

**FINANCE COMMITTEE AGENDA
February 1, 2016**

Immediately Following Government Operations Committee

1. Consent Agenda

- a. Fuel Update

2. Bids/Purchasing

- a. Backhoe/Loader – Public Services – Nortrax - \$110,000 (net life cycle cost of \$57,000)
- b. Engineering Services – Engineering – Woodard & Curran - \$21,905

3. Bond Order

4. Scoping Audit – Large Customer Energy Efficiency Program

5. Executive Session – 1 MRSA Section 405 6 (E) - Contract Negotiations

To: Finance Committee
From: Debbie Cyr
Date: January 21, 2016
RE: Update on Diesel Fuel Contracts – FY 2017

On November 9, 2015, the City Council adopted Order 16-003, recommended by the Finance Committee, to allow staff to execute fixed rate pricing contracts with the City's current fuel suppliers for purchases through June 30, 2017. The Order indicated that if fixed rate contracts were executed the Finance Committee would be updated.

The City and school purchase in excess of 300,000 gallons of diesel from Dysart's annually. The price per gallon in January 2014 was \$3.40, in January 2015 was \$2.13 and through June 30 2016 it is \$2.1054.

On December 7, 2015, the Committee was updated that a contract for 72,000 gallons of diesel for delivery July 2016 – September 2016 at a price of \$1.7796 per gallon had been executed.

On January 21, 2016, the Finance Director executed a contract for 225,000 gallons of diesel for delivery October 2016 – June 2017 at a price of \$1.5056 per gallons.



CITY OF BANGOR AWARD RECOMMENDATION

BID ITEMS: Backhoe/Loader

DEPARTMENT: Public Services

BUDGET AMOUNT: 75,000 **AMOUNT OF AWARD:** 110,000

ACCOUNT NUMBER: 7709-91001100

VENDOR(S) RECOMMENDED: Nortrax

Past Experience with Vendor : **Excellent** **Good** **Fair**
 Poor **None**

OTHER COMMENTS:

The above purchased is the continuation of the City's life-cycle costing practice for certain pieces of equipment. The City purchases the equipment and the vendor provides a guarantee to purchase the equipment back at a fixed price. This unit will replace a current unit that was acquired as a life-cycle purchase. The "buy back" amount on the current unit is \$35,000 - instead of "selling" back to vendor this unit will be sold to the WWTP as it is a very competitive price for the current condition of the unit (this was anticipated and included in the FY 16 approved budget). Staff recommendation is to award the contract to the low life cycle cost bidder Nortrax with a purchase price of \$110,000, a guaranteed buy back of \$53,000 for a net life cycle cost of \$57,000. As the purchase exceeds \$100,000 this contract will require City Council approval.

City of Bangor
 Bid Tabulation
 Bid No.: B16-023: Backhoe/Loader
 Bid Opening: 01/20/16

Item	Description	Northland JCB Lewiston, ME	Milton Cat Brewer, ME	Nortrax Hermon, ME
1	Backhoe/Loader	\$115,295.00	\$110,000.00	\$110,000.00
2	Guaranteed maximum total cost of repairs for 5yrs/4000 hrs	\$0.00	\$7,000.00	\$0.00
	Subtotal:	\$115,295.00	\$117,000.00	\$110,000.00
3	Less guaranteed buy back amount at end of 5yrs/4000hrs	\$41,500.00	\$47,000.00	53,000.00
	Total "Life Cycle" Bid Amount:	\$73,795.00	\$70,000.00	\$57,000.00
	Year/Make/Model	2016 JCB 3CX 14HFCE	New 2015 Caterpillar 420F2 ST	2016 John Deere 310SL
	Estimated Delivery Time After Receipt of Order	60 days	1-Mar-16	None Given

To: Finance Committee
From: Engineering Department, John Theriault
Date: January 29, 2016
Re: Engineering Design Services for Trail V – Sylvan Road to Stillwater Avenue

The Bangor Land Trust recently donated \$22,000 to the City of Bangor to fund the final design of Trail V. This money was provided to the Bangor Land Trust through grants from the Elmina B. Sewall Foundation and the Stephen and Tabitha King Foundation. The intended purpose of these grants was to assist in the funding for the design and construction of the proposed trail.

