

EPC COMMITTEE RECOMMENDATION TO THE WESTPORT BOARD OF FINANCE

Recommended Package

Total Project Cost: \$8.37 million Amount to Be Financed Net of Utility Incentives: \$6.84 million Energy Cost Savings Over a 10-Year Financing Term: \$8.70 million Net Project Payback: 8.5 years (See Table 6) Following completion of the full Investment Grade Energy Audit (IGEA) by NORESCO, the Energy Performance Contract (EPC) Committee recommends a package of thirteen specific energy conservation measures (ECMs) across twelve Westport public buildings that can be financed using guaranteed savings over a 10-year term and create an annual net excess cashflow with a net present value of \$911,000 over that

period. The estimated total project cost of \$8.37 million will be reduced by estimated Eversource incentive payments of \$1.5 million, for a net price at completion of \$6.84 million. After the 10-year financing term, all savings will continue to accrue to the benefit of the Town, which will result in a net present value of \$4.9 million over a conservative 15-year functional life.

At this time, the EPC Committee is asking for an endorsement of this recommended package of ECMs. If the Westport Board of Finance (BOF) finds this package of measures acceptable, NORESCO will commence with procuring competitive pricing from subcontractors for the scope of work, and prepare the final IGEA document with a go-to-contract price for approval by the BOF and all other necessary committees.

Investment Grade Energy Audit Introduction

The completed IGEA provides the Town a means to identify, prioritize, and implement the most cost-beneficial and critically needed energy-related infrastructure upgrades. All the identified ECMs in this study will be necessary or desirable for the Town to complete in the future, but implementing them all at this time would cost in excess of \$16.96 million. Instead, the \$8.37 million recommended ECM package consists of those measures that will provide the Town the highest return on investment and the greatest near-term positive benefits to users of all buildings included in the IGEA. Please refer to Appendix A for the EntelliChoice[®] tables for further information on all of the ECMs investigated for the IGEA.

The rate of return estimates include incentives through Eversource that NORESCO will secure for the Town prior to implementation and that will be paid out at project completion. The EPC Committee's deliberate selection of projects based on return criteria provides the Town with 77% of the total potential cost savings, and 74% of the total potential CO_2 reduction at less than half the cost of the total measures analyzed in the audit. The two largest comprehensive measures (new LED lighting and energy management system upgrades) consist of well over 15,000 individual upgrades, and both will be closely managed by the NORESCO project management team to ensure a safe, consistent, and high-quality installation in a timely manner. Over a half million dollars of annual energy cost savings will accrue to the Town from these two measures alone. Combined with the other cost-effective recommended measures, a total of \$750,000 in annual cost savings will be achieved in the first year after completion of the expedited 15-month estimated construction and commissioning schedule.

The recommendations in the comprehensive IGEA report will provide long-term, sustainable and cost-effective operating cost savings, create an optimum environment for working and learning, and significantly reduce the Town's carbon footprint. Town and school personnel have worked together with NORESCO in a collaborative, thorough, and detailed project development process to develop and review the ECMs included in the scope of work contained in the IGEA. The recommended package is summarized in the tables on the following pages.



Table 1: Project Summary for Town of Westport & Westport Public Schools -- Recommended Measures

	Energy Conservation Measures	Total Price	Electric Savings (kWh)	Natural Gas Savings (CCF)	Oil Savings (gal)	First Year Energy Cost Savings	Estimated Incentive	Net Payback
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				\boxtimes	\boxtimes			
	Totals	\$7,887,258	3,957,840	137,480	264	\$750,457	\$1,528,363	8.5 Yrs

The Total Price for the individual ECMs above does not include the up-front project costs listed below. These costs will be included in the financing and have been included in all financial analysis of the project and represent the total project cost of \$8,370,000:

- Owner's representative engineering services (AKF) of \$157,000
- Town legal fees for negotiation of the Energy Services Agreement (ESA), estimated at \$30,000
- NORESCO audit fee (\$91,393) payable upon execution of the ESA
- Capitalized interest cost during construction of \$205,000



Table 2: Cash Flow Pro Forma

	Annual Energy Cost Savings ¹	Payments for Financed Equipment ²	Measurement & Verification Services	Net Annual Benefits ³	Cumulative Cash Flow
Year 1					
Year 2					
Year 3					
Year 4			\boxtimes		
Year 5			\boxtimes		
Year 6			\boxtimes		
Year 7			\boxtimes		
Year 8					
Year 9			\boxtimes		
Year 10					
Totals	\$8,703,000	\$7,560,000	\$88,000	\$1,055,000	

After the completion of the 10-year finance term, the recommended project will continue to generate meaningful annual energy costs savings, without any further finance payments. As a result, the Town could potentially realize an increased net annual benefit of more than \$1,000,000 per year.

