinton Point Well House #3A, Lebanon Well House #2, Potterstown Well House #4, Hydropneumatic Well Station #7, Barn Well House #12, Beaver Brook Well House #11, Foster Wheeler Hydropneumatic Station #14, Well House #15, Fox Fire Hydropneumatic Station #2.

The town has two water storage tanks: one serving the main service area, and the other serving a small portion of the system. The main service area water storage tank is located within Clinton Township, outside of the Town of Clinton. The tank has a 2.5 MG capacity. The tank has a height of 45' with an approximate diameter of 97'. This is an existing tank that is currently in use by the Town of Clinton. A second storage tank will be installed in the same location as the current tank and will have the same dimensions as the current tank. A smaller, 110,000 gallon tank is used for Booster Pump Well #7 to serve the low elevation, valley area surrounding the tank.

The wells were assumed to run 24 hours a day, pumping at a capacity needed to meet the demands of the day. The distribution system is broken down even further with the use of hydropneumatic booster pump stations. These stations (3 in total - #7, #14, and #2) serve the area that they surround.

2.4.1 Lebanon Well House #2

Description of Building Envelope

This is a one-story concrete building with asphalt shingle roof that was built in 1940. There is one single-pane window in fair condition. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 100 square feet. Overall, the building appears to be in fair shape according to its age.

Description of Lighting

The lighting system consists of one incandescent fixture which should be replaced with a higher efficiency compact fluorescent lamp. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with one electric unit heater rated at 5 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Marley Electric MWUH5004	Unit heater	5 kW	Electric	1999, good condition

2.4.2 Potterstown Well House #4

Description of Building Envelope

This is a concrete pit (concrete walls, floor and ceiling) that was built in 1964. There are two small windows in good condition. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 100 square feet. Overall, the building appears to be in fair condition

Description of Lighting

The lighting system consists of one incandescent fixture which should be replaced with a higher efficiency compact fluorescent lamp. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with one electric unit heater rated at 5 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Dayton 3UG73D SN: 240AC	Unit heater	5 kW	Electric	N/A, very good condition

2.4.3 Barn Well House #12

Description of Building Envelope

This well is located in a room that was built as an addition to the DPW Barn in 1979 (the original barn is more than 100 years old). The building has vinyl siding and asphalt shingle roof and appears to be in good shape with no visible problems. The total building area is estimated at 580 square feet.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use. This area is occupied regularly on a daily basis.

Description of Building HVAC

Heating is provided by a gas fired furnace that is also used to heat a garage area in DPW. The unit is rated at 100,000 Btuh.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Lennox G20Q3/4E-100-1 SN: 5890G10522	Forced air furnace	100,000 Btuh	NG	1990, approaching end of useful life

2.4.4 Well House #15

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof that was built in 2003. There are no windows. The inside of the building include several areas that include an emergency generator room and pump room. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 1,564 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with seven electric unit heaters each rated at 3 kW each. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Qmark MUH0341	Unit heater (7 units)	3 kW	Electric	2003, good condition

2.4.5 West End Well House #1

Description of Building Envelope

This is a one-story concrete building with asphalt shingle roof that was built in 1954. The inside of the building consists of a single room. There are four single-pane windows on wood frames in poor condition. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 240 square feet. Overall, the building appears to be in fair condition with no visible problems.

Description of Lighting

The lighting system consists of one incandescent fixture which should be replaced with a higher efficiency compact fluorescent lamp. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with two electric unit heaters each rated at 5 kW each. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Federal Pacific Cat. No. USA2415 SN: K70	Unit heater	5 kW	Electric	N/A, fair condition
Marley MWUH5004	Unit heater	5 kW	Electric	N/A, fair condition

2.4.6 Well House #6

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof that was built in 1968. There are three single-pane windows in fair condition. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 360 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 8-foot (2 lamp) fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with one electric unit heater rated at 10 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Qmark MUH102	Unit heater	7.5kW /10 kW 208 / 240 V	Electric	2000, good condition

2.4.7 Lilac Drive Well House and Hydropneumatic Station #7

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof that was built in 1970. There are four single-pane windows in fair condition. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 300 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The lighting system consists of incandescent fixtures which should be replaced with higher efficiency compact fluorescent lamps. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with two electric unit heaters each rated at 5 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Qmark MUH0521	Unit heater	3.7kW /5 kW 208 / 240 V	Electric	2001, good condition
Berko Electric NUM-584-S	Unit heater	5 kW	Electric	N/A, fair condition

2.4.8 Beaver Brook Well House #11

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof that was built in 1979. The inside consists of two areas: pump room and chlorine room. There are no windows. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 225 square feet. Overall, the building appears to be in good shape with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) fluorescent fixtures as well as incandescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. The incandescent fixtures should also be replaced with higher efficiency compact fluorescent fixtures. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with one electric unit heater rated at 5 kW. There is no cooling equipment. One exhaust fan is located in the chlorine room and used as needed.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Qmark MUH0521	Unit heater	3.7kW /5 kW 208 / 240 V	Electric	2002, good condition

2.4.9 Fox Fire Hydropneumatic Station #2

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof that is approximately 15 years old. There are no windows. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. The total building area is estimated at 840 square feet. Overall, the building appears to be in very good condition with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (2 lamp) vapor tight fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with two electric unit heaters each rated at 5 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Berko Electric HUHAA548	Unit heater	5 kW	Electric	1995, good condition
Qmark MUH0541	Unit heater	5 kW	Electric	2007, good condition

2.4.10 Foster Wheeler Hydropneumatic Station #14

Description of Building Envelope

This is a one-story brick building with asphalt shingle roof. There are no windows. The building is mostly un-occupied and is visited by operators and maintenance staff as needed. This site is currently used as a hydropneumatic station only (well disconnected from the system). The total building area is estimated at 300 square feet. Overall, the building appears to be in very good condition with no visible problems.

Description of Lighting

The existing lighting system consists of 4-foot (4 lamp) fluorescent fixtures. None of the fluorescent fixtures at this facility have energy efficient T-8 lamps with electronic ballasts, which should be replaced with the higher efficiency T-8 standard. There are no occupancy sensors in use.

Description of Building HVAC

The building is heated with two electric unit heaters each rated at 5 kW. There is no cooling equipment.

Manufacturer & Model Number	Unit Description	Size	Fuel	Age/Condition
Emerson-Chromalox MUH-05-2 SN: 02-84-1390	Unit heater (2 units)	5 kW	Electric	N/A, good condition

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 facilities current and historical energy usage and associated utility costs. It is important to establish the existing patterns of electric, gas and fuel oil usage in order to be able to identify areas in which energy consumption can be reduced.

For this study, monthly utility bills were analyzed and unit costs of energy obtained. The unit cost of energy, as determined from the monthly utility bills, 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 Town of Clinton.

3.1.1 Electric Charges

For wastewater treatment plants and remote water pumping and booster stations, the majority of the energy consumed is electric as a result of both indoor and outdoor lighting, pumping systems, and wastewater treatment processes and equipment. Electricity is charged by three basic components: electrical consumption (kWh), electrical demand (kW) and power factor (kVAR) (reactive power).

The cost for electrical consumption appears on the utility bill as kWh consumed per month with a cost figure associated with it. In this case, the facilities are billed by JCP&L for delivery charges and commodity charges based on a flat rate per kWh as explained in Table 3.1.

Electrical demand can be as much as 50 percent or more of the electric bill. The maximum kW value during the billing period is multiplied by the demand cost factor and the result 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 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.

The facilities are billed using a flat rate kWh charge based on JCP&L's General Service Secondary 1Φ/3Φ (GS) tariff rates and commodity charges. The current tariff is as follows:

Table 3.1 – Breakdown of current electrical charges

Account #:	
Customer Charge per month: 1Φ	$3.25
Customer Charge per month: 3Φ	$11.65
Demand Charges > 10 kW:	$6.47/kW
Summer Demand Charges:	$6.94/kW
(Win) kWh<1000, kWh>1000	$0.06199/kWh, $0.004958/kWh
(Sum) kWh<1000, kWh>1000	$0.057366/kWh, $0.004958/kWh
Non-Utility Generation Charge:	$0.016960/kWh
Societal Benefits Charge:	$0.006322/kWh

- Average monthly rate for the period of May 2008 to April 2009.

Figure 3-1 illustrates the average monthly electrical energy consumption associated with the Municipal Building from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 13,707 kWh per month. The total annual cost and consumption for this period was $27,047 and 164,480 kWh respectively. The electrical consumption is the result of mainly lighting, electric heating and air conditioning. The average annual energy requirement of the building was 16.45 kWh/sqft.

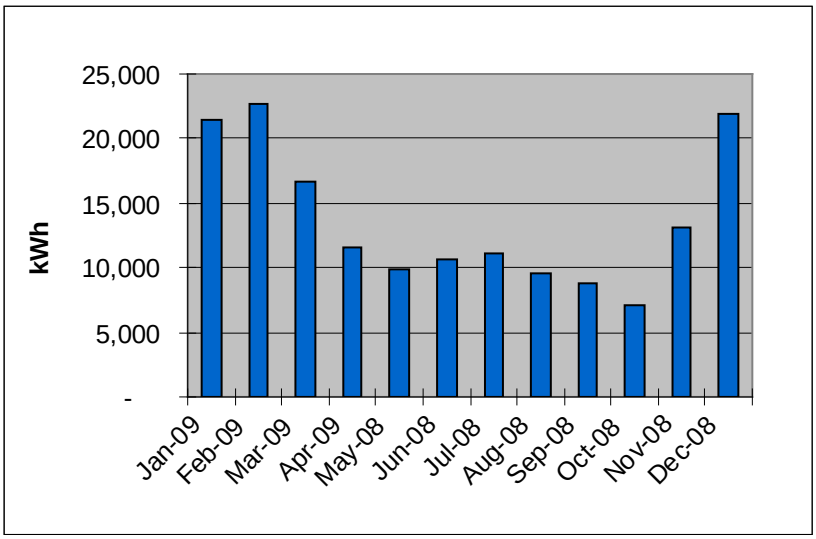


Figure 3-1: Municipal Building Electrical Usage

Figure 3-2 illustrates the average monthly electrical energy consumption associated with the Community Center from June 2008 through May 2009. Analysis of this data indicates that the baseline energy consumption averages 1,697 kWh per month. The total annual cost and

consumption for this period was $3,995 and 20,363 kWh respectively. The electrical consumption is the result of mainly lighting, heating hot water, and air conditioning. The average annual energy requirement of the building was 2.96 kWh/sqft.

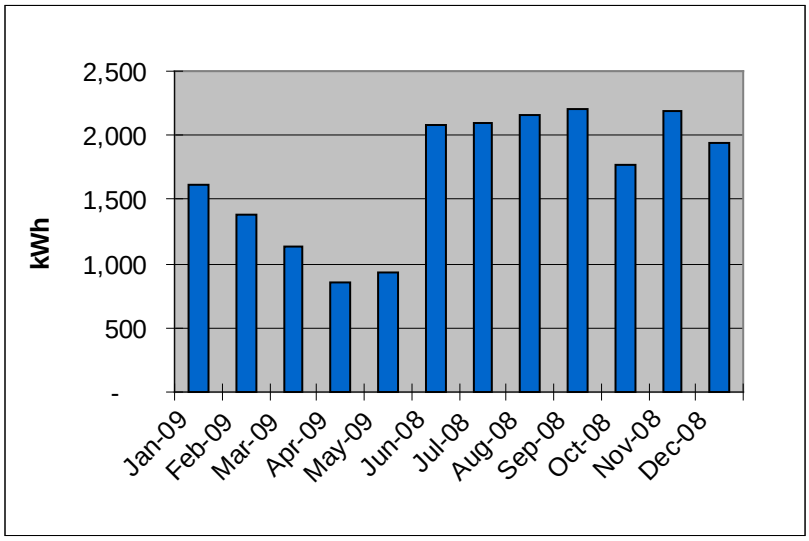


Figure 3-2: Community Center Electrical Usage

Please note the monthly utility bills for electrical energy consumption at the Wastewater Treatment Plant were not available for review in order to establish the baseline energy use. However, based on the information provided by the Town, the total annual cost and consumption was 1,411,120 kWh and $224,021 respectively. The average annual energy requirement of all four buildings was 113.37 kWh/sqft.

Figure 3-3 illustrates the average monthly electrical energy consumption associated with the West End Well House 1 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 4,732 kWh per month. The total annual cost and consumption for this period was $9,650 and 56,780 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 236.58 kWh/sqft. **Please note billing data for December, 2008 is an average between the previous and following months due to missing information.**

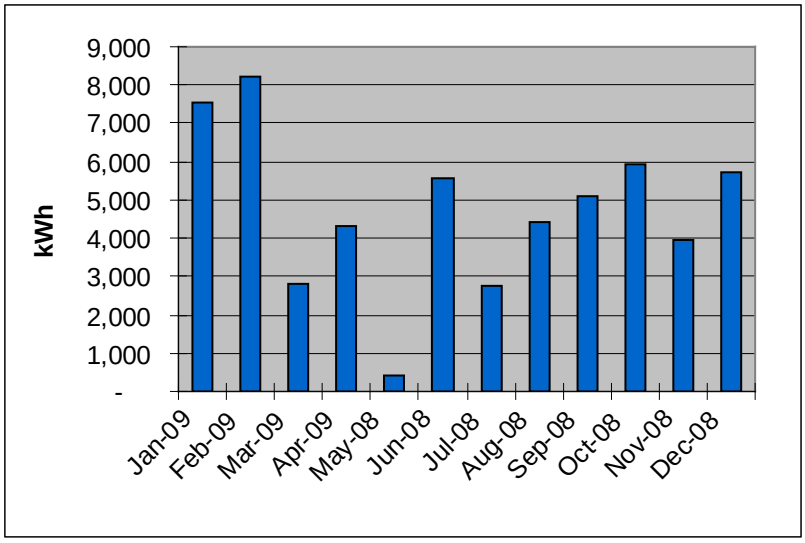


Figure 3-3: West End Well House 1 Electrical Usage

Figure 3-4 illustrates the average monthly electrical energy consumption associated with the Lebanon Well House 2 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 27,108 kWh per month. The total annual cost and consumption for this period was $50,216 and 325,300 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 3,253 kWh/sqft. **Please note billing data for December, 2008 is an average between the previous and following months due to missing information.**

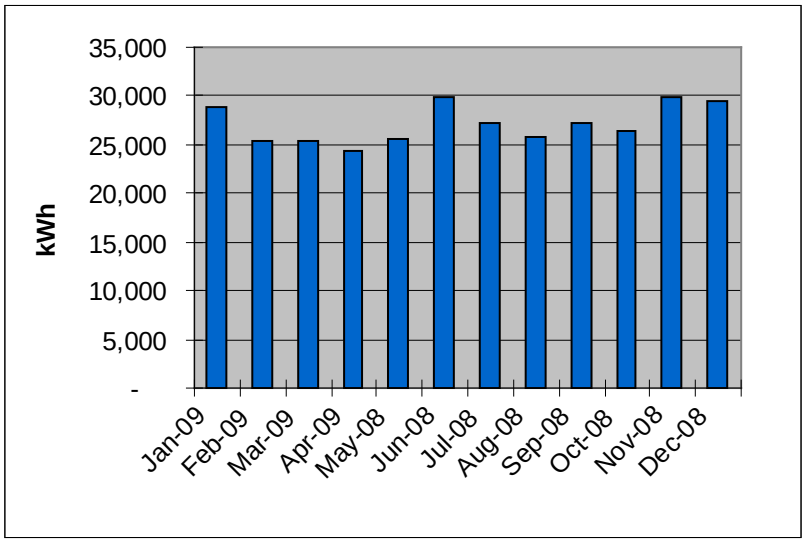


Figure 3-4: Lebanon Well House 2 Electrical Usage

Figure 3-5 illustrates the average monthly electrical energy consumption associated with the Potterstown Well House 4 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 20,358 kWh per month. The total annual cost and consumption for this period was $37,867 and 244,301 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 2,443 kWh/sqft. **Please note billing data for December, 2008 is an average between the previous and following months due to missing information.**

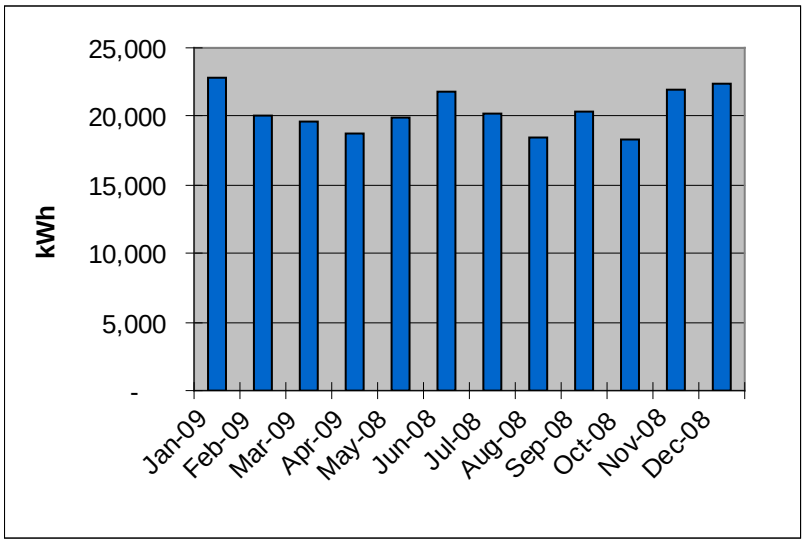


Figure 3-5: Potterstown Well House 4 Electrical Usage

Figure 3-6 illustrates the average monthly electrical energy consumption associated with the Well House 6 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 9,161 kWh per month. The total annual cost and consumption for this period was $17,616 and 109,937 kWh respectively. The electrical

consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 305.38 kWh/sqft. **Please note billing data for December, 2008 is an average between the previous and following months due to missing information.**

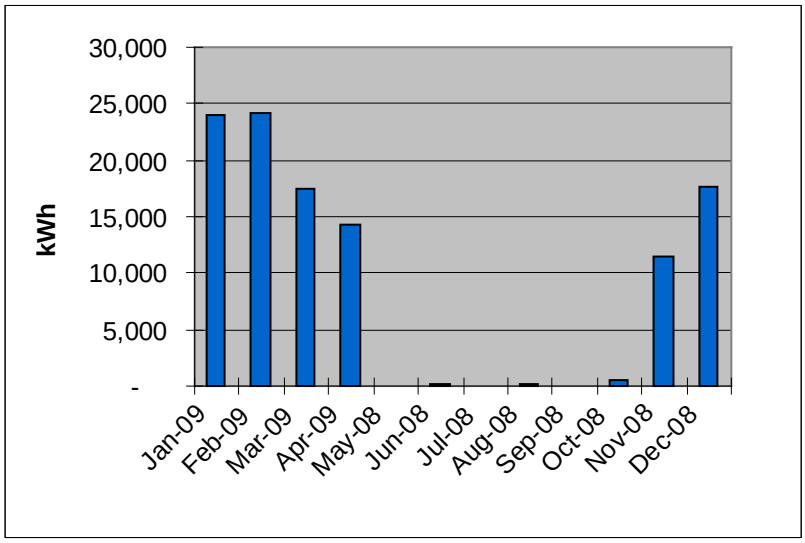


Figure 3-6: WWTP-Well House 6 Electrical Usage

Figure 3-7 illustrates the average monthly electrical energy consumption associated with the Lilac Drive Well House 7 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 3,323 kWh per month. The total annual cost and consumption for this period was $7,182 and 39,880 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 132.93 kWh/sqft. **Please note billing data for December, 2008 and March, 2009 is an average between the previous and following months due to missing information.**

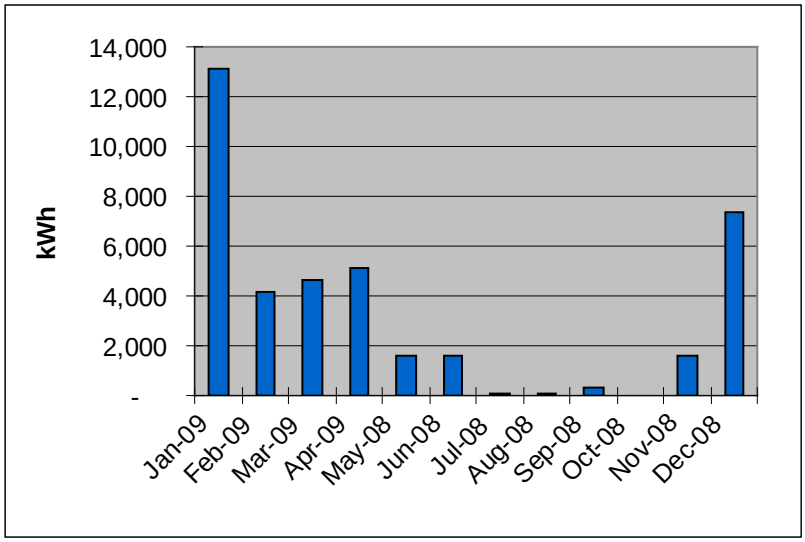


Figure 3-7: Lilac Drive Well House 7 Electrical Usage

Figure 3-8 illustrates the average monthly electrical energy consumption associated with the Fox Fire Booster Pump Station 2 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 3,352 kWh per month. The total annual cost and consumption for this period was $7,046 and 40,220 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 47.88 kWh/sqft. **Please note billing data for December, 2008 and March, 2009 is an average between the previous and following months due to missing information.**

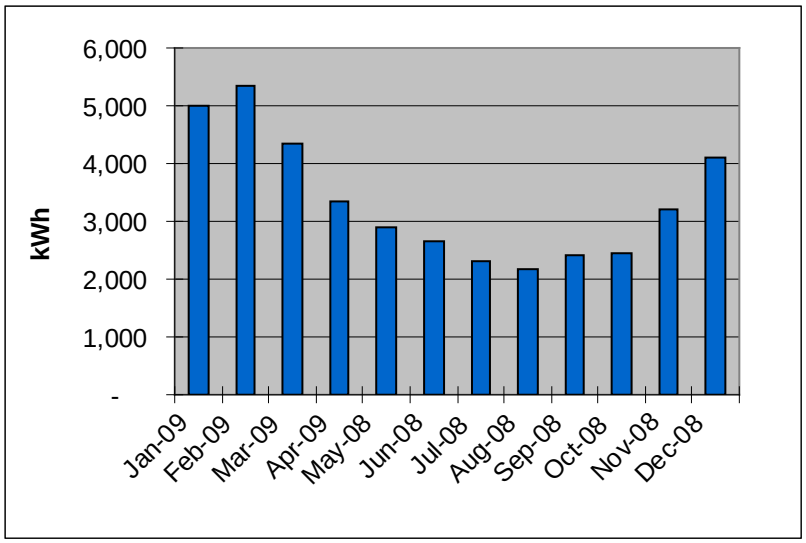


Figure 3-8: Fox Fire Pump Station 2 Electrical Usage

Figure 3-9 illustrates the average monthly electrical energy consumption associated with the Beaver Brook Well House 11 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 13,653 kWh per month. The total annual cost and consumption for this period was $27,629 and 163,840 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 728.18 kWh/sqft.

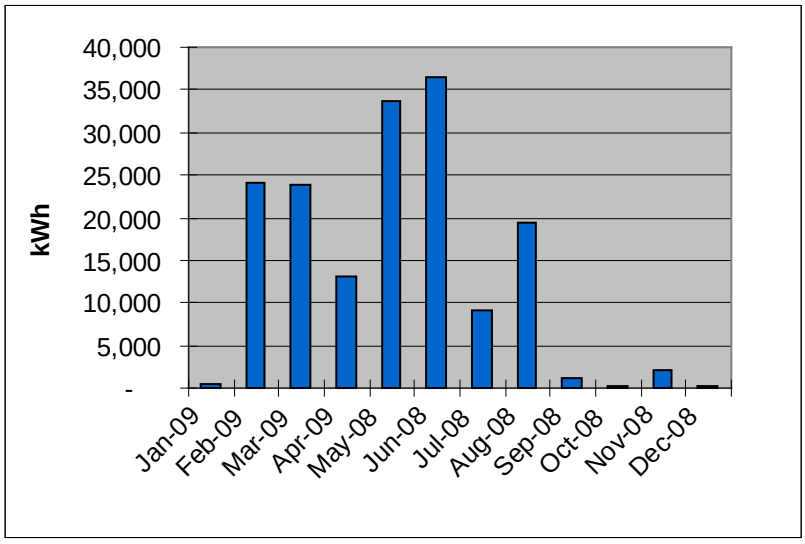


Figure 3-9: Beaver Brook Well House 11 Electrical Usage

Figure 3-10 illustrates the average monthly electrical energy consumption associated with the Barn Well House 12 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 39,053 kWh per month. The total annual cost and consumption for this period was $73,232 and 468,640 kWh respectively. The electrical consumption is the result of motor and lighting loads. The average annual energy requirement of the building was 808 kWh/sqft.

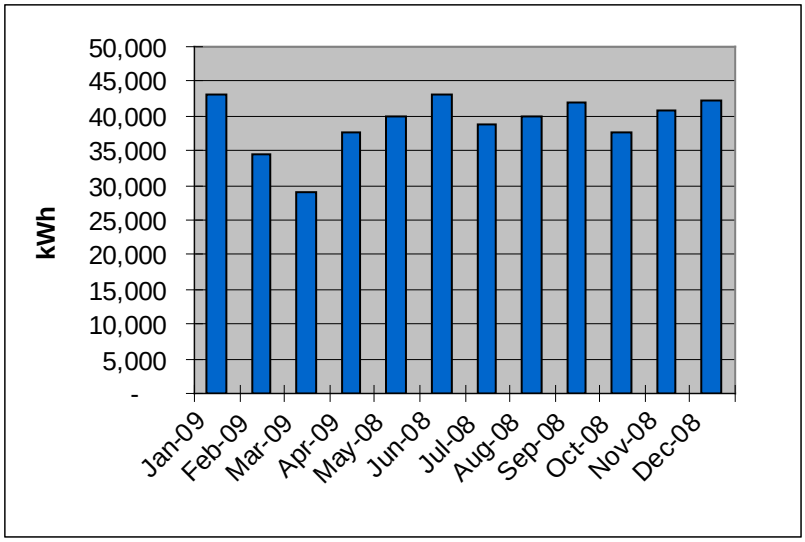


Figure 3-10: DPW-Barn Barn Well House 12 Electrical Usage

Figure 3-11 illustrates the average monthly electrical energy consumption associated with the Hunts Mill Park Well House 15 from May 2008 through April 2009. Analysis of this data indicates that the baseline energy consumption averages 38,593 kWh per month. The total annual cost and consumption for this period was $72,821 and 463,120 kWh respectively. The electrical consumption is the result of motor loads and electric heating. The average annual energy requirement of the building was 296.11 kWh/sqft. **Please note billing data for**

November, 2008 is an average between the previous and following months due to missing information.

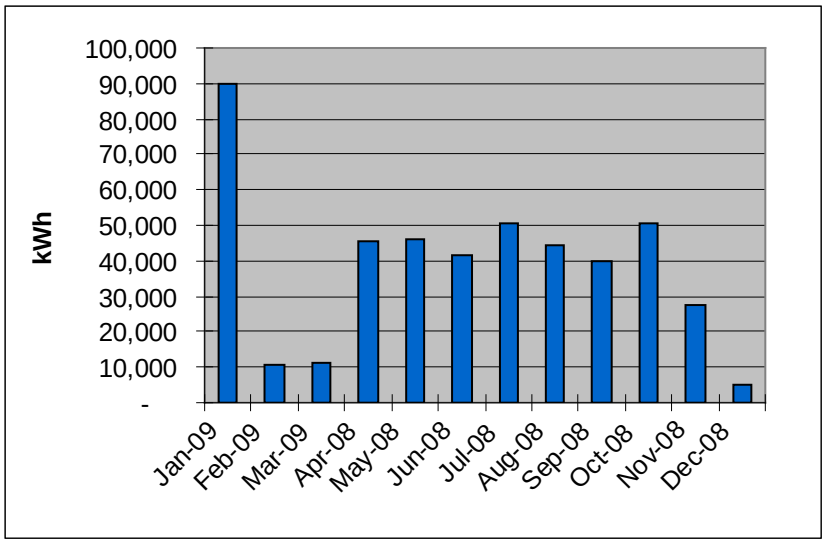


Figure 3-11: Hunts Mill Park Well House 15 Electrical Usage

Refer to Table 3-2, in Section 3.2, for average electrical aggregate cost. These tariffs are subject to change quite frequently. For the most up to date tariffs, refer to JCP&L website. Refer to Appendix A for complete Historical Data Analysis.

3.1.2 Natural Gas Charges and Propane

There are natural gas accounts for the Municipal Building, Community Center, and Hunts Mill Park Well House 15. The Wastewater Treatment Plant has a propane account with Suburban Propane. The Municipal Building is the only location with multiple natural gas accounts. Gas is delivered by Elizabeth Town Gas based on SGS tariffs respectively and is generally used for the heating systems.

Figure 3-12 illustrates the blended average monthly natural gas consumption from May 2008 through January 2009 for the Municipal Building. The total annual gas consumption for this period was 1,992 therms resulting in $3,623 in natural gas costs. The monthly rate varied from $1.70/therm in January 2009 to $4.46/therm in August 2008. The average annual energy requirement of the building was 0.20 therm/sqft.

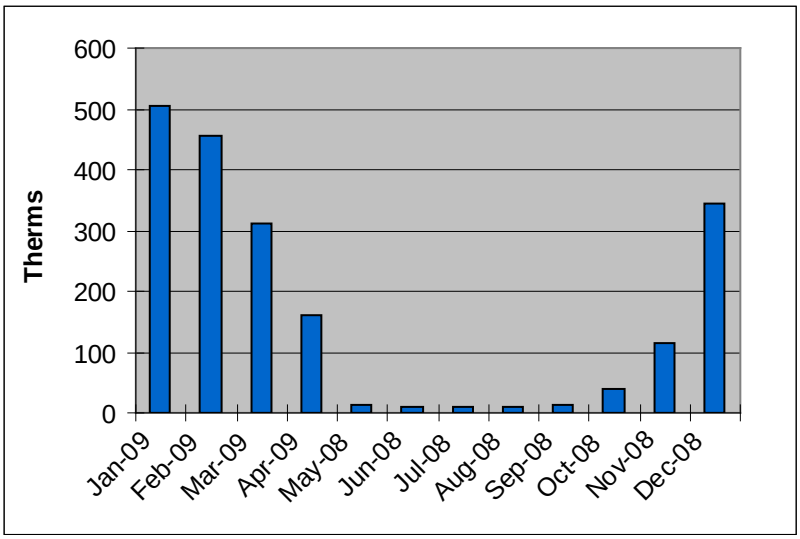


Figure 3-12: Municipal Building Gas Usage

Figure 3-13 illustrates the average monthly natural gas consumption from June 2008 through May 2009 for the Community Center. The total annual gas consumption for this period was 2,535 therms resulting in $4,321 in natural gas costs. The monthly rate varied from $1.66/therm in January 2009 to $2.09/therm in September 2008. The average annual energy requirement of the building was 0.37 therm/sqft. **Please note billing data for May, 2009 is an average between the previous and following months due to missing information.**

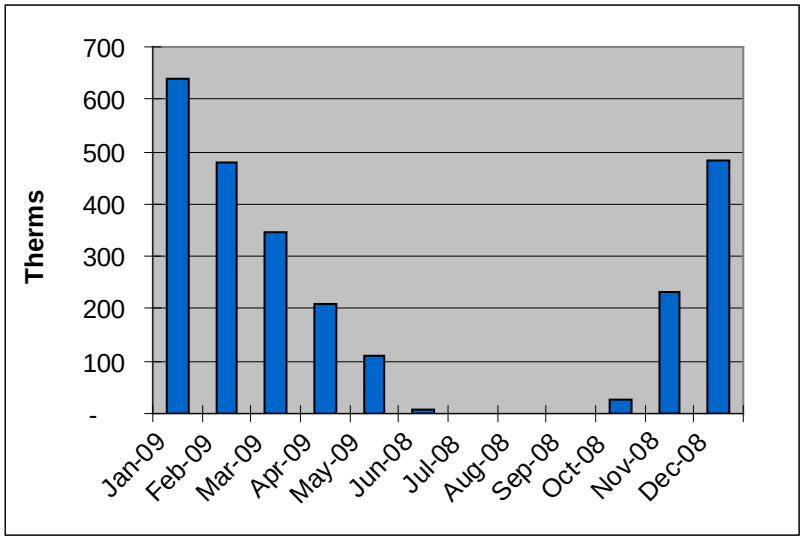


Figure 3-13: Community Center Gas Usage

Please note the monthly utility bills for propane at the Wastewater Treatment Plant were not available for review in order to establish the baseline energy use. However, based on the information provided by the Town, the total annual propane consumption was 8,786 gallons

resulting in $12,260 in propane costs. The average annual energy requirement of the building was 0.71 gal/sqft.

Figure 3-14 illustrates the average monthly natural gas consumption from May 2008 through April 2009 for Hunts Mill Park Well House 15. The total annual gas consumption for this period was 250 therms resulting in $591 in natural gas costs. The monthly rate varied from $2.01/therm in December 2008 to $2.80 in January 2009. The average annual energy requirement of the building was 0.16 therm/sqft. **Please note billing data for June, 2008 is an average between the previous and following months due to missing information.**

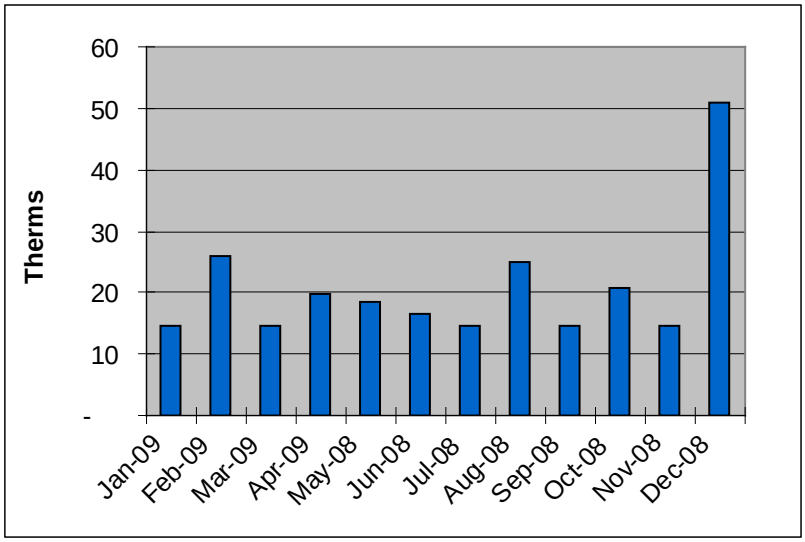


Figure 3-14: Hunts Mill Park Well House 15 Gas Usage

3.2 Aggregate Costs

For the purposes of computing energy savings for all identified energy conservation and retrofit measures, aggregate unit costs for electrical energy and natural gas were determined and utilized in the simple payback analyses discussed in subsequent sections. Please note that there is one electrical account for the Wastewater Treatment Plant; therefore, the same cost per kWh is used for all buildings on site (except for Well House 6). Furthermore, the Municipal Building, Community Center and each Well House/Station have individual electrical accounts. Foster Wheeler Hydropneumatic Station 14 utility bills are not paid for by the Town of Clinton, therefore a cost of $.16 per kWh was used for energy savings calculations. For natural gas, there are four accounts for three locations. Please note the Municipal Building has two gas accounts that have been blended into one for the purposes of this report. The other locations that use natural gas are the Community Center and Hunts Mill Park Well House 15. The only location that uses propane gas is the Wastewater Treatment Plant. Tables 3-2, 3-3 and 3-4 summarize the aggregate electrical and gas unit costs.

Table 3-2: Electrical Aggregate Unit Costs

Service Location	Aggregate $ / kW-hr
Municipal Building	$0.16
Community Center	$0.20
Wastewater Treatment Plant	$0.16
West End Well House 1	$0.17
Lebanon Well House 2	$0.15
Potterstown Well House 4	$0.16
WWTP-Well House 6	$0.16
Lilac Drive Well House 7	$0.18
Fox Fire Booster Pump Station 2	$0.18
Beaver Brook Well House 11	$0.17
Barn Well House 12	$0.16
DPW-Hunts Mill Park Well House 15	$0.16

Table 3-3: Gas Aggregate Unit Costs

Service Location	Aggregate $ / therm
Municipal Building	$1.82
Community Center	$1.70
DPW-Hunts Mill Park Well House 15	$2.36

Table 3-4: Propane Aggregate Unit Costs

Service Location	Aggregate $ / gal
Wastewater Treatment Plant	$1.4

3.3 Portfolio Manager

3.3.1 Portfolio Manager Overview

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

3.3.2 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.