The schematic design of Trail V proposes a 12 foot wide paved multi-use trail that begins at the end of Sylvan Road and follows alongside the north bound off ramp of Exit 186 of I-95 and terminates at Stillwater Avenue. The total length of the proposed multi-use trail is approximately 2,300 feet (0.44 miles). The engineering firm of Woodard & Curran completed the schematic design for Trail V back in 2011. This project was administered and funded by the Bangor Area Comprehensive Transportation System (BACTS).

With the Bangor Land Trust's recent donation, they are wishing to facilitate the design of the Trail 5 project in hopes of providing additional motivation for the Maine Department of Transportation (MaineDOT) to provide construction funding for this project. The Engineering Department has discussed the proposed Trail V project with MaineDOT and have been told that the proposed Trail has been approved for funding once MaineDOT themselves have been allocated the funding. MaineDOT anticipates that the Trail may receive funding as soon as 2017. The funding for construction of the Trail will require a 20 percent local match to secure the MaineDOT funds.

During the past year, the Engineering Department has been discussing the Trail project with the Bangor Land Trust, MaineDOT, Maine DEP, and Woodward & Curran to evaluate the best way to move the design forward while accounting for potential environmental impacts.

The Engineering Department recently requested that Woodward & Curran provide a proposal to furnish additional engineering services to complete the final design of the Trail. Woodward & Curran's fees for final design services for the Trail are \$21,905.

A summary of the services included with their proposal are as follows:

1. Complete a topographic survey sufficient to allow us to determine the grades and limits of work for the project.
2. Add control to the project drawings for the Contractor's use laying out the trail.
3. Confirm right of way limits and needs.
4. Prepare cross sections.
5. Prepare technical specifications.
6. Coordinate with the City to gather front-end specification requirements.
7. Prepare front-end bid specification.
8. Internal QA/QC of 90% bid documents.
9. Revise as needed to complete 95% review documents.
10. Perform quantity take-offs and prepare opinion of probable cost.
11. Provide 95% review documents and opinion of probable costs to the City & MDOT.
12. Meet with the City & MDOT to discuss feedback and plot out future path (permitting, bidding, construction, etc.).
13. Incorporate City & MDOT feedback.
14. Provide Final Bid specification.

With Woodard & Curran's past design experience with this project as well as their continued involvement with the project during the past year, I believe that they will be able to provide the City of Bangor and the Bangor Land Trust with the most value for the funding dollars that have been donated for this project.

The Engineering Department requests that the Finance Committee waive the bid process and accept this proposal from Woodard & Curran for final design services for the Trail V project.

To: Finance Committee
From: Debbie Cyr
Date: January 28, 2016
RE: SRF Bond Order

Attached is a proposed bond order that would authorize up to \$2,145,000 in State Revolving Loan Fund borrowing for improvements at the Wastewater Treatment Plant (WWTP). With the completion of the recent consent decree, certain projects initially anticipated to be completed in FY 16 have been delayed while staff and the WWTP's engineering firm (AECOM) complete a long term control plan to refine the near and long term infrastructure needs within the system.

The City has recently received engineered construction pricing from AECOM on the bio media replacement for the Plant. Until now, the City only had a very preliminary cost for this work which was used as a place holder for the future improvement. In addition, the public notice for the initial bond SRF contained a transposition error, so in order to correct, this order includes an additional \$90,000. The three projects that will be funded by the SRF borrowing this coming year are the bio media replacement at the WWTP, the Court Street sewer and stormwater separation, and the Hammond Street sewer main improvements.

The SRF program was created in 1987 by the Clean Water Act. The Environmental Protection Agency (EPA) provided all states with the seed money to capitalize this revolving loan fund. SRF funding is typically at below market rates, but does carry additional State administrative costs and processes. In addition, all bidding must comply with federal regulations such as; Davis Bacon wage rates, DBE and WBE participation, and Buy American. Borrowing through this program is most cost effective for larger combined sewer overflow type projects. Current interest rates for 20 fixed rate borrowings from the SRF program are approximately 1%. The issuance of the bonds will likely occur after the bidding process has concluded to ensure that only the necessary amount of debt is issued.