Selection Criteria for Recommended ECMs

The EPC Committee reviewed 24 specific ECMs in the twelve buildings audited. ECMs were selected for inclusion in this recommendation based on specific economic criteria that produce an economic benefit to the taxpayer. ECMs by building are included in Appendix B. Criteria include:

- **Positive Net Present Value (NPV):** The comprehensive recommended project generates a positive NPV after financing costs within 10 years. Most of the measures have a positive NPV of less than 10 years, and the entire recommended project has an NPV of \$911,000 for the projected 10-year contract term.
- Internal Rate of Return (IRR): Individual ECMs, and the comprehensive recommended project, show an IRR that materially exceeds the cost of financing. The estimated IRR for the recommended comprehensive project is 5.0%. For this analysis, Westport's cost of financing was estimated at 2.5% less a PURA buydown estimated at \$225,000, with the observation that Westport's last bond issue was executed at 2.07%.
- **Payback Period:** Individual ECMs should have a simple payback (excluding financing costs) of less than 15 years, based on the first year savings with no escalation. The comprehensive recommended project has a simple payback of 8.5 years.



- **Complexity and/or Magnitude of Installation:** The EPC committee reviewed the list of prospective ECMs to determine which measures, due to complexity of the installation and the magnitude, should remain in the project and which could be taken on by Town or BOE facility staff. For example, there are over 15,000 lighting fixtures included in the project as well as extensive building energy management system upgrades that require precise installation, programming, and commissioning.
- **Financing Term:** Selecting a package of measures with the payback period of 8.5 years will enable the Town to reduce the term of the financing from 15 to 10 years.
- **Resilience of Savings in Higher and Lower Cost Environments:** A sensitivity analysis was performed on the project's proportional electric and fuel use across a range of price escalation scenarios, to evaluate the potential impact of energy cost fluctuations on the projected savings generated from the recommended project. It was estimated that the energy costs savings would still be sufficient to meet the total debt service payments if there were no escalation in rates over the next 10 years. As illustrated in Appendix C, according to the 2014 Integrated Resources Plan for Connecticut, electric rates are expected to rise continually through year 2024 for each natural gas market scenario. In addition, the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP) provides the Energy Escalation Rate Calculator (EERC) tool to determine the appropriate escalation rate for the specific recommended electric and fuel saving measures, and calculated the appropriate rate to be 4.64% over a 10-year term. The EPC Committee took a more conservative stance by assuming that there would be a much lower overall inflation rate over the next 10 years than projected by the federal government, resulting in an assumed energy escalation rate of 3.25%.

Table 3: Assumptions Used for Recommended Package

Key Recommended Energy Conservation Measures

The two largest comprehensive key recommended ECMs are summarized below:

- A carefully considered interior and exterior solid-state LED lighting upgrade that will provide substantial electric energy savings, sustained material cost savings, maintain or improve existing building aesthetics, and provide maintenance staff relief from frequent fluorescent lamp and ballast replacements of more than 15,000 fixtures. The new LED lighting system will free up Town staff to focus on performing high quality, systematic, preventative building maintenance, and will be augmented with lighting control solutions including occupancy sensors and daylight harvesting strategies for increased sustainable savings.
- New energy management system upgrades that will provide substantial fuel energy savings, as well as substantially increased occupant comfort conditions, ease of equipment scheduling, building performance reporting, and improved maintenance and service.



Operations & Maintenance Savings (O&M)

While O&M cost savings are not currently included in the project financial return estimates, a number of the ECMs in the recommended package will reduce the work required by the Town and BOE facility staff. The longerlasting LED lighting compared to the existing primarily fluorescent lighting will significantly reduce lamp replacement. NORESCO has estimated that the material savings alone is approximately \$63,000. In addition, the upgrade of the steam traps will reduce the need for facility staff to replace failed traps, and the energy management system upgrades will enhance the ability of the facility staff to monitor and investigate comfort complaints.

Another benefit is that the equipment selected to be installed on the project will be consistent for all facilities reducing the number of replacement parts that need to be stored, and reducing the need for training on multiple types of equipment.

Environmental Impact of Proposed Energy Conservation Measures

NORESCO is a proud member of the U.S. Green Building Council, Clinton Climate Initiative, and a long-time Energy Star[®] Business Partner. In addition to the direct positive economic benefit this project will have to the Town, this project will provide significant environmental benefits to the Town and the surrounding community, consistent with the Town's CO₂ reduction policy objectives.

Quantified in the tables below are the greenhouse gas emission reductions that will occur as a result of new higher efficiency equipment replacing the existing old, less efficient systems; as well as new controls that will limit the equipment's use to when only needed by the building occupants.