The wastewater treatment plant facility is eligible to receive a rating, yet is not eligible for an Energy Star label.

3.3.3 Portfolio Manager Account Information

A Portfolio Manager account has been established for Clinton, which includes a profile for the wastewater treatment plant facility, well houses, and other associated buildings. Information entered into this Portfolio Manager Facility profile, including electrical energy consumption, natural gas consumption, and propane usage has been used to establish a performance baseline.

It is recommended that the information be updated to track the buildings' energy usage. At the time of the audit the wastewater treatment plant facility received a rating of 1.

Appendix B contains 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: Clinton_NJ

PASSWORD: EnergyStar

Section 4
Energy Conservation and Retrofit Measures (ECRM)

The following is a summary of how Annual Return on Investment (AROI), Internal Rate of Return (IRR), and Net Present Value (NPV) will be broken down in the cost analysis for all ECRMs recommended in this report.

Included in the 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:

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

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) (assumed bond rate of 3%). NPV is calculated using the following equation:

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

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

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

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

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

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

4.1 Waste Water Treatment Plant – Process

4.1.1 Aeration System and Controls

There are two duty blowers that serve the two aeration treatment trains. Each blower supplies approximately 900 scfm of airflow to each aeration treatment train with an amperage draw of 45 amps per blower. Typical dissolved oxygen levels recorded in the aeration treatment trains ranges between 6.0 and 7.0 mg/l on average. The facility currently does not use dissolved oxygen (DO) concentration control to vary the amount of air that is delivered to the aeration tanks. Variation of air flow is performed manually and is achieved by closing the suction valve associated with each operating blower. Table 4-1 presents the existing blower design information.

Table 4-1: Existing Blower Information

	Existing Blowers
Number of Duty Units	4
Motor Horsepower	50 hp
Motor Power Factor	0.86

It is estimated that based upon the current operation of the aeration system, the average current blower system power draw is 90 amps. This power draw translates into a yearly energy cost of $90,100 (90 Amp x 480 V x 0.86 (power factor) x 1.73/1000 x 24 hr/day x 365 day/yr x $0.16/kWh) or 563,125 kWh/year of energy consumption. CDM analyzed the design conditions as well as the existing operating conditions of the aeration system in efforts to identify potential energy savings measures to include process control modifications, blower modifications or replacements.

Design Conditions

Table 4-2 presents a summary of the relevant design parameters used to calculate the amount of air required based on the design conditions. The design conditions were provided in the design drawing mass balance. The maximum month and day flows were estimated from current flow peaking factors. Diffuser efficiency was based on new membrane, fine bubble discs.

Table 4-2: Aeration System Calculation Summary – Design Conditions

		Average	Max Month	Max Day
Flow	mgd	2.03	2.7	2.9
Wastewater Temperature	deg C	18	18	18
Beta		0.95	0.95	0.95
Alpha		0.65	0.65	0.65
Oxygen Saturation (Cd, based on WW temp)	mg/L	8.5	8.5	8.5
Dissolved Oxygen Concentration	mg/L	2	2	2
Oxygen Saturation (Cs, based on Standard Conditions)	mg/L	9.09	9.09	9.09
Oxygen Demand/BOD removed	lb/lb	1.202	1.202	1.202
Oxygen Demand/TKN removed	lb/lb	4.25	4.25	4.25
Influent BOD Concentration	mg/L	250	252	275
Influent BOD Load	lb/day	4,233	5,672	6,645
Influent Nitrogen Concentration	mg/L	40	40	40
Influent Nitrogen Load	lb/day	677	901	967
Oxygen Demand	lb/day	6,657	8,592	9,852
Density of Air		0.075	0.075	0.075
Diffuser Efficiency	%	1.80%	1.80%	1.80%
Oxygen in Air	%	23.20%	23.20%	23.20%
Standard Oxygen Rate (SOR)	lb/day	16,069	20,740	23,781
Oxygen Transfer Efficiency (OTE), field	%	8.97%	8.97%	8.97%
Air Flow	scfm	2,963	3,824	4,385

4.1.1.1 Actual Current Conditions

The facility influent data was analyzed to determine the required blower demands based upon actual process recorded data. Table 4-3 presents a summary of the relevant design parameters used to calculate the amount of air needed based on the actual current operating conditions of the aeration system.

Table 4-3: Aeration System Calculation Summary – Actual Conditions

		Average	Max Month	Max Day
Flow	mgd	1.33	1.78	2.01
Wastewater Temperature	deg C	18	18	18
Beta		0.95	0.95	0.95
Alpha		0.65	0.65	0.65
Oxygen Saturation (Cd, based on WW temp)	mg/L	8.5	8.5	8.5
Dissolved Oxygen Concentration	mg/L	2	2	2
Oxygen Saturation (Cs, based on Standard Conditions)	mg/L	9.09	9.09	9.09
Oxygen Demand/BOD removed	lb/lb	1.202	1.202	1.202
Oxygen Demand/TKN removed	lb/lb	4.25	4.25	4.25
Influent BOD Concentration	mg/L	249.6	254	265
Influent BOD Load	lb/day	2,773	3,771	4,437
Influent Nitrogen Concentration	mg/L	40	40	40
Influent Nitrogen Load	lb/day	444	594	671
Oxygen Demand	lb/day	2,792	4,123	4,882
Density of Air		0.075	0.075	0.075
Diffuser Efficiency	%	1.80%	1.80%	1.80%
Oxygen in Air	%	23.20%	23.20%	23.20%
Standard Oxygen Rate (SOR)	lb/day	6,739	9,952	11,784
Oxygen Transfer Efficiency (OTE), field	%	8.97%	8.97%	8.97%
Air Flow	scfm	1,243	1,835	2,173

The actual average current conditions require approximately 47 hp to provide adequate air. This power equates to an energy cost of approximately $49,140 per year (47 hp x 0.746 kw/hp x 24 hrs/day x 365 days/year x $0.16/kWh) or 307,150 kWh/year which is $40,960 and 255,978 kWh/year less than what the facility is currently paying to operate the blowers. This difference is attributed to the excess amount of air being conveyed to the aeration tanks as evidenced of the recorded high dissolved oxygen levels. The calculated blower power and energy cost savings are estimates; each blower manufacturer will have different estimated power requirements based on their specific machines and efficiencies.

4.1.1.2 Aeration System Improvement Alternatives

The actual recorded facility influent data as well as the design conditions were used to estimate the amount of air required for the aeration system. As can be seen from Table 4-3, the required airflow ranges from 1,243 to 4,385 scfm; with the lower end of this range corresponding to the current average wastewater flow and the higher end corresponding to the design maximum day wastewater flow.

To achieve energy savings for the aeration system, four alternatives were evaluated: installing new centrifugal blowers, installing new positive displacement blowers, installing new turbo blowers, and installing new variable frequency drives (VFDs) on the existing blowers. In addition, each alternative considered an automated dissolved oxygen control system.

A dissolved oxygen sensor and controller would be provided for each tank. The dissolved oxygen controller along with the air flow as measured through the existing air flow meters would throttle a new motorized butterfly valve controlling the air flow to each respective aeration tank. A pressure transducer and controller would need to be installed on the common discharge header that would control the speed of the blowers. For example, if the dissolved oxygen concentration in any one or both aeration tanks increases, then the motorized valve(s) would close thus increasing the air pressure in the common header causing the blower(s) speed to reduce. In other words, the motorized valves will distribute the total blower output to the two aeration tanks and at least one of these valves is always maintained in its most open position to minimize the main air pressure. Under this control scenario, the dissolved oxygen concentration in each nitrification tank is controlled independently from each other. This type of control is often referred to as "most open valve" control.

Since the facility already has fine bubble diffusers, a new diffuser system was not included in the alternatives.

4.1.1.3 Alternative 1: New Centrifugal Blowers

New centrifugal blowers could be provided. Manufacturers such as Turblex can provide three duty and one standby blower to meet the conditions of the facility. It is estimated that the average required power would be approximately 42.5 hp having an annual energy cost of approximately $49,440 and an annual energy consumption of 309,000 kWh/year resulting in an annual energy savings (based on current conditions) of $40,700 and energy consumption of 254,125 kWh/year. Modifications to the existing instrumentation and controls to implement an automatic dissolved oxygen control system is recommended to automatically control the blowers' output capacity to fully realize the energy savings.

4.1.1.4 Alternative 2: Positive Displacement Blowers

New positive displacement blowers could be provided. Manufacturers such as Aerzen can provide three duty and one standby blower to meet the conditions of the facility. It is estimated that the average required power would be approximately 48.5 hp having an annual energy cost of approximately $50,600 and an annual energy consumption of 316,250 kWh/year resulting in an annual energy savings (based on current conditions) of $39,500 and energy consumption of 246,875 kWh/year.

Modifications to the existing instrumentation and controls to implement an automatic dissolved oxygen control system is recommended to automatically control the blowers' output capacity to fully realize the energy savings.

4.1.1.5 Alternative 3: New Turbo Blowers

New turbo-type blowers could be provided. Manufacturers such as Neuros can provide three duty and one standby blower to meet the conditions of the facility. It is estimated that the average required power would be approximately 41.8 hp having an annual energy cost of approximately $48,900 and an annual energy consumption of 305,625 kWh/year resulting in an annual energy savings (based on current conditions) of $41,200 and energy consumption of 257,500 kWh/year. Instrumentation and controls to implement an automatic dissolved oxygen control system is recommended to automatically control the blowers' output capacity to fully realize the energy savings.

4.1.1.6 Alternative 4: New VFDs

The existing blowers could be modified by installing variable speed drives (VFDs). Using the average required air flow from Table 4-3 of 1,243 scfm, results in an estimated average power requirement of 47 hp. This would result in $41,000 in annual energy savings or 256,250 kWh/year of energy consumption. Instrumentation and controls to implement an automatic dissolved oxygen control system is recommended to automatically control the blowers' output capacity to fully realize the energy savings.

Evaluating the required blower turndown based on the affinity laws, shows that the minimum amount of air that could be expected out of one blower is 734 scfm which is greater that the surge flow of 300 scfm.. The calculation assumes 10.25 ft for static head and 1.5 ft for piping losses, which equals 5.06 psig of pressure that the blower has to overcome. The affinity laws give:

$P_2/P_1 = n_2^2/n_1^2 \rightarrow (5.06 \text{ psig}/7.6 \text{ psig}) = n_2^2/(3580 \text{ rpm})^2$, therefore, $n_2 = 2921$ rpm.

$Q_2/Q_1 = n_2/n_1 \rightarrow Q_2/900 \text{ scfm} = 2921 \text{ rpm}/3580 \text{ rpm}$, therefore, $Q_2 = 734$ scfm.

Table 4-4 presents preliminary costs, savings and a simple payback period for each of the blower alternatives. Engineer's Opinion of Probable Construction Cost computations are included in Appendix E.

Table 4-4: Blower Alternatives Probable Cost Summary

	Alt. 1 – New Centrifugal Blowers & New Diffusers	Alt. 2 – New Positive Displacement Blowers & New Diffusers	Alt. 3 – New Turbo Blowers & New Diffusers	Alt. 4 - VFDs on Existing Blowers
Installation Cost	$1,354,000	$1,102,000	$1,430,000	$281,800
Annual Energy Savings	$40,700	$39,500	$41,200	$41,000
Annual O&M Cost	$8,000	$10,000	$10,000	$2,000
Simple Payback Period, years	41.4	37.4	45.8	7.2
Lifetime, years	20	20	20	20
Internal Rate of Return (IRR)	-4.4%	-3.0%	-4.8%	13.4%
Net Present Value (NPV)	-$748,000	-$514,000	-$817,000	$329,000

Based upon the simple payback periods, internal rates of return and net present values presented in Table 4-4, it is recommended that variable frequency drives be retrofitted into the existing blower system in order to achieve energy savings associated with the aeration system.

4.1.2 Return Activated Sludge (RAS) Pumps

CDM has analyzed the return activated sludge (RAS) pumps at the wastewater treatment plant to determine if energy savings can be realized with modifications such as the addition of variable frequency drives (VFDs). There are currently two (2) RAS pumps located in the Control Building that pump RAS from the clarification tanks to the aeration basins. The existing pumps are manufactured by Gorman-Rupp, Model T8A-3B rated at 1410 gallons per minute at 25 feet of head and having 20 hp motors. The pump curve associated with these pumps can be found in Appendix D.

Based on discussions with the plant operator, the existing RAS flow is about 900gpm. The pumps run at constant speed, but the flow is adjusted by manually throttling the discharge valve; thus resulting in an energy inefficient operation.

As a possible energy conservation measure, the implementation of variable frequency drives to vary the speed and flow output from the return activated sludge pumps will be investigated.

Referring to the pump curve in Appendix D, at the design rating point, the following pump characteristics are noted and tabulated in Table 4-5

Table 4-5: Existing RAS Pump Characteristics at Design Rating Point

Q (gpm)	1410
TDH (ft)	25
Pump Efficiency	63%
Brake Horsepower	15
Pump Speed (RPM)	850

To achieve the required return activated sludge flow of 900 gallons per minute, the discharge valve associated with the operating pump is manually throttled to a more closed position until the desired flow is achieved. Referring to the pump curve in Appendix D, the throttled operating point on the pump curve is clearly shown. At this throttled point, the following pump characteristics are noted and tabulated in Table 4-6.

Table 4-6: RAS Pumps Throttled Operation Condition

Q (gpm)	900
TDH (ft)	35
Est. Pump Efficiency	62%
Brake Horsepower	13
Pump Speed (RPM)	850

The difference between the design rating performance point and the throttled performance point is 510 gallons per minute at 35 feet of head; therefore, 10 feet of head drop is across the discharge valve in order to reduce the flow. From an energy perspective, the pump used 15 brake horsepower at the design rating point, and 13 brake horsepower at the throttled performance point. Although accomplished via an inefficient pressure drop across the discharge valve, the resulting energy savings is 2 hp or roughly 13%.

If the pumps were to operate at a reduced speed to achieve the required return activated sludge flow of 900 gallons per minute, the pump speed can be reduced from 850 rpm to 650 rpm as shown on the pump curve at the reduced speed operation point. At the reduced speed operating point, the following pump characteristics are noted and tabulated in Table 4-7.

Table 4-7: RAS Pumps Reduced Speed Operation Condition

Q (gpm)	900
TDH (ft)	18
Est. Pump Efficiency	67%
Brake Horsepower	6
Pump Speed (RPM)	650

At operating at a reduced speed, the savings in brake horsepower between the design rating performance point and the reduced speed performance point equates to 9 hp or roughly 60% savings as compared to 2 hp or 13% savings when operating at the throttled operating condition. This clearly demonstrates that operation of the pump system utilizing variable frequency drives is more energy efficient as compared to throttling the discharge valve to achieve the desired return activated sludge flow rate.

To determine the appropriate energy savings of operating the return activated sludge pumping system in a variable speed mode, the baseline energy consumption will be based upon operating the system in a throttled discharge condition (current operating condition) and compare the energy savings from this operating condition to a variable speed operating condition.

Baseline Energy Usage (Throttled Discharge Condition)

Annual Energy Cost = 13 Brake Horsepower x 0.746 kw/Bhp x 24 hrs/day x 365 days/year x $0.16 /kWh = $13,600.00 (85,000 kWh/year)

Reduced Energy Usage (Reduced Speed Condition)

Annual Energy Cost = 6 Brake Horsepower x 0.746 kw/Bhp x 24 hrs/day x 365 days/year x $0.16 /kWh = $6,300.00 (39,375 kWh/year)

Based upon the above, the annual energy savings that can be potentially realized by operating the return activated sludge pump system in a variable speed mode as compared to throttling the discharge valve is estimated to be $7,300.00, or 45,645 kWh/year of energy consumption.

Table 4-8 presents preliminary costs, savings and a simple payback period for the addition of VFD's to the existing RAS pumps. Engineer's Opinion of Probable Construction Cost computations are included in Appendix E.

Table 4-8: VFDs on Existing RAS Pumps Probable Cost Summary

	New VFDs
Installation Cost	$47,000
Annual Energy Savings	$7,300
Annual O&M Cost	$500
Simple Payback Period, years	6.9
Lifetime, years	20
Internal Rate of Return (IRR)	14.5%
Net Present Value (NPV)	$62,000

Based upon the simple payback periods, internal rates of return and net present values presented in Table 4-8, it is recommended that variable frequency drives be retrofitted into the existing RAS pumping system in order to achieve energy savings.

4.2 Water Wells & Hydropneumatic Stations

Although the Town of Clinton's energy costs currently do not reflect energy rates associated with on-peak/off-peak energy usage, the viability of off-peak pumping of production and booster pumping units in an effort to take advantage of potential reduced energy rates during off-peak time periods will be evaluated should the Town decide to entertain an on-peak/off-peak operational protocol in the future in efforts to reduce energy costs. To undertake this, CDM performed an evaluation of satisfying the existing demands and the future potential for off-peak pumping for high demand conditions. The maximum month average day (MMAD) was selected as this represents the highest monthly demand requirements upon the system, and once it is established that MMAD demands can be met, all other lesser demands will also be met.

Currently, 7 of the wells feed into the main distribution system and the main water storage tank. This tank is a Ground Storage Tank with a 97' inside tank diameter, 45' shell height, and 2,500,000 gallon nominal capacity. Each foot of rise or fall in the tank is equal to approximately 55,500 gallons. Similarly, each 1 psi of rise or fall in the tank is equal to approximately 130,000 gallons. The main distribution system serves all but three areas which are served by hydropneumatic systems.

A new Ground Storage Tank will be installed in addition to the existing storage tank. It is assumed that the new tank will be in place in the same general location as the existing tank, and will be of the same size as the existing tank, including height, diameter, nominal capacity and elevation.

For the Water System's current operation, the wells pump at various rates and production quantities as shown in Table 4-9.

Table 4-9: Well Production Rates

Well #	Capacity (gpm)	Pressure (psi)
1	100	124
2	350	150
3A	375	130
4	250	125
6	120	140
7	100	130
11	400	145
12	250	152
15	440	160

For the well houses, hydropneumatic booster pump stations and storage tanks, the only data available was overall daily values in terms of gallons pumped and tank level in feet. A Mass Balance was performed using the hourly production and tank level information to determine the normalized hourly demand for the water system. For a water system, or any system, Accumulation = input – output. The accumulation is defined by the rising and falling of the water elevation inside the tank. By subtracting this accumulation (positive or negative) from the input, an average demand amount, in gallons, was able to be determined for the water system.

In order to determine whether off-peak pumping would be a possibility, assumptions had to be made on how much demand from the system occurred at a given time during the day. It was assumed that the seven wells listed in Table 4-9 used in the analysis will feed the distribution system, the current 2.5 MG Ground Storage Tank, and the new 2.5 MG Ground Storage Tank that will be built adjacent to the existing. The 3 hydropneumatic stations (Fox Fire #2, Lilac Drive Well #7, and Booster Pump Well #14) were not used for this analysis, as they are designed to serve only isolated portions of the distribution system. For the well capacity, it was assumed that an average full capacity for an average pressure output occurs with the understanding that the capacity of the wells will fluctuate based on the pressure in the system. For the off-peak pumping analysis, it was assumed that the hours of peak pumping would be from 8 AM until 8 PM every day. An assumption was made that the minimum tank capacity needed would be based on retaining a volume of water within the tank for fire flow requirements. For this analysis, it is assumed that a minimum of 3500 gpm is required for meeting fire flow demands of the system. For a 3500 gpm fire flow requirement, the duration needed according to NFPA is 3 hours,

which equates to 630,000 gallons. The minimum tank level necessary would be approximately 5.6 ft of water in each tank. For this analysis, each tank had to stay above a level of 10 ft in order to meet system requirements, which includes some additional "emergency" storage.

4.2.1 Off-Peak Pumping Analysis

The first analysis run was determining whether or not an off-peak pumping scheme could work for the distribution system, and what requirements or constraints would be on the system. In order to complete this analysis, the MMAD was determined as previously described along with the average day for the system in order to perform a proper calculation of the system. Because only daily values were provided for the wells and tank levels, assumptions had to be made on how the demand was split throughout the day. Four different scenarios were used in order to bracket the analyses: 25% of total demand during peak hours, 50% of total demand during peak hours, 75% of total demand during peak hours, and 90% of total demand during peak hours.

The MMAD demand value for the Town of Clinton was found on the New Jersey DEP's website. From this website, the historical data and committed capacity showed that the peak month was a total pumped volume of 71.521 MGM, which equates to an average day of 2.307 MGD. Removing the three hydropneumatic stations from this analysis, we arrive with an MMAD demand of 1.651 MGD. This was the demand used for the analysis.

For the average day scenario, the tanks were assumed to start at full capacity, with a level of 45'. As previously mentioned,, it was assumed that the tank level would provide sufficient pressure throughout the distribution system if the level was above 10'. Each of the four scenarios started out at 8 AM on the peak day and was run for 5 consecutive days with the maximum month average day demands, only utilizing pumping during the off-peak hours of 8 PM to 8 AM. The model was run through to observe tank level response with respect to the low tank level.

The tank is filled by the pumps until 8 AM, or the beginning of the peak billing rate, where it is allowed to drain until it can pump full capacity again to fill.

The tank is allowed to fill via either an on/off sequence or variable frequency drive (VFD) until the off-peak pumping hours are over at 8 AM, or so that it reaches maximum capacity of 2,500,000 gallons right at the end of the off-peak energy pumping period. Once the off-peak energy cost time frame is over at 8 AM, and the peak-hourly rate begins, the wells are shut off and the tank is able to drain due to the

demand in the supply system. Figures 4.1, 4.2, 4.3, and 4.4 indicate the model run of the off-peak pumping capabilities for the water distribution system for the MMAD demand, in gallons. The figures relate the water tank level vs. the time of day.

As can be seen from the figures, during MMAD demands, the Ground Storage Tank levels would not drop below 10 feet above the bottom of each of the tanks with all wells operating during off-peak hours and shutting off during peak hours and in any of the four demand scenarios (25% during peak hours, 50%, 75%, 90%) for four consecutive days. However, during the maximum month, this demand continues for a full 31 days. During the month long period, all of the four demand scenarios will cause the tank level to drop below the lowest acceptable level.

An additional model was run just using one Ground Storage Tank for 75% demand scenario during MMAD. This model was run to confirm whether or not the second Ground Storage Tank would be necessary for the demand of the system. As can be seen by Figure 4.5, if only one Ground Storage Tank is used, there is insufficient storage capacity available to be able to accommodate a MMAD demand for a long period of time.

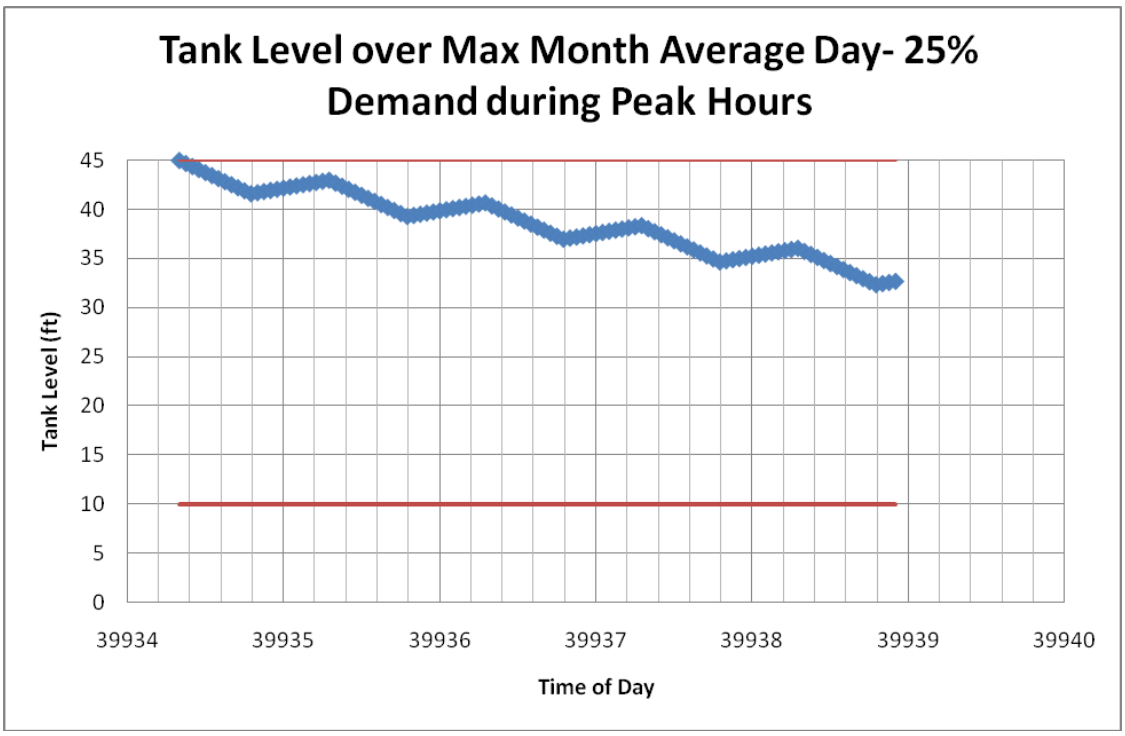


Figure 4.1 – Tank Level (ft) over MMAD for 25% Demand assumed during peak hours

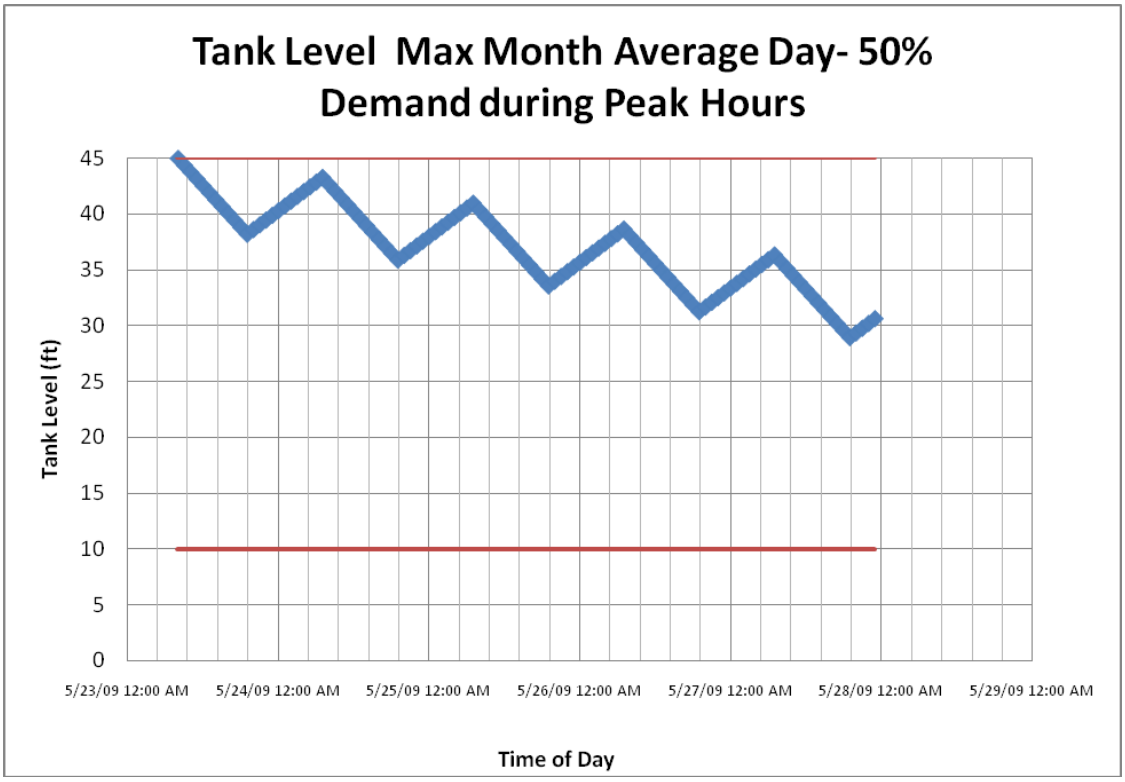


Figure 4.2 – Tank Level (ft) over MMAD for 50% Demand assumed during peak hours

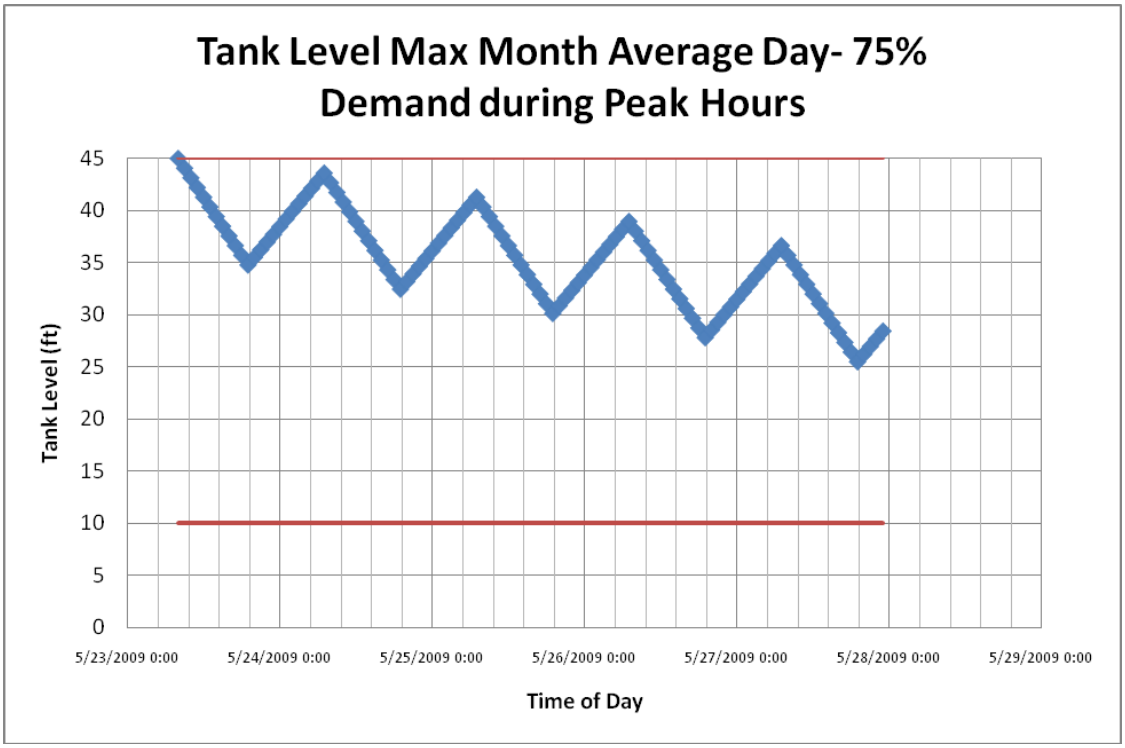


Figure 4.3 – Tank Level (ft) over MMAD for 75% Demand assumed during peak hours

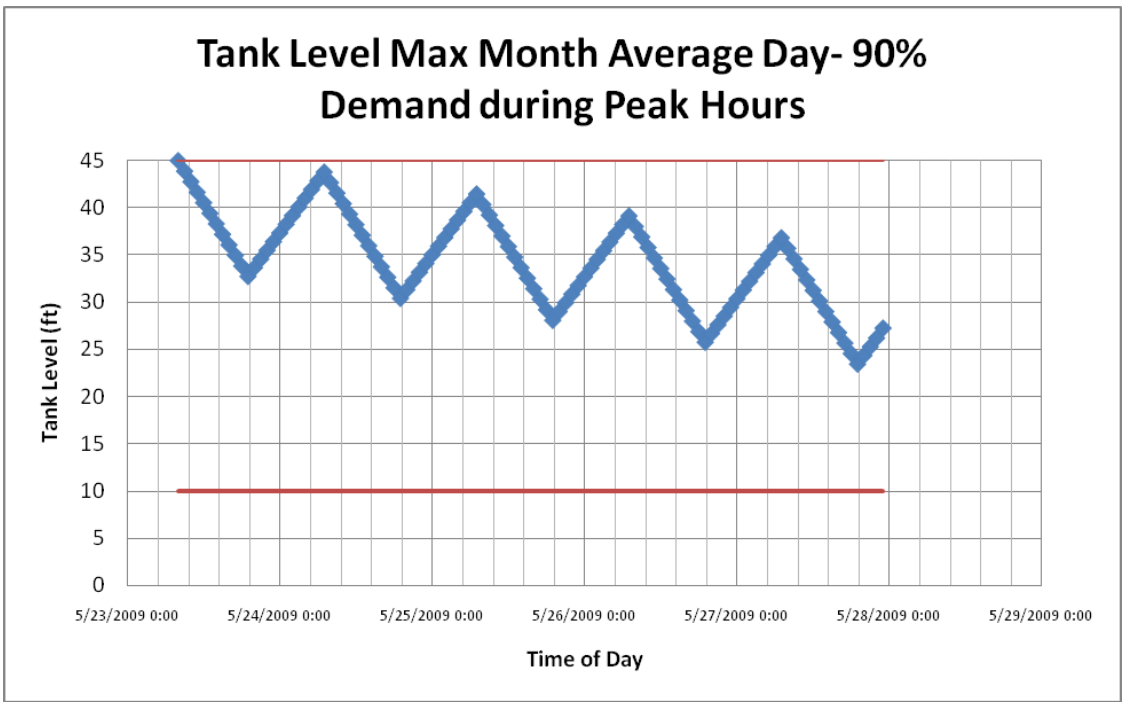


Figure 4.4 – Tank Level (ft) over MMAD for 90% Demand assumed during peak hours

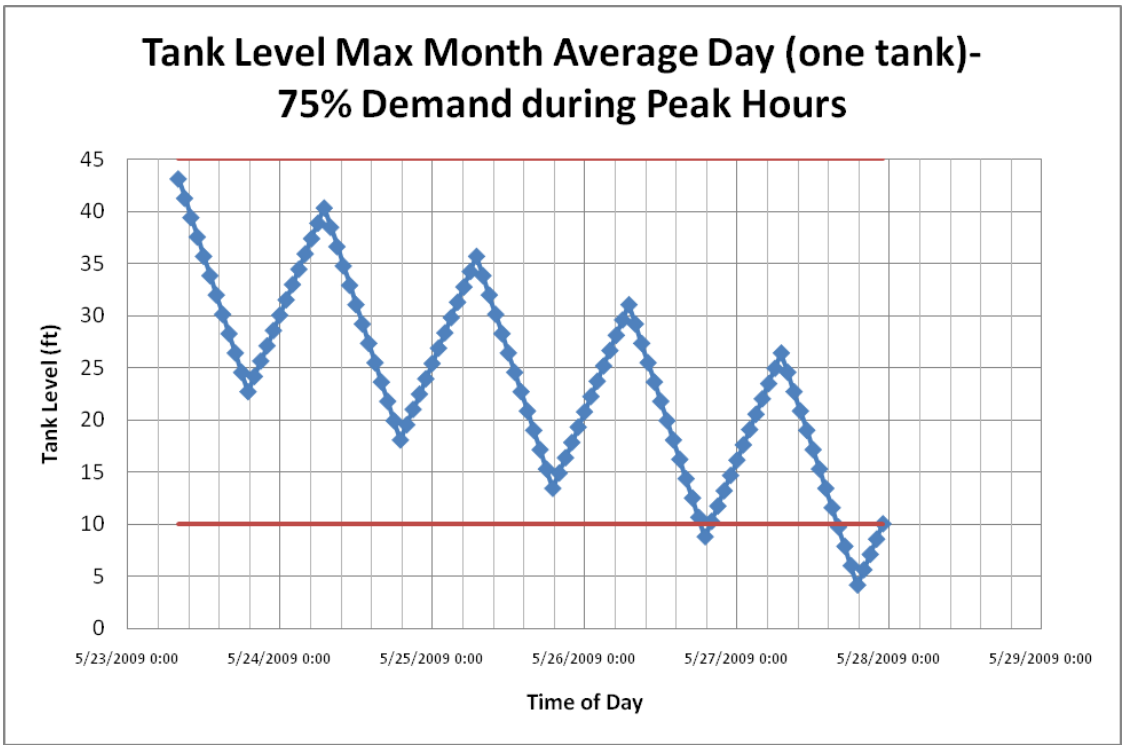


Figure 4.5– Tank Level (ft) over MMAD for 75% Demand assumed during peak hours, using only one storage tank.

The off-peak pumping analysis was completed based on the assumption that all 7 of the well stations can operate periodically, during the higher peak periods to augment the supply needed. It can be seen through the analysis that the wells in the system equipped with the two 2.5 MG Ground Storage Tanks can adequately serve the distribution system in the Town of Clinton with the augmentation of supply during the peak periods. The wells can be run on VFD or on/off controls in order to keep the tank level adequately above the low pressure or elevation 10 feet.. The pumps will be allowed to pump at full capacity during the off-peak hours until either 8 AM or until the maximum capacity of the tank is reached. During average day conditions, this will also be the case for the 4 wells that will still pump to the tank during this time.