COUNCIL ACTION

Item No. 16-xxx

Date: February 8, 2016

Item/Subject: Order, Authorizing a Loan in the Amount of \$2,145,000 from the Maine Municipal Bond Bank State Revolving Fund, and the Issuance of the City's General Obligation Bonds and a Tax Levy Therefor

Responsible Department: Finance

Commentary:

The attached Order would authorize a loan in the amount of \$2,145,000 from the Maine Municipal Bond Bank State Revolving Fund (SRF) and the issuance of the City's general obligation bonds. These funds would be used fund the bio media replacement project that was recently discussed by the Infrastructure Committee.

The SRF program was created in 1987 by the Clean Water Act. The Environmental Protection Agency (EPA) provided all states with the seed money to capitalize this revolving loan fund. SRF funding is typically at below market rates, but does carry additional State administrative costs and processes. In addition, all bidding must comply with federal regulations such as; Davis Bacon wage rates. Borrowing through this program is most cost effective for larger combined sewer overflow type projects.

Department Head

Manager's Comments:

City Manager

Associated Information:

Order

Budget Approval:

Finance Director

Legal Approval:

City Solicitor

Introduced for

- Passage
- First Reading
- Referral

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To: Finance Committee
From: Debbie Cyr
Date: January 29, 2016
RE: Scoping Audit – Efficiency Maine Large Customer Program

Efficiency Maine offers free scoping audits to a select group of business that have the potential of developing a project as part of the Large Customer Program. Scoping audits provide an opportunity for a business to get a professional consultation on a facility's specific energy needs and identify cost-effective energy efficiency projects that will reduce operating expenses. Attached please find the City's recently completed scoping audit prepared by ERS Inc.

The Large Customer Program provides several advantages, it typically contains higher incentives, provides incentives for improvements beyond those in the Efficiency Maine's business program and allows customers to bundle projects to meet the program requirements. In addition, it allows for the higher level of incentives on typical business program prescriptive measures, when that program is closed, as it currently is.

The audit resulted in the identification of three significant lighting projects that the City should consider pursuing, with an average payback of under five years. Additional measures are also characterized that would save a mixture of fuel and electricity, but would need further development by a contractor or city engineer to estimate their potential energy impacts. Please keep in mind that the cost estimates are not based on contractor bids for our facility, but rather ERS's experience from costs for other facilities such that actual measure costs could vary significantly from these estimates. ERS representatives would be more than happy to review this report in more detail for the Committee or Council.

Staff is seeking authority to submit an application to the Efficiency Maine Large Customer Program for the three lighting projects at a minimum. The Cross Insurance Center and Fire Department lighting projects are currently only eligible for funding under the Large Customer Program as the business program is currently closed. When the business program reopens, these two projects will not qualify for the higher incentives under the Large Customer program. By submitting the application now, the City would be eligible for the higher incentive even once the business program reopens. The funding of these projects can be reviewed as part of the City's upcoming FY 17 budget process or potentially may be funded earlier from other sources.

Scoping Audit Report

prepared for

City of Bangor

Maine

audit sponsored by



audit prepared by

Jesse Remillard, Project Engineer II

ERS. Inc

January 19, 2016

EXECUTIVE SUMMARY

The purpose of this report is to present the results of an energy efficiency scoping audit conducted by Efficiency Maine on the primary facilities owned and operated by the City of Bangor: the Cross Insurance Center (CIC), the Bangor International Airport (BIA), the Fire Department (FD), and the waste water treatment plant (WWTP). Efficiency Maine worked with contacts at each facility to identify the best opportunities for near-term implementation and additional opportunities for future energy efficiency measures (EEMs).

A comprehensive scoping audit, performed by Honeywell in 2009, identified numerous EEMs across nearly all of the city's facilities. It is understood that most of the measures recommended at that time were implemented, from control upgrades to de-stratification fans and mechanical retrofits. To Bangor's benefit, this has reduced the number of opportunities available, but technology advancements, operational changes, and overlooked areas have revealed cost effective measures.

The primary EEMs that have been identified are lighting retrofits at the CIC, BIA, and FD. In the last few years, the entry of major lighting manufacturers to the light-emitting diode (LED) market has driven prices down drastically such that LEDs now represent a significant opportunity for demand reduction as a retrofit from fluorescents. A summary of the Efficiency Maine findings are shown in Table 1.