Table 4: Energy Savings

Energy Source	Units	Value
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Table 5: Annual Emissions Reductions

Emission Type	Reductions
Carbon Dioxide (CO ₂)	6,128,755 Lbs per year
Sulfur Oxides (SOx)	1,797 Lbs per year
Nitrogen Oxides (NO _x)	5,926 Lbs per year
Equivalent Acres of Trees Planted	821 acres
Equivalent Cars Removed from the Roads	662 cars



ECMs Identified During the Development of the IGEA

The following is a brief description of each of the potential improvements identified and evaluated throughout the Town and School facilities.

EPC Committee Recommended ECMs

- **Lighting Improvements & Controls:** Upgrades to the existing lighting with efficient LED source lighting and the installation of occupancy sensors will reduce maintenance and electricity usage while maintaining high-quality illumination.
- Energy Management System (EMS) Upgrades: EMS upgrades will allow BOE staff to easily schedule heating and cooling equipment, saving significant electricity and natural gas costs each year. Additionally, many new control points will be added to further expand the functionality of the system.
- **Weatherization & Insulation:** Sealing the building envelope with insulating foam, weather-stripping, and silicone caulk will reduce infiltration of unconditioned air, save energy, and improve occupant comfort.
- **Pipe Insulation:** New heating system insulation in four schools will reduce the amount of heat lost in ventilated mechanical spaces and improve comfort conditions in nearby occupied areas such as classrooms and administrative spaces. Reduced heat losses decrease boiler fuel consumption and utility costs, and insulating hot surfaces provide a safer environment for building staff and occupants.
- **Automated Swimming Pool Cover:** A new pool cover at Staples High School will reduce the humidity in the pool area, improving the space conditions for building occupants.
- **Plug Load Controls:** Energy savings are achieved by automatically turning off plug load equipment when idle, typically during the night and unoccupied periods. In addition to reducing electrical consumption and the associated utility costs, this ECM also extends equipment life.
- **High-Efficiency Transformers:** Replacing the existing transformers with new high-efficiency transformers in three school buildings will step down voltage more efficiently and reduce stand-by losses, resulting in a cooler and quieter operation.
- **Energy Conservation Through Behavior Change**[®]**:** This behavior change and education program, which will be implemented at all Westport schools, will focuses on environmental and energy conservation.
- **High-Efficiency Motors & Variable Frequency Drives:** Variable frequency drives (VFDs) will be added to selected fans and/or pumps in conjunction with the EMS upgrades to reduce electricity consumption and extend equipment life.
- Chiller Variable Speed Control, Water Side Economizer, & Tower Refurbishment: Improving the chiller system in the J wing basement at Staples High School will reduce the facilities electrical consumption and utility costs while improving reliability and comfort. Upgrading and repairing existing equipment also will provide increased performance with less capital outlay than equipment replacement.
- **Convert Dining Multi-zone Air Handler to Variable Air Volume:** Converting the Staples High School cafeteria multi-zone air handler unit AC 1-2 will increase comfort and reduce energy consumption by optimizing air flow to the space conditioning requirements.
- **Replace Steam Traps:** New steam traps at three schools will help heating system operate effectively and efficiently, improve comfort, and reduce fuel consumption and utility costs. Properly functioning steam traps facilitate effective operation of steam equipment, transfer steam to its point-of-use, and prevent steam losses by returning condensed steam to building boilers for reprocessing.
- Water Heater Replacement: Replacing the existing electric hot water heater at the Fire Headquarters with a heat pump water heater will produce hot water more efficiently and have the added bonus of providing cooling to overheated areas in the process.



ECMs Evaluated But Not Included

- **Cooling Tower Replacement:** Replace old cooling towers at several locations with new high-efficiency towers with fan variable frequency drives. Not included due to long simple payback (>50 years).
- Steam to Hot Water Heating Conversion: Convert to hot water heating to improve heating system reliability and efficiency, in addition to reduced maintenance and lifecycle costs. Not included due to long simple payback (King's Highway >80 years, Long Lots > 25 years).
- **Walk-in Refrigeration Upgrades:** Install controls and new evaporator fans. Measure can be funded through the Board of Education Cafeteria Fund.
- New Air Handling Units with Air Conditioning: Install cooling equipment where none currently exists. Measure is being completed by the Town.
- **New Energy-Efficient Condensing Boilers:** Replace existing boilers beyond their useful life with new high-efficiency condensing boilers. Not included due to long simple payback, all greater than 25 years.
- **HVAC Replacement or Refurbishment:** Replace HVAC equipment in poor condition or beyond its useful life with new equipment. Also repair or refurbish existing HVAC equipment that is still in good condition. Not included due to long simple payback (average over 100 years).
- **Kitchen Hood Controls:** Install variable frequency drives and controls on kitchen hoods to reduce fan energy and the amount of conditioned air exhausted based on cooking activity. Identified as more appropriate to fund through the Board of Education Cafeteria Fund.
- **Fuel Conversion (Oil to Natural Gas):** Add natural gas service to facilities currently using only oil to reduce utility costs. This work is already scheduled for completion by the Town.
- **Geothermal Heat Pump Conversion:** Convert existing water source heat pump systems to geothermal, which use the ground as an efficient source/sink for heat. Not included due to uncertainty associated with the Senior Center enhancement project.
- **New Roofing:** Replace selected roof areas that are nearing their end of life and on BOE capital plan. This is a capital measure that was eliminated after proposal award.
- **Solar Photovoltaic (PV) Systems:** Install roof-mounted PV systems on buildings. This measure was eliminated after proposal award due to lack of compatible roofs and locations.
- **Pipe Insulation at Town Buildings:** The scope of the measure at this building was small enough that the Town facility staff could complete during slow periods.
- **Lighting at Town Hall:** The Town has already started the replacement of lighting fixtures to LED, which reduced the savings potential to the point the simple payback was approximately 20 years. The remaining scope off this measure is small enough that the Town facility staff can complete.