To confirm and solidify the potential for on-peak/off-peak pumping operational protocol, further analysis to include a hydraulic model of the water distribution

system is needed to determine the estimated energy savings. The additional analysis is beyond the scope of this project and will also serve to determine if the off-peak pumping scenario does not impose service quality issues in any of the higher or more remote areas of the distribution system.

4.2.2 Energy Savings of Reduced Hydraulic Grade Line

In addition to on-peak/off-peak pumping, an additional analysis was performed on the Town of Clinton Water Distribution System to identify energy savings associated with a reduced hydraulic grade line. For this analysis, the annual electrical energy savings were identified for a reduction in the hydraulic grade line in five 10 psi pressure increments. Unlike the off-peak pumping analysis, this model was run for an average annual day of pumping. Available information for all the wells with the capacity, pressure, and demand as shown in Table 4-10. In order to complete this analysis, a baseline Hydraulic Grade Line (HGL) at each well supply was calculated using the discharge pressure and estimated grade elevation. Since the analysis utilized differential pressure, the precise HGL was not necessary. The estimated HGL along with the horsepower and kW used for all of the wells were used to estimate kWh (kilowatt-hours), which through the billing and tariff rates provided, were used to approximate a cost savings for the water system for each reduced HGL. The HP of the well pumps was determined by the product of the capacity used and the well's HGL, which was then converted to kW. The kW then can be used to determine the kWh used by the wells.

Table 4-10 Well Capacity, Pressures, and Demand

WELL	CAPACITY (GPM)	GRADE (FT)	PRESSURE (PSI)	HGL	Tank Elevation	HP	kW	kWh
West End Well #1	100	230	124	516	466	9.60	7.16	171.78
Barn Well #12	250	260	152	611	466	28.40	21.17	508.19
Treatment Plant Well #6	120	179	140	502	466	11.21	8.36	200.53
Well #15	440	190	160	560	466	45.76	34.13	819.01
Clinton Point Well #3A	375	230	130	530	466	36.96	27.56	661.47
Potterstown Well #4	250	270	125	559	466	25.96	19.36	464.64
Beaver Brook Well #11	400	265	145	600	466	44.60	33.26	798.24

The HGL pressure was reduced by 10 psi increments for a reduced HP and kW usage for each of the wells. Table 4-10 represents the potential energy savings in kWh (assuming the wells all run for a period of 24 hours per day, kWh = 24 hrs x kW usage) for a HGL pressure reduction of 10 psi, 20 psi, 30 psi, 40 psi, and 50 psi for peak day conditions.

The capacity of all 7 wells totals approximately 2,400,000 gallons/day. For the average day demand taken over the year, the demand is approximately 1,980,000 gallons/day, or approximately 83% of the total capacity possible by the wells. It is to be noted that this demand capacity does not include any of the hydropneumatic stations that lie within the Town of Clinton. This reduced capacity was taken into consideration for the energy savings, so the energy in kWh would only be approximately 83% of the peak day energy usage, assuming that the wells would run for fewer hours during the day. This analysis shows that if a 10 psi reduction in HGL is implemented throughout the distribution system, the annual savings would be approximately $7,366. The pressure reduction would need to be accomplished by either a change in the pumping unit itself or by the addition of variable frequency drives. It should be noted that it is not recommended to throttle the discharge valve on the pumping unit as this results in an energy inefficient operation. Depending upon the well hydraulics, and the impact to pumping level by aquifer withdrawal, Variable Frequency Drives may be considered along with adjustment in pump selection.

Table 4-11 Energy Savings

WELL	10 % REDUCED PSI		20 % REDUCED PSI		30 % REDUCED PSI		40 % REDUCED PSI		50 % REDUCED PSI	
	kWh/day	$/day	kWh/day	$/day	kWh/day	$/day	kWh/day	$/day	kWh/day	$/day
West End Well #1	6.34	$1.08	12.68	$2.16	19.02	$3.23	25.36	$4.31	31.70	$5.39
Barn Well #12	15.85	$2.54	31.70	$5.07	47.54	$7.61	63.39	$10.14	79.24	$12.68
Treatment Plant Well #6	7.61	$1.22	15.21	$2.43	22.82	$3.65	30.43	$4.87	38.03	$6.09
Well #15	27.89	$4.46	55.78	$8.93	83.68	$13.39	111.57	$17.85	139.46	$22.31
Clinton Point Well #3A	23.77	$4.04	47.54	$8.08	71.31	$12.12	95.09	$16.16	118.86	$20.21
Potterstown Well #4	15.85	$2.54	31.70	$5.07	47.54	$7.61	63.39	$10.14	79.24	$12.68
Beaver Brook Well #11	25.36	$4.31	50.71	$8.62	76.07	$12.93	101.42	$17.24	126.78	$21.55
TOTAL	**122.66**	**$20.18**	**245.32**	**$40.36**	**367.98**	**$60.54**	**490.64**	**$80.72**	**613.30**	**$100.90**

It also may be required that a new booster pump station be installed to pump water to the tanks when the reduced pressure of the wells goes into effect depending upon the objectives for savings in HGL. This booster pump station will have a pressure relief valve (PRV) and a bypass main that pump into the two 2.5 MG Ground Storage Tanks which would be maintained within a high service area. With the addition of the booster pump, it allows the Town of Clinton to reduce service pressure at all times, saving money and energy usage through the water distribution system. With this scenario, there could be a possibility of recovering the head with a micro turbine as well.

The potential energy savings shown are based upon limited water distribution system information provided. The actual ability to implement this scenario including estimated capital cost expenditures and energy savings is greatly dependent upon the details of the water distribution system and in particular how service in the higher elevations of the system can be maintained with an appropriate level of service. Even if the higher service elevations are found to have service compromised, it could be that additional hydropneumatic stations may resolve service issues. But again, due to

the nature of this analysis and the limitations associated with the details of the information provided, the actual energy savings is difficult to estimate at this time.

There is a possibility of having a combination of both the off-peak pumping scenario with the reduced pressure scenario, but hydraulic modeling will need to be run in order to properly determine the cost savings of reducing the Hydraulic Grade Line of the system.

It is recommended that a more detailed distribution system analysis be undertaken that would provide a precise investigation into the ability, constraints, limitations and benefits of a reduction in water supply pressure provided from each of the well stations. Additionally, the manner and timing in which any improvement is implemented is a critical component to its success since any adjustment in supply pressure would impact the overall distribution system.

4.3 Building Lighting Systems

The goal of this section is to present any lighting energy conservation measures that may also be cost beneficial. It should be noted that replacing current bulbs with more energy-efficient equivalents will have a small effect on the building heating and cooling loads. The building cooling load will see a small decrease from an upgrade to more efficient bulbs and the heating load will see a small increase, as the more energy efficient bulbs give off less heat. Please note that the Engineer's Estimate of Probable Construction Costs presented herein are estimates based on historic data compiled from similar installations and engineering opinions. Additional engineering will be required for each measure identified in this report and final scope of work and budget cost estimates will need to be confirmed prior to the coordination of project financing or the issuance of a Request for Proposal.

The strategies included in this section focus on maximizing energy savings while also maintaining the existing look of each fixture; therefore, most of the proposed lamp styles remain consistent with existing lamp styles. The additional recommendations to install occupancy sensors in specified areas of the facility are included. Please refer to Appendix F for a line-by-line proposed detailed lighting upgrades list.

4.3.1 Municipal Building

It is recommended that the existing T-8 lighting system at the Municipal Building be upgraded to higher efficiency T8 lamps and ballasts. In general, the recommended lighting upgrade project, as presented in Appendix F, involves relamping fluorescent lamps and rebuilding existing troffers with reduced amount of lamps, new reflectors and new ballasts. Metro Energy's survey also identified select locations where the installation of occupancy sensors would increase overall energy savings.

The following table, Table 4-12, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Municipal Building.

Table 4-12 Municipal Building Lighting Improvements	
Annual kW Saved	1.83 kW
Annual kWh Saved	9,553 kWh
Annual Energy Savings	$1,528
Engineer's Opinion of Probable Cost	$5,212
New Jersey SmartStart Rebate	$330
Total Cost	$4,882
Simple Payback	3.2 years
NPV	$8,848

Refer to Appendix F for complete energy model calculations.

4.3.2 Community Center

It is recommended that the existing incandescent and T-12 lighting system at the Community Center be upgraded to higher efficiency compact fluorescents and T-8 standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix F, involves relamping incandescent fixtures, relamping and reballasting 4-foot T-12 fixtures, installing new T5 fluorescent fixtures in the gym and retrofitting existing outside HID fixtures with new LED lighting technology.

The following table, Table 4-13, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Community Center.

Table 4-13 Community Center Lighting Improvements	
Annual kW Saved	1.86 kW
Annual kWh Saved	5,610 kWh
Annual Energy Savings	$1,122
Engineer's Opinion of Probable Cost	$7,195
New Jersey SmartStart Rebate	$353
Total Cost	$6,842
Simple Payback	6.1 years
NPV	$3,377

Refer to Appendix F for complete energy model calculations.

4.3.3 WWTP-Control Building

It is recommended that the existing incandescent and T-12 lighting system at the Control Building be upgraded to higher efficiency compact fluorescents and T-8 standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade project, as presented in Appendix F, involves relamping incandescent fixtures, relamping and reballasting 4-foot and 8-foot T-12 fixtures, and rebuilding current troffers with new lamps, reflectors, and ballasts.

The following table, Table 4-14, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Control Building.

Table 4-14 Control Building Lighting Improvements	
Annual kW Saved	5.14 kW
Annual kWh Saved	12,263 kWh
Annual Energy Savings	$1,962
Engineer's Opinion of Probable Cost	$6,930
New Jersey SmartStart Rebate	$520
Total Cost	$6,410
Simple Payback	3.3 years
NPV	$11,113

Refer to Appendix F for complete energy model calculations.

4.3.4 WWTP-Pump Station Building

It is recommended that the existing T-12 lighting system at the Pump Station Building be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in Appendix F, involves relamping and reballasting 4-foot T-12 fixtures.

The following table, Table 4-15, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Pump Station Building.

Table 4-15 Pump Station Lighting Improvements	
Annual kW Saved	0.3 kW
Annual kWh Saved	304 kWh
Annual Energy Savings	$49
Engineer's Opinion of Probable Cost	$499
New Jersey SmartStart Rebate	$80
Total Cost	$419
Simple Payback	8.5 years
NPV	$110

Refer to Appendix F for complete energy model calculations.

4.3.5 WWTP-Filter Building

No retrofit strategy was proposed for this building.

4.3.6 WWTP- Blower Building

It is recommended that the existing T-12 lighting system at the Blower Building be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in Appendix F, involves rebuilding 4-foot T-12 fixtures with new lamps, ballasts, and a reflector.

The following table, Table 4- 16, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Blower Building.

Table 4-16 Blower Building Lighting Improvements	
Annual kW Saved	0.57 kW
Annual kWh Saved	944 kWh
Annual Energy Savings	$151
Engineer's Opinion of Probable Cost	$1,302
New Jersey SmartStart Rebate	$110
Total Cost	$1,192
Simple Payback	7.9 years
NPV	$187

Refer to Appendix F for complete energy model calculations.

4.3.7 WWTP-Outside Lighting System

It is recommended that the existing outside HID lighting system be upgraded to higher efficiency LED lamps and ballasts. Current LED technology allows for much greater lamp life expectancy and a large reduction in energy consumption which make outside flood lights ideal candidates. The recommended lighting upgrade project, as presented in Appendix F, involves retrofitting current, mercury vapor, high pressure sodium, and metal halide HID fixtures with the new LED lamps and ballasts.

The following table, Table 4- 17, summarizes a simple payback analysis assuming the implementation of all recommended outside lighting system improvements at the waste water treatment plant.

Table 4-17 Outside Lighting Improvements	
Annual kW Saved	7.39 kW
Annual kWh Saved	26,907 kWh
Annual Energy Savings	$4,305
Engineer's Opinion of Probable Cost	$21,843
New Jersey SmartStart Rebate	$0
Total Cost	$21,843
Simple Payback	5.1 years
NPV	$16,941

Refer to Appendix F for complete energy model calculations.

4.3.8 WWTP- Well House 6

It is recommended that the existing incandescent and T-12 lighting system at Well House #6 be upgraded to higher efficiency compact fluorescents and T-8 standards to create lighting uniformity throughout the building. The recommended lighting upgrade project, as presented in Appendix F, involves relamping incandescent fixtures, and relamping and reballasting the 8-foot T-12 fixtures with new T8 lamps and ballasts.

The following table, Table 4-18, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at Well House #6.

Table 4-18 Well House #6 Lighting Improvements	
Annual kW Saved	0.49 kW
Annual kWh Saved	247 kWh
Annual Energy Savings	$40
Engineer's Opinion of Probable Cost	$214
New Jersey SmartStart Rebate	$30
Total Cost	$184
Simple Payback	4.6 years
NPV	$173

Refer to Appendix F for complete energy model calculations.

4.3.9 DPW-Barn Well House 12

It is recommended that the existing T-12 lighting system at the Barn Well House #12 be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in Appendix F, involves rebuilding 4-foot T-12 fixtures with new lamps and ballasts.

The following table, Table 4-19, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Barn Well House #12.

Table 4-19 Barn Well House #12 Lighting Improvements	
Annual kW Saved	0.19 kW
Annual kWh Saved	456 kWh
Annual Energy Savings	$73
Engineer's Opinion of Probable Cost	$312
New Jersey SmartStart Rebate	$50
Total Cost	$262
Simple Payback	3.6 years
NPV	$395

Refer to Appendix F for complete energy model calculations.

4.3.10 West End Well House 1

It is recommended that the existing incandescent lighting fixture at the West End Well House #1 be upgraded to higher efficiency compact fluorescents. The recommended lighting upgrade project, as presented in Appendix F, involves relamping the existing 100 watt incandescent fixture with a higher efficiency 23 watt compact fluorescent lamp.

The following table, Table 4-20, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at West End Well House #1.

Table 4-20 West End Well House #1 Lighting Improvements	
Annual kW Saved	0.08 kW
Annual kWh Saved	39 kWh
Annual Energy Savings	$7
Engineer's Opinion of Probable Cost	$27
New Jersey SmartStart Rebate	$0
Total Cost	$27
Simple Payback	3.9 years
NPV	$48

Refer to Appendix F for complete energy model calculations.

4.3.11 Booster Pump-Foster Wheeler Hydropneumatic Station 14

It is recommended that the existing T-12 lighting system at the Foster Wheeler Booster Pump Station #14 be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in Appendix F, relamping and reballasting the existing 4-foot T-12 wrap fixtures new T-8 lamps and ballasts.

The following table, Table 4- 21, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Foster Wheeler Station Booster Pump Station #14.

Table 4-21 Foster Wheeler Booster Pump Station #14 Lighting Improvements	
Annual kW Saved	0.86 kW
Annual kWh Saved	432 kWh
Annual Energy Savings	$69
Engineer's Opinion of Probable Cost	$562
New Jersey SmartStart Rebate	$90
Total Cost	$472
Simple Payback	6.8 years
NPV	$160

Refer to Appendix F for complete energy model calculations.

4.3.12 Beaver Brook Well House 11

It is recommended that the existing incandescent and T-12 lighting system at Beaver Brook Well House #11 be upgraded to higher efficiency compact fluorescents and T-8 standards to create lighting uniformity throughout the building. The recommended lighting upgrade project, as presented in Appendix F, involves relamping incandescent fixtures, and relamping and reballasting the 4-foot T-12 fixtures with new T8 lamps and ballasts.

The following table, Table 4-22, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at Beaver Brook Well House #11.

Table 4-22 Beaver Brook Well House #11 Lighting Improvements	
Annual kW Saved	0.62 kW
Annual kWh Saved	308 kWh
Annual Energy Savings	$52
Engineer's Opinion of Probable Cost	$330
New Jersey SmartStart Rebate	$40
Total Cost	$290
Simple Payback	5.6 years
NPV	$186

Refer to Appendix F for complete energy model calculations.

4.3.13 Hunts Mill Park Well House 15

It is recommended that the existing T-12 lighting system at the Hunts Mill Park Well House #15 be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in F, involves rebuilding 4-foot T-12 fixtures with new lamps and ballasts.

The following table, Table 4- 23, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Hunts Mill Park Well House #15.

Table 4-23 Hunts Mill Park Well House #15 Lighting Improvements	
Annual kW Saved	0.57 kW
Annual kWh Saved	285 kWh
Annual Energy Savings	$46
Engineer's Opinion of Probable Cost	$935
New Jersey SmartStart Rebate	$150
Total Cost	$785
Simple Payback	17.1 years
NPV	$348

Refer to Appendix F for complete energy model calculations.

4.3.14 Lilac Drive Well House/Hydropneumatic Station 7

It is recommended that the existing incandescent lighting fixtures at the Lilac Drive Well House #7 be upgraded to higher efficiency compact fluorescents. The recommended lighting upgrade project, as presented in Appendix F, involves relamping the existing 60 watt and 200 watt incandescent fixtures with a higher efficiency 15 watt and 42 watt compact fluorescent lamp.

The following table, Table 4- 24, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at Lilac Drive Well House #7.

Table 4-24 Lilac Drive Well House #7 Lighting Improvements	
Annual kW Saved	0.68 kW
Annual kWh Saved	339 kWh
Annual Energy Savings	$61
Engineer's Opinion of Probable Cost	$195
New Jersey SmartStart Rebate	$0
Total Cost	$195
Simple Payback	3.2 years
NPV	$353

Refer to Appendix F for complete energy model calculations.

4.3.15 Lebanon Well House 2

It is recommended that the existing incandescent lighting fixture at the Lebanon Well House #2 be upgraded to higher efficiency compact fluorescents. The recommended lighting upgrade project, as presented in Appendix F, involves relamping the existing 100 watt incandescent fixture with a higher efficiency 23 watt compact fluorescent lamp.

The following table, Table 4- 25, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at Lebanon Well House #2.

Table 4-25 Lebanon Well House #2 Lighting Improvements	
Annual kW Saved	0.08 kW
Annual kWh Saved	39 kWh
Annual Energy Savings	$6
Engineer's Opinion of Probable Cost	$27
New Jersey SmartStart Rebate	$0
Total Cost	$27
Simple Payback	4.5 years
NPV	$26

Refer to Appendix F for complete energy model calculations.

4.3.16 Potterstown Well House 4

It is recommended that the existing incandescent lighting fixture at the Potterstown Well House #4 be upgraded to higher efficiency compact fluorescents. The recommended lighting upgrade project, as presented in Appendix F, involves relamping the existing 100 watt incandescent fixture with a higher efficiency 23 watt compact fluorescent lamp.

The following table, Table 4- 26, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at Potterstown Well House #4.

Table 4-26 Potterstown Well House #4 Lighting Improvements	
Annual kW Saved	0.08 kW
Annual kWh Saved	39 kWh
Annual Energy Savings	$6
Engineer's Opinion of Probable Cost	$27
New Jersey SmartStart Rebate	$0
Total Cost	$27
Simple Payback	4.5 years
NPV	$26

Refer to Appendix F for complete energy model calculations.

4.3.17 Fox Fire Booster Pump Station 2

It is recommended that the existing T-12 lighting system at the Fox Fire Pump Station #2 be upgraded to higher efficiency T-8 standards to create lighting uniformity throughout the building. In this case, the recommended lighting upgrade project, as presented in Appendix F, involves rebuilding 4-foot T-12 fixtures with new lamps and ballasts.

The following table, Table 4- 27, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Fox Fire Pump Station #2.

Table 4-27 Fox Fire Pump Station #2 Lighting Improvements	
Annual kW Saved	0.19 kW
Annual kWh Saved	95 kWh
Annual Energy Savings	$17
Engineer's Opinion of Probable Cost	$312
New Jersey SmartStart Rebate	$50
Total Cost	$262
Simple Payback	15.4 years
NPV	$85

Refer to Appendix F for complete energy model calculations.

4.4 Building 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. Equipment cost estimate calculations are provided in Appendix E

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 window air conditioning unit has a median service life of 10 years. Therefore, if a window unit has been in service for more than 10 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. 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".

4.4.1 Municipal Building

Heating is provided by two gas-fired furnaces (new section) and two split system heat pumps equipped with electric heaters (original building). Additionally, cooling is provided by two split system air conditioning units and the above mentioned heat pumps. The units are approximately 18 years old with the exception of two condensing units that were replaced in 2004 and 2008. Additional HVAC equipment includes electric cabinet heaters near entrance doors and a small number of electric baseboards.

All major HVAC equipment associated with the Municipal Building is listed in Table 4-28, along with ASHRAE-expected service lives.

Table 4-28 Municipal Building HVAC Equipment Service Lives					
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Service location**	**Age / Condition**	**ASHRAE Expected Life (Years)**
Reznor HXE150-8-2E SN: AUE66H5N32596	Furnace	Attic	New Section – First Floor	N/A (assumed 1991), good condition	18
Carrier 58GP-125 SN: 3091A01998	Furnace, 2 units	Attic	New Section – Second Floor	1991, approaching end of useful life	18
Carrier 40RT012530 SN: 0395406	Fan coil unit	Attic	Old Section – Second Floor	1991, approaching end of useful life	18
Carrier 40BA000300 SN: 0391166	Fan coil unit	Attic	Old Section – First Floor	1991, approaching end of useful life	18
Carrier 38AC012430 SN: D397079	Heat pump	Outside	Old Section – Second Floor	1991, approaching end of useful life	15
Carrier 38ARQ008 SN: 0404G020048	Heat pump	Outside	Old Section – First Floor	2004, very good condition	15
Carrier 38BA009550 SN: 3091G13003	Condensing unit	Outside	New Section – Second Floor	1991, approaching end of useful life	15
Carrier 24ABR360 SN: 1608E06643	Condensing unit	Outside	New Section – First Floor	2008, very good condition	15

Air conditioning/heat pump replacement

There is one heat pump and one air conditioner condensing unit that are at the end of their useful life. We recommend replacing these units with new, energy efficient units similar in size. The energy savings related to cooling were calculated based on an assumed efficiency of the old and new unit of 8 EER and 11 EER, respectively, and approximately 1,000 hours of operating time per year. Similarly, average Coefficient of Performance (COP) of the existing and proposed heat pump is estimated at 1.9 and 2.5, respectively. Please note that COP values were reduced from the units' factory rated values to account for the operational inefficiencies associate with colder weather in NJ.

Table 4-29: Municipal Office
Air Conditioning/ Heat Pump Replacement Savings

Predicted annual gas savings	N/A
Natural gas cost savings	N/A
Predicted annual Electricity savings	12,194 kWh
Electricity cost savings at $0.16/kWh	$1,951
Total savings	$1,951
Cost of upgrade	$30,000
Incentives	$1,241
Simple payback	14.74
Lifetime energy savings (15 years)*	$36,287
Net present value (NPV)	$2,525

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

Furnace replacement

As stated, the two furnaces that serve the upper floor of the new section are approximately 18 years old. The units still appear to be in good condition, however,

as per ASHRAE standards they will reach their expected lifetime in the next few years. Assuming heating was provided at 75 percent efficiency (originally it was rated at 80% efficiency), and replacing these units with a 93 percent efficiency furnace, the energy savings were estimated at 237 therms. At the current rate of $1.80/therm, this replacement would save $427 per year. Please note that only one furnace is assumed to be used most of the time, however it is recommended to replace both units.

Table 4-30: Municipal Building Furnace Replacement Savings	
Predicted gas annual savings	237 therms
Natural gas cost savings at $1.80/therm	$427
Predicted annual Electricity savings	N/A
Electricity cost savings at $0.16/kWh	N/A
Total savings	$427
Cost of upgrade	$10,000
Incentives	$600
Simple payback	22.03
Lifetime energy savings (25 years)*	$9,134
Net present value (NPV)	$2,572

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

Room Temperature Control

The current temperature control system utilizes manual, non-programmable thermostats. This system requires increased maintenance and labor by staff since each unit needs to be checked and adjusted manually. Metro Energy investigated replacing the thermostats with a new network-based system that would be controlled either at the thermostat or remotely through a computer.

As per US Department of Energy, savings of about 5%–15% of the heating and cooling bill can be saved by reducing the room temperature 10°–15° for 8 hours per day. Based on the utility bills, the Municipal building's heating and cooling requirements are approximately 80,000 kWh of electricity and 1,900 therms of natural gas per year.

Assuming conservative energy savings of approximately 7.5%, the estimated energy savings for electricity and natural gas consumption are calculated to be 6,000 kWh and 142 therms per year, respectively.

The implementation of this recommendation includes installation of four networkable thermostats, a web-based software and wired or wireless network. The total cost is estimated to be $5,000.

Table 4-31: Municipal Building Thermostat Replacement	
Predicted natural gas annual savings	142 therms
Natural gas cost savings at $1.80/therm	$256
Predicted annual Electricity savings	6,000 kWh
Electricity cost savings at $0.16/kWh	$960
Total savings	$1,216
Cost of upgrade	$5,000
Incentives	$0
Simple payback	4.11
Lifetime energy savings (25 years)*	$13,804
Net present value (NPV)	$5,853

4.4.2 Community Center

The building is heated using two gas-fired furnaces rated at 125 MBH each. There is no cooling in the building except for a single window air conditioner located in the upstairs office.

All major HVAC equipment associated with the Community Center is listed in Table 4-32, along with ASHRAE-expected service lives.

Table 4-32 Community Center HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Service location	Age / Condition	ASHRAE Expected Life (Years)
Comfortmaker NTG9125FKA2 SN:L974963184	Forced air furnace (2 units)	Basement	Entire Building	1997, good condition.	15
N/A	Window AC	Office	Office	N/A	10

Room Temperature Control

Room temperature in the building is controlled through a manual, non-programmable thermostat. As a result, the system will stay on during un-occupied hours unless the temperature is set back manually. Metro Energy investigated replacing the thermostats with a new internet-based system that can be controlled either at the thermostat or remotely through a computer. The system may also be programmed to operate based on a weekly or monthly schedule.

As per US Department of Energy, savings of about 5%–15% of the heating and cooling bill can be saved by reducing the room temperature 10°–15° for 8 hours per day. Based on the utility bills, the Municipal building's heating requirements are approximately 2,400 therms of natural gas per year. Assuming conservative savings of approximately 7.5%, the total savings are equal to 180 therms per year.

The implementation of this recommendation includes installation of a networkable thermostat, and a web-based front end. The total cost is estimated to be $1,250.

Table 4-33: Community Center Thermostat Replacement	
Predicted natural gas annual savings	180 therms
Natural gas cost savings at $1.70/therm	$306
Cost of upgrade	$1,250
Incentives	$0
Simple payback	4.08
Lifetime energy savings (25 years)*	$2,759
Net present value (NPV)	$920

4.4.3 WWTP-Control Building

The building is heated with a propane-fired hot water boiler rated at 375 MBH. There are four heating zones and each zone in controlled by a non-programmable thermostat. Hot water is circulated to five unit heaters and a number of baseboard radiators. Cooling is provided to the office, break room and lab only via two split system air conditioners rated at 3.5 and 4 tons, respectively. Air ventilation in the wet well and dry well area includes two exhaust fans, used most of the time.

All major HVAC equipment associated with this location is listed in Table 4-34, along with ASHRAE-expected service lives.

Table 4-34 Control Building HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age / Condition**	**ASHRAE Expected Life (Years)**
Burnham K-5006B SN: 7740992	HW boiler	Basement	1995, good condition	20
ILG Industries	HW unit heater	Basement & Shop	N/A, approach. end of useful life	20
Carrier 38EH048 SN: 2886F65131	Condensing unit SEER 9*	Outside	1986, passed life expectancy	15
Carrier 38YMA042 SN: 2992E05149	Heat Pump SEER 11.5 HSPF 7.5*	Outside	1992, approach. end of useful life	15

*Original rated efficiency of the units

Air conditioning replacement

There is one heat pump and one air conditioner that are at the end of their useful life. We recommend replacing these units with new, energy efficient units similar in size. The energy savings based on an assumed efficiency of the new units of 16 S EER and 9 HSPF and approximately 1,000 hours of cooling and 2,200 hours of heating operating time per year.

Table 4-35: Control Building Air Conditioning/ Heat Pump Replacement Savings	
Predicted annual gas savings	N/A
Natural gas cost savings	N/A
Predicted annual Electricity savings	7,913 kWh
Electricity cost savings at $0.16/kWh	$1,266
Total savings	$1,266
Cost of upgrade	$15,000
Incentives	$690
Simple payback	11.30
Lifetime energy savings (15 years)*	$23,548
Net present value (NPV)	$2,526

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

4.4.4 WWTP-Pump Station Building

The building is heated with one electric unit heater rated at 5.6 kW. There is no cooling equipment. In addition, there is one exhaust fan for ventilation that is typically not used.

All major HVAC equipment associated with this location is listed in Table 4-36, along with ASHRAE-expected service lives.

Table 4-36 Pump Station Building HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Qmark MUH072	Unit heater	Inside	2003, good condition	15
Exhaust Fan	Exhaust fan	Wall-mounted	1993 (estimated) good condition	20

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.5 WWTP-Filter Building

The building is heated with two propane-fired unit heaters each rated at 200 MBH. There is no cooling equipment.

All major HVAC equipment associated with this location is listed in Table 4-37, along with ASHRAE-expected service lives.

Table 4-37 Filter Building HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Reznor	Unit heater (2 units)	Filter Area	N/A, good condition	20
Exhaust Fan	Exhaust fan (2 units)	Wall-mounted	1993 (estimated) good condition	20

The existing propane-fired unit heaters are approximately 80% efficient and in good condition. Although a more efficient unit is available in the market (91%), given the age and condition of the existing units, a replacement is not recommended.

4.4.6 WWTP- Blower Building

The building is heated with one propane-fired unit heater rated at 150 MBH. There is no cooling equipment. The building is also equipped with one exhaust fan that is rarely used.

All major HVAC equipment associated with this location is listed in Table 4-38, along with ASHRAE-expected service lives.

Table 4-38 Blower Building
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Trane GPPC015AEC SN: A87E07007	Unit heater	Inside	1987, approaching end of useful life	20
Exhaust Fan	Exhaust fan	Roof	1987 (estimated) good condition	20

Unit heater replacement

One propane-fired unit heater used to heat this building is approximately 22 years old. The unit appears to be in good condition; however, as per ASHRAE standards it has exceeded its useful life. Assuming heating was provided at 75 percent efficiency (originally it was rated at 80% efficiency), and replacing this unit with a 92 percent heater, there would be energy savings estimated at 263 gallons of propane. At the current rate of $1.40/gal, the savings were calculated at $368 per year.

Table 4-39: WWTP Blower Building Unit Heater Replacement Savings	
Predicted Propane annual savings	263 gallons
Natural gas cost savings at $1.40/gal	$368
Cost of upgrade	$4,500
Incentives	$600
Simple payback	10.59
Lifetime energy savings (25 years)*	$8,946
Net present value (NPV)	$2,343

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

4.4.7 Well House 6

The heating equipment includes one electric unit heater rated at 10 kW. There is no cooling equipment at this site. The existing electric heater is 100% efficient, and in good condition.

All major HVAC equipment associated with this location is listed in Table 4-40, along with ASHRAE-expected service lives.

Table 4-40 Well House #6
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Qmark MUH102	Unit heater	Pump room	2000, Good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.8 DPW-Barn Well House 12

Heating is provided by a gas fired furnace that is also used to heat a garage area in the DPW. The unit is rated at 100,000 Btuh. This unit is about 20 years old and approaching the end of useful life.

All major HVAC equipment associated with this location is listed in Table 4-41, along with ASHRAE-expected service lives.

Table 4-41 Barn Well House #12
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Lennox G20Q3/4E-100-1 SN: 5890G10522	Forced air furnace	DPW Garage*	1990, approaching end of expected life	18

4.4.9 West End Well House 1

The heating equipment includes two electric unit heaters rated at 5 kW each. There is no cooling equipment at this site. The existing electric heaters are 100% efficient, and in fair condition. The age of the heaters is unknown and based on visual inspection it is assumed they are approaching the end of their ASHRAE expected lifetime, therefore replacement of these unit heaters should be considered.

All major HVAC equipment associated with this location is listed in Table 4-42, along with ASHRAE-expected service lives.

Table 4-42 West End Well House #1
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Federal Pacific Cat. No. USA2415 SN: K70	Unit heater	Pump room	N/A, Fair condition	13
Marley MWUH5004	Unit heater	Pump room	N/A, Fair condition	13

As these electric heaters operate close to 100% efficiency; a replacement with a similar heater will result in negligible energy savings. Therefore no energy savings/cost analysis is provided.

Window Replacements

There are four single-glaze glass windows mounted on wood frames. The glass in these windows is 1/8 inch thick and provides little thermal insulation. The total glass area is roughly estimated at 30 square feet. It is recommended to replace these old windows with new, energy efficient windows with aluminum or vinyl frames.

Energy savings that could be realized from the window replacement is a result of reduced heat conduction and air infiltration in new windows and frames. The following table illustrates those savings and anticipated installation costs.

Table 4-43: West End Well #1 Window Replacement Savings

Predicted annual Electricity savings	1,712 kWh
Electricity cost savings at $0.17/kWh	$291
Cost of upgrade	$3,000
Incentives	$0
Simple payback	10.3 years
Lifetime energy savings (20 years)*	$10,611
Net present value (NPV)	$2,930

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

4.4.10 Booster Pump-Foster Wheeler Hydropneumatic Station 14

The heating equipment includes two electric unit heaters rated at 5 kW each. There is no cooling equipment at this site. The existing electric heaters are 100% efficient, and in good condition.

All major HVAC equipment associated with this location is listed in Table 4-44, along with ASHRAE-expected service lives.

Table 4-44 Foster Wheeler Hydropneumatic Station #14 HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
	Unit heater	Pump room	N/A, good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.11 Beaver Brook Well House 11

The heating equipment includes one electric unit heater rated at 5 kW. There is no cooling equipment at this site. The existing electric heater is 100% efficient, and in good condition.

All major HVAC equipment associated with this location is listed in Table 4-45, along with ASHRAE-expected service lives.

Table 4-45 Beaver Brook Well House #11 HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Qmark MUH0521	Unit heater	Pump room	2002, good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.12 Hunts Mill Park Well House 15

The heating equipment includes seven electric unit heaters rated at 3 kW each. There is no cooling equipment at this site. The existing electric heaters are 100% efficient, and in good condition.

All major HVAC equipment associated with this location is listed in Table 4-46, along with ASHRAE-expected service lives.

Table 4-46 Hunts Mill Park Well House #15 HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Qmark MUH0341	Unit heater	Pump room	2003, good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.13 Lilac Drive Well House/Hydropneumatic Station 7

The heating equipment includes two electric unit heaters rated at 5 kW each. There is no cooling equipment at this site. The existing electric heaters are 100% efficient; however, one of the heaters appears to be at the end of its ASHRAE expected lifetime, so a replacement may be considered.

All major HVAC equipment associated with this location is listed in Table 4-47, along with ASHRAE-expected service lives.

Table 4-47 Lilac Drive Well House HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Qmark MUH0521	Unit heater	Pump room	2001, good condition	13
Berko Electric NUM-584-S	Unit heater	Pump room	N/A, some rust visible indicating an older unit	13

As these electric heaters operate close to 100% efficiency; a replacement with a similar heater will result in negligible energy savings. Therefore no energy savings/cost analysis is provided.

Window Replacements

There are four single-glaze glass windows mounted on wood frames. The glass in these windows is 1/8 inch thick and provides little thermal insulation. The total glass area is roughly estimated at 30 square feet. It is recommended to replace these old windows with new, energy efficient windows with aluminum or vinyl frames.

Energy savings that could be realized from the window replacement is a result of reduced heat conduction and air infiltration in new windows and frames. The following table illustrates those savings and anticipated installation costs.

Table 4-48: Lilac Drive Well House Window Replacement Savings	
Predicted annual Electricity savings	1,712 kWh
Electricity cost savings at $0.18/kWh	$308
Cost of upgrade	$3,000
Incentives	$0
Simple payback	9.7 years
Lifetime energy savings (20 years)*	$11,235
Net present value (NPV)	$3,271

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

4.4.14 Lebanon Well House 2

The heating equipment includes one electric unit heaters rated at 5 kW. There is no cooling equipment at this site. The existing electric heater is 100% efficient, and in good condition. There are no HVAC-related energy savings measures recommended for this site

All major HVAC equipment associated with this location is listed in Table 4-49, along with ASHRAE-expected service lives.

Table 4-49 Lebanon Well House #2 HVAC Equipment Service Lives				
Manufacturer & Model Number	**Unit Description**	**Unit Location**	**Age/Condition**	**ASHRAE Expected Life (Years)**
Marley Electric MWUH5004	Unit heater	Pump room	1999, good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

Window Replacements

There is one single-glaze glass window mounted on a wood frame. The glass in this window is 1/8 inch thick and provides little thermal insulation. The total glass area is roughly estimated at 7.5 square feet. It is recommended to replace this old window with new, energy efficient window with aluminum or vinyl frames.