Table 1. Summary of Energy Efficiency Measures

Measure Description	Energy Savings (kWh/yr)	Peak Demand Reduction (kW)	Cost Savings (\$/yr)	Installation Cost	Estimated Efficiency Maine Incentive	Simple Payback (Yrs) ¹
Lighting Measures						
EEM-1: CIC lighting retrofit	217,625	105.8	\$26,115	\$150,000	\$60,935	3.4
EEM-2: BIA exterior runway lighting retrofit	638,337	11.3	\$76,600	\$608,700	\$178,734	5.6
EEM-3: FD lighting retrofit	114,877	21.5	\$13,785	\$70,000	\$32,166	2.7
Lighting totals	970,840	138.7	\$116,501	\$828,700	\$271,835	4.8
Other Measures						
EEM-4: FD rooftop unit (RTU) retrofits	5,829	14.6	\$699	\$8,000 ²	\$1,632	9.1
EEM-5: WWTP blower automation	38,132	4.4	\$4,576	TBD	TBD	TBD
Other measure totals	44,188	19	\$5,303	\$8,000	\$1,632	6.2
All measure totals	1,015,028	158	\$121,803	\$836,700	\$273,467	5.0

¹Simple paybacks are calculated with the Efficiency Maine incentive included

²Cost represents incremental cost between a baseline unit and a high efficiency unit

TBD = To be determined

The potential EEMs are discussed in detail in the following sections. Other EEMs that do not have a known impact at this stage but are believed to be cost-effective are also outlined for further investigation and consideration. The savings and costs for these measures are

estimates and are based on a preliminary investigation of the systems. The simple paybacks were calculated using an electric cost of \$0.12 per kWh. An American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) level 2 energy audit would need to be conducted to provide a more definitive assessment of the savings and costs associated with each measure.

FACILITY DESCRIPTION AND ENERGY USE

The four facilities under consideration each have different uses and equipment; these will be outlined in the following subsections.

Cross Insurance Center

The CIC, located at 515 Main Street, was built in 2013. At that time, LEDs were just becoming a cost-effective option, and the CIC installed the majority of its lighting as indoor fluorescents and high intensity discharge (HID) outdoor fixtures, such as metal halides (MHs), all of which represent a energy savings opportunity.

Because the building is so new, well-designed, and equipped with variable frequency drives (VFDs) where appropriate and an advanced HVAC control system, no EEMs other than the lighting were identified. This was anticipated based on preliminary conversations with the site contact, Mr. Joe Imbracio.

Bangor International Airport

BIA is a joint civil-military public airport owned and operated by the City of Bangor. The airport, which serves approximately 462,000 passengers per year, recently completed many of the energy efficiency upgrades recommended by Honeywell; however, opportunities still exist. The primary opportunity BIA is interested in, is the upgrade of the exterior lighting on the runway, or airside of the terminal buildings. This includes LED retrofits of runway, taxiway, high mast area lighting, and exterior wall packs.

Fire Department

The Bangor FD has three buildings: Central Fire on Main Street, 168 Hogan Road, and 11 Griffin Road. Central Fire is the largest (23,000 sq ft of floor space) and the oldest (built in 1978) of the three. It represents the best opportunities for energy savings and was therefore the focus of the scoping audit site visit. The facility at 168 Hogan Road is a small building of around 6,000 sq ft with minimal occupancy and energy loads; the facility at 11 Griffin Road was recently built to Leadership in Energy and Environmental Design (LEED)-certified standards and includes features such as lighting occupancy sensors and mini-split heat pumps. Despite being LEED-certified, 11 Griffin Road has T-5 fluorescent lighting and represents an opportunity for an LED retrofit.

The primary energy loads at all three FD facilities are heating, ventilation, and lighting. Central Fire and 11 Griffin Road are both occupied continuously. Additional loads include laundry and specialty ventilation equipment both for drying the fire hoses after use and for the fire truck engine exhaust while warming up in the garage.

Waste Water Treatment Plant

The Bangor WWTP campus has an administration building with offices and processing controls, an operations building housing primary pumps and belt presses, and an aeration building housing the blowers. The aeration process is fine-bubble and driven primarily by one 100 hp blower with an additional 100 hp blower as backup. Two 60 hp blowers add capacity when needed. The current blowers are controlled manually via inlet guide vanes. The facility staff report that for the majority of the facility’s operating loads, one 100 hp blower serves their needs, and during high load periods a 60 hp blower is brought online.