Table 6: Financial Comparison of Energy Conservation Measures

	All \$ Values in (000's)	All ECMs	EPC Committee Recommended Measure Package
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В	Project Price	\$16,211	\$7,887
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F	CXXXXXXXXX CXXXXXXXXXXXXXXXXXXXXXXXXXX		
G	Total Project Cost (2)	\$16,949	\$8,370
Н	EXXXX XXXXX EXXXXXX IXXXXXXXXXX XXX		
I	Net Amount Financed (4)	\$15,151	\$6,842
J			XXXX
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Notes:

- (1) Construction interest included in financed amount
- (2) Total project cost equals the sum of Lines B through F
- (3) Eversource provides higher custom incentives for comprehensive projects
- (4) Net amount to be financed equals Line G minus Line H
- (5) Estimated first year savings based on 3-year average rates from 2013 to 2015
- (6) Projected annual energy escalation rate of 3.25%
- (7) Operating lease at 2.5% with stepped payments to match savings
- (8) Net Simple Payback = (Total Project Cost Incentives) / First Year Savings

(9) IRR is based on direct purchase at Total Project Cost, less incentives -- IRR is the interest rate at which the net present value of all the cash flows from a project or investment equal zero; it is used to evaluate the attractiveness of a project.



Next Steps

Procurement

NORESCO will develop specific detailed scopes of work and bid packages to obtain firm subcontractor pricing at the applicable prevailing wage rate. For the larger measures, NORESCO plans to send bid packages to a minimum of 3 to 5 potential subcontractors that have been prequalified by NORESCO. NORESCO has requested any lists of applicable subcontractors that the Town may have and wish to include in the prequalification and bid process for this project. The Town will have the opportunity to review the potential subcontractor list prior to issuance of bid packages. After NORESCO has received, reviewed, and leveled all bid pricing, NORESCO will prepare a cost matrix and review the results with the Town. The cost matrix will indicate the recommended subcontractor. Because the final price of the project is based on the subcontractor cost multiplied by our mark-up, the Town, Board of Finance, and any other Town department will be able to see the subcontractor costs being carried for the project.

Open-Book Pricing

NORESCO regularly implements contracts on an open-book, fixed-price basis. More than 80% of NORESCO's performance contracting business is implemented in an open-book approach, including the majority of our municipal projects, and all of our federal government performance contracts since 1984.

Under this process, NORESCO will provide complete pricing transparency during the IGEA, including material and contractor quotes, internal costs, overhead, and profit. Once the project is signed, NORESCO still provides a fixed-price cost and the same performance guarantees as a normal performance contract, so the customer still retains the benefits of a single-source solution.

Request for Information (RFI) for Financing

NORESCO cannot, and will not, act as a Municipal Advisor on this project, as that term is defined in the Dodd-Frank Act and the regulations promulgated thereunder. NORESCO will perform construction project management and engineering services for the Town on the proposed Energy Performance Contract. As part of those services, NORESCO can transmit a request for information (RFI) to financial institutions selected by the Town, collect the responses, and transmit the responses back to the Town only. NORESCO will not provide the Town with any advice with respect to the municipal financial products or the issuance of municipal securities including advice with respect to the structure, timing, terms, and other similar matters concerning such financial products or services.

Finalize Investment Grade Energy Audit (IGEA) Report

The final IGEA report will include the following:

- Facility Profile, Including Baseline Energy Use, Energy and Water Costs, and Description of Buildings
- Savings Opportunities Summary, Including a Summary of all ECMs with Savings Calculations
- Financial Summary, Including Cash Flow Analysis
- Measurement & Verification Plan

NORESCO Compensation

NORESCO has not been paid for any of its work to date. Per our Audit Agreement with the Town, NORESCO will only be paid the audit fee if an Energy Services Agreement (ESA) is executed. If the Town decides not to execute an ESA, then NORESCO will not receive any compensation for its work, and NORESCO will retain ownership of its work product.



