Energy Savings Improvement Program
Matawan-Aberdeen Regional School District

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Report Background

The information contained in this report is intended to be used as guidance for the Matawan-Aberdeen Regional School District. This report was put together with input from the district's Business Administrator, Architect, information from the District Energy Audit dated November 2013 and conducted by CHA, and tracking data from the District's Energy Star Portfolio Manager.

Introduction

In New Jersey State Legislature approved Assembly Bills A1185, A2313 and A2564, specific public entities have the ability to enter into contracts for up 15 years to finance energy conservation and/or renewable energy production projects. The Bills allowed for the contracts to be paid for with the projected resulting savings from the projects. This is achieved through enacting an Energy Savings Improvement Program (ESIP), which serves as the vehicle through which the savings are outlined and investment case is made. It provides various agencies with an outline to highlight a path to improve utility consumption while having as little impact as possible on an operating and capital budget. The guidelines of this program are contained in Department of Community Affairs Local Finance Notice 2009-11 and further refined through the Board of Public Utilities Docket Number EO09020128 2/24/2009 for calculation guidance.

After completion of the Energy Audit, associated Energy Conservation Measures (ECMs) are evaluated on a case by case basis and rolled into the Energy Savings Plan (ESP). The Energy Audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) for a Level II Audit. In the case of this particular District, an extension of the Long Range Facilities Plan (LRFP) was developed to allow for a case to be made for capital expenditures on such projects. This method was used as the specific ECMs highlighted in the Energy Audit would not support an ESIP which would attract an Energy Services Company (ESCO) proposal in an ESIP Request for Proposal (RFP) as the payoff period in many cases was in excess of 15 years. Determinations on this position are contained in this report.

Executive Summary

The Operations & Maintenance Department has been researching a way to implement an ESP through an ESIP in accordance with NJ Public Law 2009, Chapter 4. The ESP in this case has been a working document that was built as an extension of the LRFP. The intention of this has been to assess the feasibility of different scenarios for the funding portion of the ESIP though outsourced financing, a hybrid outsourced/self-funded model, or a completely self-funded model.

Through the ESP, a look at energy savings over a 15 year time frame is examined. This savings baseline allows for the District to seek external financing for implementation of the projects through an Energy Services Company (ESCO). In order for the ESCO to bid a project, the savings must outweigh the costs over a 15 year timeframe. In almost every case examined according to our Energy Audit's ECMs, it was found that this scenario was not feasible. The conclusion eliminated two of the three options for financing, leaving only the self-financed method for implementation.

In coming to this conclusion, Operations & Maintenance examined not only the historical utility data, but also the newly updated data and projections for the coming 15 years. The reasoning for this was brought about by the recently installed Boiler Plants which will set a new baseline for operation, beyond what was projected in the Energy Audit which was conducted prior to the installations. Overall, the District is in good shape from an efficiency standpoint at the present time. Currently 5 of the 7 schools that comprise the District are eligible for Energy Star Certification. For further action, the District will need to carefully channel savings into capital improvements through either the operating budget or capital improvements to achieve any measurable gains.

Energy Audit Results

ECM-1 Window Replacements and Reduced Glazing

Cambridge Park was the only building highlighted in this ECM. The project cost was projected to be $409,900 with the resulting savings being $5,685 per year. The payback period of >15 years determined that this measure was not feasible for an ESIP.

ECM-2 Replace Boilers with Condensing Hot Water Boilers (Completed)

This project was completed in the summer of 2014 district wide. The project cost was projected to be $1,419,629 with the resulting savings being $18,826 per year. The payback period of >15 years determined that this measure was not feasible for an ESIP. The need remained because the equipment was at end of life (EOL) of 50 years which is why it was included in last summer's round of capital projects. In addition to this, rebates in the amount of $16,000 were obtained from the NJ Clean Energy Program, post project, to offset a small portion of initial costs.

ECM-3 Replace Window A/C Units with Ductless Splits

This project cost was projected to be $584,800 with the resulting savings being $1,298 per year. The payback period of >15 years determined that this measure was not feasible for and ESIP.

ECM-4 Replace Old Motors with Premium Efficiency Motors (Partially Complete)

This project encompassed Cambridge Park and Ravine Drive Schools. The projected cost was $6,065 with a resulting savings of $508. The payback period of <15 years determined that this project was feasible and Cambridge Park was included in the Boiler Project during the Summer of 2014. Remaining motors at Ravine Drive are being phased in as part of regular maintenance.

ECM-5 Install Variable Frequency Drives (VFDs) and Premium Pumps on Hot Water Pumps (Partially Complete)

This project cost was projected to be $69,509 with the resulting savings being $7,628 per year and originally encompassed the Lloyd Road, Cliffwood, Middle, and Strathmore Schools. The payback period was determined to be <15 years making this project feasible for an ESIP. During the Boiler Project of 2014, VFDs were incorporated into the designs of Cambridge Park (along

with ECM -4) and added to the High School and Middle School designs (along with premium motors). VFDs will be incorporated into regular maintenance change-outs going forward at the remaining schools.