Energy savings that could be realized from the window replacement is a result of reduced heat conduction and air infiltration in new windows and frames. The following table illustrates those savings and anticipated installation costs.

Table 4-50: Lebanon Well House #2 Window Replacement Savings	
Predicted annual Electricity savings	428 kWh
Electricity cost savings at $0.15/kWh	$64
Cost of upgrade	$500
Incentives	$0
Simple payback	7.8 years
Lifetime energy savings (20 years)*	$2,341
Net present value (NPV)	$801

*Assume 2% yearly inflation on natural gas costs, 3% on electrical costs

4.4.15 Potterstown Well House 4

The heating equipment includes one electric unit heater rated at 5 kW. There is no cooling equipment at this site. The existing electric heater is 100% efficient, and in good condition. There are no HVAC-related energy savings measures recommended for this site.

All major HVAC equipment associated with this location is listed in Table 4-51, along with ASHRAE-expected service lives.

Table 4-51 Potterstown Well House 4
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Qmark MUH0521	Unit heater	Pump room	2002, good condition	13

The existing electric unit heater is 100% efficient and in very good condition. There are no energy efficiency-related recommendations for this site.

4.4.16 Fox Fire Hydropneumatic Station 2

The heating equipment includes two electric unit heaters rated at 5 kW each. There is no cooling equipment at this site. The existing electric heaters are 100% efficient, and in good condition. However it is assumed that one of the heaters is approaching the end of its ASHRAE expected lifetime, so a replacement may be considered.

All major HVAC equipment associated with this location is listed in Table 4-52, along with ASHRAE-expected service lives.

Table 4-52 Fox Fire Hydropneumatic Station #2
HVAC Equipment Service Lives

Manufacturer & Model Number	Unit Description	Unit Location	Age/Condition	ASHRAE Expected Life (Years)
Berko Electric HUHAA548	Unit heater	Pump room	1995, good condition	13
Qmark MUH0541	Unit heater	Pump room	2007, good condition	13

As these electric heaters operate close to 100% efficiency; a replacement with a similar heater will result in negligible energy savings. Therefore no energy savings/cost analysis is provided.

4.5 Building Pump and Motor Systems

The goal of this section is to present any energy conservation measures related to upgrading motors to premium efficiency models, and adding variable frequency drives (VFD) that may also be cost beneficial. To model the expected energy savings from upgrading motors to premium efficiency models, MotorMaster+ 4.0 software was utilized. Replacement of older motors with a depreciated efficiency with higher premium efficiency motors will be evaluated under this Section. High end users such as the Process Air Blowers and Return Activated Sludge Pumping System have been evaluated under Sections 4.1.1 and 4.1.2, respectively, to determine the energy savings associated with retrofitting these systems with variable frequency drives. Please note that the Engineer's Estimate of Probable Construction Costs presented herein are estimates based on historic data compiled from similar installations and engineering opinions. Additional engineering will be required for each measure identified in this report and final scope of work and budget cost estimates will need to be confirmed prior to the coordination of project financing or the issuance of a Request for Proposal. The following Table, Table 4-53, summarizes a simple payback analysis assuming the implementation of all recommended motor upgrades. For a complete list of motors at the site, see Appendix H. For a complete breakdown of the motor upgrades, see Appendix G.

Table 4-53 Motor Upgrades					
	WWTP Control Bldg - (4) 20 HP, (2) 5 HP, (2) 3 HP	**WWTP Pump Station Bldg – (2) 60 HP**	**WWTP Filter Bldg – (8) 3 HP, (1) 2 HP**	**WWTP Outside– (4) 4.4 HP, (1) 3 HP, (1) 1.5 HP**	**WWTP Well House 6 – (1) 3 HP**
New or Retrofit Cost	$13,935	$15,816	$7,825	$5,387	$915
NJ Smart Start Rebate	$740	$520	$540	$350	$60
Total Cost	$13,195	$15,296	$7,285	$5,037	$855
kWh Savings	11,788	11,882	5,810	7,018	1,129
Annual Energy Savings	$1,886	$1,901	$930	$1,123	$181
Simple Payback	7.0	8.1	7.8	4.5	4.7
Annual Return on Investment (AROI)	14%	12%	13%	22%	21%
Lifetime Energy Savings (15 years)	$35,079	$35,359	$17,290	$20,884	$3,360
Annual Maintenance Cost Savings	$0	$0	$0	$0	$0
Net Present Value (NPV)	$4,057	$2,179	$1,252	$780	$780

Table 4-53 Motor Upgrades							
	DPW Barn Well House 12–(1) 40 HP	**Foster Wheeler Station 14 – (2) 30 HP, (1) 20 HP**	**Beaver Brook Well House 11 – (1) 1.5 HP**	**Hunts Mill Park Well House 15 – (1) 50 HP**	**Lilac Drive Station 7 – (2) 40 HP, (1) 1 HP, (1) 3 HP**	**Lebanon Well House 2 - (1) 50 HP**	**Fox Fire Station 2 – (2) 15 HP, (1) 75 HP. (1) 5 HP**
New or Retrofit Cost	$4,688	$9,519	$704	$5,513	$10,769	$5,513	$15,423
NJ Smart Start Rebate	$180	$425	$50	$220	$470	$220	$590
Total Cost	$4,508	$9,094	$654	$5,293	$10,299	$5,293	$14,833
kWh Savings	3,124	4,854	364	4,396	7,418	4,396	11,125
Annual Energy Savings	$500	$777	$62	$703	$1,335	$659	$2,003
Simple Payback	9.0	11.7	10.6	7.5	7.7	8.0	7.4
Annual Return on Investment (AROI)	11%	9%	9%	13%	13%	12%	14%
Lifetime Energy Savings (15 years)	$9,296	$14,445	$1,151	$13,082	$24,834	$12,264	$37,244
Annual Maintenance Cost Savings	$0	$0	$0	$0	$0	$0	$0
Net Present Value (NPV)	$107	$1,833	$78	$1,157	$5,051	$768	$3,519

4.5.1 Municipal Building

The Municipal Building currently has no pumps installed.

4.5.2 Community Center

The Community Center currently has no pumps installed.

4.5.3 WWTP-Control Building

The Control Building at the WWTP currently houses two Return Activated Sludge (RAS) Pumps, two Diaphragm Pumps, two MOYNO progressive cavity Pumps, two Influent Pumps, and two positive displacement (P.D.) Blower motors.

The two RAS Pump motors are 20 Hp, 230/460V, 91%/89.5 efficiency, and EPFC enclosure. The runtime for these pumps are unknown, however, one pump is usually operating at a time and the other is a standby. We estimated an average run time of 4,380 hours per year per pump at 80% load for these motors.

CDM recommends replacing the existing RAS pump motors, to new 93.6% efficiency rated motors. Based on energy model calculations, energy savings of 4,155 kWh yields $664 dollars in energy savings. In addition to motor replacement, CDM also recommends for additional energy savings, retrofitting the RAS pump system with variable frequency drives as discussed in Section 4.1.2.

The two Diaphragm Pump motors are 3 Hp, 460/230V, 84% efficiency, and TE enclosure. The runtime for these pumps are unknown, however it is assumed that one pump runs continuously at approximately 80% load.

CDM recommends replacing the existing Diaphragm Pump motors to new 90.2% efficiency rated motors. Based on our assumptions we estimated energy savings of 1,284 kWh which yields $206 in cost savings.

The two MOYNO Pump motors are 5 Hp, 460/230V, an assumed 84% standard efficiency, and EPFC enclosure. The runtime for these motors are unknown.

CDM recommends replacing the existing MOYNO Pump motors to new 90.2% efficiency rated motors. Based on energy model calculations where similar run hours as above were assumed, the energy savings were calculated at 2,138 kWh yielding $342 in cost savings.

The two Influent Pump motors are 60 Hp/3 Hp, 460/230V, 92.4% efficiency, and XPFC enclosure. Both pumps operate via two Variable Frequency Drives (VFDs), each one dedicated to a pump. The runtime for these motors are unknown.

The existing Influent Pump motors are already efficient motors with VFDs and in very good condition and as such there is no need to replace them at this time. Advise replacing with premium efficiency motor in the case of future motor failure only.

The two P.D. Blowers are 20 Hp, 208-230, 90.2% efficiency, and TE enclosure. The runtime for these motors are unknown. We estimated an average run time of 4,380 hours per year per blower at 80% load for each motor.

CDM recommends replacing the existing P.D. Blower motors to new 93.6% efficiency rated motors. The energy savings were calculated at 4,210 kWh totaling $674 in cost savings.

Refer to Appendix G for detailed energy savings comparison analysis.

4.5.4 WWTP-Pump Station Building

The Pump Station Building at the WWTP currently houses two Effluent Pumps having identical US Electric Motors rated at 60 HP, 460/230V, an assumed 91.7% standard efficiency, and EPFC enclosure. The run-meter readings of each motor are unknown and couldn't be provided at the time of the site visit. Both pumps operate via two Variable Frequency Drives (VFDs), each one dedicated to a pump. We estimated an average run time of 4,380 hours per year at 80% load for each motor.

CDM recommends replacing the existing Effluent Pump motors to new 95% efficiency rated motors. Based on energy model calculations, energy savings of 11,882 kWh totaling $1,901.00 in cost savings.

4.5.5 WWTP-Filter Building

The Filter Building currently houses a Sludge Press motor, HY Press motor, Sludge Press Conveyor motor, and six (6) FLYGHT Pump motors. We estimated an average run time of 4,380 hours per year at 80% load for the Sludge Press, HY Press, and Sludge Press Conveyor motors.

The Sludge Press motor is 3 HP, 460/230V, and an assumed standard 84% efficiency. The runtime for the motor is unknown.

CDM recommends replacing the existing Sludge Press motor to a new 90.2% efficiency rated motor. Based on MotorMaster energy model calculations, energy savings of 642 kWh yields a total $103.00 in cost savings.

The HY Press motor is 2 HP, 460/230V, and an assumed standard 80.4% efficiency. The runtime for the motor is unknown.

CDM recommends replacing existing HY Press motor to a new 87.5% efficiency rated motor. Based on MotorMaster energy model calculations, energy savings of 528 kWh yields a total $84.00 in cost savings.

The Sludge Press Conveyor motor is 3 HP, 460/230V, and an assumed standard 81.5% efficiency. The runtime for the motor is unknown.

CDM recommends replacing existing Sludge Press Conveyor motor to a new 90.2% efficiency rated motor. Based on MotorMaster energy model calculations, energy savings of 928 kWh yields a total of $148.00 in cost savings.

The six FLYGHT Pumps are each 3 HP, 230V, and an assumed standard 81.5% efficiency. The runtime for these motors are unknown. We estimated an average run time of 2,920 hours per year at 80% load for these motors.

CDM recommends replacing all existing six (6) FLYGHT Pump motors to new 90.2% premium efficiency rated motors. Based on energy model calculations, energy savings of 3,714 kWh yield $594 dollars in cost savings.

4.5.6 WWTP- Blower Building

The Blower Building currently houses four Process Air Blowers having identical Reliance-XE Duty Master AC Motors rated at 50 HP, 460V, and 93.6% efficiency, and XT TEFC enclosure. Two Process Air Blowers run continuously with the remaining two units as standby.

There are more efficient motors available in the marketplace (94.1% efficiency), however the replacement of the existing motors would yield negligible energy savings and therefore is not recommended. Instead, CDM recommends, retrofitting the Process Air Blower system with variable frequency drives as discussed in Section 4.1.1

4.5.7 WWTP-Outside Equipment

The WWTP's outside equipment currently consists of four (4) Mixers, an Odor Control Scrubber and a Gravity Thickener. All of the pumps and motors associated with these processes were considered for replacement. We estimated an average run time of 4,380 hours per year at 80% load for each motor.

The mixer motors are Davis EMU Pump Motors, 4.4 HP, 460/230V, and an assumed standard 81.5% efficiency. The runtime for these motors are unknown.

CDM recommends replacing all four (4) of the existing Davis EMU Pump motors with new 90.2% efficiency rated motors. Based on energy model calculations, energy savings of 5,444 kWh yields a total of $871 in cost savings.

The Odor Control Scrubber system motor is a Baldor Industrial Motor rated at 3 HP, 460/230V, and an assumed standard 79.3% efficiency. The actual runtime for the motor is unknown.

CDM recommends replacing the existing Odor Control Scrubber system Baldor Industrial Motor to a new 88.5% efficiency rated motor. Based on energy model calculations, energy savings of 1,028 kWh yields a total of $164.00 in cost savings.

The Gravity Thickener drive motor is a SEW-Euro Drive motor rated at 1.5 HP, 460/230V, and an assumed standard 78% efficiency. The runtime for the motor is unknown.

CDM recommends replacing the existing Gravity Thickener SEW-Euro Drive motor with new 87.5% efficiency rated motor. Based on energy model calculations, energy savings of 546 kWh yields a total of $87.00 in cost savings.

Refer to Appendix G for detailed energy savings comparison analysis.

4.5.8 WWTP- Well House 6

Well House 6 currently houses two pump motors. This Well House is used for arsenic treatment and calcium hypochlorite for disinfection. It was upgraded 1.5 years ago. The first pump is of the submersible type (well pump) and motor information could not be obtained during the site visit. The second pump has a Baldor Reliance Industrial Motor rated at 3 HP, 115/208-230V, 75% efficiency, and TEFC enclosure. The runtime for these motors are unknown. We estimated an average run time of 2,920 hours per year at 80% load for these motors. CDM recommends replacing the existing Baldor Pump motor with a new 89.5% efficient motor. Based on energy model calculations, energy savings of 1,129 kWh total $181.00 in cost savings.

4.5.9 DPW-Barn Well House 12

Barn Well House 12 currently houses two pump motors. This Well House is used for VOC treatment and calcium hypochlorite for disinfection. The first pump is of the submersible type and motor information could not be obtained during the site visit. The second pump has a motor rated at 40 HP, 460/230V, and 90.2% efficiency, and DP enclosure. The runtime for these motors are unknown. We estimated an average run time of 2,920 hours per year at 80% load for these motors. CDM recommends replacing the existing Baldor Pump motor with a new 94% efficient motor. Based on energy model calculations, energy savings of 3,124 kWh total $500.00 in cost savings.

4.5.10 West End Well House 1

West End Well House 1 currently houses one submersible pump and information on the pump motor could not be obtained during the site visit. This well is used to supply the main water system heading back to the tank near the prison. There is not a recommendation for this site.

4.5.11 Booster Pump-Foster Wheeler Hydropneumatic Station 14

The Booster Pump-Foster Wheeler Hydropneumatic Station 14 currently houses three pumps. This station has two tanks and is pressure operated to keep pressure at a usable rate. The main purpose of the station is to supply water to the new Foster Wheeler development. We estimated an average run time of 2,920 hours per year at 80% load for each motor. Two motors are identical US Electric Motors-Unimount 125 Enclosed High Performance, 30 HP, 460/230V, 91% efficiency, and UT TE enclosure. The runtime for these motors are unknown.

CDM recommends replacing the existing US Electric Motors to a new 93.6% efficiency rated motor. Based on energy model calculations, energy savings of 3,192 kWh yield $510.00 in cost savings.

The third motor is a Baldor Industrial Motor, 20 HP, 460/230V, 88.5% efficiency, and DP enclosure. The runtime for the motor is estimated at 2,920 hours per year.

CDM recommends replacing the existing Baldor motor to a new 92.4% efficiency rated motor. Based on energy model calculations, energy savings of 1,662 kWh total $266.00 in cost savings.

Refer to Appendix G for detailed energy savings comparison analysis

4.5.12 Beaver Brook Well House 11

Beaver Brook Well House 11 currently houses two pump motors. The first pump is of the submersible type and motor information could not be obtained during the site visit. The second motor is a Grundfos 1.5 HP, 460/230V, and 78% efficiency. The runtime for the motors are unknown. We estimated an average run time of 2,920 hours per year at 80% load for these motors. CDM recommends replacing the existing Grundfos motor with a new 87.5% efficient motor. Based on energy model calculations, energy savings of 364 kWh total $62.00 in cost savings.

4.5.13 Hunts Mill Park Well House 15

Hunts Mill Park Well House 15 currently houses two pump motors. The well pump conveys water into the underground wet well, and then the booster pump conveys water into the main system. The first pump is of the submersible type and motor information could not be obtained during the site visit. The second motor is a US Electric Motors 50 HP, 460/230V, and 90.2% efficiency, and WP-1 enclosure. The runtime for these motors are unknown. We estimated an average run time of 2,920 hours per year at 80% load for these motors. CDM recommends replacing the existing US Electric Motor with a new 94.5% efficient motor. Based on energy model calculations, energy savings of 4,396 kWh total $703.00 in cost savings.

4.5.14 Lilac Drive Well House/Hydropneumatic Station 7

Lilac Drive Well House/Hydropneumatic Station 7 currently houses three pumping units and an air compressor. The well pumps convey water into a ground tank that serves a hydro pneumatic system. We estimated an average run time of 2,920 hours per year at 80% load for each motor. Two motors are identical US Electric Motors, 40 HP, 460/230V, 90.2% efficiency, and DP enclosure. The runtime for these motors are unknown.

CDM recommends replacing the existing US Electric Motors to new 94.1% efficiency rated motors. Based on energy model calculations, energy savings of 6,406 kWh totaling $1,154.00 in cost savings.

The third motor is a Baldor Industrial Motor, 1 HP, 115/230V, 75% efficiency, and TE FC enclosure. The runtime-meter for the motor is unknown.

CDM recommends replacing the existing Baldor motor to a new 85% efficiency rated motor. Based on energy model calculations, energy savings of 273 kWh total $49.00 in cost savings.

Furthermore, there is an air compressor that houses an Elekrim, 3 HP, 230/460V, and 80% efficiency. The runtime for the motor is unknown but for the purpose of this analysis it was assumed at 2,920 hour per year (one shift per day).

CDM recommends replacing the existing Elekrim motor to a new 90.2% efficiency rated motor. Based on energy model calculations, energy savings of 739 kWh total $133.00 in cost savings.

Refer to Appendix G for detailed energy savings comparison analysis.

4.5.15 Lebanon Well House 2

Lebanon Well House 2 currently houses one pump. The motor is a US Electric Motors-High Thrust 50 HP, 460/230V, 90.2% efficiency, and WP enclosure. The runtime for the motor is unknown. We estimated an average run time of 2,920 hours per year at 80% load for the motor. CDM recommends replacing the existing US Electric Motor with a new 94.5% efficient motor. Based on MotorMaster energy model calculations, energy savings of 4,396 kWh total $659.00 in cost savings.

4.5.16 Potterstown Well House 4

Potterstown Well House 4 currently houses one submersible pump and motor information could not be obtained during the site visit.

4.5.17 Fox Fire Hydropneumatic Station 2

Fox Fire Hydropneumatic Station 2 currently houses three pumping units and an air compressor. We estimated an average run time of 2,920 hours per year at 80% load for each motor. The two motors are identical WEG Motors, 15 HP, 460/230V-208, 85.5% efficiency, and ODP enclosure. The runtime for these motors are unknown.

CDM recommends replacing the existing WEG motors to new 92.4% efficiency rated motors. Based on energy model calculations, energy savings of 4,566 kWh yield $822.00 in cost savings.

The third motor is a Marathon Electric Motor, 75 HP, 115/230V, 85.5% efficiency, and DP enclosure. The runtime for the motor is unknown.

CDM recommends replacing the existing Marathon Electric motor to a new 95.4% efficiency rated motor. Based on energy model calculations, energy savings of 5,528 kWh total $995.00 in cost savings.

Lastly, there is an air compressor that houses a Baldor Industrial Motor, 5 HP, 230/460V, and 81.5% efficiency. The runtime for the motor is unknown (estimated at 2,920 hours per year).

CDM recommends replacing existing Baldor motor to a new 90.2% efficiency rated motor. Based on energy model calculations, energy savings of 1,031 kWh total $186.00 in cost savings.

Refer to Appendix G for detailed energy savings comparison analysis.

4.6 Alternative Energy Sources

4.6.1 Photovoltaic Solar System Overview

PV cells convert energy in sunlight directly into electrical energy through the use of semi conductors, diodes and collection grids. Several PV Cells are then linked together in a single frame of module to become a solar panel. This conversion is done without any moving parts and without generating any noise or pollution. Solar panels must be mounted in a non-shaded location. Rooftops, carports and ground-mounted arrays are common mounting locations. The angle of inclination of the PV panels, 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. Under full sun, each panel produces direct current (DC) electricity at about 12-18% efficiency. Factors affecting PV panel output include the type of PV panel selected, collector, the tilt and azimuth of the collector, the temperature and the level of sunlight. The solar azimuth angle is the azimuth angle of the sun. It is most often defined as the angle between the line from the observer to the sun projected on the ground and the line from the observer due south. The highest production possible is when the panels are facing directly south at an azimuth of 180 degrees. An inverter is required to convert the DC output of the PV panels to alternating current (AC) of the desired voltage compatible with building and utility power systems. The balance of the system consists of conductors/conduit, switches, disconnects and fuses. Grid-connected PV systems feed power into the facility electrical system and do not include batteries. Installing PV systems enables the Town of Clinton to realize energy savings and promote clean, renewable energy while helping the State of New Jersey achieve the goals outlined in the State's Energy Master Plan, which targets having 30% of the state's electricity produced through wind and solar, by the year 2020.

Site Assessment

In order to determine the best locations for the installation of PV systems for the Town of Clinton, the audit team's engineers performed a satellite image analysis and site walkthrough at the wastewater treatment plant, municipal building, public works garage, and community center. Roof, canopy and ground-mounted arrays were considered for the various PV installations. The site walkthrough was to assess roof conditions (for space availability and suitability), canopy locations, the topography of the potential ground locations, access to electrical interconnection points, and positioning of the solar panels relative to the movement and track of the sun.

PV Panel Location and System Sizing

After having evaluated several locations throughout the municipality, the audit engineers believe that a PV system consisting of canopy and roof-mount installations can be done at the wastewater treatment plant. The community center could

accommodate a solar array, but a visual inspection of the roof indicates that the structure would not support the additional weight. Additional engineering would be required to confirm this. The municipal building is not a viable candidate for a PV system as it the roof is too small to accommodate a PV system that would be economically viable. The roof of the public works garage, because of its configuration, is not a viable candidate for solar. Therefore, our engineers are recommending a PV system for the wastewater treatment plant.

Wastewater Treatment Plant:

Two types of installations are being proposed for this site: a) canopy-type or over the tank-mount; and b) roof-mount. In sizing the potential systems, our calculations were based on the use of a poly-crystalline panel such as the Sharp NU-U235F1 (rated at 235 watts dc). The roof-mounted systems will follow the slope of the roofs. The over-the-tank-mount system for the aeration basins will utilize a 10-degree tilt. Based on the available area for these three locations, our preliminary analysis indicates that a PV system rated at 172 kW (dc) can be installed utilizing a combination of roof-mount and over-the-tank-mount systems. The actual locations and various system sizes are discussed in detail below.

The roof-mount systems will be installed on the Control Building (15.98 kW dc), and the Filter Building (25.38 kW dc). The over-the-tank system will total 130.67 kW dc. Other parameters taken into consideration when sizing the systems included proximity to the electrical interconnection points, land topography and potential shading of the solar panels. Furthermore, consideration was given to at least a 50 foot buffer from trees and any other objects that might be a potential shading issue. Following is a summary by the type of installation.

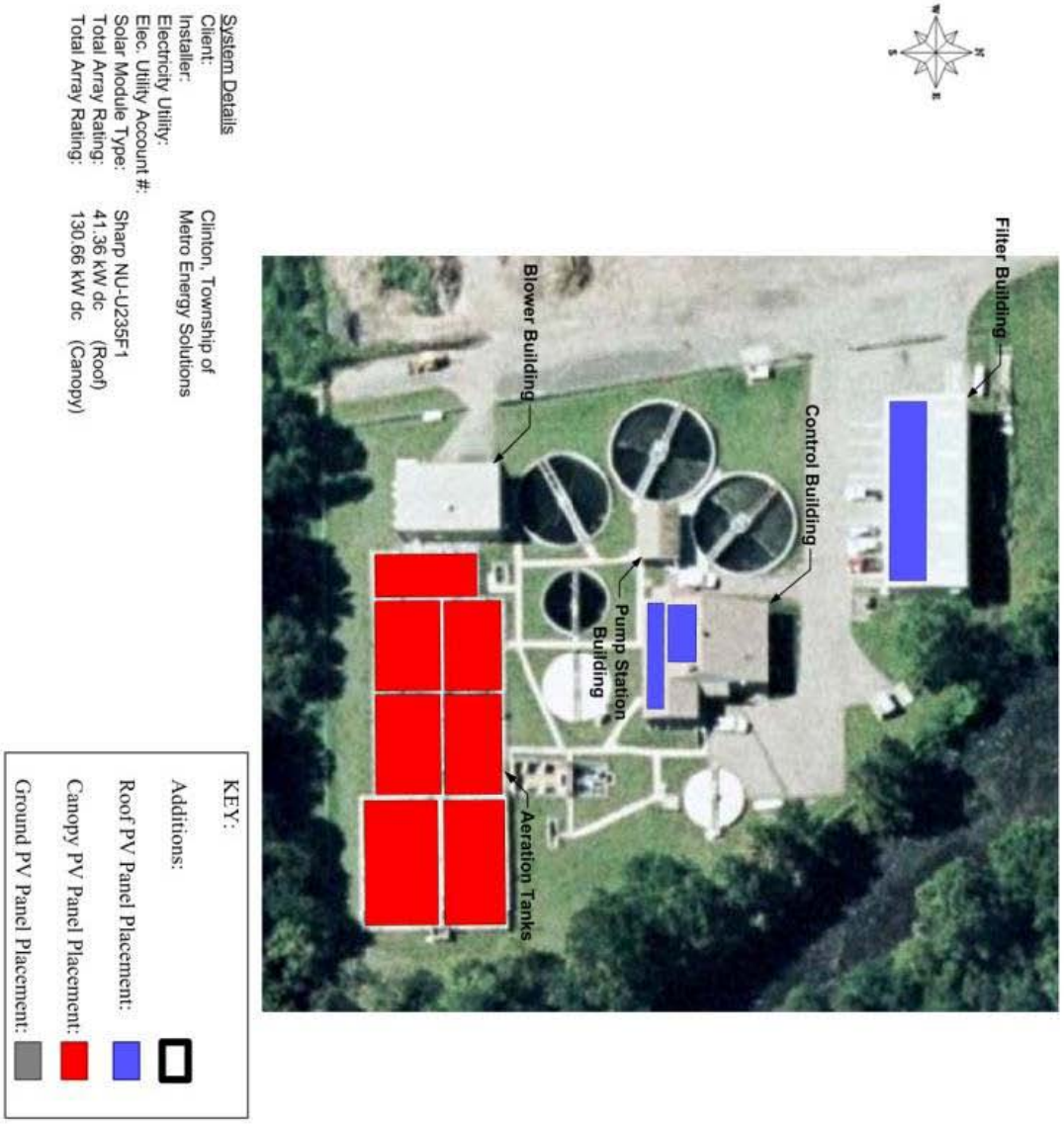
Canopy-Mount (Over-the-Tank): A system of this type was explored for all potential areas of the facility. Our survey indicates that the aeration basin tanks are viable candidates for this type of PV installation. The PV panels would be installed onto steel supports that would be erected over the tanks. The final installation would not interfere with equipment or operations of these tanks. If necessary, new lighting would be installed under the solar panels to provide working light if needed. **The total output produced from this proposed installation would be approximately 130.67 kW (dc).**

Roof-Mount: After reviewing the sizes of the roofs, setback requirements and the amount of HVAC equipment located on a number of the buildings, the audit team found two buildings that are viable candidates for solar: A) the Filter Building (25.38 kW dc); and B) Control Building (15.98 kW dc). The PV panels will be installed on those portions of the roof that have a south-facing exposure (please see the overlay on

page 4-13). **The total output produced from these two locations would be approximately 41.45 kW dc.** The structural integrity of the two proposed roof sites was not evaluated during our survey, nor was any information gathered as to existing warranties. Structural analysis would have to take place prior to the final design phase of the project.

Should all locations identified in this report have PV systems installed, the total output produced would be approximately 172.02 kW (DC).

In addition, the energy audit team investigated the possibility of canopy-mount systems over the parking lot. The lot was not deemed a viable candidate for a PV system because it is too narrow and too close to building structures that would provide undesirable shading of the PV panels.


System Details
Client:
Installer:
Electricity Utility:
Elec. Utility Account #:
Solar Module Type:
Total Array Rating:
Total Array Rating:
Clinton, Township of
Metro Energy Solutions
Sharp NU-U235F1
41.36 kW dc (Roof)
130.66 kW dc (Canopy)
KEY:
Additions:
Roof PV Panel Placement:
Canopy PV Panel Placement:
Ground PV Panel Placement:
Filter Building
Control Building
Blower Building
Pump Station Building
Aeration Tanks
METRO ENERGY SOLUTIONS
1140 Bloomfield Avenue
Suite 200
West Caldwell, NJ 07006
(973) 439-7283
Title
Clinton Waste Water Treatment Plant
Location
2 Ramsey Road, Clinton, NJ 08809
UNAUTHORIZED REPRODUCTION OF THIS MATERIAL IS STRICTLY PROHIBITED. PLEASE CONTACT METRO ENERGY SOLUTIONS FOR PERMISSION TO REPRODUCE OR DISTRIBUTE THIS MATERIAL.

PV Interconnect Points

The facility's service comes in at 480/277 volts, three-phase, four-wire from the local utility. This feeder enters a Westinghouse switchboard with an 800-ampere main circuit breaker. There is no ground-fault protection for equipment as permitted under NEC Article 230.95. The main switchgear feeds various motor control centers and other circuit breaker panels in various buildings at the facility in order to serve the connected loads of process equipment, HVAC, and lighting. The following is a summary of the possible interconnection points for the AC output generated by the proposed inverters.

Roof-Mount Locations: The proposed roof-mount systems are small. Pending a final engineering design study, these systems could be connected directly (via a circuit breaker) to the respective circuit breaker panels in the buildings. These could be connected at either 208 V or 480 V three-phase depending on the incoming voltage for the building. This type of connection is considered a load side connection. It is permitted but must be in compliance with all provisions of NEC Article 690.64 (B) (1) through (7). The inverters for these two systems would be installed in the respective buildings as well.

Canopy Systems: The proposed systems for the installation over the aeration basins total approximately 130 kW (dc) in size. The system interconnect points from the inverter would be made at the main service switchgear in the Control Building. This connection would be made between the line side of the 800-ampere main circuit breaker and the utility company current transformer (CT) section of the switchgear. This is considered a "supply side" connection and is permitted under NEC Article 690.64 (A) and NEC Article 230.82(6). The inverter for this system would be installed outside on a concrete pad enclosed by a chain-link fence.

PV System Output

An industry accepted software package was used to calculate projected annual electrical production of the crystalline silicon PV system in its first year. The energy savings generated by approximately 172 kW dc of photovoltaic power is estimated to be 148,956 kWh ac. for the canopy mounted system and 50,978 kWh ac. for the roof mount system. At an electrical aggregate unit cost of $0.16/kWh, the total energy savings would be $31,989 per year.

Economic Analysis – Direct Purchase:

With direct purchase, the Town of Clinton funds, builds, owns, maintains, and operates the PV system. The Town will have to budget funds to finance and maintain the project. With direct purchase, the Town owns the total solar output from the system as well as any SRECs generated by the system.

The Engineer's Opinion of Probable Construction Cost is estimated at $6.00 per watt and would total $783,960 for the canopy mounted systems and $248,160 for the roof mounted systems. A typical solar installation can vary in cost from $4.50 - $9.00 per watt depending on size, complexity of the system, labor rates, and material costs. Approximately 60-70% of the total cost is material costs, while the balance is labor, engineering, environmental, permitting, etc. Like any installation, certain conditions can affect a price upward or downward. The budget costs presented in this report reflect the engineering, material and labor costs required to provide a working system as described herein, including mounting (racking) systems and electrical interconnection work. The budget costs do not include repairing or replacing roofs, structural improvements, or civil site work (if necessary). These costs must be further defined during the design phase of a solar energy project. The following table includes an economic analysis for the recommended solar system.

Table 4-5-1: Simple Payback Analysis for a Solar Energy System

Capital Cost)	$1,032,120.00
1st Year Production	199,943 kWh
1st Year Electric Savings @ $0.16/kWh	$31,991
1st Year SREC Revenue @ $0.50/kWh	$99,972
Simple Payback	7.82 Years
Annual Return on Investment (AROI)	13%
Lifetime Energy Savings (25 years)	$1,166,364
Net Present Value (NPV)	$2,151,493

Given that the project financials vary with the prevailing energy market conditions and SREC rates, the largest impact to the simple payback model is the SREC credit pricing. Based on SREC sales of January 2010 the average SREC value of $500 was used for the simple payback model. The simple payback model does not take into account project finance charges, equipment depreciation or possible alternative finance methods to offset initial project costs.

Economic Analysis – Power Purchase Agreement (PPA):

A power purchase agreement involves entering into an agreement with a private developer who builds, owns, and operates a PV system on the property and sells the generated electricity back to the Town at rates that are less than the utility's. Under this scenario, there is no capital outlay or investment in the system. The PPA provider owns the system and invests all of the capital necessary to design, build, operate, and maintain the PV system for the length of the agreement. The minimum size PV system for a PPA, according to most PPA providers is approximately 300 kW. This size is based on the fixed transaction costs associated with financing the project. Based on the total installed system size in this proposal (172 kW dc), we believe that the proposed PV system is not a candidate for a PPA type installation.

Solar Renewable Energy Credits (SRECs):

Each time a system generates 1,000 kWh of electricity; a SREC is earned and placed in the customer's electronic account. SRECs can then be sold, providing revenue for the first 15 years of the system's life.

As part of New Jersey's Renewable Portfolio Standards (RPS), electric suppliers are required to have an annually-increasing percentage of their retail sales generated by solar energy. Electricity suppliers are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard (RPS). One way they can meet their RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Although solar systems generate electricity and SRECs in tandem, the two are independent commodities and sold separately. The RPS, and creation of SRECs, is intended to provide additional revenue flow and financial support for solar projects in New Jersey.

4.6.2 Ground Source Heat Pump System

Ground source heat pumps utilize the relatively constant temperature of underground water sources to reject or supply heat to the interior space. Water is pumped through a loop that runs from the underground source to heat pumps at the building level. Depending on the time of year and building demand, these heat pumps use the ground source loop as a heat source or a heat sink. Typically, ground source heat pump systems are most efficient when used in spaces that have similar heating and cooling loads, as the same loop and heat pumps are used for both cooling and heating. For wastewater treatment plant facilities, the heating and cooling loads

are essentially unequal with most of the cooling in plant process areas achieved by ventilation of outdoor air to meet code requirements. Furthermore, as a water conservation measure, the cooling medium for a proposed ground source geothermal system will likely consist of treated plant effluent, which, although treated, will tend to foul heat transfer components as a result of inherent microbiological organisms present in the cooling media. Potential fouling of heat transfer components will result in increased maintenance efforts and system outage. Ground source heat pump systems are often very costly to install due to the high cost of test boring and drilling wells. Because of the largely unbalanced heating and cooling demands at wastewater treatment plants, and the potential fouling of heat transfer components, it is believed that installation of a ground source heat pump system would not prove cost-beneficial for the Town of Clinton.

4.6.3 Wind Power Generation

On-site wind power generation typically utilizes a form of turbine that is rotated when winds flows across the blades attached to the turbine; 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. An ideal location for a wind turbine is 20 feet above any surrounding object within a 250 foot radius. In general this relates to a property size of one acre or more. In addition, an average of 9 mph wind speed is required to 'fuel' the wind turbine. On-site wind power generation is not recommended for any locations within the Town of Clinton, as there is insufficient available area to install wind turbines that will generate a reasonable amount of electricity to provide for an attractive simple payback period. In addition, there is the potential for a negative impact that wind turbines may have on the surrounding community. Additionally, engineering feasibility studies have not been performed to confirm if adequate wind speeds exist to power wind turbines. Wind turbine systems generally require a high initial investment, including feasibility studies, material and labor costs, installation, and lifetime maintenance costs and would not generate enough energy savings to result in an attractive payback period.

4.6.4 Combined Heat and Power Cogeneration Technology

The feasibility to implement combined heat and power cogeneration systems at the Town's wastewater treatment plant facility was not conducted as the plant does not employ the anaerobic digestion process to stabilize collected sludge and therefore digester gas is not available as potential fuel. Furthermore, there is no natural gas service for the wastewater treatment plant facility eliminating the use of natural gas as fuel.