NORESCO's compensation if an ESA is executed, in addition to the audit fee, will include NORESCO's fees for services (i.e., design, project management, commissioning, training), and mark-ups for overhead and profit. NORESCO's fees and mark-ups were submitted with our response to the RFP.

Execute Energy Services Agreement (ESA)

The Town is in the process of securing the services of an outside legal firm with experience on Energy Services Agreements. This agreement will incorporate all of the Terms & Conditions for the construction of the project, including the detailed scopes of work for the recommended ECMs, the Guaranteed Cost Savings, the Measurement & Verification (M&V) Plan, and the roles and responsibilities for NORESCO and the Town.

Guaranteed Cost Savings

The ESA will contain the guarantee language confirming that savings will meet or exceed all project-related costs within the term of the contract. NORESCO will conduct annual performance inspections and review findings with the Town to confirm the guarantee has been met, while noting any deficiencies in project performance. If there is a shortfall, NORESCO will write a check to the Town in the amount of the shortfall. All savings in excess of the guarantee each year belong to the Town; we do not carry over excess savings from one year to the next. This ensures that the cost of debt service and ongoing services are fully paid for from the savings in each year of the contract.

Our guarantee is backed by a 30-year reputation for long-term performance. Our guarantee is also backed by a sound, financially strong company that provides the optimum level of confidence to enter into a long-term performance contracting partnership. In addition, NORESCO is backed by our Fortune Top 50 parent company, UTC, with superior financial strength and credit.



APPENDIX A:

EntelliChoice[®] SUMMARY OF ALL ECMs INVESTIGATED



	by NORESCO Recommended ECM Not Recommended Installation Price	UNDERN HUD INVESTIG	COMMANN ELEMAN	RIMIN HOM	BUTTON MUTURIA	COMPANY NAME	Samples and Samples	Kuna Hull France	LUDI LUDI LUDI	RADING ENTRY -	FURIH ALE CONTRACT	Man Dunn Frank	Room COMM	
1	Lighting Improvements & Controls	\$1,234,034	\$273,255	\$157,006	\$510,383	\$456,114	\$265,068	\$181,952	\$397,662	\$391,127	\$57,802	\$105,784	\$48,535	\$4,078,722
2	New Energy Efficient Condensing Boilers	\$1,351,128		\$435,552				\$396,641	\$528,854			\$596,962		\$3,309,137
3	Packaged AC Units		\$81,512											\$81,512
4	Energy Management System Upgrades	\$552,633	\$316,000		\$109,176	\$400,066	\$195,557	\$96,579	\$260,096	\$117,574		\$100,778	\$57,387	\$2,205,846
5	Weatherization & Insulation	\$55,586	\$29,009	\$13,174	\$7,332	\$7,732	\$7,346	\$10,255	\$21,107	\$22,086	\$5,253			\$178,880
6	Pipe Insulation	\$35,964	\$22,250	\$39,738				\$5,635	\$13,780			\$6,019		\$123,386
7	Automated Swimming Pool Covers	\$103,218												\$103,218
8	Plug Load Controls	\$42,630	\$13,027	\$7,186	\$30,415	\$13,284	\$14,134	\$10,419	\$12,757	\$12,222			\$576	\$156,650
9	Walk-In Cooler Controls	\$28,834			\$16,162	\$19,069	\$18,114		\$17,554	\$18,114			\$8,892	\$126,739
10	Kitchen Hood Controls	\$209,131			\$49,401	\$49,401				\$57,635				\$365,568
11	High Efficiency Transformers	\$307,009			\$237,742				\$40,756					\$585,507
12	Energy Conservation Through Behavior Change	\$4,691	\$4,691		\$4,691	\$4,691	\$4,691	\$4,691	\$4,691	\$4,691				\$37,530
13	High Efficiency Motors and Variable Frequency Drives	\$87,604		\$4,318	\$72,712	\$75,559	\$37,420	\$10,951	\$39,578					\$328,142
14	Air Handling Unit Refurbishment	\$67,557												\$67,557
15	Chiller Variable Speed Control, Water Side Economizer, and Tower Refurbishment	\$153,308												\$153,308
16	Convert Dining Multizone Air Handler to Variable Air Volume	\$52,544												\$52,544
17	New Pool Air Handling Unit	\$463,958												\$463,958
18	Water Heater Replacement										\$19,760			\$19,760
19	HVAC Replacement											\$948,499		\$948,499
20	Geothermal Heat Pump Conversion												\$280,000	\$280,000
21	Steam to Hot Water Heating Conversion							\$918,694	\$758,066					\$1,676,760
22	Cooling Tower Replacement					\$185,583	\$250,463							\$436,046
23	Staples HS Boiler Replacement B HW Boiler	\$359,804												\$359,804
24	Steam Trap Replacement		\$72,455					\$47,425	\$47,425					\$167,305