ECM-6 HVAC Replacement of Rooftop Units (Partially Complete)

This project cost was projected to be $32,000 with an annual savings of $42. The payback period of >15 years made this project not feasible for an ESIP. In the spring of 2015, another district wide assessment was done on rooftop units through the NJ Clean Energy Program's Direct Install Program. Every school but the Middle and High Schools qualified for the 70/30 cost sharing program. In total, 12 rooftop units are being replaced as part of the project, with the district responsible for 30% of the costs. The High School and Middle School Rooftop Units (RTUs) will need to become part of a phase out program as part of regular maintenance going forward, especially as the government and manufacturers phase out the refrigerant used in the cooling systems.

ECM-7A Replace Existing Condensing Units with Standard Efficiency Units

The project cost was projected to be $96,900 with an annual savings of $695. The payback period of >15 years made this project not feasible for an ESIP. This project will need to become part of a phase out program as part of regular maintenance going forward, especially as the government and manufacturers phase out the refrigerant used in the systems.

ECM-7B Replace Existing Condensing Units with Higher Efficiency Units

The project cost was projected to be $116,700 with an annual savings of $943. The payback period of >15 years made this project not feasible for an ESIP. This project will need to become part of a phase out program as part of regular maintenance going forward, especially as the government and manufacturers phase out the refrigerant used in the systems.

ECM-8 Replace Existing Packaged Terminal Air Conditioner Unit

The project cost was projected to be $5,400 with an annual savings of $10. The payback period of >15 years made this project not feasible for an ESIP. This project will need to become part of

a phase out program as part of regular maintenance going forward, especially as the government and manufacturers phase out the refrigerant used in the systems.

ECM-9 Install Demand Control Ventilation (DCV) (Partially Complete)

This project cost was projected to be $45,000 with an annual savings of $16,153. The payback period of <15 years made this project feasible for an ESIP. The original scope of the project was Lloyd Road, Cliffwood, Middle and Strathmore Schools. In the spring of 2015, another district wide assessment was done on rooftop units through the NJ Clean Energy Program's Direct Install Program. Every school but the Middle and High Schools qualified for the 70/30 cost sharing program. In total, 12 rooftop units are being replaced and equipped with DCV as part of the project, with the district responsible for 30% of the costs. The High School and Middle School RTUs will need to become part of a phase out program as part of regular maintenance going forward, especially as the government and manufacturers phase out the refrigerant used in the cooling systems. DCV will be incorporated into the new units as they are replaced.

ECM-10 Install Vending Machine Controls

This project cost was projected to be $3,600 with an annual savings of $3,174. The payback period of <15 years made this project feasible for an ESIP. This measure will be explored further in the coming fiscal year as part of the regular operating budget.

ECM-11 Install Network Controller

This project cost was projected to be $10,000 with an annual savings of $5,817. The payback period of <15 years made this project feasible for an ESIP. This measure is very dynamic in the sense that new technology may have already removed the need for a separate device to control the district's computer network. With the changeover to energy efficient Chromebooks and the phasing out traditional Windows-based desktops, the District will need to re-evaluate its technology model before implementing any changes.

ECM-12A Replace Electric Domestic Hot Water Heaters with Natural Gas (Partially Complete)

This project cost was projected to be $40,341 with an annual savings of $2,396. The payback period of >15 years made this project not feasible for an ESIP. The original scope consisted of Cambridge Park and Cliffwood Schools. The Cambridge Park portion of the project was included in the Boiler Project of 2014. The Cliffwood portion will be examined as part of regular maintenance. In addition, there is one electric heater in the ASB Building at the High School. This was replaced this year with another electric heater as there is no gas currently run to the building.

ECM-12B Replace Gas-Fired Domestic Hot Water Heater with Condensing Natural Gas Domestic Hot Water Heater

This project cost was projected to be $10,997 with an annual savings of $152. The payback period of >15 years made this project not feasible for an ESIP. The scope only encompasses Cliffwood School and will be examined as part of the response in ECM-12A.

ECM-13 Install Kitchen Hood Controller

This project cost was projected to be $77,000 with an annual savings of $422. The payback period of >15 years made this project not feasible for an ESIP.

ECM-14 Install Walk-in Cooler/Freezer Controls

This project cost was projected to be $60,000 with an annual savings of $3,571. The payback period of >15 years made this project not feasible for an ESIP. We are looking at a possible overhaul as part of regular maintenance and this would be included in that portion of the project.