Section 5
Evaluation of Energy Purchasing and Procurement Strategies

5.1 Energy Deregulation

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law, 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.

Jersey Central Power and Light (JCP&L) is currently the generator and supplier of electrical energy for The Town of Clinton (Clinton) wastewater treatment plant. Energy deregulation creates the opportunity to choose your electric generation supplier. The benefit of this is the ability to choose a supplier based on what is important to you, for example, lowest rate or how the electric generation supply is produced.

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 (JCP&L) 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 JCP&L service territory:

- 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 Jersey Energy
- Strategic Energy LLC
- Suez Energy Resources NA, Inc
- UGI Energy Services

5.1.1 Alternate Third Party Electrical Energy Supplier

In evaluating the potential for an alternative third party supplier, CDM contacted and requested a proposal for electrical service from Glacial Energy. The objective of which was to get an overall idea of whether or not switching electric energy suppliers is an avenue that should be pursued further to obtain electrical energy cost savings.

Glacial Energy has proposed a flat rate retail cost per kWh over the next 6 or 12 month period for the thirteen (13) accounts. The proposal, included in Appendix C, was provided to CDM by Ann Marie Felmey, a Glacial Energy Sales Agent who can be reached at (914)715-4284 or annmarie.glacial@live.com.

The following table, Table 5.1-1, summarizes the annual cost savings available based on historical energy consumption and the proposed energy rate for a 12 month term. The retail rates used in this analysis represent the baseline generation rates from the two suppliers and do not include any applicable demand charges, societal benefits charges, transmission charges, energy charges, reconciliation charges, transitional assessment charges or system control charges that were included in the aggregate rates presented in Section 3. These baseline generation rates, are used for comparison purposes to identify any potential energy cost savings, as all other applicable charges cannot be avoided by switching suppliers. This summary table, which utilizes the historical electrical energy usage provided, confirms the information and available cost savings presented by Glacial Energy.

Table 5.1-1: Potential Energy Cost Savings with an Alternate Third Party Supplier – Glacial Energy

Account #'s	Average Annual Consumption (kWh)	Projected Annual Cost with JCP&L(@ $0.12279/kWh)	Proposed Annual Cost with Glacial Energy (@ $0.10837/kWh)	Potential Annual Savings ($)
(see Appendix C)	3,483,243	$427,708	$377,494	$50,214

As energy cost savings are available by switching to a third party supplier, such as Glacial Energy, this is a recommended energy cost savings measure. The estimated annual cost savings available by switching to Glacial Energy is a 12% savings. CDM recommends that Clinton investigate this opportunity further and compare proposals from alternate third party suppliers to obtain the lowest electrical energy rates available.

5.1.2 Alternate Third Party Natural Gas Supplier

CDM also requested a proposal for gas service from Glacial Energy. The objective of which was to get an overall idea of whether or not switching natural gas suppliers is an avenue that should be pursued further to obtain energy cost savings.

Glacial Energy has proposed a flat rate retail cost per therm over the 12 month period for the six (6) accounts. The proposal, included in Appendix C, was provided to CDM by Ann Marie Felmey as mentioned above for the electrical quote.

The following table, Table 5.1-2, summarizes the annual cost savings available based on historical energy consumption and the proposed energy rate for a 12 month term. The retail rates used in this analysis represent the baseline generation rates from the two suppliers and do not include any applicable services that were included in the aggregate rates presented in Section 3. These baseline generation rates, are used for comparison purposes to identify any potential energy cost savings, as all other applicable charges cannot be avoided by switching suppliers. This summary table, which utilizes the historical natural gas usage provided, confirms the information and available cost savings presented by Glacial Energy.

Table 5.1-2: Potential Energy Cost Savings with an Alternate Third Party Supplier – Glacial Energy

Account #'s	Average Annual Consumption (therms)	Projected Annual Cost with Elizabethtown(@ $0.87346/therm)	Proposed Annual Cost with Glacial Energy (@ $0.74170/therm)	Potential Annual Savings ($)
(see Appendix C)	6,108	$5,335	$4,530	$805

As energy cost savings are available by switching to a third party supplier, such as Glacial Energy, this is a recommended energy cost savings measure. The estimated annual cost savings available by switching to Glacial Energy is a 15% savings. CDM recommends that Clinton investigate this opportunity further and compare proposals from alternate third party suppliers to obtain the lowest natural gas rates available.

5.2 Demand Response Program

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 effective means of reducing 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 2 hours advance notice before curtailment is required. There is typically 1 event a year that lasts about 3 hours in the summer months, when demand for electricity is at its highest.

Participation in Demand Response is generally done through companies known as Curtailment Service Providers, or CSPs, who are members of 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 remotely 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, O&M 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 savings associated with each measure amounts to the capital investment cost.

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

In general, ECRMs 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:

- Waste Water Treatment Plant – Process Related;
- Building HVAC & Building Envelope Components;
- Building Lighting Systems;
- Motors.

6.1.1 Waste Water Treatment Plant – Process

Based upon the analysis of the existing aeration system and controls and return activated sludge pumping system as discussed in Section 4.1, it is recommended that the existing process air blowers and return activated sludge pump system be retrofitted with variable frequency drive units.

The following table presents the potential energy savings associated with installing variable frequency drives for the existing process air blowers and return activated sludge pumps.

Table 6-1: Wastewater Treatment Plant Processes- Process Air Blowers and Return Activated Sludge Pumps				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Energy Savings (kW-hrs)**	**Annual Energy Savings**	**Simple Payback (Years)**
Alternative 4: New Variable Frequency Drives for Process Air Blowers	$281,800	257,500	$41,000	**7.2**
New Variable Frequency Drives for Return Activated Sludge Pumps	$47,000	45,645	$7,300	**6.9**

6.1.2 Building Lighting Systems

Table 6-2 includes rankings of all recommended ECRMs to provide energy savings for all building lighting systems which include the installation of occupancy sensors and the replacement of T12 fluorescent fixtures with T8 fluorescent fixtures and high efficiency ballasts. A detailed discussion on building lighting systems is presented in Section 4.2.

Table 6-2: Ranking of Energy Savings Measures - Electrical Lighting				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Energy Savings (kW-hrs)**	**Annual Energy Savings**	**Simple Payback (Years)**
Municipal Building – Lighting Replacement/Occupancy Sensor	$4,882	9,553	$1,629	**3.00**
WWTP Control Building – Lighting Replacement	$6,410	12,263	$2068	**3.10**
Lilac Drive Well House – Lighting Replacement	$195	339	$62	**3.15**
DPW Barn Well House 12 – Lighting Replacement	$262	456	$77	**3.40**
West End Wheel House– Lighting Replacement	$27	39	$7	**3.86**
Well House 6 – Lighting Replacement	$184	247	$42	**4.38**
Lebanon Well House 2 – Lighting Replacement	$27	39	$6	**4.50**
Potterstown Well House – Lighting Replacement	$27	39	$6	**4.50**

Table 6-2 cont'd: Ranking of Energy Savings Measures - Electrical Lighting				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Energy Savings (kW-hrs)**	**Annual Energy Savings**	**Simple Payback (Years)**
WWTP Outside Equipment– Lighting Replacement	$21,843	26,907	$4,308	**5.07**
Beaver Brook Wheel House– Lighting Replacement	$290	308	$54	**5.37**
Community Center - Lighting Replacement	$6,842	5,610	$1,161	**5.89**
Booster Pump-Foster Wheeler Hydropneumatic– Lighting Replacement	$472	432	$71	**6.65**
WWTP – Blower Building– Lighting Replacement	$1,192	944	$155	**7.69**
WWTP – Pump Station Building– Lighting Replacement	$419	304	$49	**8.55**
Fox Fire Hydropneumatic Station 2– Lighting Replacement	$262	95	$18	**14.55**
Hunts Mill Park Well House 15– Lighting Replacement	$785	285	$48	**16.35**

6.1.3 Building HVAC & Envelope Components

The HVAC components of all buildings have been evaluated and all evaluations are presented in Section 4.3.

Table 6-3 includes a ranking of the recommended energy savings measures for HVAC and the Building Envelope at ELSA.

Table 6-3: Ranking of Energy Savings Measures – HVAC & Envelope				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Savings (kWh & Therms)**	**Annual Energy Savings**	**Simple Payback (Years)**
Municipal Building – Thermostat Replacement	$5,000	6,000 kWh 142 therms	$1,216	**4.11**
Community Center – Thermostat Replacements	$1,250	180 therms	$252	**4.96**
Lebanon Wheel House 2 – Window Replacement	$500	428 kWh	$308	**7.81**
Lilac Dr. Wheel House/Hydropneumatic Station 7 – Window Replacement	$3,000	1,712 kWh	$1,095	**9.74**
West End Wheel House 1 – Window Replacement	$3,000	1,712 kWh	$291	**10.30**
WWTP – Blower Building – Unit Heater Replacement	$3,900	263 therms	$368	**10.59**

Table 6-3 cont'd: Ranking of Energy Savings Measures – HVAC & Envelope				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Savings (kWh & Therms)**	**Annual Energy Savings**	**Simple Payback (Years)**
WWTP – Control Building – Air Conditioning/Heat Pump Replacement	$14,310	7,913 kWh	$1,258	**11.37**
Municipal Building - Air Conditioning/Heat Pump Replacement	$28,759	12,194 kWh	$1,951	**14.74**
Municipal Building – Furnace Replacement	$9,400	237 therms	$427	**22.01**

6.1.4 Motors

Table 6-4, includes the ranking of ECRMs associated with Electric Motors.

Table 6-4: Ranking of Energy Savings Measures - Electrical Motors				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Energy Savings (kW-hrs)**	**Annual Energy Savings**	**Simple Payback (Years)**
WWTP Outside Equipment	$5,037	7,018	$1,123	**4.5**
Well House #6	$855	1,129	$181	**4.7**
WWTP Control Building	$13,195	11,788	$1,886	**7.0**
Fox Fire Station 2	$14,833	11,125	$2,003	**7.4**
Hunts Mill Park Well House #15	$5,293	4,396	$703	**7.5**
Lilac Dr. Well House #7	$10,299	7,418	$1,335	**7.7**
WWTP Filter Building	$7,285	5,810	$930	**7.8**
Lebanon Wheel House#2	$5,293	4,396	$659	**8.0**
WWTP Pump Station Bldg	$15,296	11,882	$1,901	**8.1**
DPW Barn Well House #12	$4,508	3,124	$500	**9.0**
Beaver Brook Well House #11	$654	364	$62	**10.6**
Booster Pump Foster Wheeler	$9,094	4,854	$777	**11.7**

6.1.5 PV System

Table 6-5, includes the ranking of ECRMs associated with PV Systems

Table 6-5: Ranking of Energy Savings Measures – PV System				
Recommendation	**Engineer's Opinion of Probable Construction Cost**	**Annual Energy Savings (kW-hrs)**	**Annual Energy Savings***	**Simple Payback (Years)**
Waste Water Treatment Plant:				
Canopy Mount	$783,960	148,965	$98,317	**7.97**
Roof Mount	$248,160	50,978	$33,645	**7.38**

*Includes annual SREC value.

	Area: [ft²]	Total kWh:	Total therms:	Total propane (gal):	Total Electric Bill:	Total Gas Bill:	Total Propane Bill:	Electric Rate:	Propane Rate:	Gas Rate:	kwh/ft²	therms/ft²
Municipal Building	10,000	164,480	1,992		27,047	3,623		$0.16		$1.82	16.45	0.20
Community Center	6,880	20,363	2,426		3,995	4,135		$0.20		$1.70	2.96	0.35
WWTP	12,447	21,926		8,786	4,057		12,260	$0.19	$1.40		1.76	0.71
West End Well House 1	240	51,040			8,715			$0.17			212.67	0.00
Lebanon Well House 2	100	295,920			45,853			$0.15			2959.20	0.00
Potterstown Well House 4	100	221,951			34,491			$0.16			2219.51	0.00
Treatment Plant Well House 6	360	92,247			14,877			$0.16			256.24	0.00
Lilac Drive Well House 7	300	27,840			5,084			$0.18			92.80	0.00
Foxfire Booster Pump Station	840	31,760			5,646			$0.18			37.81	0.00
Beaver Brook Well House 11	225	163,840			27,629			$0.17			728.18	0.00
DPW-Barn Well House 12	580	468,640			73,232			$0.16			808.00	0.00
Hunts Mill Park Well House 15	1,564	435,360	233		68,610	551		$0.16		$2.36	278.36	0.15
		1,995,367	**4,651**	**8,786**	**319,236**	**8,310**						

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Town of Clinton Wastewater Treatment Plant

Building ID: 2286493
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 07, 2010

Facility
Town of Clinton Wastewater Treatment Plant
2 Ramsey Road
Town of Clinton, NJ 08809

Facility Owner
Town of Clinton Wastewater Treatment Plant
2 Ramsey Road
Town of Clinton, NJ 08809

Primary Contact for this Facility
N/A

Year Built: 1968
Energy Performance Rating[2] (1-100) 1

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	11,969,218
Natural Gas (kBtu)[4]	477,600
Propane (kBtu)	805,033
Total Energy (kBtu)	13,251,851

Energy Intensity[5]

Site (kBtu/gpd)	10
Source (kBtu/gpd)	31

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,899

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	3
National Average Source EUI	11
% Difference from National Average Source EUI	186%
Building Type	Wastewater

Stamp of Certifying Professional

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.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Town of Clinton Wastewater Treatment Plant	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Wastewater	Is this an accurate description of the space in question?		☐
Location	2 Ramsey Road, Town of Clinton, NJ 08809	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Water Utility/Wastewater Plant	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Clinton WWTP (Municipal Wastewater Treatment Plant)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Average Influent Flow	1.33MGD (million gallons per day)(Optional)	Is this the daily average actual flow of wastewater into the facility, measured in million gallons per day (MGD)? The average flow is likely to vary over time; this figure should reflect an annual average influent flow.		☐
Average Influent Biological Demand (BOD5) Concentration	250 mg/l (milligrams per liter)	Is this the average biological demand concentration of the wastewater flowing into the facility? This should be the average concentration estimated over a 12 month period. BOD5 should be reported in mg/l. BOD5 is not the same as CBOD5, the carbonaceous biological oxygen demand. BOD5 is required for the energy performance rating.		☐
Average Effluent Biological Demand (BOD5) Concentration	20 mg/l (milligrams per liter)	Is this the average biological demand concentration of the wastewater after it is treated and is leaving the facility? This should be the average concentration estimated over a 12 month period. BOD5 should be reported in mg/l. BOD5 is not the same as CBOD5, the carbonaceous biological oxygen demand. BOD5 is required for the energy performance rating.		☐
Plant Design Flow Rate	2 MGD (million gallons per day)	Is this the plant design flow rate, measured in million gallons per day (MGD)? This is the amount of flow the plant is designed to process.		☐
Fixed Film Trickle Filtration Process	No	Does this facility have an onsite fixed film trickle filtration process? Trickle filtration is a process used to reduce BOD, pathogens, and nitrogen levels.		☐
Nutrient Removal	Yes	Does this facility conduct nutrient removal as part of the treatment process? Nutrient removal is considered any process included for the purpose of removing nutrients (i.e., nitrogen, phosphorous). This may include biological nitrification, biological denitrification, phosphorus removal, or recirculating sand filters.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: FirstEnergy - Jersey Central Power & Lt Co

Fuel Type: Electricity

Meter: Municipal Bldg Meter G23749655 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	21,920.00
11/01/2008	11/30/2008	13,120.00
10/01/2008	10/31/2008	7,040.00
09/01/2008	09/30/2008	8,800.00
08/01/2008	08/31/2008	9,600.00
07/01/2008	07/31/2008	11,040.00
06/01/2008	06/30/2008	10,720.00
05/01/2008	05/31/2008	9,920.00
04/01/2008	04/30/2008	11,520.00
03/01/2008	03/31/2008	16,640.00
02/01/2008	02/29/2008	22,720.00
01/01/2008	01/31/2008	21,440.00
Municipal Bldg Meter G23749655 Consumption (kWh (thousand Watt-hours))		**164,480.00**
Municipal Bldg Meter G23749655 Consumption (kBtu (thousand Btu))		**561,205.76**

Meter: Community Ctr Meter G88698707 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	1,945.00
11/01/2008	11/30/2008	2,189.00
10/01/2008	10/31/2008	1,768.00
09/01/2008	09/30/2008	2,212.00
08/01/2008	08/31/2008	2,153.00
07/01/2008	07/31/2008	2,103.00
06/01/2008	06/30/2008	2,077.00
05/01/2008	05/31/2008	929.00
04/01/2008	04/30/2008	852.00
03/01/2008	03/31/2008	1,133.00
02/01/2008	02/29/2008	1,381.00
01/01/2008	01/31/2008	1,621.00
Community Ctr Meter G88698707 Consumption (kWh (thousand Watt-hours))		**20,363.00**

Community Ctr Meter G88698707 Consumption (kBtu (thousand Btu))	**69,478.56**

Meter: West End Well House #1 Meter G15129296 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	5,740.00
11/01/2008	11/30/2008	3,960.00
10/01/2008	10/31/2008	5,920.00
09/01/2008	09/30/2008	5,120.00
08/01/2008	08/31/2008	4,400.00
07/01/2008	07/31/2008	2,760.00
06/01/2008	06/30/2008	5,560.00
05/01/2008	05/31/2008	440.00
04/01/2008	04/30/2008	4,320.00
03/01/2008	03/31/2008	2,800.00
02/01/2008	02/29/2008	8,240.00
01/01/2008	01/31/2008	7,520.00
West End Well House #1 Meter G15129296 Consumption (kWh (thousand Watt-hours))		**56,780.00**
West End Well House #1 Meter G15129296 Consumption (kBtu (thousand Btu))		**193,733.36**

Meter: Lebanon Well House #2 Meter G15168218 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	29,380.00
11/01/2008	11/30/2008	29,880.00
10/01/2008	10/31/2008	26,400.00
09/01/2008	09/30/2008	27,320.00
08/01/2008	08/31/2008	25,720.00
07/01/2008	07/31/2008	27,160.00
06/01/2008	06/30/2008	29,840.00
05/01/2008	05/31/2008	25,680.00
04/01/2008	04/30/2008	24,440.00
03/01/2008	03/31/2008	25,280.00
02/01/2008	02/29/2008	25,320.00
01/01/2008	01/31/2008	28,880.00
Lebanon Well House #2 Meter G15168218 Consumption (kWh (thousand Watt-hours))		**325,300.00**
Lebanon Well House #2 Meter G15168218 Consumption (kBtu (thousand Btu))		**1,109,923.60**

Meter: Potterstown Wellhouse #4 Meter G15076265 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	22,350.00
11/01/2008	11/30/2008	21,918.00
10/01/2008	10/31/2008	18,290.00
09/01/2008	09/30/2008	20,315.00

08/01/2008	08/31/2008	18,443.00
07/01/2008	07/31/2008	20,167.00
06/01/2008	06/30/2008	21,760.00
05/01/2008	05/31/2008	19,933.00
04/01/2008	04/30/2008	18,694.00
03/01/2008	03/31/2008	19,587.00
02/01/2008	02/29/2008	20,063.00
01/01/2008	01/31/2008	22,781.00
Potterstown Wellhouse #4 Meter G15076265 Consumption (kWh (thousand Watt-hours))		**244,301.00**
Potterstown Wellhouse #4 Meter G15076265 Consumption (kBtu (thousand Btu))		**833,555.01**

Meter: Well House #6 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	17,690.00
11/01/2008	11/30/2008	11,441.00
10/01/2008	10/31/2008	452.00
09/01/2008	09/30/2008	1.00
08/01/2008	08/31/2008	120.00
07/01/2008	07/31/2008	40.00
06/01/2008	06/30/2008	120.00
05/01/2008	05/31/2008	80.00
04/01/2008	04/30/2008	14,306.00
03/01/2008	03/31/2008	17,523.00
02/01/2008	02/29/2008	24,226.00
01/01/2008	01/31/2008	23,938.00
Well House #6 Consumption (kWh (thousand Watt-hours))		**109,937.00**
Well House #6 Consumption (kBtu (thousand Btu))		**375,105.04**

Meter: Lilac Drive Well House #7 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	7,380.00
11/01/2008	11/30/2008	1,600.00
10/01/2008	10/31/2008	40.00
09/01/2008	09/30/2008	320.00
08/01/2008	08/31/2008	80.00
07/01/2008	07/31/2008	80.00
06/01/2008	06/30/2008	1,640.00
05/01/2008	05/31/2008	1,600.00
04/01/2008	04/30/2008	5,160.00
03/01/2008	03/31/2008	4,660.00
02/01/2008	02/29/2008	4,160.00
01/01/2008	01/31/2008	13,160.00
Lilac Drive Well House #7 Consumption (kWh (thousand Watt-hours))		**39,880.00**

Lilac Drive Well House #7 Consumption (kBtu (thousand Btu))	**136,070.56**

Meter: Foxfire Booster Pump Station 2 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	4,100.00
11/01/2008	11/30/2008	3,200.00
10/01/2008	10/31/2008	2,440.00
09/01/2008	09/30/2008	2,400.00
08/01/2008	08/31/2008	2,160.00
07/01/2008	07/31/2008	2,320.00
06/01/2008	06/30/2008	2,640.00
05/01/2008	05/31/2008	2,880.00
04/01/2008	04/30/2008	3,360.00
03/01/2008	03/31/2008	4,360.00
02/01/2008	02/29/2008	5,360.00
01/01/2008	01/31/2008	5,000.00
Foxfire Booster Pump Station 2 Consumption (kWh (thousand Watt-hours))		**40,220.00**
Foxfire Booster Pump Station 2 Consumption (kBtu (thousand Btu))		**137,230.64**

Meter: Beaver Brook Well House #11 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	160.00
11/01/2008	11/30/2008	2,120.00
10/01/2008	10/31/2008	120.00
09/01/2008	09/30/2008	1,240.00
08/01/2008	08/31/2008	19,480.00
07/01/2008	07/31/2008	9,040.00
06/01/2008	06/30/2008	36,400.00
05/01/2008	05/31/2008	33,680.00
04/01/2008	04/30/2008	13,160.00
03/01/2008	03/31/2008	23,960.00
02/01/2008	02/29/2008	24,120.00
01/01/2008	01/31/2008	360.00
Beaver Brook Well House #11 Consumption (kWh (thousand Watt-hours))		**163,840.00**
Beaver Brook Well House #11 Consumption (kBtu (thousand Btu))		**559,022.08**

Meter: Barn Wellhouse #12 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	42,240.00
11/01/2008	11/30/2008	40,680.00
10/01/2008	10/31/2008	37,760.00
09/01/2008	09/30/2008	41,960.00

08/01/2008	08/31/2008	40,000.00
07/01/2008	07/31/2008	38,880.00
06/01/2008	06/30/2008	43,040.00
05/01/2008	05/31/2008	39,800.00
04/01/2008	04/30/2008	37,760.00
03/01/2008	03/31/2008	29,120.00
02/01/2008	02/29/2008	34,400.00
01/01/2008	01/31/2008	43,000.00
Barn Wellhouse #12 Consumption (kWh (thousand Watt-hours))		**468,640.00**
Barn Wellhouse #12 Consumption (kBtu (thousand Btu))		**1,598,999.68**

Meter: Hunts Mill Park Well House #15 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	4,800.00
11/01/2008	11/30/2008	27,760.00
10/01/2008	10/31/2008	50,720.00
09/01/2008	09/30/2008	40,160.00
08/01/2008	08/31/2008	44,520.00
07/01/2008	07/31/2008	50,560.00
06/01/2008	06/30/2008	41,720.00
05/01/2008	05/31/2008	46,000.00
04/01/2008	04/30/2008	45,240.00
03/01/2008	03/31/2008	11,160.00
02/01/2008	02/29/2008	10,480.00
01/01/2008	01/31/2008	90,000.00
Hunts Mill Park Well House #15 Consumption (kWh (thousand Watt-hours))		**463,120.00**
Hunts Mill Park Well House #15 Consumption (kBtu (thousand Btu))		**1,580,165.44**

Meter: Wastewater Treatment Plant - Electrical (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	117,593.00
11/01/2008	11/30/2008	117,593.00
10/01/2008	10/31/2008	117,593.00
09/01/2008	09/30/2008	117,593.00
08/01/2008	08/31/2008	117,593.00
07/01/2008	07/31/2008	117,593.00
06/01/2008	06/30/2008	117,593.00
05/01/2008	05/31/2008	117,593.00
04/01/2008	04/30/2008	117,593.00
03/01/2008	03/31/2008	117,593.00
02/01/2008	02/29/2008	117,593.00
01/01/2008	01/31/2008	117,593.00
Wastewater Treatment Plant - Electrical Consumption (kWh (thousand Watt-hours))		**1,411,116.00**

Wastewater Treatment Plant - Electrical Consumption (kBtu (thousand Btu))	**4,814,727.79**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**11,969,217.52**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas

Meter: Municipal Bldg Meter 01137789 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	240.00
11/01/2008	11/30/2008	85.00
10/01/2008	10/31/2008	36.00
09/01/2008	09/30/2008	11.00
08/01/2008	08/31/2008	11.00
07/01/2008	07/31/2008	11.00
06/01/2008	06/30/2008	10.00
05/01/2008	05/31/2008	11.00
04/01/2008	04/30/2008	119.00
03/01/2008	03/31/2008	191.00
02/01/2008	02/29/2008	309.00
01/01/2008	01/31/2008	361.00
Municipal Bldg Meter 01137789 Consumption (therms)		**1,395.00**
Municipal Bldg Meter 01137789 Consumption (kBtu (thousand Btu))		**139,500.00**

Meter: Municipal Bldg Meter 01580565 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	105.00
11/01/2008	11/30/2008	30.00
10/01/2008	10/31/2008	3.00
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	1.00
05/01/2008	05/31/2008	3.00
04/01/2008	04/30/2008	40.00
03/01/2008	03/31/2008	122.00
02/01/2008	02/29/2008	147.00
01/01/2008	01/31/2008	144.00
Municipal Bldg Meter 01580565 Consumption (therms)		**595.00**
Municipal Bldg Meter 01580565 Consumption (kBtu (thousand Btu))		**59,500.00**

Meter: Community Ctr Meter 06469237 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	482.00
11/01/2008	11/30/2008	231.00

10/01/2008	10/31/2008	28.00
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	0.00
07/01/2008	07/31/2008	0.00
06/01/2008	06/30/2008	9.00
05/01/2008	05/31/2008	109.00
04/01/2008	04/30/2008	210.00
03/01/2008	03/31/2008	346.00
02/01/2008	02/29/2008	481.00
01/01/2008	01/31/2008	638.00
Community Ctr Meter 06469237 Consumption (therms)		**2,534.00**
Community Ctr Meter 06469237 Consumption (kBtu (thousand Btu))		**253,400.00**

Meter: Hunts Mill Park Well House #15 Meter 00035960 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	51.00
11/01/2008	11/30/2008	15.00
10/01/2008	10/31/2008	21.00
09/01/2008	09/30/2008	14.00
08/01/2008	08/31/2008	25.00
07/01/2008	07/31/2008	14.00
06/01/2008	06/30/2008	17.00
05/01/2008	05/31/2008	19.00
04/01/2008	04/30/2008	20.00
03/01/2008	03/31/2008	15.00
02/01/2008	02/29/2008	26.00
01/01/2008	01/31/2008	15.00
Hunts Mill Park Well House #15 Meter 00035960 Consumption (therms)		**252.00**
Hunts Mill Park Well House #15 Meter 00035960 Consumption (kBtu (thousand Btu))		**25,200.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**477,600.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Fuel Type: Propane

Meter: Wastewater Treatment Plant - Propane (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
12/01/2008	12/31/2008	732.00
11/01/2008	11/30/2008	732.00
10/01/2008	10/31/2008	732.00
09/01/2008	09/30/2008	732.00
08/01/2008	08/31/2008	732.00
07/01/2008	07/31/2008	732.00
06/01/2008	06/30/2008	732.00
05/01/2008	05/31/2008	732.00

04/01/2008	04/30/2008	732.00
03/01/2008	03/31/2008	732.00
02/01/2008	02/29/2008	732.00
01/01/2008	01/31/2008	732.00
Wastewater Treatment Plant - Propane Consumption (Gallons)		**8,784.00**
Wastewater Treatment Plant - Propane Consumption (kBtu (thousand Btu))		**805,032.52**
Total Propane Consumption (kBtu (thousand Btu))		**805,032.52**
Is this the total Propane consumption at this building including all Propane meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

IT Energy Type: Average Influent Flow Meter		
Meter Name: Average Influent Flow Meter		
Start Date	**End Date**	**Energy Use (kWh)**
01/01/1968	12/31/2010	1.33
Average Influent Flow Meter (kWh)		**1.33**

Total IT Energy from All Required Meters	
Annual Site IT Energy (kWh)	**1.33**
Annual Source IT Energy (kWh)	**4.44**

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

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) and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

General Information:

Town of Clinton Wastewater Treatment Plant	
Year Built	1968
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Clinton WWTP	
Space Type	Municipal Wastewater Treatment Plant
Average Influent Biological Demand (BOD5) Concentration	250
Average Effluent Biological Demand (BOD5) Concentration	20
Plant Design Flow Rate	2
Fixed Film Trickle Filtration Process	No
Nutrient Removal	Yes

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date: 12/31/2008)	**Baseline** (Ending Date: 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	**1**	**1**	75	N/A	50
Energy Intensity					
Site (kBtu/gpd)	10	10	N/A	N/A	3
Source (kBtu/gpd)	31	31	N/A	N/A	11
Energy Cost					
$/year	$ 579,113	$ 579,113	N/A	N/A	$ 202,341
$/mgpd/year	$435,423.29	$435,423.29	N/A	N/A	$152,135.85
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,899	1,899	N/A	N/A	664
$kgCO_2e/ft^2$/year	N/A	N/A	N/A	N/A	N/A

Statement of Energy Performance

2008

Town of Clinton Wastewater Treatment Plant
2 Ramsey Road
Town of Clinton, NJ 08809

Portfolio Manager Building ID: 2286493

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 score

1

1 50 100

Least Efficient **Average** **Most Efficient**

This building uses N/A kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending December 2008

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

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 06/07/2010

Savings Analysis Proposal - JCP&L

Glacial Energy

This analysis illustrates what your recent energy costs savings might have been had Glacial Energy been your preferred electricity supplier. This proposal is based on your organization's estimated usage (kwh) and demand (kw) over the coming year.

Secure your savings today!

Contract Summary - Forecasted Price Comparison

Company Name: Town of Clinton
Billing Address: Clinton controlbuilding1.pdf, Clinton, NJ 08809

Start Month:	Jun-10
Number of LDC Accounts:	13
Retail Margin Adder:	N/A

Estimated Rate Comparison over the next 12 months

Avg Rate ($/kwh)*:	$	0.12279
Annual Utility Charges:	$	427,708
Glacial Energy Index:	$	0.10837
Glacial Charges:	$	377,494

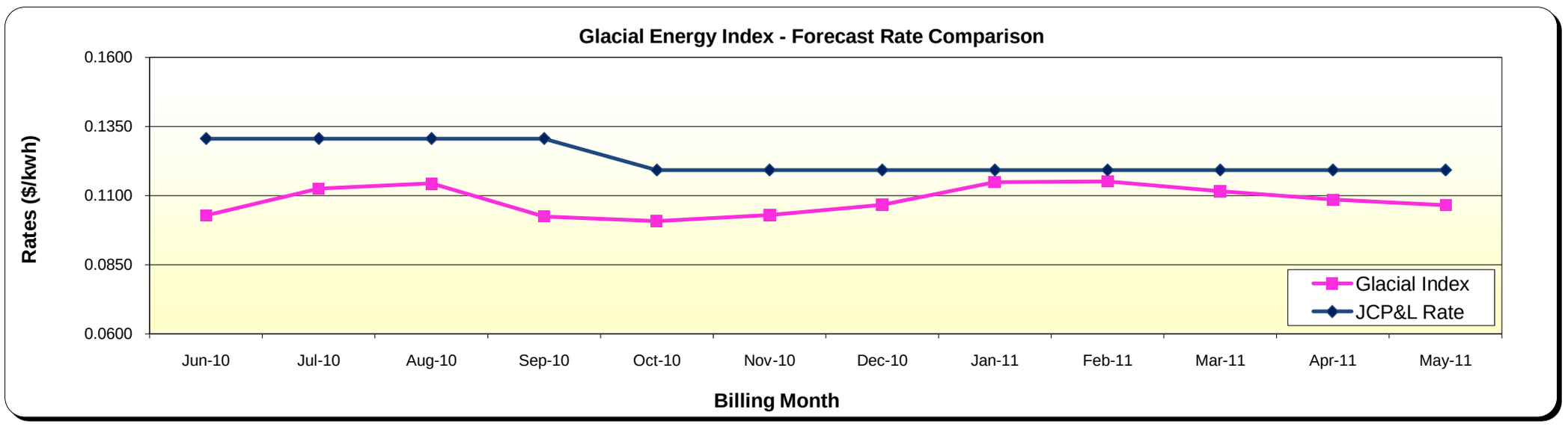
Forecasted Customer Usage Data Summary

Usage (kwh):	3,483,243
Avg Monthly Usage (kwh):	290,270
Peak Monthly kw:	682
Peak Load Factor:	58%
Capacity PLC:	722
Transmission PLC:	830

Savings Summary

Estimated Savings vs. Utility	**$**	**50,214**
Savings (Glacial vs. Utility)		**12%**

The savings in this proposal are estimated, not guaranteed. Actual savings may vary.

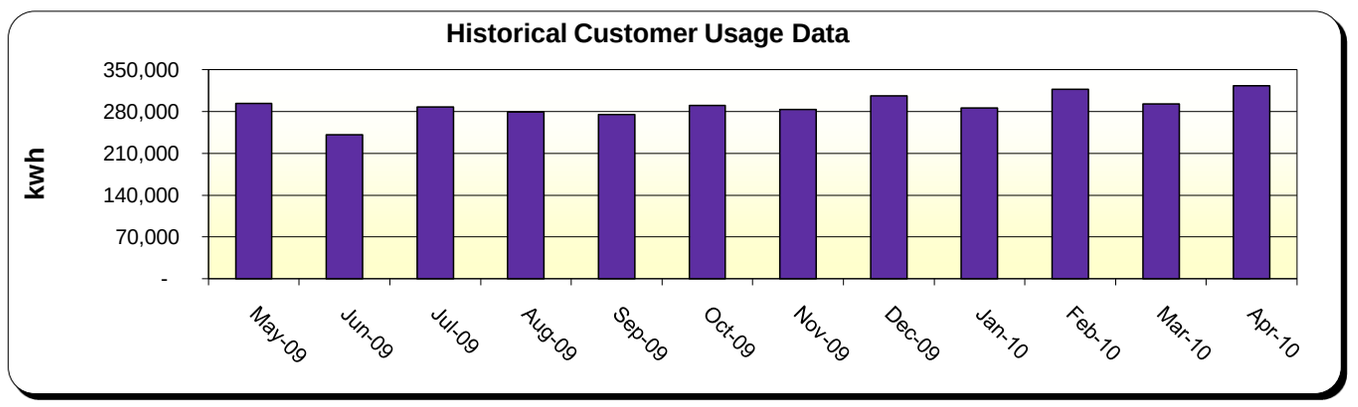


Glacial Index Includes:

a. Wholesale Delivery Price of Energy
b. Energy Losses and Unaccounted for Energy (UFE)
c. Ancillary Services & other ISO Charges
d. Zonal Congestion
e. Retail Adder
f. Transmission Losses & Charges
g. Capacity Charges
h. NJ SUT (Tariff Rate also includes NJ SUT)

Glacial Index Excludes:

a. Distribution or other (wires) charges from the utility
b. Non NJ SUT Taxes.



1. The Glacial Index price is a monthly variable rate, it is not a fixed rate.
2. The index is based in part on forecasted ISO charges, estimated future zonal energy prices and the cost to provide service.
3. The forward tariff rates are based on the latest, pending or estimated utility rates (inclusive of NJ SUT), as published by the utility forecasted for this rate schedule.

	LDC Account No:	Physical Address:
1	08003847540000863870	Clinton controlbuilding1.pdf, Clinton, NJ 08809
2	08016413050000093129	Deer Hill Rd., Lebanon, NJ 08833
3	08016413050000135706	Rt 22 E - XST Cokesburry Rd. Well, Lebabon, NJ 08833
4	08016413050000818036	Lilac Dr, Annandale, NJ 08801
5	08016413050000818762	43 Leigh St., Clinton, NJ 08809
6	08016413050000818763	43 Leigh St., Clinton, NJ 08809
7	08016413050000818836	Alton Pl., Annandale, NJ 08801
8	08016413050000819466	Rt 173 - West End Well, Clinton, NJ 08809
9	08016413050000863869	6 Ramsey Rd., Clinton, NJ 08809
10	08016413050000946916	23 Austin Hill Rd, Clinton, NJ 08809
11	08016413050003156275	100 Alton P., Clinton, NJ 08809
12	08028462200005377047	183 Center St., Clinton, NJ 08809
13	08016413050000776238	63 Halstead St., Clinton, NJ 08809

Savings Analysis Proposal - JCP&L

Glacial Energy

This analysis illustrates what your recent energy costs savings might have been had Glacial Energy been your preferred electricity supplier.