	by NORESCO Recommended ECM Not Recommended Projected First Year Savings	LANDA HANNA	COMMUNICATION COMPANY	NUMI HUM	BUDDEN NUTRINIA	COMMAN NUMBER	Canal Can	KWWW HUN ENNIN	LUDI LUDI ENVIRON	LUNDON COMPANY	FIM HIDDRAW	Man Dunn Ence	RAMIN COMM	, /
1	Lighting Improvements & Controls	\$92,998	\$21,274	\$7,301	\$39,335	\$33,305	\$24,195	\$15,352	\$33,758	\$35,491	\$5,922	\$7,546	\$5,244	\$321,721
2	New Energy Efficient Condensing Boilers	\$50,894		\$10,930				\$5,200	\$13,100			\$18,100		\$98,224
3	Packaged AC Units		\$1,154											\$1,154
4	Energy Management System Upgrades	\$115,234	\$17,906		\$11,969	\$13,484	\$11,918	\$14,263	\$15,513	\$16,694		\$6,493	\$7,798	\$231,272
5	Weatherization & Insulation	\$3,735	\$2,530	\$672	\$426	\$547	\$475	\$1,564	\$1,501	\$2,145	\$329			\$13,924
6	Pipe Insulation	\$2,123	\$1,699	\$943				\$304	\$1,488			\$116		\$6,673
7	Automated Swimming Pool Covers	\$22,234												\$22,234
8	Plug Load Controls	\$9,393	\$3,259	\$2,887	\$3,462	\$1,383	\$953	\$1,362	\$1,293	\$986			\$145	\$25,123
9	Walk-In Cooler Controls	\$1,835			\$762	\$1,504	\$905		\$821	\$828			\$410	\$7,065
10	Kitchen Hood Controls	\$10,724			\$2,342	\$1,584				\$3,710				\$18,360
1	High Efficiency Transformers	\$28,174			\$20,168				\$3,042					\$51,384
12	Energy Conservation Through Behavior Change	-	-		-	-	-	-	-	-				-
13	High Efficiency Motors and Variable Frequency Drives	\$16,698		\$825	\$6,151	\$9,353	\$1,719	\$635	\$6,091					\$41,472
L4	Air Handling Unit Refurbishment	\$4,503												\$4,503
15	Chiller Variable Speed Control, Water Side Economizer, and Tower Refurbishment	\$14,784												\$14,784
16	Convert Dining Multizone Air Handler to Variable Air Volume	\$5,115												\$5,115
17	New Pool Air Handling Unit	\$11,068												\$11,068
18	Water Heater Replacement										\$2,400			\$2,400
19	HVAC Replacement											\$3,895		\$3,895
20	Geothermal Heat Pump Conversion												\$19,600	\$19,600
21	Steam to Hot Water Heating Conversion					-		\$11,300	\$28,800					\$40,100
22	Cooling Tower Replacement					\$3,700	\$4,900							\$8,600
23	Staples HS Boiler Replacement B HW Boiler	\$14,054												\$14,054
24	Steam Trap Replacement		\$7,301					\$8,158	\$13,749					\$29,208