ECM-L1 Lighting Replacement/Upgrades

The project cost was projected to be $1,112,167 with an annual savings of $37,969. The payback period of >15 years made this project not feasible for an ESIP. A portion of this project is being included in the NJ Clean Energy Direct Install Program project this summer.

Photovoltaic Rooftop Solar Power Generation

As part of the Energy Audit, solar power generation was examined for feasibility on the rooftops of the District's buildings. The projected cost of the project is $9,800,000 for a 2450 kW system.

Total annual savings would be approximately $374,455 annually. While the payback period is <15 years, when assessing solar projects a timeframe of 10-12 years is used therefore making the project not feasible for inclusion in an ESIP.

Historic Energy Consumption and Costs

The District's buildings are currently delivered electricity from Jersey Central Power & Light and natural gas from NJ Natural Gas. Our supplies of both are contracted through the Alliance for Competitive Energy Services (ACES) Purchasing Cooperative provided by the New Jersey School Boards Association. The historical data being used in this assessment is benchmarked using data from February 2014 through April of 2015. This differs from the timeframe that was used for the Energy Audit which was benchmarked through October of 2013. The reasoning for this was to establish a benchmark to gauge improvements made with purged and consistent data as the reasoning and calculation methods for the previous data was not clear. The table below presents the data through the latest dates available per building. For more information contained in the Energy Star reports, please refer to the worksheets in Appendix B. Note: Cambridge Park shows up as "Not Applicable" because it falls under a different category than the other schools. For detailed information on it, please see Appendix B.

Property Name	**Site EUI (kBtu/ft²) Change**	**Source EUI (kBtu/ft²) Change**	**Weather Normalized Site EUI (kBtu/ft²) Change**	**Weather Normalized Source EUI (kBtu/ft²) Change**	**Site EUI - Adjusted to Current Year (kBtu/ft²) Change**	**Source EUI - Adjusted to Current Year (kBtu/ft²) Change**	**Yearly Energy Cost ($) Change Since 2/2014**
Cliffwood Elementary School	-2.5	-0.1	-3.9	-1.4	-2.5	0	-963.65
Matawan Aberdeen Middle School	-54.8	-77	-53.2	-75.4	-94.5	-148	-29845.69
Matawan Regional High School	-7.4	-8.4	-8.8	-10	-17.2	-25.2	-12623.75
Ravine Drive Elementary School	-1.6	0.1	-2.9	-1.6	-1.5	0.2	716.73
Strathmore Elementary School	9.7	12.9	7.6	11.2	9.9	13.2	6978.38
Lloyd Road Elementary School	-11.6	-14.8	-12.2	-15.6	-11.5	-14.7	-15711.48
Cambridge Park Administration Building	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Conclusion

In conclusion, the findings of the Operations & Maintenance Review indicate that the self-financed model for an ESIP will be the most effective as it is the District's only option. During the research for this report, a representative from one of the nation's top ESCOs, Honeywell, was brought in to give perspective from the point of view of the businesses that support the fully outsourced and hybrid financed models. Their assessment was in line with this report's findings. Much of the low cost, high return items have been completed and the remaining items do not warrant an immediate energy efficiency reasoning for replacement. Going forward, regular capital projects and smaller replacement projects from the regular operating budget will be the basis of funding for improvements. It is suggested that replacement of these items be included in preventative maintenance planning in the future. It is also suggested that offsetting funding be obtained as much as possible from grant funding through the NJ Clean Energy Program and others to lighten the burden on the additional costs of upgrading to energy efficient equipment.