Contract Summary - Historical Utility Charges

Company Name: Town of Clinton
Billing Address: Clinton controlbuilding1.pdf, Clinton, NJ 08809

Historical Timeframe (mo.):	6
Start Month:	Nov-09
Number of LDC Accounts:	13

Estimated Historical Utility Charges

Avg Rate ($/kwh):	$	0.11331
Annual Utility Charges:	$	204,929

Glacial Energy Index:	$	0.10551
Glacial Charges:	$	190,827

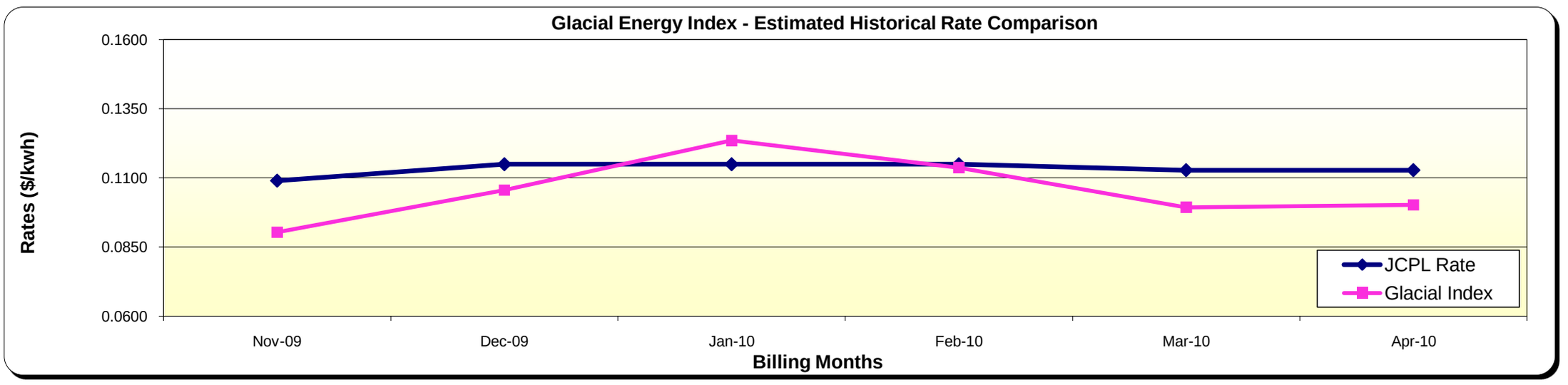
6 month Period Summary

Usage (kwh):	1,808,582
Avg Monthly Usage (kwh):	301,430
Peak Monthly kw:	682
Peak Load Factor:	61%
Capacity PLC:	722
Transmission PLC:	830

Savings Summary

Estimated Savings vs. Utility	**$**	**14,102**
Savings (Glacial vs. Utility)		**7%**

The savings in this proposal are estimated, not guaranteed. Actual savings will vary.



Glacial Index Includes:
a. Wholesale Delivery Price of Energy
b. Energy Losses and Unaccounted for Energy (UFE)
c. Ancillary Services & other ISO Charges
d. Zonal Congestion
e. Retail Adder
f. Transmission Losses & Charges
g. Capacity Charges
h. NJ SUT (Tariff Rate also includes NJ SUT)

Glacial Index Excludes:
a. Distribution or other (wires) charges from the utility
b. Non NJ SUT Taxes.

1. The historic tariff rate comparison is based on the customer's historical usage as provided or estimated and provided or estimated demand over the previous term.
2. Savings are based on the corresponding utility rates for the appropriate rate schedule over the analysis term.

Savings Analysis Proposal - Elizabethtown Gas

Glacial Energy

This analysis illustrates what your previous energy cost savings might have been had Glacial Energy been your preferred Natural Gas supplier.
The savings estimate is based on your organization's provided, acquired or estimated historical usage.

Secure your savings today!

Cost Comparison - Historical Index Analysis

Company Name: Town of Clinton
Billing Address: 43 Leigh St. PO Box 5194, Clinton, NJ 08809
Utility Service Territory: Elizabethtown Gas
Number of LDC Accounts: 6
Number of Rate Classes: 1
Rate Classes: SC-SGS

Customer Usage Data Summary

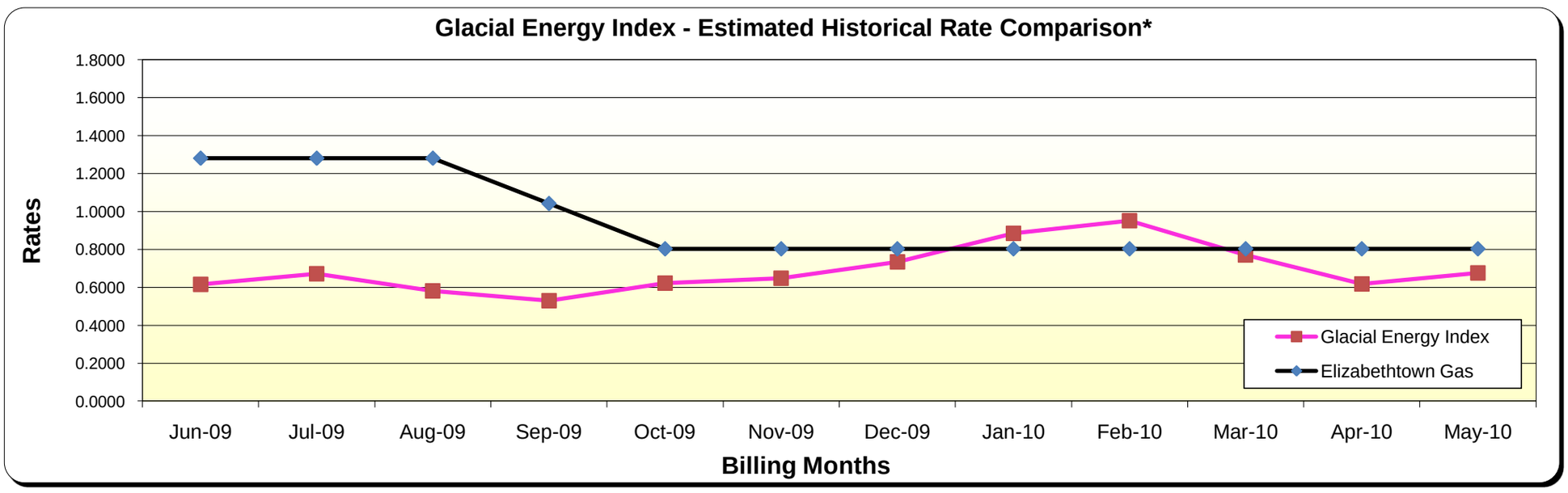
Start Month:	Jun-09
Term (Months):	12
Term Usage (Therms):	6,108
Avg Monthly Usage (Therms):	509
Peak Monthly Usage (Therms):	906

Estimated Historical Rate Comparison

Avg Utility Rate ($/Therms):	$	0.87346
Term Utility Charges:	$	5,335
Avg Glacial Energy Index:	$	0.74170
Term Glacial Charges:	$	4,530

Estimated Dollar Savings vs. Utility	$805
Percent Savings (Glacial vs. Utility)	15%

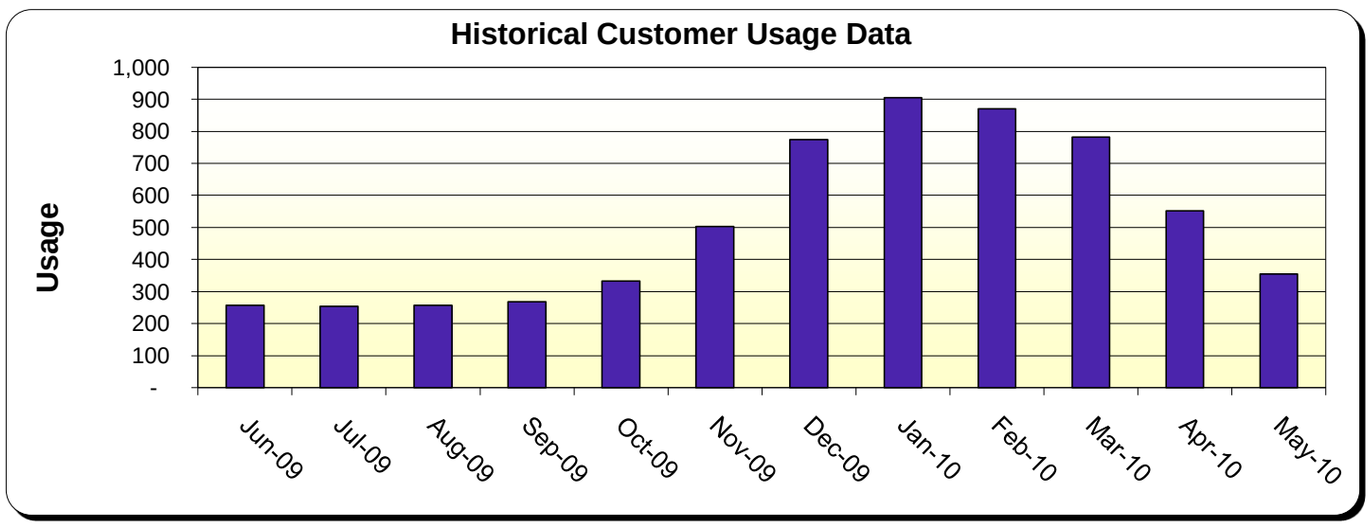
* The savings in this proposal are estimates, and are not guaranteed. Actual savings may vary.



* *This comparison illustrates an estimate of what the Glacial Energy Index might have been, as compared to your current utility rates. Actual historical savings may vary by customer.*

Glacial Index Includes:
a. Wholesale Delivered Price of Gas
b. BTU Conversion adjusted w/applicable losses
c. Associated Utility Gas Charges
d. Basis Congestion Charges
e. Capacity & Related Transportation Fees
f. Market Settlement Charges
g. Retail Adder
h. NJ SUT (Tariff Rate also includes NJ SUT)

Glacial Index Excludes:
a. Distribution or other charges from the utility
b. Non NJ SUT Taxes

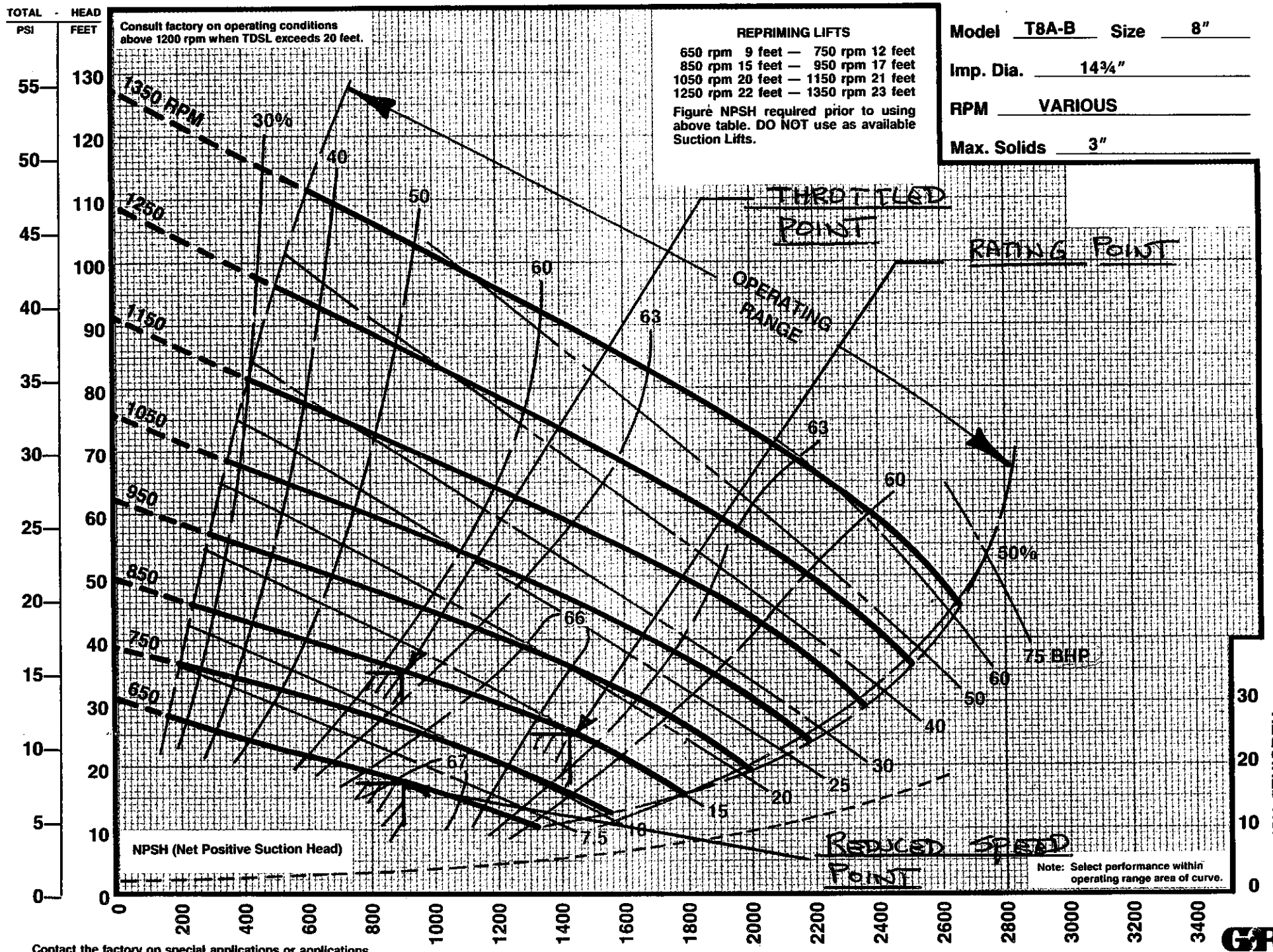


1.The Glacial Index price is a monthly variable rate and is subject to change as market conditions fluctuate.
2. The Index is also subject to price fluctuations in additional services necessary for the provision of natural gas.
3. The Glacial Index rate is not fixed. The comparative numbers shown in this analysis are based on estimations.
4. Utility Rates shown in this analysis are based on the latest published, pending or forecasted utility rates.
5. If complete usage data was not available, remaining usage data was estimated.

	LDC Account No:	Physical Address:
1	2994872821	183 Center St., Clinton, NJ, 08809
2	1241399601	63 Halstead St., Clinton, NJ, 08809
3	2231813551	43 Leigh St., Clinton, NJ, 08809
4	6472456541	PO Box 5194 43 Leigh St., Clinton, NJ, 08809
5	8598233551	43 Leigh St., Clinton, NJ, 08809
6	7404218601	100 Alton Pl., Clinton, NJ, 08809

Town of Clinton Accounts

JCP&L Customer #	JCP&L Acct #	Attachment File Name	Service Address	Elizabethtown Gas Acct. #	Meter #	Account Name	Attachment File Name	Address
0801641305 0000818763	100004867998	Clinton municipalbuilding4.pdf and Clinton municipalbuilding1.pdf	Police Mun. Bldg., 43 Leigh St., Clinton					
0801641305 0000135706	100002543138	Clinton Lebanonwellhouse2.pdf	Rt. 22E-XST, Cokesburry Rd Well, Lebanon					
0801641305 0000818036	100004122766	Clinton lilacdrivewellhouse7.pdf	Lilac Dr., Annandale					
0801641305 0000819466	100004894281	Clinton westendwellhouse1 A.pdf	Rt. 173 - West End Well, Clinton					
0801641305 0000093129	100003479555	Clinton potterstownwellhouse4.pdf	Deer Hill Rd., Lebanon					
0801641305 0000863869	100004894950	Clinton wellhouse6.pdf	6 Ramsey Rd., Clinton					
0802846220 0005377047	100030516593	Clinton wellhouse15 A.pdf	Pond Ridge Dr., Clinton	2994872821	00035960	Town of Clinton Water Dept - Well House #15	Clinton wellhouse15.pdf	Pond Ridge Dr.
0801641305 0000946916	100005216047	Clinton foxfireboosterpumpstation.pdf	23 Austin Hill Rd., Clinton					
08016413050000776238	100004776645	Clinton communitycenter A.pdf	63 Halstead St., Clinton	1241399601	06469239	Town of Clinton - Community Center	Clinton communitycenter.pdf	63 Halstead St.
0801641305 0000818836	100003580097	Clinton beaverbrookwellhouse11.pdf	Alton Pl., Annandale					
0801641305 0000818762	100004867865	Clinton barnwellhouse12 A.pdf	43 Leigh St., Clinton	2231813551		Town of Clinton Water Dept - Barn Well House #12	(no gas bill attached/cover pg only)	43 Leigh St.
0801641305 0003156275	100049032368	Clinton controlbuilding3a A.pdf	100 Alton Pl., Clinton	7404218601	05954993	Clinton Control Building	Clinton controlbuilding2.pdf	100 Alton Pl.
Obtained from utility co.	100004894885	Clinton controlbuilding1.pdf	2 Ramsey Rd. & 6 ramsey Rd., Clinton					
				6472456541	01137789	Town of Clinton Municipal Bldg 2	Clinton municipalbuilding2.pdf	PO Box 5194, 43 Leigh St.
				8598233551	01580565	Town of Clinton Municipal Bldg 3	Clinton municipalbuilding3.pdf	43 Leigh St.



PERFORMANCE CHART NO. T8A-3 7-6-81

SECTION 55 PAGE 1353

REQUIRED NSPH

Contact the factory on special applications or applications exceeding priming or other performance limitations indicated.

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GORMAN-RUPP

Lighting Price Estimates for Town of Clinton

BUILDING	LIGHTING MATERIAL COST	LIGHTING LABOR COST	TOTAL LIGHTING COST	SENSOR MATERIAL COST	SENSOR LABOR COST	TOTAL SENSOR COST	MATERIAL SUBTOTAL	LABOR SUBTOTAL	TOTAL
Municipal Building	$ 1,954	$ 838	$ 2,792	$ 1,694	$ 726	$ 2,420	$ 3,648	$ 1,564	$ 5,212
Community Center	$ 5,036	$ 2,158	$ 7,195	$ -	$ -	$ -	$ 5,036	$ 2,158	$ 7,195
WWTP-Control Building	$ 4,713	$ 2,020	$ 6,733	$ 138	$ 59	$ 197	$ 4,851	$ 2,079	$ 6,930
WWTP-Pump Station Building	$ 349	$ 150	$ 499	$ -	$ -	$ -	$ 349	$ 150	$ 499
WWTP-Filter Building	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WWTP-Blower Building	$ 911	$ 391	$ 1,302	$ -	$ -	$ -	$ 911	$ 391	$ 1,302
WWTP-Outside Equipment	$ 15,290	$ 6,553	$ 21,843	$ -	$ -	$ -	$ 15,290	$ 6,553	$ 21,843
WWTP-Well House 6	$ 150	$ 64	$ 214	$ -	$ -	$ -	$ 150	$ 64	$ 214
DPW-Barn Well House 12	$ 218	$ 94	$ 312	$ -	$ -	$ -	$ 218	$ 94	$ 312
West End Well House 1	$ 19	$ 8	$ 27	$ -	$ -	$ -	$ 19	$ 8	$ 27
Foster Wheeler Pump Station 14	$ 393	$ 168	$ 561	$ -	$ -	$ -	$ 393	$ 168	$ 561
Beaver Brook Well House 11	$ 231	$ 99	$ 330	$ -	$ -	$ -	$ 231	$ 99	$ 330
Hunts Mill Park Well House 15	$ 655	$ 281	$ 935	$ -	$ -	$ -	$ 655	$ 281	$ 935
Lilac Drive Well House 7	$ 137	$ 59	$ 195	$ -	$ -	$ -	$ 137	$ 59	$ 195
Lebanon Well House 2	$ 19	$ 8	$ 27	$ -	$ -	$ -	$ 19	$ 8	$ 27
Potterstown Well House 4	$ 19	$ 8	$ 27	$ -	$ -	$ -	$ 19	$ 8	$ 27
Fox Fire Hydropneumatic Station 2	$ 218	$ 94	$ 312	$ -	$ -	$ -	$ 218	$ 94	$ 312
Subtotal							$ 32,144	$ 13,776	
								SUBTOTAL=	$ 45,920
								MARKUP %=	0.00
								MARKUP=	$ -
								BUDGET COST ESTIMATE	$ 45,920

Solar Price Estimates for Town of Clinton

BUILDING	SOLAR MATERIAL COST	SOLAR LABOR COST	PROJECT SUBTOTAL	TOTAL
Canopy Mount System - Over Final Clarifiers	$ 587,970	$ 195,990	$ 783,960	$ 783,960
Roof Mount System - Filter Building	$ 114,210	$ 38,070	$ 152,280	$ 152,280
Roof Mount System - Control Building	$ 71,910	$ 23,970	$ 95,880	$ 95,880
Subtotal			$ 1,032,120	

SUBTOTAL=	$ 1,032,120
MARKUP %=	0.00
MARKUP=	$ -
BUDGET COST ESTIMATE	$ 1,032,120

Motor Price Estimates for Town of Clinton

BUILDING	MOTOR MATERIAL COST	MOTOR LABOR COST	TOTAL MOTOR COST	MATERIAL SUBTOTAL	LABOR SUBTOTAL	TOTAL
WWTP Control Bldg - (4) 20 HP, (2) 5 HP, (2) 3 HP	$ 7,837	$ 3,359	$ 11,196	$ 7,837	$ 3,359	$ 11,196
WWTP Pump Station Bldg – (2) 60 HP	$ 10,153	$ 4,351	$ 14,504	$ 10,153	$ 4,351	$ 14,504
WWTP Filter Bldg – (8) 3 HP, (1) 2 HP	$ 4,414	$ 1,892	$ 6,306	$ 4,414	$ 1,892	$ 6,306
WWTP Outside– (4) 4.4 HP, (1) 3 HP, (1) 1.5 HP	$ 3,429	$ 1,469	$ 4,898	$ 3,429	$ 1,469	$ 4,898
WWTP Blower Bldg - (4) 50 HP	$ 15,254	$ 6,538	$ 21,792	$ 15,254	$ 6,538	$ 21,792
WWTP Well House 6 – (1) 3 HP	$ 650	$ 278	$ 928	$ 650	$ 278	$ 928
DPW Barn Well House 12 – (1) 40 HP	$ 2,934	$ 1,258	$ 4,192	$ 2,934	$ 1,258	$ 4,192
Foster Wheeler Station 14 – (2) 30 HP, (1) 20 HP	$ 6,667	$ 2,857	$ 9,524	$ 6,667	$ 2,857	$ 9,524
Beaver Brook Well House 11 – (1) 1.5 HP	$ 399	$ 171	$ 570	$ 399	$ 171	$ 570
Hunts Mill Park Well House 15 – (1) 50 HP	$ 3,377	$ 1,447	$ 4,824	$ 3,377	$ 1,447	$ 4,824
Lilac Drive Station 7 11 – (2) 40 HP, (1) 1 HP, (1) 3 HP	$ 6,658	$ 2,854	$ 9,512	$ 6,658	$ 2,854	$ 9,512
Lebanon Well House 2 - (1) 50 HP	$ 3,377	$ 1,447	$ 4,824	$ 3,377	$ 1,447	$ 4,824
Fox Fire Station 2 – (2) 15 HP, (1) 75 HP. (1) 5 HP	$ 6,002	$ 2,572	$ 8,574	$ 6,002	$ 2,572	$ 8,574
Subtotal				$ 71,151	$ 30,493	
					SUBTOTAL=	$ 101,644
					MARKUP %=	0.00
					MARKUP=	$ -
					BUDGET COST ESTIMATE	$ 101,644

HVAC & Building Envelope Price Estimates for Town of Clinton

BUILDING	ECM Description	MATERIAL COST	LABOR COST	TOTAL COST
Municipal Building	Air Conditioning/ Heat Pump Replacement	$ 21,000	$ 9,000	$ 30,000
Municipal Building	Furnace Replacement	$ 7,000	$ 3,000	$ 10,000
Municipal Building	Thermostat Replacement	$ 3,500	$ 1,500	$ 5,000
Community Center	Thermostat Replacement	$ 875	$ 375	$ 1,250
WWTP Control Building	Air Conditioning/ Heat Pump Replacement	$ 10,500	$ 4,500	$ 15,000
WWTP Blower Building`	Unit Heater Replacement	$ 3,150	$ 1,350	$ 4,500
West End Well #1	Window Replacement	$ 2,100	$ 900	$ 3,000
Lilac Drive Well House #6	Window Replacement	$ 2,100	$ 900	$ 3,000
Lebanon Well House #2	Window Replacement	$ 350	$ 150	$ 500
Subtotal				

SUBTOTAL=	$	72,250
MARKUP %=		0.00
MARKUP=	$	-
BUDGET COST ESTIMATE	$	72,250

CDM

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Raritan Plaza 1, Raritan Center
Edison, New Jersey 08818
Phone (732) 225-7000
Fax (732) 225-7851

Location: Clinton
ITEM **New Centrifugal Blowers & New Diffusers - Alt. 1**
Estimate by: Christie Arlotta
Checked by:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	Blowers - Centrifugal and Install Labor	4	ea.	$ 125,412.50	$ 501,650.00	128	hrs	$ 70.00	$ 8,960.00	$ 510,610.00
2	Remove Existing Blowers	4	ea.	$ -	$ -	160	hrs	$ 70.00	$ 11,200.00	$ 11,200.00
3	Rigging	4	ea.	$ 5,000.00	$ 20,000.00	4	ea.	$ 5,000.00	$ 20,000.00	$ 40,000.00
4	New Piping	4	ea.	$ 15,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
5	Blower Instrumentation and Controls	4	l.s.	$ 30,000.00	$ 120,000.00	0	hrs	$ 70.00	$ -	$ 120,000.00
6	Aeration Tank Instrumentation and Controls	2	l.s.	$ 30,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
7	Electrical Work	4	l.s.	$ 10,000.00	$ 40,000.00	0	hrs	$ 70.00	$ -	$ 40,000.00
8	System Testing	4	l.s.	$ 6,000.00	$ 24,000.00	32	hrs	$ 70.00	$ 2,240.00	$ 26,240.00
					$ -				$ -	$ -
					$ -				$ -	$ -
					$ -				$ -	$ -
	Subtotal				825,650.00				42,400.00	

SUBTOTAL =	$	868,050.00
MARKUP % =	$	0.20
MARKUP =	$	173,610.00
SUB-TOTAL w/ OH & P =	$	1,041,660.00
CONTINGENCY % =		0.30
CONTINGENCY =	$	312,498.00
BUDGET COST ESTIMATE =	$	1,354,158.00

CDM

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Raritan Plaza 1, Raritan Center

Edison, New Jersey 08818
Phone (732) 225-7000
Fax (732) 225-7851

Location: Clinton
ITEM **New Positive Displacement Blowers & New Diffusers - Alt. 2**
Estimate by: Christie Arlotta
Checked by:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	Blowers - PD, VFDs and Install Labor	4	ea.	$ 85,000.00	$ 340,000.00	128	hrs	$ 70.00	$ 8,960.00	$ 348,960.00
2	Remove Existing Blowers	4	ea.	$ -	$ -	160	hrs	$ 70.00	$ 11,200.00	$ 11,200.00
3	Rigging	4	ea.	$ 5,000.00	$ 20,000.00	4	ea.	$ 5,000.00	$ 20,000.00	$ 40,000.00
4	New Piping	4	ea.	$ 15,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
5	Blower Instrumentation and Controls	4	l.s.	$ 30,000.00	$ 120,000.00	0	hrs	$ 70.00	$ -	$ 120,000.00
6	Aeration Tank Instrumentation and Controls	2	l.s.	$ 30,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
7	Electrical Work	4	l.s.	$ 10,000.00	$ 40,000.00	0	hrs	$ 70.00	$ -	$ 40,000.00
8	System Testing	4	l.s.	$ 6,000.00	$ 24,000.00	32	hrs	$ 70.00	$ 2,240.00	$ 26,240.00
					$ -				$ -	$ -
					$ -				$ -	$ -
					$ -				$ -	$ -
	Subtotal				664,000.00				42,400.00	

SUBTOTAL =	$	706,400.00
MARKUP % =	$	0.20
MARKUP =	$	141,280.00
SUB-TOTAL w/ OH & P =	$	847,680.00
CONTINGENCY % =		0.30
CONTINGENCY =	$	254,304.00
BUDGET COST ESTIMATE =	$	1,101,984.00

CDM

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Raritan Plaza 1, Raritan Center
Edison, New Jersey 08818
Phone (732) 225-7000
Fax (732) 225-7851

Location: Clinton
ITEM **New Turbo Blowers & New Diffusers - Alt. 3**
Estimate by: Christie Arlotta
Checked by:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	Blowers - Turbo, VFDs and Install Labor	4	ea.	$ 137,600.00	$ 550,400.00	128	hrs	$ 70.00	$ 8,960.00	$ 559,360.00
2	Remove Existing Blowers	4	ea.	$ -	$ -	160	hrs	$ 70.00	$ 11,200.00	$ 11,200.00
3	Rigging	4	ea.	$ 5,000.00	$ 20,000.00	4	ea.	$ 5,000.00	$ 20,000.00	$ 40,000.00
4	New Piping	4	ea.	$ 15,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
5	Blower Instrumentation and Controls	4	l.s.	$ 30,000.00	$ 120,000.00	0	hrs	$ 70.00	$ -	$ 120,000.00
6	Aeration Tank Instrumentation and Controls	2	l.s.	$ 30,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
7	Electrical Work	4	l.s.	$ 10,000.00	$ 40,000.00	0	hrs	$ 70.00	$ -	$ 40,000.00
8	System Testing	4	l.s.	$ 6,000.00	$ 24,000.00	32	hrs	$ 70.00	$ 2,240.00	$ 26,240.00
					$ -				$ -	$ -
					$ -				$ -	$ -
					$ -				$ -	$ -
	Subtotal				874,400.00				42,400.00	

SUBTOTAL =	$	916,800.00
MARKUP % =	$	0.20
MARKUP =	$	183,360.00
SUB-TOTAL w/ OH & P =	$	1,100,160.00
CONTINGENCY % =		0.30
CONTINGENCY =	$	330,048.00
BUDGET COST ESTIMATE =	$	1,430,208.00

CDM

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Raritan Plaza 1, Raritan Center
Edison, New Jersey 08818
Phone (732) 225-7000
Fax (732) 225-7851

Location: Clinton
ITEM **New VFDs - Alt. 4**
Estimate by: Christie Arlotta
Checked by:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	New VFDs and Install Labor	4	ea.	$ 15,000.00	$ 60,000.00	200	hrs	$ 70.00	$ 14,000.00	$ 74,000.00
2	Aeration Tank Instrumentation and Controls	2	l.s.	$ 30,000.00	$ 60,000.00	0	hrs	$ 70.00	$ -	$ 60,000.00
3	Electrical Work	4	l.s.	$ 6,000.00	$ 24,000.00	0	hrs	$ 70.00	$ -	$ 24,000.00
4	System Testing	4	l.s.	$ 5,000.00	$ 20,000.00	32	hrs	$ 70.00	$ 2,240.00	$ 22,240.00
					$ -				$ -	$ -
					$ -				$ -	$ -
					$ -				$ -	$ -
	Subtotal				164,000.00				16,240.00	

SUBTOTAL =	$	180,240.00
MARKUP % =	$	0.20
MARKUP =	$	36,048.00
SUB-TOTAL w/ OH & P =	$	216,288.00
CONTINGENCY % =		0.30
CONTINGENCY =	$	64,886.40
BUDGET COST ESTIMATE =	$	281,174.40

	Alt. 1 – New Centrifugal Blowers & New	Alt. 2 – New Positive Displacement	Alt. 3 – New Turbo Blowers & New	Alt. 4 - VFDs on Existing Blowers	
Installation Cost	$1,354,000	$1,102,000	$1,430,000	$281,200	
Annual Energy Savings	$40,700	$39,500	$41,200	$41,000	
Annual O&M Cost	$8,000	$10,000	$10,000	$2,000	**assume $2000/yr per blower, $500/yr per VFD**
Simple Payback Period, years	41.4	37.4	45.8	7.2	
Lifetime, years	20	20	20	20	
Internal Rate of Return (IRR)	-4.4%	-3.0%	-4.8%	13.4%	
Net Present Value (NPV)	-$748,000	-$514,000	-$817,000	$329,000	
				$0.16	per kWh

Energy Savings Breakdown

current estimated use	$90,100	$90,100	$90,100	$90,100	**assumes avg power = 90 A (2 blowers running at 45 A each)**
future average HP use	42.5	48.5	41.8	47.0	**assumes avg flows/loads stay the same**
future	$49,400	$50,600	$48,900	$49,100	
savings	$40,700	$39,500	$41,200	$41,000	

0.815556

73.4

Year	**Centrifugal**	**PD**	**Turbo**	**VFDs**
0	($1,354,000)	($1,102,000)	($1,430,000)	($281,200)
1	$40,700	$39,500	$41,200	$41,000
2	$40,700	$39,500	$41,200	$41,000
3	$40,700	$39,500	$41,200	$41,000
4	$40,700	$39,500	$41,200	$41,000
5	$40,700	$39,500	$41,200	$41,000
6	$40,700	$39,500	$41,200	$41,000
7	$40,700	$39,500	$41,200	$41,000
8	$40,700	$39,500	$41,200	$41,000
9	$40,700	$39,500	$41,200	$41,000
10	$40,700	$39,500	$41,200	$41,000
11	$40,700	$39,500	$41,200	$41,000
12	$40,700	$39,500	$41,200	$41,000
13	$40,700	$39,500	$41,200	$41,000
14	$40,700	$39,500	$41,200	$41,000
15	$40,700	$39,500	$41,200	$41,000
16	$40,700	$39,500	$41,200	$41,000
17	$40,700	$39,500	$41,200	$41,000
18	$40,700	$39,500	$41,200	$41,000
19	$40,700	$39,500	$41,200	$41,000
20	$40,700	$39,500	$41,200	$41,000
IRR	-4.4%	-3.0%	-4.8%	13.4%
NPV	($748,487)	($514,340)	($817,048)	$328,776

CDM

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

110 Fieldcrest Avenue, 6th Floor
Edison, New Jersey 08837
Phone (732) 225-7000
Fax (732) 225-7851

Location: Clinton
ITEM **Addition of VFD's to existing RAS pumps**
Estimate by: Liz Yanosey
Checked by:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	VFDs and Install Labor	2	ea.	$ 4,500.00	$ 9,000.00	60	hrs	$ 70.00	$ 4,200.00	$ 13,200.00
2	Instrumentation and Controls	1	l.s.	$ 5,000.00	$ 5,000.00	0	hrs	$ 70.00	$ -	$ 5,000.00
3	Electrical Work	1	l.s.	$ 10,000.00	$ 10,000.00	0	hrs	$ 70.00	$ -	$ 10,000.00
4	System Testing	1	l.s.	$ 2,000.00	$ 2,000.00	0	hrs	$ 70.00	$ -	$ 2,000.00
					$ -				$ -	$ -
					$ -				$ -	$ -
					$ -				$ -	$ -
	Subtotal				26,000.00				4,200.00	

SUBTOTAL =	$	30,200.00
MARKUP % =	$	0.20
MARKUP =	$	6,040.00
SUB-TOTAL w/ OH & P =	$	36,240.00
CONTINGENCY % =		0.30
CONTINGENCY =	$	10,872.00
BUDGET COST ESTIMATE =	$	47,112.00

	New VFDs
Installation Cost	$47,000
Annual Energy Savings	$7,300
Annual O&M Cost	$500
Simple Payback Period, years	6.9
Lifetime, years	20
Internal Rate of Return (IRR)	14.5%
Net Present Value (NPV)	$62,000

assume $2000/yr per blower, $500/yr per VFD

Year	**VFDS**
0	($47,000)
1	$7,300
2	$7,300
3	$7,300
4	$7,300
5	$7,300
6	$7,300
7	$7,300
8	$7,300
9	$7,300
10	$7,300
11	$7,300
12	$7,300
13	$7,300
14	$7,300
15	$7,300
16	$7,300
17	$7,300
18	$7,300
19	$7,300
20	$7,300
IRR	14.5%
NPV	$61,606