	by N C RESCO Recommended ECM Not Recommended Simple Payback	Contract - And Contract	Company and a	RIADI HAR	ELECTION AND AND AND AND AND AND AND AND AND AN	COMPANY AND	San Line (Kanan-Hold Egeneration	LUDI LUDI ENTRY	Internal Contraction	FURTH CONTRACT	Man David France	Robert Contract	
1	Lighting Improvements & Controls	11.0	10.9	19.5	10.9	11.6	8.9	10.0	9.8	8.9	7.8	12.0	7.5	10.6
2	New Energy Efficient Condensing Boilers	25.1		38.5				75.0	39.4			32.8		32.6
3	Packaged AC Units		68.7											68.7
4	Energy Management System Upgrades	3.1	15.3		6.8	27.3	14.2	4.4	14.1	4.7		14.8	5.1	7.6
5	Weatherization & Insulation	12.1	9.1	19.2	14.8	11.5	13.1	4.3	11.4	7.9	13.7			10.4
6	Pipe Insulation	14.1	10.7	42.1				15.9	7.1			51.9		16.4
7	Automated Swimming Pool Covers	3.0												3.0
8	Plug Load Controls	2.9	2.6	1.6	6.8	7.6	12.8	5.8	8.0	10.4			2.6	4.6
9	Walk-In Cooler Controls	13.5			19.2	10.6	18.0		19.5	19.9			20.0	15.9
.0	Kitchen Hood Controls	17.0			18.9	28.8				13.3				17.5
.1	High Efficiency Transformers	8.7			9.8				11.5					9.3
2	Energy Conservation Through Behavior Change													
3	High Efficiency Motors and Variable Frequency Drives	3.4		3.3	9.8	6.0	19.7	15.4	4.6					6.0
.4	Air Handling Unit Refurbishment	12.9												12.9
.5	Chiller Variable Speed Control, Water Side Economizer, and Tower Refurbishment	8.1												8.1
6	Convert Dining Multizone Air Handler to Variable Air Volume	7.9												7.9
7	New Pool Air Handling Unit	40.9												40.9
.8	Water Heater Replacement										6.3			6.3
.9	HVAC Replacement											243.5		243.5
20	Geothermal Heat Pump Conversion												13.3	13.3
21	Steam to Hot Water Heating Conversion							80.0	25.4					40.8
22	Cooling Tower Replacement					49.1	50.1							49.7
23	Staples HS Boiler Replacement B HW Boiler	24.0												24.0
24	Steam Trap Replacement		9.9					5.8	3.4					4.0



APPENDIX B: BUILDING-BY-BUILDING BREAKDOWN



STAPLES HIGH SCHOOL

Project Overview



Recommended ECMs

Savings: \$310,488 Net Payback: 6.5 years Price: \$2,629,222

LXXXXXXXXXX IX XXXXXXX XXXXXX X CXXXXXXXX	
$E\overline{XXMX}M\overline{XX}$	EXMMX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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All Identified ECMs

Savings: \$403,566 Net Payback: 10.8 years Price: \$5,109,633

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:



BEDFORD MIDDLE SCHOOL

Project Overview



Recommended ECMs

Savings: \$81,511 Net Payback: 9.8 years Price: \$972,451

EXXXXXX MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	EXXXXXX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

All Identified ECMs

Savings: \$84,615 Net Payback: 10.2 years Price: \$1,038,014

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:



COLEYTOWN MIDDLE SCHOOL

Project Overview



Recommended ECMs

Savings: \$58,072 Net Payback: 14.3 years Price: \$957,446

EXXXXXX MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	EXXXXX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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All Identified ECMs

Savings: \$64,860 Net Payback: 16.6 years Price: \$1,211,499

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

KIMMANA HANN CANMAN



COLEYTOWN ELEMENTARY SCHOOL

Project Overview



Recommended ECMs

Savings: \$53,969 Net Payback: 11.7 years Price: \$730,687

EXXXXXX MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	EXMMX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

All Identified ECMs

Savings: \$55,123 Net Payback: 12.9 years Price: \$812,199

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:



GREENS FARMS ELEMENTARY SCHOOL

Project Overview



Recommended ECMs

Savings: \$39,260 Net Payback: 11.2 years Price: \$524,216

EXXXXXX MXXXXXXX XXXXXXXXX X XXXXXXXX	EXXMX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
	$H_{XXXX}^{XXXXX} M_{XXXX}^{XXXX} M_{XXXX}^{XXXX} M_{XXXX}^{XXXX} F_{XXXXXXXXX}^{XXXXXXX} D_{XXXXXX}^{XXXXXX} D_{XXXXXXX}^{XXXXXXXX} D_{XXXXXXXX}^{XXXXXXXXXX} D_{XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX$		

All Identified ECMs

Savings: \$45,065 Net Payback: 15.7 years Price: \$792,793

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

M MANAN CANANA CANANAN



KING'S HIGHWAY ELEMENTARY SCHOOL

Project Overview



Recommended ECMs

Savings: \$41,638 Net Payback: 7.1 years Price: \$367,907

LXXXXXXXXX IX XXXXXX XXXXX CXXXXXXX	
EXXMX MXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXX	EXXMX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
	$H_{M}^{M}(X) \times H_{M}^{M}(X) \times H_{M}^{M}(M) \times H_{M}^{M}($

All Identified ECMs

Savings: \$49,980 Net Payback: 30.9 years Price: \$1,635,817

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:



LONG LOTS ELEMENTARY SCHOOL

Project Overview



Recommended ECMs

Savings: \$76,435 Net Payback: 9.2 years Price: \$837,852

EXXXXXX MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	EXMMX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
	HXXXXEXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

All Identified ECMs

Savings: \$105,407 Net Payback: 18.2 years Price: \$2,094,901

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

	$\square \square $	



SAUGATUCK ELEMENTARY SCHOOL

Project Overview



Recommended ECMs

Savings: \$55,316 Net Payback: 7.7 years Price: \$547,700

EXXXXXX MXXXXXXX XXXXXXXXXXXXXXXXXXXXXX	EXXXXXX CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		

All Identified ECMs

Savings: \$59,854 Net Payback: 8.3 years Price: \$623,449

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:



FIRE HEADQUARTERS

Project Overview



Recommended ECMs

Savings: \$8,651 Net Payback: 7.6 years Price: \$82,815

All Identified ECMs

Savings: \$8,651 Net Payback: 7.6 years Price: \$82,815

All Recommended ECMs as shown above.