Appendix A – LRFP and ESIP Items

DISTRICT SCHOOL- PROPOSED BUILDING PROJECT- (List Deficiencies from District Facilities Department and 00-05 district LRFP'S by School and Year) Note: *ITALICIZED* projects added by District Administration / Facilities Department; requires LRFP update. BOLD **items are District / Administrations / Facilities Department Recommended Projects. "*" Requires Confirmation.**	**PRIORITY E** ENERGY RELATED IMPROVEMENTS FOR ENERGY COST REDUCTIONS	**ESTIMATED COSTS (BUDGET)**
Matawan Regional High School		
MECHANICAL CONTROL UPGRADES	x	$375,000.00
AUDITORIUM HVAC UPGRADES	x	$300,000.00
100-WING CLASSROOM HVAC UPGRADES	x	$225,000.00
200-WING CLASSROOM HVAC UPGRADES	x	$250,000.00
400-WING CLASSROOM HVAC UPGRADES	x	$450,000.00
LARGE GYMNASIUM UPGRADES	x	$500,000.00
500-WING CLASSROOM HVAC UPGRADES	x	$125,000.00
ATHLETIC DEPT OFFICE HVAC UPGRADES	x	$75,000.00
600-WING CLASSROOM HVAC UPGRADES	x	$275,000.00
REPLACE EXISTING EMERGENCY EGRESS LIGHTING	x	$5,000.00
Matawan Avenue Middle School		
MECHANICAL CONTROL UPGRADES	x	$175,000.00
EXHAUST UPGRADES	x	$270,000.00
100-WING CLASSROOM HVAC UPGRADES OPTION A (Recommend)	x	$150,000.00
100-WING CLASSROOM HVAC UPGRADES OPTION B (180K)	x	
200-WING CLASSROOM HVAC UPGRADES OPTION A (Recommend)	x	$150,000.00
200-WING CLASSROOM HVAC UPGRADES OPTION B (180K)	x	
300-WING CLASSROOM HVAC UPGRADES OPTION A (Recommend)	x	$225,000.00
300-WING CLASSROOM HVAC UPGRADES OPTION B (260K)	x	
ADMIN AREA HVAC UPGRADES	x	$85,000.00
C-WING CLASSROOM HVAC UPGRADES OPTION A (Recommend)	x	$225,000.00
C-WING CLASSROOM HVAC UPGRADES OPTION B	x	
OLD GYMNASIUM HVAC UPGRADES OPTION A (Recommend)	x	$300,000.00
OLD GYMNASIUM HVAC UPGRADES OPTION B	x	
REPLACE EXISTING PARKING AREA FIXTURES WITH LED LUMINAIRIES	x	
REPLACE EXISTING EMERGENCY EGRESS LIGHTING	x	$7,000.00
NEW CLASSROOM LIGHTING OPTION A (Surface Mount Fluor)	x	$70,000.00
NEW CLASSROOM LIGHTING OPTION B (All lights Fluor))	x	$200,000.00
NEW CORRIDOR LIGHTING (100 & 300 Wing LED - In House)	x	$17,000.00
NEW LIGHTING IN NEW GYMNASIUM (LED or T5HB)	x	$9,000.00
NEW LIGHTING IN OLD GYMNASIUM (LED or T5HB)	x	$10,000.00
NEW MEDIA CENTER LIGHTING (LED/Fluor)	x	$22,000.00
Cambridge Park School		
REPLACE CEILINGS AND LIGHTING (LED)	x	$25,000.00

MECHANICAL CONTROL UPGRADES	x	$190,000.00
EXHAUST UPGRADES	x	
ADMIN WING HVAC UPGRADES	x	$300,000.00
CENTRAL WING HVAC UPGRADES	x	$300,000.00
CLASSROOM WING HVAC UPGRADES	x	$300,000.00
ADD COMBINATION EXIT SIGNS WITH DUAL HEADS	x	$7,700.00
Cliffwood Avenue Elementary School		
REPLACE CEILINGS AND LIGHTING	x	$150,000.00
REPLACE CAFETERIA CEILING AND LIGHTING	x	$75,000.00
MECHANICAL CONTROL UPGRADES	x	$180,000.00
BOILER UPGRADE	x	$100,000.00
EXHAUST UPGRADE	x	$110,000.00
ORIGINAL BUILDING HVAC UPGRADES	x	$900,000.00
REPLACE EXISTING EMERGENCY EGRESS LIGHTING	x	$3,000.00
Lloyd Road Elementary School		
REPLACE AUDITORIUM CEILING AND LIGHTING	x	$75,000.00
UPGRADE / REPLACE AUDITORIUM THEATER LIGHTING	x	$100,000.00
REPLACE CORRIDOR CEILING AND LIGHTING	x	$10,000.00
REPLACE CEILINGS AND LIGHTING	x	$200,000.00
MECHANICAL CONTROL UPGRADES	x	$400,000.00
EXHAUST UPGRADES	x	$115,000.00
ORIGINAL BUILDING HVAC UPGRADES	x	$1,850,000.00
REPLACE EXTERIOR SITE LIGHTING OPTION A	x	$75,000.00
REPLACE EXTERIOR SITE LIGHTING OPTION B	x	
Ravine Drive Elementary School		
MECHANICAL CONTROL UPGRADES	x	$235,000.00
EXHAUST UPGRADE	x	$125,000.00
ORIGINAL BUILDING HVAC UPGRADES	x	$760,000.00
1969 ADDITION HVAC UPGRADES	x	$420,000.00
Strathmore Elementary School		
REPLACE CORRIDOR CEILING AND LIGHTING	x	$5,000.00
MECHANICAL CONTROL UPGRADES	x	$175,000.00
EXHAUST UPGRADE	x	$45,000.00
ORIGINAL BUILDING HVAC UPGRADES	x	$880,000.00
1996 ADDITION HVAC UPGRADES	x	$80,000.00
REPLACE EXISTING EMERGENCY EGRESS LIGHTING	x	$4,500.00
	Total	$12,690,200.00

Appendix B-
Current Energy Star Ratings for District Buildings