Attachment - Town of Clinton Lighting Spreadsheets

Seq. #	Building	Floor #	Location	Existing Fixture Description	Exist. Qty of Fix.	Proposed Fixture Description	Prop. Qty of Fixtures	Sensor Description	Sensor Qtys	Total kW Saved	kWh Saved Lighting Only	kWh Saved Sensors Only	Total kWh Saved	Energy Cost Savings
1	WWTP Control Building	1	Break Room	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	4	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	4	Wall Switch Occupancy Sensor	1	0.47	1,416	126	1,542	$245
2	WWTP Control Building	1	Office	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	2	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	2	Wall Switch Occupancy Sensor	1	0.24	566	50	617	$98
3	WWTP Control Building	1	Control Room	2X2 recessed troffer with (2) F34 T12 U6 Lamps & (1) 2-Light Electronic ballast	1	Re-build existing troffer fixture w/ (2) F17 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	1	NO SENSOR PROPOSED	0	0.04	126	-	126	$20
4	WWTP Control Building	1	Control Room	Exit Sign w/ 2w LED	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
5	WWTP Control Building	1	Control Room	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	3	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	3	NO SENSOR PROPOSED	0	0.29	864	-	864	$137
6	WWTP Control Building	1	Lab	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	4	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Normal Power 2-Lamp Electronic Ballast & Silver Reflector	4	NO SENSOR PROPOSED	0	0.45	1,075	-	1,075	$171
7	WWTP Control Building	1	Shop Area	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	11	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Normal Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	11	NO SENSOR PROPOSED	0	0.99	2,376	-	2,376	$378
8	WWTP Control Building	1	Shop Area	Exit Sign w/ (2) 20w Incandescent Lamps	2	Remove and Replace existing exit sign with a new LED exit sign.	2	NO SENSOR PROPOSED	0	0.08	666	-	666	$106
9	WWTP Control Building	1	Shop Area	Exit Sign w/ 2w LED	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
10	WWTP Control Building	1	Storage	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	4	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	4	NO SENSOR PROPOSED	0	0.47	472	-	472	$75
11	WWTP Control Building	1	Women's	40w. Incandescent G40 Globe S/I	3	Remove and Replace Existing Lamp With a New 14w Compact Fluorescent One Piece Screw-In With Globe.	3	NO SENSOR PROPOSED	0	0.08	187	-	187	$30
12	WWTP Control Building	1	Women's	75w. Incandescent S/I	1	Remove and Replace Existing Lamp With a New 18w Compact Fluorescent Screw-In	1	NO SENSOR PROPOSED	0	0.06	137	-	137	$22
13	WWTP Control Building	1	Men's	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	1	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	1	NO SENSOR PROPOSED	0	0.10	230	-	230	$37
14	WWTP Control Building	1	Entrance Vestibule	Exit Sign w/ 2w LED	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
15	WWTP Control Building	1	Pit Vestibule	100w Incandescent S/I	2	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	2	NO SENSOR PROPOSED	0	0.16	154	-	154	$24
16	WWTP Control Building	1	Parts Storage	150w Incandescent S/I	2	Remove and Replace Existing Lamp With a New 32w Compact Fluorescent Two Piece Screw-In.	2	NO SENSOR PROPOSED	0	0.24	236	-	236	$38
17	WWTP Control Building	B	Pump Area	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	13	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	13	NO SENSOR PROPOSED	0	1.25	2,995	-	2,995	$476
18	WWTP Control Building	B	Pump Area	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	1	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	1	NO SENSOR PROPOSED	0	0.05	125	-	125	$20
19	WWTP Control Building	B2	Pump Area	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	2	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	2	NO SENSOR PROPOSED	0	0.19	461	-	461	$73
20	WWTP Effluent Pump Station	1	Pump Station	4' Vapor & Moisture Resistant Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	6	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	6	NO SENSOR PROPOSED	0	0.23	228	-	228	$36
21	WWTP Effluent Pump Station	B	Pump Station	4' Vapor & Moisture Resistant Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	2	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	2	NO SENSOR PROPOSED	0	0.08	76	-	76	$12
22	WWTP Blower		Blower Building	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	11	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	11	NO SENSOR PROPOSED	0	0.57	944	-	944	$150
23	WWTP Outside		Outside	200w Incandescent S/I	4	Remove and Replace Existing Lamp With a New 42w Compact Fluorescent Two Piece Screw-In.	4	NO SENSOR PROPOSED	0	0.63	2,300	-	2,300	$366

Attachment - Town of Clinton Lighting Spreadsheets

Seq. #	Building	Floor #	Location	Existing Fixture Description	Exist. Qty of Fix.	Proposed Fixture Description	Prop. Qty of Fixtures	Sensor Description	Sensor Qtys	Total kW Saved	kWh Saved Lighting Only	kWh Saved Sensors Only	Total kWh Saved	Energy Cost Savings
24	WWTP Outside		Outside	Flood Fixture with (1) 150w High Pressure Sodium Lamp and (1) Magnetic HID Ballast	24	LED Retrofit High Powered 6-inch puck 30-watt	24	NO SENSOR PROPOSED	0	3.96	14,414	-	14,414	$2,292
25	WWTP Outside		Outside	Parking Lot Fixture Mounted on a Pole w/ (1) 250w Mercury Vapor Lamp and (1) Magnetic HID Ballast	14	LED Retrofit High Powered 6-inch puck 90- watt	14	NO SENSOR PROPOSED	0	2.80	10,192	-	10,192	$1,621
26	Municipal	2	Council Room	2X4 recessed troffer with (2) F32 T8 Lamps & (1) 2-Light Electronic ballast	12	Re-lamp existing fixture with (2) Energy Saving 28w Lamps to standardize lamp types for maintenance. Existing Ballast stays in place	12	Low Voltage (w/ PP-20) PIR Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High	2	0.16	374	346	720	$115
27	Municipal	2	Mayor's Office	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	3	No Work Proposed	0	Wall Switch Occupancy Sensor	1	-	-	110	110	$18
28	Municipal	2	Hallway	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	4	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
29	Municipal	2	Hallway	23w Compact Fluorescent S/I	4	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
30	Municipal	2	Mechanical Room	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
31	Municipal	1	Reception	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	5	No Work Proposed	0	Low Voltage (w/ PP-20) PIR Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High	1	-	-	668	668	$107
32	Municipal	1	Criminal Investigation	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	1	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	1	Wall Switch Occupancy Sensor	1	0.05	438	131	569	$91
33	Municipal	1	Chief's Office	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	1	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	1	Wall Switch Occupancy Sensor	1	0.05	120	36	156	$25
34	Municipal	1	Holding Area	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	1	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	1	NO SENSOR PROPOSED	0	0.05	438	-	438	$70
35	Municipal	1	Bathroom	4' Vanity Fixture with (2) F32 T8 Lamps & (1) 2L Electronic Ballast	1	Re-lamp existing fixture with (2) Energy Saving 28w Lamps to standardize lamp types for maintenance. Existing Ballast stays in place	1	NO SENSOR PROPOSED	0	0.01	47	-	47	$8
36	Municipal	1	Entrance Vestibule	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
37	Municipal	1	Entrance Vestibule	Exit Sign w/ 2w LED	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
38	Municipal	1	Office Area	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	4	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	4	Low Voltage (w/ PP-20) Dual Technology Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High-(1) PP-20 per sensor	1	0.20	1,752	526	2,278	$364
39	Municipal	1	Office Area	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
40	Municipal	1	Office	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	1	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	1	Wall Switch Occupancy Sensor	1	0.05	182	55	237	$38
41	Municipal	1	Hallway	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	6	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
42	Municipal	1	Hallway	Exit Sign w/ 2w LED	3	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
43	Municipal	1	Hallway	23w Compact Fluorescent S/I	10	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
44	Municipal	1	Mechanical	1X4 recessed troffer with (2) F32 T8 Lamps & (1) 2-Light Electronic ballast	2	Remove and Replace Existing Lamp With a New 9w Torch Compact Fluorescent One Piece Screw-In.	2	NO SENSOR PROPOSED	0	0.10	104	-	104	$17
45	Municipal	1	Men's	2' Vanity Fixture with (2) F17 T8 Lamps & (1) 2-Light Electronic Ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
46	Municipal	1	Men's	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
47	Municipal	1	Women's	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
48	Municipal	1	Women's	2' Vanity Fixture with (2) F17 T8 Lamps & (1) 2-Light Electronic Ballast	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
49	Municipal	1	Telephone Closet	23w Compact Fluorescent S/I	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
50	Municipal	1	Assessor's Office	2X4 recessed troffer with (3) F32 T8 Lamps & (1) 3-Light Electronic ballast	4	Re-build existing troffer fixture w/ (2) F32XP T8 Lamps & Silver Reflector. Ballast Remains	4	Low Voltage (w/ PP-20) PIR Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High	1	0.12	422	218	641	$103
51	Municipal	1	Clerk's Office	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	6	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	6	NO SENSOR PROPOSED	0	0.30	1,092	-	1,092	$175

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Seq. #	Building	Floor #	Location	Existing Fixture Description	Exist. Qty of Fix.	Proposed Fixture Description	Prop. Qty of Fixtures	Sensor Description	Sensor Qtys	Total kW Saved	kWh Saved Lighting Only	kWh Saved Sensors Only	Total kWh Saved	Energy Cost Savings
52	Municipal	1	Clerk's Office	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	1	No Work Proposed	0	Low Voltage (w/ PP-20) PIR Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High	1	-	-	56	56	$9
53	Municipal	1	Vault	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	2	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	2	NO SENSOR PROPOSED	0	0.10	240	-	240	$38
54	Municipal	1	Kitchen	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	2	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	2	Wall Switch Occupancy Sensor	1	0.10	364	109	473	$76
55	Municipal	1	Stairwell 1	23w Compact Fluorescent S/I	4	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
56	Municipal	1	Stairwell 1	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	2	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
57	Municipal	3	Attic	23w Compact Fluorescent S/I	5	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
58	Municipal	3	Attic	4' Wrap Fixture w/ (2) F32 T8 Lamps & (1) 2-Light Electronic Ballast	2	Re-lamp existing fixture with (2) Energy Saving 28w Lamps to standardize lamp types for maintenance. Existing Ballast stays in place	2	NO SENSOR PROPOSED	0	0.03	26	-	26	$4
59	Municipal	1	Stairwell 2	23w Compact Fluorescent S/I	8	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
60	Municipal	2	Janitor	23w Compact Fluorescent S/I	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
61	Municipal	2	Men's	23w Compact Fluorescent S/I	3	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
62	Municipal	2	Men's	4' Vanity Fixture with (2) F32 T8 Lamps & (1) 2L Electronic Ballast	1	Re-lamp existing fixture with (2) Energy Saving 28w Lamps to standardize lamp types for maintenance. Existing Ballast stays in place	1	NO SENSOR PROPOSED	0	0.01	47	-	47	$8
63	Municipal	2	Hallway	2X2 recessed troffer with (2) F32 T8 U6 Lamps & (1) 2-Light Electronic ballast	5	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
64	Municipal	2	Interview Room	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	2	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	2	Wall Switch Occupancy Sensor	1	0.10	240	72	312	$50
65	Municipal	2	Police Locker Room	2X4 recessed troffer with (4) F32 T8 Lamps & (1) 4-Light Electronic ballast	2	Re-build existing troffer fixture w/ (3) F32XP T8 Lamps & Silver Reflector. Ballast Remains	2	NO SENSOR PROPOSED	0	0.10	240	-	240	$38
66	Municipal	2	Women's	4' Vanity Fixture with (2) F32 T8 Lamps & (1) 2L Electronic Ballast	2	Re-lamp existing fixture with (2) Energy Saving 28w Lamps to standardize lamp types for maintenance. Existing Ballast stays in place	2	NO SENSOR PROPOSED	0	0.03	95	-	95	$15
67	Municipal	2	Women's	23w Compact Fluorescent S/I	3	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
68	Municipal	2	Admin Office	4X4 recessed troffer with (6) F32 T8 Lamps & (2) 3-Light Electronic ballasts	6	Re-lamp existing fixture with an Energy Saving 28w Lamp to standardize lamp types for maintenance. Existing Ballast stays in place	6	NO SENSOR PROPOSED	0	0.28	1,005	-	1,005	$161
69	Municipal	2	Admin Office	23w Compact Fluorescent S/I	7	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
70	Municipal		Outside	32w. Compact Fluorescent SI	8	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
71	DPW		Machine Storage	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	4	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	4	NO SENSOR PROPOSED	0	0.21	208	-	208	$33
72	DPW		Men's	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	185	-	185	$30
73	DPW		Attic Storage	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	4	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	4	NO SENSOR PROPOSED	0	0.47	236	-	236	$38
74	DPW		Attic Storage	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	1	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	1	NO SENSOR PROPOSED	0	0.10	48	-	48	$8
75	DPW		Break Room	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	3	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	3	NO SENSOR PROPOSED	0	0.29	691	-	691	$111
76	DPW		Break Room	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	1	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	1	NO SENSOR PROPOSED	0	0.05	125	-	125	$20
77	DPW		Boiler Room	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	185	-	185	$30
78	DPW		Garage	Industrial Hood 8' Fixture with (2) F96 Econo-Watt T12 Lamps & (1) 2L EE Magnetic Ballast	4	Rebuild an 8' Fixture. Install a 2-Lamp Electronic Low Power Ballast, Reflector, Sub to Measure Channel, Socket Bracket, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	4	NO SENSOR PROPOSED	0	0.38	922	-	922	$147

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Seq. #	Building	Floor #	Location	Existing Fixture Description	Exist. Qty of Fix.	Proposed Fixture Description	Prop. Qty of Fixtures	Sensor Description	Sensor Qtys	Total kW Saved	kWh Saved Lighting Only	kWh Saved Sensors Only	Total kWh Saved	Energy Cost Savings
79	DPW		Garage	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	4	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	4	NO SENSOR PROPOSED	0	0.21	499	-	499	$80
80	DPW		Attic Office	2X4 recessed troffer with (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic ballast	4	Re-build existing troffer fixture w/ (2) F28 T8 Lamps, & (1) Low Power 2-Lamp Electronic Ballast & Silver Reflector	4	Low Voltage (w/ PP-20) PIR Ceiling Sensor (8-15' Mtg. Height) 360 Deg. Coverage 12' Circular Viewing Pattern @ 9' High	1	0.47	1,133	101	1,234	$197
81	DPW		Meter Shop	4' Wrap Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	3	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	3	NO SENSOR PROPOSED	0	0.11	274	-	274	$44
82	DPW- Barn Well #12		Well House	4' Wrap Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	5	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	5	NO SENSOR PROPOSED	0	0.19	456	-	456	$73
83	DPW		Storage Building	Industrial Hood 8' Fixture with (2) F96 T12 HO Lamps & (1) 2L Standard Magnetic Ballast	7	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Normal Power Ballast, (2) 8' T8 Energy Saving Lamps, New Lamp Sockets.	7	NO SENSOR PROPOSED	0	0.97	2,335	-	2,335	$374
84	DPW		Storage Building	75w. Par 38 Incandescent S/I	5	Remove and Replace Existing Lamp With a New 18w R38 Compact Fluorescent Screw-In	5	NO SENSOR PROPOSED	0	0.29	684	-	684	$109
85	DPW		Outside	75w. Par 38 Incandescent S/I	10	Remove and Replace Existing Lamp With a New 18w R38 Compact Fluorescent Screw-In	10	NO SENSOR PROPOSED	0	0.57	2,075	-	2,075	$332
86	Community Center		Gym	Low Bay Fixture with (1) 175w Metal Halide Lamp and (1) Magnetic HID Ballast	6	New 2x4 Recessed Fixture, (3) FP54 Lamps, HO Ballast, Silver Reflector.	6	NO SENSOR PROPOSED	0	0.22	648	-	648	$130
87	Community Center		Gym	Existing Fixture is not being retrofitted	0	Install a New Industrial Fixture Containing a 4-Lamp Normal Powered Electronic T8 Ballast, and (4) 4' T8 F28 Energy Saving Lamps, and Silver Reflector.	2	NO SENSOR PROPOSED	0	(0.19)	(570)	-	-570	-$114
88	Community Center		Gym	4' Wrap Fixture w/ (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic Ballast	1	Remove and Replace Existing Fixture With a New 1x4 Surface Mounted Wrap Fixture Containing a 2-Lamp Electronic Low Power Ballast, Silver Reflector, and (2) 4' 28w T8 Energy Saving Lamps.	1	NO SENSOR PROPOSED	0	0.12	354	-	354	$71
89	Community		Gym	Exit Sign w/ 2w LED	3	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
90	Community Center		Gym	4' Wrap Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	2	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	2	NO SENSOR PROPOSED	0	0.08	228	-	228	$46
91	Community Center		Kitchen	4' Wrap Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	2	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	2	NO SENSOR PROPOSED	0	0.08	228	-	228	$46
92	Community Center		Basement	100w Incandescent S/I	2	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	2	NO SENSOR PROPOSED	0	0.15	77	-	77	$15
93	Community Center		Entrance	4' Industrial Hood Fixture with (2) F34 Econo-Watt T12 Lamps & (1) 2L Magnetic Ballast	2	Rebuild 4' Fixture With a Miro 4 reflector system containing a 1-Lamp Electronic Normal Power Ballast, Reflector and (1) 4' 28W T8 Energy Saving Lamp.	2	NO SENSOR PROPOSED	0	0.10	312	-	312	$62
94	Community		Entrance	Exit Sign w/ 2w LED	1	No Work Proposed	0	NO SENSOR PROPOSED	0	-	-	-	0	$0
95	Community Center		Storage	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	39	-	39	$8
96	Community Center		Bathroom	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	231	-	231	$46
97	Community Center		Bathroom	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	231	-	231	$46
98	Community Center		Stairs	4' Wrap Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	1	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	1	NO SENSOR PROPOSED	0	0.04	114	-	114	$23
99	Community Center		Lounge	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	231	-	231	$46
100	Community Center		Outside	Flood Fixture with (1) 250w Metal Halide Pulse Start Lamp and (1) Magnetic HID Ballast	3	LED Retrofit High Powered 6-inch puck 90- watt	3	NO SENSOR PROPOSED	0	0.59	2,140	-	2,140	$428
101	Community Center		Outside	Flood Fixture with (1) 175w Mercury Vapor Lamp and (1) Magnetic HID Ballast	2	LED Retrofit High Powered 6-inch puck 30-watt	2	NO SENSOR PROPOSED	0	0.37	1,347	-	1,347	$269
102	West End Well #1		Pump House	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	39	-	39	$7
103	Foster Wheeler		Pump House	4' Wrap Fixture w/ (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic Ballast	9	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic High Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	9	NO SENSOR PROPOSED	0	0.86	432	-	432	$69

Attachment - Town of Clinton Lighting Spreadsheets

Seq. #	Building	Floor #	Location	Existing Fixture Description	Exist. Qty of Fix.	Proposed Fixture Description	Prop. Qty of Fixtures	Sensor Description	Sensor Qtys	Total kW Saved	kWh Saved Lighting Only	kWh Saved Sensors Only	Total kWh Saved	Energy Cost Savings
104	**Water Treatment Plant Well #6**		Pump House	8' Strip Fixture with (2) F96 T12 HO Lamps & (1) 2L Standard Magnetic Ballast	3	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Normal Power Ballast, (2) 8' T8 Energy Saving Lamps, New Lamp Sockets.	3	NO SENSOR PROPOSED	0	0.42	209	-	209	$33
105	**Water Treatment Plant Well #6**		Pump House	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	39	-	39	$6
106	**Beaver Brook Well #11**		Pump House	4' Wrap Fixture w/ (4) F34 Econo-Watt T12 Lamps & (1) 4-Light Magnetic Ballast	4	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic High Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	4	NO SENSOR PROPOSED	0	0.38	192	-	192	$33
107	**Beaver Brook Well #11**		Pump House	100w Incandescent S/I	3	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	3	NO SENSOR PROPOSED	0	0.23	116	-	116	$20
108	**Well House #15**		Pump House	4' Vapor & Moisture Resistant Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	15	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	15	NO SENSOR PROPOSED	0	0.57	285	-	285	$46
109	**Lilac Well #7**		Pump House	200w Incandescent S/I	4	Remove and Replace Existing Lamp With a New 42w Compact Fluorescent Two Piece Screw-In.	4	NO SENSOR PROPOSED	0	0.63	316	-	316	$57
110	**Lilac Well #7**		Pump House	60w. Incandescent S/I	1	Remove and Replace Existing Lamp With a New 15w Compact Fluorescent one Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.05	23	-	23	$4
111	**Lebanon Well #2**		Pump House	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	39	-	39	$6
112	**Potterstown Well #4**		Pump Bunker	100w Incandescent S/I	1	Remove and Replace Existing Lamp With a New 23w Compact Fluorescent Two Piece Screw-In.	1	NO SENSOR PROPOSED	0	0.08	39	-	39	$6
113	**Fox Fire Pump Station #2**		Pump House	4' Vapor & Moisture Resistant Fixture w/ (2) F34 Econo-Watt T12 Lamps & (1) 2-Light Magnetic Ballast	5	Re-lamp & Re-ballast existing fixture. Install a 2-Lamp Electronic Low Power Ballast, (2) 4' 28w T8 Energy Saving Lamps, New Lamp Sockets.	5	NO SENSOR PROPOSED	0	0.19	95	-	95	$17
					397		301		15	25.20	64,953	2,603	67,556	$11,005

Sum of Existing Quantity			Exsit. Oper. Hrs.						
			D	E	F	A	G	B	Z
Building	Location	Existing Code	500	1000	1650	2400	3000	3640	8760
Beaver Brook Well #11	Pump House	SI/100A	X						
		W4/4F34/ES	X						
Community Center	Basement	SI/100A	X						
	Bathroom	SI/100A					X		
	Entrance	IH4/2F34/ES					X		
		XLED							X
	Gym	LB/MH/175					X		
		NW					X		
		W4/2F34/ES					X		
		W4/4F34/ES					X		
		XLED							X
	Kitchen	W4/2F34/ES					X		
	Lounge	SI/100A					X		
	Outside	FL/MH/250						X	
		FL/MV/175						X	
	Stairs	W4/2F34/ES					X		
	Storage	SI/100A	X						
DPW	Attic Office	T24/4F34/ES				X			
	Attic Storage	IH8/2F96/ES	X						
		T24/4F34/ES	X						
	Boiler Room	SI/100A				X			
	Break Room	IH4/2F34/ES				X			
		IH8/2F96/ES				X			
	Garage	IH4/2F34/ES				X			
		IH8/2F96/ES				X			
	Machine Storage	IH4/2F34/ES		X					
	Men's	SI/100A				X			
	Meter Shop	W4/2F34/ES				X			

	Outside	SI/75R38						X	
	Storage Building	IH8/2F96/HO				X			
		SI/75R38				X			
DPW- Barn Well #12	Well House	W4/2F34/ES				X			
Foster Wheeler	Pump House	W4/4F34/ES	X						
Fox Fire Pump Station #2	Pump House	VP4/2F34/ES	X						
Lebanon Well #2	Pump House	SI/100A	X						
Lilac Well #7	Pump House	SI/200A	X						
		SI/60A	X						
Municipal	Admin Office	SI/23CF						X	
		T44/6F32						X	
	Assessor's Office	T24/3F32						X	
	Attic	SI/23CF		X					
		W4/2F32		X					
	Bathroom	V4/2F32						X	
	Chief's Office	T24/4F32				X			
	Clerk's Office	T22/2FB32						X	
		T24/4F32						X	
	Council Room	T24/2F32				X			
	Criminal Investigation	T24/4F32							X
	Entrance Vestibule	T22/2FB32							X
		XLED							X
	Hallway	SI/23CF						X	X
		T22/2FB32						X	
		XLED							X
	Holding Area	T24/4F32							X
	Interview Room	T24/4F32				X			
	Janitor	SI/23CF		X					
	Kitchen	T24/4F32						X	
	Mayor's Office	T22/2FB32				X			
	Mechanical	T14/2F32		X					
	Mechanical Room	T22/2FB32		X					
	Men's	SI/23CF						X	
		T22/2FB32						X	

		V2/2F17						X	
		V4/2F32						X	
	Office	T24/4F32						X	
	Office Area	T22/2FB32							X
		T24/4F32							X
	Outside	SI/32CF						X	
	Police Locker Room	T24/4F32				X			
	Reception	T22/2FB32							X
	Stairwell 1	SI/23CF						X	
		T22/2FB32						X	
	Stairwell 2	SI/23CF						X	
	Telephone Closet	SI/23CF		X					
	Vault	T24/4F32				X			
	Women's	SI/23CF						X	
		T22/2FB32						X	
		V2/2F17-						X	
		V4/2F32						X	
Potterstown Well #4	Pump Bunker	SI/100A	X						
Water Treatment Plant Well #6	Pump House	SI/100A	X						
		ST8/2F96/HO	X						
Well House #15	Pump House	VP4/2F34/ES	X						
West End Well #1	Pump House	SI/100A	X						
WWTP Blower	Blower Building	IH4/2F34/ES			X				
WWTP Control Building	Break Room	T24/4F34/ES					X		
	Control Room	IH8/2F96/ES					X		
		T22/2FB34/ES					X		
		XLED							X
	Entrance Vestibule	XLED							X
	Lab	T24/4F34/ES				X			
	Men's	IH8/2F96/ES				X			
	Office	T24/4F34/ES				X			
	Parts Storage	SI/150A		X					
	Pit Vestibule	SI/100A		X					
	Pump Area	IH4/2F34/ES				X			

		IH8/2F96/ES				X			
	Shop Area	IH8/2F96/ES				X			
		X40							X
		XLED							X
	Storage	T24/4F34/ES		X					
	Women's	SI/40G40				X			
		SI/75A				X			
WWTP Effluent Pump Station	Pump Station	VP4/2F34/ES		X					
WWTP Outside	Outside	FL/HPS/150						X	
		PS/MV/250						X	
		SI/200A						X	

Appendix G: Motor Replacement Energy Savings Calculations

Location	Load Description	Capacity Rating	Unit	Run Time (hrs)/Yr	Full Load Eff.	New Effi.	load factor	kWh saved	$/kWh	$ saved
Control Building	RAS PUMP 1	20.00	HP	4,380	91.0%	93.6%	0.8	1,596	$ 0.16	$ 255
Control Building	RAS PUMP 2	20.00	HP	4,380	89.5%	93.6%	0.8	2,559	$ 0.16	$ 409
Control Building	DIAPHRAGM PUMP 1	3.00	HP	4,380	84.0%	90.2%	0.8	642	$ 0.16	$ 103
Control Building	DIAPHRAGM PUMP 2	3.00	HP	4,380	84.0%	90.2%	0.8	642	$ 0.16	$ 103
Control Building	MOYNO PUMP MOTOR 1	5.00	HP	4,380	84.0%	90.2%	0.8	1,069	$ 0.16	$ 171
Control Building	MOYNO PUMP MOTOR 2	5.00	HP	4,380	84.0%	90.2%	0.8	1,069	$ 0.16	$ 171
Control Building	INFLUENT PUMP 1	60.00	HP	4,380	92.4%	95.0%	0.8	4,645	$ 0.16	$ 743
Control Building	INFLUENT PUMP 2	60.00	HP	4,380	92.4%	95.0%	0.8	4,645	$ 0.16	$ 743
Control Building	P.D. BLOWER 1	20.00	HP	4,380	90.2%	93.6%	0.8	2,105	$ 0.16	$ 337
Control Building	P.D. BLOWER 2	20.00	HP	4,380	90.2%	93.6%	0.8	2,105	$ 0.16	$ 337
Blower Building	BLOWER 1	50.00	HP	4,380	93.6%	94.1%	0.8	742	$ 0.16	$ 119
Blower Building	BLOWER 2	50.00	HP	4,380	93.6%	94.1%	0.8	742	$ 0.16	$ 119
Blower Building	BLOWER 3	50.00	HP	4,380	93.6%	94.1%	0.8	742	$ 0.16	$ 119
Blower Building	BLOWER 4	50.00	HP	4,380	93.6%	94.1%	0.8	742	$ 0.16	$ 119
Pump Station Building	EFFLUENT PUMP MOTOR 1	60.00	HP	4,380	91.7%	95.0%	0.8	5,941	$ 0.16	$ 951
Pump Station Building	EFFLUENT PUMP MOTOR 2	60.00	HP	4,380	91.7%	95.0%	0.8	5,941	$ 0.16	$ 951
Filter Building	SLUDGE PRESS	3.00	HP	4,380	84.0%	90.2%	0.8	642	$ 0.16	$ 103
Filter Building	HY PRESS	2.00	HP	4,380	80.4%	87.5%	0.8	528	$ 0.16	$ 84
Filter Building	SLUDGE PRESS CONVEYOR	3.00	HP	4,380	81.5%	90.2%	0.8	928	$ 0.16	$ 148
Filter Building	FLYGHT PUMP 1	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Filter Building	FLYGHT PUMP 2	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Filter Building	FLYGHT PUMP 3	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Filter Building	FLYGHT PUMP 4	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Filter Building	FLYGHT PUMP 5	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Filter Building	FLYGHT PUMP 6	3.00	HP	2,920	81.5%	90.2%	0.8	619	$ 0.16	$ 99
Outside Equipment	OUTSIDE SCRUBBER	3.00	HP	4,380	79.3%	88.5%	0.8	1,028	$ 0.16	$ 164
Outside Equipment	MIXERS	4.40	HP	4,380	81.5%	90.2%	0.8	1,361	$ 0.16	$ 218
Outside Equipment	MIXERS	4.40	HP	4,380	81.5%	90.2%	0.8	1,361	$ 0.16	$ 218
Outside Equipment	MIXERS	4.40	HP	4,380	81.5%	90.2%	0.8	1,361	$ 0.16	$ 218
Outside Equipment	MIXERS	4.40	HP	4,380	81.5%	90.2%	0.8	1,361	$ 0.16	$ 218
Outside Equipment	OUTSIDE THICKENER	1.50	HP	4,380	78.0%	87.5%	0.8	546	$ 0.16	$ 87
West End Well House No.1			HP			0.0%			$ 0.16	$ -
Booster Pump Foster Wheeler No.14	PUMP MOTOR 1	30.00	HP	2,920	91.0%	93.6%	0.8	1,596	$ 0.16	$ 255
Booster Pump Foster Wheeler No.14	PUMP MOTOR 2	30.00	HP	2,920	91.0%	93.6%	0.8	1,596	$ 0.16	$ 255
Booster Pump Foster Wheeler No.14		20.00	HP	2,920	88.5%	92.4%	0.8	1,662	$ 0.16	$ 266
Treatment Plant Well House No.6			HP	2,920					$ 0.16	$ -
Treatment Plant Well House No.6	PUMPS CHLORINE OUT	3.00	HP	2,920	75.0%	89.5%	0.8	1,129	$ 0.16	$ 181
Beaver Brook Well No.11			HP	2,920					$ 0.17	$ -
Beaver Brook Well No.11	CHLORINE BOOSTER PUMP	1.50	HP	2,920	78.0%	87.5%	0.8	364	$ 0.17	$ 62
Hunts Mill Park Well No.15		50.00	HP	2,920	90.2%	94.5%	0.8	4,396	$ 0.16	$ 703
Hunts Mill Park Well No.15			HP	2,920					$ 0.16	$ -
Lilac Drive Well House No.7	PUMPS CHLORINE OUT	1.00	HP	2,920	75.0%	85.0%	0.8	273	$ 0.18	$ 49
Lilac Drive Well House No.7	PUMP MOTOR 1	40.00	HP	2,920	90.2%	94.1%	0.8	3,203	$ 0.18	$ 577
Lilac Drive Well House No.7	PUMP MOTOR 2	40.00	HP	2,920	90.2%	94.1%	0.8	3,203	$ 0.18	$ 577
Lilac Drive Well House No.7	AIR COMPRESSOR	3.00	HP	2,920	80.0%	90.2%	0.8	739	$ 0.18	$ 133
Lebanon Well House No.2		50.00	HP	2,920	90.2%	94.5%	0.8	4,396	$ 0.15	$ 659
Potersown Well House No.4			HP	2,920					$ 0.16	$ -
Fox Fire Hydropneumatic Station No.2	PUMP MOTOR 1	15.00	HP	2,920	85.5%	92.4%	0.8	2,283	$ 0.18	$ 411
Fox Fire Hydropneumatic Station No.2	PUMP MOTOR 2	15.00	HP	2,920	85.5%	92.4%	0.8	2,283	$ 0.18	$ 411
Fox Fire Hydropneumatic Station No.2		75.00	HP	2,920	91.7%	95.4%	0.8	5,528	$ 0.18	$ 995
Fox Fire Hydropneumatic Station No.2	AIR COMPRESSOR	5.00	HP	2,920	81.5%	90.2%	0.8	1,031	$ 0.18	$ 186
DPW-Barn Well House No.12		30.00	HP	2,920					$ 0.16	$ -
DPW-Barn Well House No.12	BOOSTER PUMP MOTOR	40.00	HP	2,920	90.2%	94.0%	0.8	3,124	$ 0.16	$ 500