POLICE DEPARTMENT

Project Overview



Recommended ECMs

Savings: \$7,546 Net Payback: 12.0 years Price: \$105,784

All Identified ECMs

Savings: \$36,150 Net Payback: 48.0 years Price: \$1,758,042

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

EXXXXXX MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX



SENIOR CENTER

Project Overview



Recommended ECMs

Savings: \$13,187 Net Payback: 6.0 years Price: \$106,498

All Identified ECMs

Savings: \$33,197 Net Payback: 10.5 years Price: \$395,390

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

TOWN HALL





Recommended ECMs

Savings: \$4,384 Net Payback: 4.6 years Price: \$24,678

All Identified ECMs

Savings: \$23,558 Net Payback: 26.4 years Price: \$656,974

All Recommended ECMs as shown above. ECMs below that are not recommended at this time:

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APPENDIX C: RATE ESCALATION SCENARIOS



ELECTRIC POWER RATE ESCALATION VERSUS NATURAL GAS MARKET SCENARIOS

2014

INTEGRATED RESOURCES PLAN FOR CONNECTICUT

PREPARED BY:

THE CONNECTICUT DEPARTMENT OF ENERGY

AND ENVIRONMENTAL PROTECTION

Figure 27¹⁴⁸¹⁴⁹ Connecticut Customers' Power Supply-Related Costs

Average Annual Costs (¢/kWh)



Electric Power Rate Escalation Versus Natural Gas Market Scenarios

Connecticut Department of Energy & Environmental Protection 2014 Integrated Resource Plan

Connecticut Customers' Power Supply Related Costs

Base Case					
Vear	# /1-11/h		% Increase		
real	4/ K1VII	2012-2017	2017-2019	2019-2024	2012-2024
2012	8.80	3.7%			
2017	10.43		7.4%		
2019	12.76			1.3%	
2024	13.61				5.5%

High Gas					
	¢/kWb	% Increase			
	*/ K1VII	2012-2017	2017-2019	2019-2024	2012-2024
2012	8.80	5.0%			
2017	11		7.7%		
2019	13.53			2.1%	
2024	14.95				7.0%

Low Gas					
	#/hWb	% Increase			
	4/ K1VII	2012-2017	2017-2019	2019-2024	2012-2024
2012	8.80	1.7%			
2017	9.55		7.6%		
2019	11.73			0.5%	
2024	12.01				3.6%

Abundant Supply					
	¢/kWh	% Increase			
		2012-2017	2017-2019	2019-2024	2012-2024
2012	8.80	3.6%			
2017	10.37		-1.8%		
2019	9.81			7.6%	
2024	13.56				5.4%

Tight Supply					
	¢/kWh	% Increase			
		2012-2017	2017-2019	2019-2024	2012-2024
2012	8.80	4.0%			
2017	10.56		8.5%		
2019	13.25			1.4%	
2024	14.18				6.1%



ENERGY ESCALATION PROJECTION

The U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP) recommends use of the Energy Escalation Rate Calculator (EERC) [available at: <u>http://energy.gov/eere/femp/energy-escalation-rate-calculator-download</u>]. The State of Connecticut Department of Administrative Services also references the use of federal government guidelines to determine utility rate escalations in its contract templates.

Uses Annual Energy Price Forecast of the:

- Energy Information Administration (EIA)
- U.S. Department of Energy (DOE)
- National Institute of Standards and Technology (NIST)
- EERC uses a weighted average escalation rate based on the savings for each fuel type

Based on the recommended measure package, using a 1.5% inflation rate, the projected Annual Escalation Rate for the recommended measure package would be 4.64%. We are using a more conservative rate of 3.25%.

EERC			- • • ×			
File Help						
Percent of Energy (Cost Savings					
	Fuel Type	Weight (%)				
	Coal	0				
	Distillate Oil	0				
	Electricity	76				
	Natural Gas	24				
1	Residual	0				
	Total	100				
Location: CT Sector: CT Commercial						
Performance Perio	d					
	Start Date: Duration:	2017 ▼				
Carbon Pricing Poli	су					
Po	licy Option: No ca	rbon price	•			
Annual Energy Escalation Rate						
	Inflation Rate (%	1.50				
	Real:	3.09				
	Nominal:	4.64				