Appendix H: Motors Inventory List

Location	Load Description	Type	Capacity		Quantity		VFD (Yes/No)	Run Time (hrs)/Yr	Motor RPM	Voltage	Phase Φ	Frequency Hz	Enclosure	Full Load		Model No.	Serial No./I.D. No.
			Rating	Unit	On	Off								Eff.	Amp		
Control Building	RAS PUMP 1	WEG - Premium Efficiency	20.00	HP	1			4,380	1765	208-230/460	3	60	EPFC	91.0%	47.0/23.5	02018EP3E2561	
Control Building	RAS PUMP 2	Allen Bradley	20.00	HP		1		4,380	1750	460/230	3	60	EPFC	89.5%	50/25	ZD 256THGS7027AN L	
Control Building	DIAPHRAGM PUMP 1	US Elecric Motors - Hosile Duty	3.00	HP	1			4,380	1165	208-230	3	60	TE	84.0%	10.5		ID: E396-50-W01V315R174M
Control Building	DIAPHRAGM PUMP 2	US Elecric Motors - Hosile Duty	3.00	HP		1		4,380	1165	208-230	3	60	TE	84.0%	25		ID: E396-50-W01V315R174M
Control Building	MOYNO PUMP MOTOR 1	Reliance	5.00	HP	1			4,380	1710	460/230	3	60	TEFC	84.0%	16.4/8.2		ID: P18G6544F NL
Control Building	MOYNO PUMP MOTOR 2	Reliance	5.00	HP		1		4,380	1710	460/230	3	60	TEFC	84.0%	16.4/8.2		ID: P18G6544F NL
Control Building	INFLUENT PUMP 1	Allen Bradley	60.00	HP	1		Yes	4,380	1775	460/230	3	60	XPFC	92.4%	146/73	ZD364THGS7037ANW	SN: 19-06887-478-01
Control Building	INFLUENT PUMP 2	Allen Bradley	60.00	HP		1	Yes	4,380	1775	460/230	3	60	XPFC	92.4%	146/73	ZD364THGS7037ANW	SN: 19-06887-478-01
Control Building	P.D. BLOWER 1	US Elecric Motors	20.00	HP	1			4,380	1750	208-230	3	60	TE	90.2%	49.4/24.7		ID: E409-A08A157R043M
Control Building	P.D. BLOWER 2	US Elecric Motors	20.00	HP		1		4,380	1750	208-230	3	60	TE	90.2%	49.4/24.7		ID: E409-A08A157R043M
Blower Building	BLOWER 1	Reliance - XE Duty Master AC Motor	50.00	HP				4,380	3555	460	3	60	XT TEFC	93.6%	57.80		ID: P32G0398F-G2-NM
Blower Building	BLOWER 2	Reliance - XE Duty Master AC Motor	50.00	HP				4,380	3555	460	3	60	XT TEFC	93.6%	57.80		ID: P32G0398F-G2-NM
Blower Building	BLOWER 3	Reliance - XE Duty Master AC Motor	50.00	HP				4,380	3555	460	3	60	XT TEFC	93.6%	57.80		ID: P32G0398F-G2-NM
Blower Building	BLOWER 4	Reliance - XE Duty Master AC Motor	50.00	HP			Soft Start	4,380	3555	460	3	60	XT TEFC	93.6%	57.80		ID: P32G0398F-G2-NM
Pump Station Building	EFFLUENT PUMP MOTOR 1	Allen Bradley	60.00	HP			Yes	4,380	1775	460/230	3	60	EPFC	91.7%	146/73	ZD364THGS7037ANW	
Pump Station Building	EFFLUENT PUMP MOTOR 2	Allen Bradley	60.00	HP			Yes	4,380	1775	460/230	3	60	EPFC	91.7%	146/73	ZD364THGS7037ANW	
Filter Building	SLUDGE PRESS		3.00	HP				4,380	1200	460/230	3	60		84.0%	9.4/4.7		
Filter Building	HY PRESS		2.00	HP				4,380	1745	460/230	3	60		80.4%	6.58/2.9		
Filter Building	SLUDGE PRESS CONVEYOR		3.00	HP				4,380	1700	460/230	3	60		81.5%	1.2/1.6		
Filter Building	FLYGHT PUMP 1		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Filter Building	FLYGHT PUMP 2		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Filter Building	FLYGHT PUMP 3		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Filter Building	FLYGHT PUMP 4		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Filter Building	FLYGHT PUMP 5		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Filter Building	FLYGHT PUMP 6		3.00	HP				2,920	1700	230	3	60		81.5%	4.3/8.7		
Outside Equipment	OUTSIDE SCRUBBER	Baldor Industrial Motor	3.00	HP				4,380	3460	460/230	3	60		79.3%	7.4/3.7		SN: F070907199 / CAT: M7025T
Outside Equipment	MIXERS	Davis EMU Pump Motor	4.40	HP				4,380	1740	460/230	3	60		81.5%	6.50		SN: 202457
Outside Equipment	MIXERS	Davis EMU Pump Motor	4.40	HP				4,380	1740	460/230	3	60		81.5%	6.50		SN: 202457
Outside Equipment	MIXERS	Davis EMU Pump Motor	4.40	HP				4,380	1740	460/230	3	60		81.5%	6.50		SN: 202457
Outside Equipment	MIXERS	Davis EMU Pump Motor	4.40	HP				4,380	1740	460/230	3	60		81.5%	6.50		SN: 202457
Outside Equipment	OUTSIDE THICKENER	SEW - Euro Drive	1.50	HP				4,380	1700	460/230	3	60		78.0%	4.75/2.32		
West End Well House No.1		Submersible		HP													
Booster Pump Foster Wheeler No.14	PUMP MOTOR 1	US Electric Motors-Unimount 125 En	30.00	HP				2,920	1765	460/230	3	60	UT TE	91.0%	76.20		ID: F-B530-00-229-L129R090
Booster Pump Foster Wheeler No.14	PUMP MOTOR 2	US Electric Motors-Unimount 125 En	30.00	HP				2,920	1765	460/230	3	60	UT TE	91.0%	76.20		ID: F-B530-00-229-L129R090
Booster Pump Foster Wheeler No.14		Baldor Industrial Motor	20.00	HP				2,920	3525	460/230	3	60	DP	88.5%	49/24.5		CAT: 84.Z00020
Treatment Plant Well House No.6		Submersible		HP				2,920									
Treatment Plant Well House No.6	PUMPS CHLORINE OUT	Baldor Reliance Industrial Motor	3.00	HP				2,920	3450	115/208-230	3	60	TE FC	75.0%	29/16-14.5		CAT: 84Z04014
Beaver Brook Well No.11		Submersible		HP				2,920									
Beaver Brook Well No.11	CHLORINE BOOSTER PUMP	Grundfos	1.50	HP				2,920	1780	460/230	3	60		78.0%		2-50	Type: CR 2 UH
Hunts Mill Park Well No.15		US Elecric Motors	50.00	HP				2,920	1770	460/230	3	60	WP-1	90.2%	128/64	BF54A	CAT: H050S2BL6
Hunts Mill Park Well No.15		Submersible		HP				2,920									
Lilac Drive Well House No.7	PUMPS CHLORINE OUT	Baldor Reliance Industrial Motor	1.00	HP				2,920	3450	115/230	3	60	TE FC	75.0%	12/6		CAT: VL3509A
Lilac Drive Well House No.7	PUMP MOTOR 1	US Elecric Motors	40.00	HP				2,920	3150	460/230	3	60	DP	90.2%	93.00		ID: E845/RO1P308R036F
Lilac Drive Well House No.7	PUMP MOTOR 2	US Elecric Motors	40.00	HP				2,920	3150	460/230	3	60	DP	90.2%	93.00		ID: E845/RO1P308R036F
Lilac Drive Well House No.7	AIR COMPRESSOR	Elekrim	3.00	HP				2,920	1740	230/460	3	60		80.0%	12/6		SN: E880495
Lebanon Well House No.2		US Elecric Motors - High Thrust	50.00	HP				2,920	1765	460/230	3	60	WP-1	90.2%	129.4/64.7		ID: GT-1002816-154
Potersown Well House No.4		Submersible		HP				2,920									
Fox Fire Hydropneumatic Station No.2	PUMP MOTOR 1	WEG	15.00	HP				2,920	3500	208-230/460	3	60	ODP	85.5%	39.7-35.9/18	015360S3E215JM	
Fox Fire Hydropneumatic Station No.2	PUMP MOTOR 2	WEG	15.00	HP				2,920	3500	208-230/460	3	60	ODP	85.5%	39.7-35.9/18	015360S3E215JM	
Fox Fire Hydropneumatic Station No.2		Marathon Electric	75.00	HP				2,920	1775	230/460	3	60	DP	91.7%	186/93	1VJ 365TSTDS7026JP W	
Fox Fire Hydropneumatic Station No.2	AIR COMPRESSOR	Baldor Industrial Motor	5.00	HP				2,920	1725	230/460	3	60	Open	81.5%	14/7		CAT: M3218T-CH
DPW-Barn Well House No.12		Submersible	30.00	HP				2,920									
DPW-Barn Well House No.12	BOOSTER PUMP MOTOR	US Elecric Motors - High Thrust	40.00	HP				2,920	3150	460/230	3	60	DP	90.2%	93.00		

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2010 Electric Unitary HVAC Application

Customer Information

Company	Electric Serving Applicant	Electric Account No.	Installation Date

Facility Address	City	State	Zip

Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement	Size of Building

Company Mailing Address	City	State	Zip

Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )

Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address

Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature

Payee Information (must submit W-9 form with application)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Commercial-Retail; Commercial-Other than Retail; Office; School-Public K-12; School-University-Public; School-University-Private; School-Other; Hospital; Government-Municipality; Government-Other than Municipality; Farm; Non-Profit; Other

Electric Unitary HVAC Equipment Information

Reason N–New R–Replaced	**Type** A–ASHP D-DXAC P–PTS S–Split U–Unitary W–WSHP	**Manuf.**	**Model**	**A** Unit Size Cooling (Btuh)	**B** Cooling Efficiency (EER or SEER)	**C** Has Dual Enthalpy Economizer? 0-No 1-Yes	**D** Incentive $/ton (Table)	**ASHP or WSHP** Unit Size Heating (Btuh)	**ASHP or WSHP** Heating Efficiency (COP or HSPF)	**E** Quantity	**F** Total Incentives (AxDxE) / 12,000 +CxEx250
(Example) N	U	ACME	HV1011	120,000	11.5	1	$73	N/A	N/A	2	$\frac{120{,}000 \times \$73 \times 2}{12{,}000}$ +(1)(2)(250)=$1,960
*Split Systems: List matching Indoor and Outdoor Components **AHRI Certified Net Capacity and Rating									**Total: $**		

Occupancy Controlled Thermostats

T_h=Heating Season Facility Temp. (°F)	**T_c=Cooling Season Facility Temp. (°F)**	**H=Weekly Occupied Hours**	**Cap_{hp}=Connected load capacity of heat pump/AC (Tons)**	**Cap_h=Connected heating Load capacity (Btu/hr)**	**Number of OCC. Controlled Thermostats**	**Total Incentives - $75/OCT x # of units**
(Example) 72 deg F	70 deg F	56	N/A	200,000 btu	10	$750
				Total		

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet and AHRI Certified Net Capacity with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Both indoor and outdoor components of a split system must be replaced to qualify for an incentive.
4. Incentive calculation is based on the Electric Unitary HVAC equipment capacity at AHRI Certified Net Capacity and Rating at operating conditions; it is not based on the nominal Electric Unitary HVAC equipment capacity.
5. Dual Enthalpy Economizer Control incentive is available with new installation on qualifying Electric Unitary HVAC equipment.
6. Efficiency requirements to comply with ASHRAE 90.1-2004.

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included
- ❑ Check this box if you are applying for an ARRA Block Grant.

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Electric Unitary HVAC Efficiency Levels and Incentives*

Unitary HVAC/Split Systems	
<5.4 tons	14.0 SEER $92/ton
≥5.4 to <11.25 tons	11.5 EER $73/ton
≥11.25 to <20 tons	11.5 EER $79/ton
≥20 to 30 tons	10.5 EER $79/ton
Air-to-Air Heat Pump Systems	
<5.4 tons	14 SEER & 7.8 HSPF $92/ton
≥5.4 to <11.25 tons	11.5 EER $73/ton
≥11.25 to <20 tons	11.5 EER $79/ton
≥20 to 30 tons	10.5 EER $79/ton
Packaged Terminal Systems	
<9,000 BTUH	12.0 EER $65/ton
≥9,000 to 12,000 BTUH	11.0 EER $65/ton
>12,000 BTUH	10.0 EER $65/ton

Water Source Heat Pumps	
≤5.4 tons	14.0 EER $81/ton
>5.4 tons	14.0 EER $81/ton
Central DX AC Systems	
>30 to 63 tons	≥9.5 EER $40/ton
> 63 tons	≥9.5 EER $72/ton
Dual Enthalpy Economizer Controls	
All	$250/unit
Occupancy Controlled Thermostats for Hospitality/Institutional Facilities	
All	$75/unit

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 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com

*Incentives/Requirements subject to change.

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Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this 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 Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on 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 Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect 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.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true 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 am 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 selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

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2010 Lighting Controls Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date

Facility Address	City	State	Zip

Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement	Size of Building

Company Mailing Address	City	State	Zip

Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )

Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address

Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature

Payee Information (must submit W-9 form with application)

Company	Contact Name	Incorporated? Yes No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Education-Primary School; Education-Community College; Education-University; Grocery; Medical-Hospital; Medical-Clinic; Lodging Hotel(Guest Rooms); Lodging Motel; Manufacturing-Light Industrial; Office-Large; Office-Small; Restaurant-Sit Down; Restaurant-Fast Food; Retail-3 Story Large; Retail- Single Story Large; Retail-Small; Storage Conditioned; Storage Unconditioned; Warehouse; Other

Lighting Control Incentive

$_____ Total Incentive (per attached worksheet calculations)

Note: Lighting Controls Incentive Worksheet must accompany this application.

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements, including special requirements for lighting controls.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. All lighting controls eligible for incentives must be UL listed.
4. Lighting control incentives are only available for control of eligible energy efficient lighting fixtures.
5. If more than one eligible lighting control device is associated with the same eligible fixture, the incentive paid will be for the lighting control device that yields the largest incentive only.
6. Occupancy Sensor Controls (existing facilities only):
   - There is no incentive available for occupancy sensors installed in a space where they are prohibited by state or local building or safety code. Additionally, no incentive is eligible for occupancy sensors in the following specific spaces in all cases: stairways, restrooms (remote mounted only allowed), elevators, corridors/hallways, lobbies, and closets/storage areas.
   - Incentives will only be paid for eligible occupancy sensors (OSW & OSR) controlling at least 2 eligible lighting fixtures and, for OSR installations, a minimum total connected load of 180 watts.
   - Incentives will only be paid for eligible OSRH occupancy sensors controlling eligible fixtures when the controlled wattage is greater than 180 watts.
   - Occupancy sensors with manual override to the "ON" position are ineligible for incentive.
7. High-Low Controls (OHLF and OHLH):
   - Incentives will not be paid for high-low controls on eligible fluorescent fixtures where daylight dimming controls can be effectively employed.
   - Incentives will not be paid for spaces smaller than 250 square feet.
   - Incentives available only when "low level" is no more than 60% of "high level."
   - Incentives are not available for the following spaces: stairways, elevators, corridors/hallways, or lobbies.
   - OHLF will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - OHLH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.
8. Daylight Dimming Controls for eligible fixtures:
   - Incentives will only be paid for eligible daylight dimming controls operating at least 4 eligible ballasts with a minimum total connected load of 240 watts.
   - Dimming shall be continuous or stepped at 4 or more levels.
   - Incentives will be paid only for eligible daylight dimming control systems designed in accordance with IESNA practice as delineated in "RP-5-99, IESNA Recommended Practice of Daylighting."
   - DLD will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - DDH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included
- ❑ Check this box if you are applying for an ARRA Block Grant.

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Lighting Control Prescriptive Incentives*

Control Device Type	Incentive per Unit
OSW – Occupancy Sensor Wall Mounted (Existing facilities only)	$20 per control
OSR – Occupancy Sensor Remote Mounted (Existing facilities only)	$35 per control
DLD – Fluorescent Daylight Dimming	$25 per fixture controlled
DLD – Fluorescent Daylight Dimming (Office Applications)	$50 per fixture controlled
OHLF – Occupancy Controlled High-Low with Step Ballast	$25 per fixture controlled
OSRH – Occupancy Sensor Remote Mounted	$35 per control
OHLH – Occupancy Controlled High-Low with Step Ballast	$75 per fixture controlled
DDH – Daylight Dimming	$75 per fixture 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 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

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Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this 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 Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on 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 Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

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Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect 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.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

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New Jersey's Clean Energy PROGRAM™ Your Power to Save njcleanenergy.com

New Jersey SmartStart BUILDINGS®

New Jersey BPU Board of Public Utilities

2010 Lighting Controls Incentive Worksheet

Customer Information

Company	Facility Address
☐ Check here if multiple worksheets are being submitted for one project/building.	Date Submitted

Lighting Controls Information

For additional fixtures, attach additional sheets and check here ☐

Location	Reason N–New R–Replaced	Control Device Type	Fixture Type Controlled	Watts Controlled per Device	A # of Fixtures Controlled per Device	B # of Units*	C Incentive per Unit	Total Incentive (B x C)
Office 101	(Examples) N	OSW	4-lamp, T8	220	2	4	$20	4 x $20 = $80
Conference Room A	N	OSR	2-lamp, T8	330	6	2	$35	2 x $35 = $70
Large Office 400	N	DLD	2-lamp, T8	275	N/A	6	$50	6 x $50 = $300
Warehouse A	N	OHLF	4-lamp, T8	140	N/A	12	$25	12 x $25 = $300
Warehouse B	N	OSRH	4-lamp, T5	234	1	5	$35	5 x $35 = $175
Total (including additional sheets)								

*For OSW and OSR, insert number of control devices; for DLD and OHLF, insert total number of ballasts controlled; for OHLH and DDH, insert total number of fixtures controlled.

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements, including special requirements for lighting controls.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. All lighting controls eligible for incentives must be UL listed.
4. Lighting control incentives are only available for control of eligible energy efficient lighting fixtures.
5. If more than one eligible lighting control device is associated with the same eligible fixture, the incentive paid will be for the lighting control device that yields the largest incentive only.
6. Occupancy Sensor Controls (existing facilities only):
   - There is no incentive available for occupancy sensors installed in a space where they are prohibited by state or local building or safety code. Additionally, no incentive is eligible for occupancy sensors in the following specific spaces in all cases: stairways, restrooms (remote mounted only allowed), elevators, corridors/hallways, lobbies, and closets/storage areas.
   - Incentives will only be paid for eligible occupancy sensors (OSW & OSR) controlling at least 2 eligible lighting fixtures and, for OSR installations, a minimum total connected load of 180 watts.
   - Incentives will only be paid for eligible OSRH occupancy sensors controlling eligible fixtures when the controlled wattage is greater than 180 watts.
   - Occupancy sensors with manual override to the "ON" position are ineligible for incentive.
7. High-Low Controls (OHLF and OHLH):
   - Incentives will not be paid for high-low controls on eligible fluorescent fixtures where daylight dimming controls can be effectively employed.
   - Incentives will not be paid for spaces smaller than 250 square feet.
   - Incentives available only when "low level" is no more than 60% of "high level."
   - Incentives are not available for the following spaces: stairways, elevators, corridors/hallways, or lobbies.
   - OHLF will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - OHLH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.
8. Daylight Dimming Controls for Eligible Fixtures:
   - Incentives will only be paid for eligible daylight dimming controls operating at least 4 eligible ballasts with a minimum total connected load of 240 watts.
   - Dimming shall be continuous or stepped at 4 or more levels.
   - Incentives will be paid only for eligible daylight dimming control systems designed in accordance with IESNA practice as delineated in "RP-5-99, IESNA Recommended Practice of Daylighting."
   - DLD will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - DDH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.

Lighting Control Prescriptive Incentives*

Control Device Type	Incentive per Unit
OSW – Occupancy Sensor Wall Mounted (Existing facilities only)	$20 per control
OSR – Occupancy Sensor Remote Mounted (Existing facilities only)	$35 per control
DLD – Fluorescent Daylight Dimming	$25 per fixture controlled
DLD – Fluorescent Daylight Dimming (Office Applications)	$50 per fixture controlled
OHLF – Occupancy Controlled High-Low with Step Ballast	$25 per fixture controlled
OSRH – Occupancy Sensor Remote Mounted	$35 per control
OHLH – Occupancy Controlled High-Low with Step Ballast	$75 per fixture controlled
DDH – Daylight Dimming	$75 per fixture 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 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this 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 Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

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Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on 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 Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect 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.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

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2010 Premium Motors Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date

Facility Address	City	State	Zip

Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement	Size of Building

Company Mailing Address	City	State	Zip

Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )

Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address

Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature

Payee Information (must submit W-9 form with application)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Commercial-Retail; Commercial-Other than Retail; Office; School-Public K-12; School-University-Public; School-University-Private; School-Other; Hospital; Government-Municipality; Government-Other than Municipality; Farm; Non-Profit; Other

Premium Motor Information

Reason* N–New R–Replaced S–Stocked	**Type* ODP, TEFC or ECM**	**Manuf.***	**Model***	**Function*** Fan, Pump, Process, Ref / Freezer	**Location** Bldg/Rm	**Size* (HP)**	**Speed (RPM)**	**NEMA** Nominal Efficiency (%)	**Has VFD**	**Annual Run Hours** Y/N (2,000 min.)	**Incentive Per Motor - Hours**	**Quantity** (Table)	**Total Incentives**
(Example) N	TEFC	ACME	RR/C1957	HVAC Pump	Mech. Rm. #4	30	1800	93.6	N	4400	$150	1	$150
R	ECM	GE	26-ECM-6	Ref/Freezer	Freezer Case #2	1/15				6000	$40	3	$120
*Required fields for ECM											**Total**		

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives are only available for qualifying Premium Motors that operate at least 2000 run hours annually.

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included
- ❑ Check this box if you are applying for an ARRA Block Grant.

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Qualifying Premium Motor Efficiencies and Incentives*

Premium Motor Incentives Open Drip-Proof (ODP)

Size HP	Speed (RPM) NEMA Nominal Efficiency 1200	1800	3600	Customer Incentive ($/Motor)
1	82.5%	85.5%	77.0%	$45
1.5	86.5%	86.5%	84.0%	$45
2	87.5%	86.5%	85.5%	$54
3	88.5%	89.5%	85.5%	$54
5	89.5%	89.5%	86.5%	$54
7.5	90.2%	91.0%	88.5%	$81
10	91.7%	91.7%	89.5%	$90
15	91.7%	93.0%	90.2%	$104
20	92.4%	93.0%	91.0%	$113
25	93.0%	93.6%	91.7%	$117
30	93.6%	94.1%	91.7%	$135
40	94.1%	94.1%	92.4%	$162
50	94.1%	94.5%	93.0%	$198
60	94.5%	95.0%	93.6%	$234
75	94.5%	95.0%	93.6%	$270
100	95.0%	95.4%	93.6%	$360
125	95.0%	95.4%	94.1%	$540
150	95.4%	95.8%	94.1%	$630
200	95.4%	95.8%	95.0%	$630

Premium Motor Incentives Totally Enclosed Fan-Cooled (TEFC)

Size HP	Speed (RPM) NEMA Nominal Efficiency 1200	1800	3600	Customer Incentive ($/Motor)
1	82.5%	85.5%	77.0%	$50
1.5	87.5%	86.5%	84.0%	$50
2	88.5%	86.5%	85.5%	$60
3	89.5%	89.5%	86.5%	$60
5	89.5%	89.5%	88.5%	$60
7.5	91.0%	91.7%	89.5%	$90
10	91.0%	91.7%	90.2%	$100
15	91.7%	92.4%	91.0%	$115
20	91.7%	93.0%	91.0%	$125
25	93.0%	93.6%	91.7%	$130
30	93.0%	93.6%	91.7%	$150
40	94.1%	94.1%	92.4%	$180
50	94.1%	94.5%	93.0%	$220
60	94.5%	95.0%	93.6%	$260
75	94.5%	95.4%	93.6%	$300
100	95.0%	95.4%	94.1%	$400
125	95.0%	95.4%	95.0%	$600
150	95.8%	95.8%	95.0%	$700
200	95.8%	96.2%	95.4%	$700

Fractional Motor Incentives Electronic Commutated Motors (ECM)

Size HP	Customer Incentive ($/Motor)
<1 HP	$40 per ECM for replacement of existing shaded-pole motor in refrigerated/freezer cases

Motors > 200 HP must follow the Custom Electric Equipment Path

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*Incentives/Requirements subject to change.

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Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

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2010 Prescriptive Lighting Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date
Facility Address	City	State	Zip
Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement		Size of Building	
Company Mailing Address	City	State	Zip
Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )	
Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address	
Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature		

Payee Information (must submit W-9 form with application)

Company	Contact Name		Incorporated? Yes No	Email Address Federal Tax ID#	
Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name		Incorporated? ❑ Yes ❑ No	Email Address Federal Tax ID#	
Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Education-Primary School; Education-Community College; Education-University; Grocery; Medical-Hospital; Medical-Clinic; Lodging Hotel(Guest Rooms); Lodging Motel; Manufacturing-Light Industrial; Office-Large; Office-Small; Restaurant-Sit Down; Restaurant-Fast Food; Retail-3 Story Large; Retail- Single Story Large; Retail-Small; Storage Conditioned; Storage Unconditioned; Warehouse; Other

Prescriptive Lighting Incentive

$_____ Total Incentive (per attached worksheet calculations)

Note: Prescriptive Lighting Worksheet must accompany this application.

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives for T-5 and T-8 lamps with electronic ballasts are available only for fixtures with a Total Harmonic Distortion of ≤20%.
4. All eligible lighting devices must be UL listed.
5. Requirements for CFL fixtures (must meet all requirements):
   - Fixtures must be new and ENERGY STAR qualified
   - Fixtures must have replaceable electronic ballasts
   - Total Harmonic Distortion (THD) must not exceed 33%
   - Power factor of the ballast must be no less than 90%
   - The manufacturer must warrant all fixtures for a minimum of 3 years. Warranty does not pertain to lamps or photocells not physically part of the fixture.
   - The installer must warrant fixture installation – minimum of 1 yr.

5.1 Screw-in PAR 38 or 30 Compact Fluorescent Lamps (CFL) with Aluminum Reflectors replacing existing incandescent lamps.
   - Lamp must be ENERGY STAR qualified where applicable. For ENERGY STAR qualified and non-qualified product, ALL the following requirements must be met:
     - The lamp must be new and warranted by the manufacturer for 12 months, or one year
     - Average rated lamp life must be ≥8,000 hours
     - Power factor of the ballast must be >50%

6. Pulse Start Metal Halide (including pole-mounted parking lot lighting) must have a 12% minimum wattage reduction.
7. T-5 or T-8 Fixtures replacing incandescent or T-12 fluorescent fixtures greater than 250 watt or High Intensity Discharge shall comply as follows:

7.1 T-5 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.0; have reflectivity greater than or equal to 91%; have a minimum 2 lamps; and be designated as F54T5 HO.

7.2 T-8 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.14; have reflectivity greater than or equal to 91%; have a minimum of 4 lamps; and be designated as F32T8, minimum 32 watts.

7.3 Incentives for delamped T-8 lamps with new reflectors are available only for fixtures with a Total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures. Eligible delamping can include reduction in linear lamp feet from existing conditions. For example, 1-8' linear fluorescent lamp can be considered as 2-4' linear lamps. U-bend lamps 4' in total length can be considered as 2-F17/T8 lamps.

7.4 Electronic ballast replacement is necessary for all eligible delamped fixtures.

7.5 Reduced wattage T8 (28W/25W 4') (1-4 lamps) retrofit requires lamp and ballast replacement.

8. LED Refrigerated/Freezer Case Lighting must meet NEEP Design Lights Consortium Standards or be on an ENERGY STAR or a SSL Qualified Product list. For new door installations on existing open cases, indicate the number of LED fixtures to be installed. Also indicate "New Door" in the Fixture Type column on the Prescriptive Lighting Worksheet (i.e. New Door 5' LED).

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included
- ❑ Check this box if you are applying for an ARRA Block Grant.

ACKNOWLEDGEMENT

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Prescriptive Lighting Measures and Incentives*

Type of Fixture	Incentive
Recessed and Surface-Mounted Compact Fluorescents (New Fixtures Replacing Incandescent Fixtures Only): Only available for hard-wired, electronically ballasted new fixtures with rare earth phosphor lamps and 4-pin based tubes (including: twin tube, quad tube, triple tube, 2D or circline lamps), THD<33% and BF>0.9	$25 per 1-lamp fixture $30 per 2-lamp or more fixture
Screw-in PAR 38 or PAR 30 (CFL) as per 5.1 above	$7 per lamp replaced
High-Efficiency Fluorescent Fixtures: For retrofit of T-12 fixtures to T-5 or T-8 with electronic ballasts	$15 per fixture (1-4 lamps retrofits)
For replacement of fixtures with new T-5 or T-8 fixtures	

Type of Old Fixture	Wattage of Old Fixture	Type of New Fixture	Incentive Per Fixture Removed
HID, T-12, Incandescent	≥ 1000 Watts	T-5, T-8	$284
HID, T-12, Incandescent	400-999 Watt	T-5, T-8	$100
HID, T-12, Incandescent	250-399 Watt	T-5, T-8	$50
HID only	175-249 Watt	T-5, T-8	$43
HID only	100-174 Watt	T-5, T-8	$30
HID only	75-99 Watt	T-5, T-8	$16
T-12 only	<250 Watt	T-5, T-8 (1 & 2 lamp)	$25
T-12 only	<250 Watt	T-5, T-8 (3 & 4 lamp)	$30

For retrofit of T-8 fixtures by permanent delamping & new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures.	**$20 per fixture**
New Construction & Complete Renovation	**Performance based only**
LED Exit Signs (new fixtures only):	
For existing facilities with connected load <75 kW	**$20 per fixture**
For existing facilities with connected load ≥ 75 kW	**$10 per fixture**
Pulse Start Metal Halide (for fixtures ≥ 150 watts)	**$25 per fixture (includes parking lot lighting)**
Parking lot low bay - LED	**$43 per fixture**
T-12 to T-8 fixtures by permanent delamping & new reflectors. Electronic ballast replacement is necessary for all eligible delamped fixtures.	**$30 per fixture**
Retrofit of existing 32 watt T-8 system to Reduced Wattage (28W/25W 4')	**$10 per fixture (1-4 lamps)**
LED Refrigerated/Freezer Case Lighting: Incentive for replacement of fluorescent lighting systems in medium or low temperature display cases	**$42 per 5' LED fixture $65 per 6' LED fixture**
Induction Lighting Fixtures	
Retrofit of HID	**$50 per HID (≥100W) fixture retrofitted with induction lamp, power coupler and generator. Replacement unit must use 30% less wattage per fixture than existing HID system**
Replacement of HID	**$70 per HID (≥100W) fixture with a new induction fixture**

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New Jersey's Clean Energy Program
c/o TRC Energy Services
900 Route 9 North, Suite 104 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com/ssb

*Incentives/Requirements subject to change.

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this 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 Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on 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 Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect 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.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true 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 am 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 selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

New Jersey's Clean Energy PROGRAM™
Your Power to Save
njcleanenergy.com

New Jersey SmartStart BUILDINGS®

New Jersey BPU Board of Public Utilities

2010 Prescriptive Lighting Incentive Worksheet

Customer Information

Company	Facility Address
☐ Check here if multiple worksheets are being submitted for one project/building.	Date Submitted

Prescriptive Lighting Information

For additional fixtures, attach additional sheets and check here ☐

Reason N–New R–Replaced	**Fixture Type Installed**	**Fixture Type Removed**	**Permanent Delamp w/ New Reflector** (Y/N)	**Location** (Bldg/Rm)	**Size of Replaced Lamps in Watts**	**A Incentive Per Fixture** (Table)	**B # of Units**	**Total Incentives (AxB)**
(Examples) R	2x4 3L T-5	2x4 3L T-12	N	Office	40	$15	8	$15 x 8 = $120
R	2x2 2L T-8	2x2 2L T-12	N	Office	34	$15	10	$15 x 10 = $150
R	28w CFL	100w Incan	N	Supply Room	100	$25	3	$25 x 3 = $75
R	250w Pulse Start Metal Halide	400w Mercury Vapor	N	Warehouse	450	$25	3	$25 x 3 = $75
N	New Doors 5' LED-Center	1L T-8 5'	N	Dairy Case #5	38	$42	25	$42 x 25=$1,050
N	New Doors 5'LED-End	1L T-8 5'	N	Dairy Case #5	38	$42	4	$42 x 4=$168
							Total (including additional sheets)	

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives for T-5 and T-8 lamps with electronic ballasts are available only for fixtures with a Total Harmonic Distortion of ≤20%.
4. All eligible lighting devices must be UL listed.
5. Requirements for CFL fixtures (must meet all requirements):
   - Fixtures must be new and Energy Star qualified
   - Fixtures must have replaceable electronic ballasts
   - Total Harmonic Distortion (THD) must not exceed 33%
   - Power factor of the ballast must be no less than 90%
   - The manufacturer must warrant all fixtures for a minimum of 3 years. Warranty does not pertain to lamps or photocells not physically part of the fixture.
   - The installer must warrant fixture installation – minimum of 1 yr.

5.1 Screw-in PAR 38 or 30 Compact Fluorescent Lamps (CFL) with Aluminum Reflectors replacing existing incandescent lamps.
- Lamp must be ENERGY STAR qualified where applicable. For ENERGY STAR qualified and non-qualified product, ALL the following requirements must be met:
  - The lamp must be new and warranted by the manufacturer for 12 months, or one year
  - Average rated lamp life must be ≥8,000 hours
  - Power factor of the ballast must be >50%

6. Pulse Start Metal Halide (including pole-mounted parking lot lighting) must have a 12% minimum wattage reduction.
7. T-5 or T-8 Fixtures replacing incandescent or T-12 fluorescent fixtures greater than 250 watt or High Intensity Discharge shall comply as follows:

7.1 T-5 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.0; have reflectivity greater than or equal to 91%; have a minimum 2 lamps; and be designated as F54T5 HO.

7.2 T-8 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.14; have reflectivity greater than or equal to 91%; have a minimum of 4 lamps; and be designated as F32T8, minimum 32 watts.

7.3 Incentives for delamped T-8 lamps with new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures. Eligible delamping can include reduction in linear lamp feet from existing conditions. For example, 1-8' linear fluorescent lamp can be considered as 2-4' linear lamps. U-bend lamps 4' in total length can be considered as 2-F17/T8 lamps.

7.4 Electronic ballast replacement is necessary for all eligible delamped fixtures.

7.5 Reduced wattage T8 (28W/25W 4') (1-4 lamps) retrofit requires lamp and ballast replacement.

8. LED Refrigerated/Freezer Case Lighting must meet NEEP Design Lights Consortium Standards or be on an ENERGY STAR or a SSL Qualified Product list. For new door installations on existing open cases, indicate the number of LED fixtures to be installed. Also indicate "New Door" in the Fixture Type column on the Prescriptive Lighting Worksheet (i.e. New Door 5' LED).

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Prescriptive Lighting Measures and Incentives*

Type of Fixture	Incentive
Recessed and Surface-Mounted Compact Fluorescents (New Fixtures Replacing Incandescent Fixtures Only): Only available for hard-wired, electronically ballasted new fixtures with rare earth phosphor lamps and 4-pin based tubes (including: twin tube, quad tube, triple tube, 2D or circline lamps), THD<33% and BF>0.9	$25 per 1-lamp fixture $30 per 2-lamp or more fixture
Screw-in PAR 38 or PAR 30 (CFL) as per 5.1 above	$7 per lamp replaced
High-Efficiency Fluorescent Fixtures: For retrofit of T-12 fixtures to T-5 or T-8 with electronic ballasts	$15 per fixture (1-4 lamps retrofits)
For replacement of fixtures with new T-5 or T-8 fixtures	

Type of Old Fixture	Wattage of Old Fixture	Type of New Fixture	Incentive Per Fixture Removed
HID, T-12, Incandescent	≥ 1000 Watts	T-5, T-8	$284
HID, T-12, Incandescent	400-999 Watt	T-5, T-8	$100
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For retrofit of T-8 fixtures by permanent delamping & new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures.	**$20 per fixture**
New Construction & Complete Renovation	**Performance based only**
LED Exit Signs (new fixtures only):	
For existing facilities with connected load <75 kW	**$20 per fixture**
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Parking lot low bay - LED	**$43 per fixture**
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LED Refrigerated/Freezer Case Lighting: Incentive for replacement of fluorescent lighting systems in medium or low temperature display cases	**$42 per 5' LED Fixture $65 per 6' LED Fixture**
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Retrofit of HID	**$50 per HID (≥100W) fixture retrofitted with induction lamp, power coupler and generator. Replacement unit must use 30% less wattage per fixture than existing HID system**
Replacement of HID	**$70 per HID (≥100W) fixture with a new induction fixture**

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Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true 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 am 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 selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

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New Jersey SmartStart BUILDINGS®

BPU

2010 Variable Frequency Drives Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date

Facility Address	City	State	Zip

Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement	Size of Building

Company Mailing Address	City	State	Zip

Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )

Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address

Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature

Payee Information (must submit W-9 form with application)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Commercial-Retail; Commercial-Other than Retail; Office; School-Public K-12; School-University-Public; School-University-Private; School-Other; Hospital; Government-Municipality; Government-Other than Municipality; Farm; Non-Profit; Other

Variable Frequency Drive Information

Reason N-New R-Retrofit	**Type of Usage** F – Airfoil/Backward Inclined fan C – Forward Curved Fan P – Chilled Water Pump A – Air Compressor	**Manufacturer**	**Model**	**Annual Operating Hours**	**Drive Efficiency %**	**Motor Efficiency %**	**Location** (Bldg/Rm)	**A HP of Controlled Motors**	**B Incentive per HP (Table)**	**C # of Units**	**Total Incentives (AxBxC)**
(Example) N	F	ACME	RR/C1957	4,000	97	94.1	Mech. Rm. #4	30	$65	2	30 x $65 x 2 = $3,900
									Total		

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives for VFDs in HVAC VAV systems, are available only for installing a VFD on existing VAV systems as an add on measure. Replacement of an existing VFD on VAV systems and installations on VAV systems in new construction are not eligible for incentives.
4. The Variable Frequency Drive (VFD) incentive for pumps is available only for VFDs installed on centrifugal chilled water pump motors for HVAC systems.
5. The VFDs must be installed in a system (VAV air supply or chilled water pumping systems) that incorporates pressure sensors (or other applicable sensor devices) in the flow stream.

For Compressed Air Systems:

6. Incentives are available for new air or water cooled, single or double stage, oil lubricated or oil free twin rotor screw air compressors outfitted with VFDs (providing compressed air for typical plant air use).
7. Replacement of VFD on an existing air compressor that had VFD control is not eligible for incentives.
8. Incentives for retrofitting an existing qualified air compressor with VFD control may be available through the custom electric equipment program.
9. VFD controlled compressors with premium efficiency motors may be eligible for a premium motor incentive in addition to this prescriptive VFD incentive.
10. Only one VFD controlled air compressor will be eligible for an incentive for each compressed air system.
11. The applicant shall provide sufficient documentation to demonstrate that a VFD controlled air compressor operates, at a minimum, for 2000 hours annually. Documentation may include P&IDs, Control Logic Diagrams, and Plant Operating Schedules.

For All VFDs:

12. The VFD must have either an input line reactor or isolation transformer.

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included
- ❑ Check this box if you are applying for an ARRA Block Grant.

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Variable Frequency Drive Incentives*

Cumulative Motor HP Controlled by Each VFD	Incentive $/Cumulative HP Controlled
Centrifugal Fan Applications on Variable Air Volume HVAC Systems	
5 to <10 hp	$155 per hp
10 to <20 hp	$120 per hp
20+ hp	$65 per hp
Chilled Water Pump Motors for HVAC Systems	
20+ hp	$60 per VFD rated hp
Rotary Screw Air Compressors	
25 to 29 hp	Up to $5,250
30 to 39 hp	Up to $6,000
40 to 49 hp	Up to $7,200
50 to 59 hp	Up to $8,000
60 to 199 hp	Up to $9,000
200 to 249 hp	Up to $10,000
≥ 250 hp	Up to $12,500

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 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com

*Incentives/Requirements subject to change.

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this 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 Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on 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 Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect 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.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed 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 lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

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Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers 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 Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, 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/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting 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.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true 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 am 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 selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.