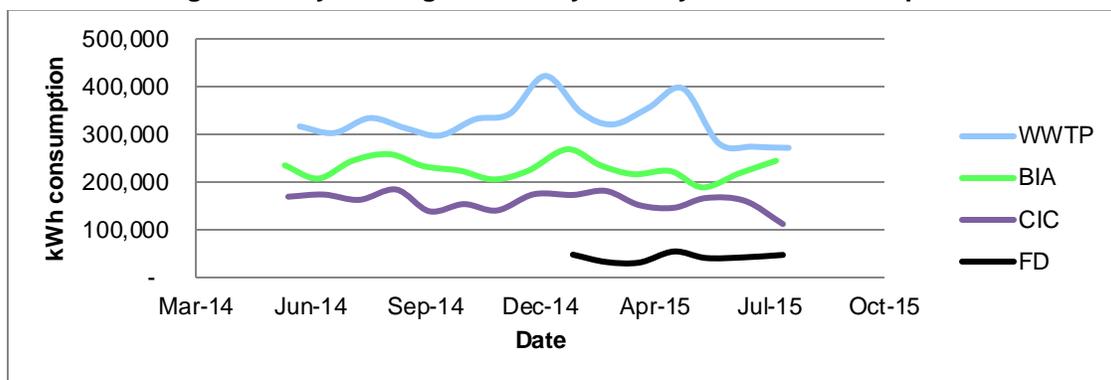
Because the city personnel work standard office hours, the blowers are left in steady state positions during weekends and nights regardless of incoming effluent loads. This typically results in far more aeration than is needed, which implies excess energy consumption from the blowers.

During the site visit it was also noticed that the operations building was constantly ventilated. Because this space houses the incoming effluent, ventilation is required to limit the levels of airborne contaminants/toxins. The current operation does not include sensors to detect levels of contaminants to moderate the outdoor air ventilation. To guarantee employee safety, the building operates with more air changes, and therefore more energy consumption, than it would need to with the use of sensors, controls, and alarms.

Summary of Facility Electric Usage

The metered electric for 2014–2015 are presented in Figure 1. A full data set was not available for the FD, and the data shown represents the sum of the Central Fire and 11 Griffin Road facilities.

Figure 1. City of Bangor – Facility Monthly Electric Consumption



ENERGY EFFICIENCY MEASURE DETAILS

Five EEMs were identified across the CIC, BIA, FD, and WWTP facilities. The proposed lighting scope spans the CIC, BIA, and the FD facilities. Each EEM is outlined individually for each facility in the following sections.

EEM-1: Cross Insurance Center Lighting Retrofit

The rapid development of LED lighting technology has resulted in significant opportunities for energy savings, even in relatively new facilities like the CIC, where relatively efficient linear fluorescent technology is in place. Table 2 shows the auditors' estimate of the fixture counts and types.

Table 2. Cross Insurance Center Interior and Exterior Approximate Fixture Counts

Lighting Fixture	Quantity	Existing
Stadium lights	62	1,000 W MH
Up lights	74	250 W MH
Pendants	18	T-5
Down lights	250	32 W CFL
Large down lights	50	50 W CFL (not confirmed)
Hanging CFL	18	T-5 and small LED
Back area hanging CFLs	22	Six lamp 32 W CFL fixture
Parking lot lights	40	400 W MH
Pole area lights	39	250 W MH
Wall packs	4	150 W MH

If this measure is pursued, we recommend contacting a lighting energy service company to visit the facility, inventory the existing lighting stock, and provide a proposal for a turnkey project including, the equipment procurement and installation, proper disposal of the removed equipment, and overall project management.

EEM-2: Bangor International Airport Exterior Runway Lighting Retrofit

BIA has hundreds of airside exterior lighting fixtures on the runway to guide airplanes taking off and landing. This exterior lighting operates from the dusk until dawn each day. Additionally, this lighting operates during daylight hours when required because of inclement weather conditions, as per the Federal Aviation Administration (FAA)¹. Table 3 summarizes the proposed scope of work.

Table 3. EEM-2 Scope of Work

Lighting Fixture	Quantity	Existing	Proposed
Runway centerline	227	(2) 48 W quartz halogen	ADB L850A FAA-approved LED
Runway touchdown	180	(1) 48 W quartz halogen	ADB L850B FAA-approved LED
Runway edge	130	120 W quartz halogen	ADB L862 FAA-approved LED

¹ Operation during daylight hours is at the discretion of the control tower (FAA, not BIA). However, the lights are typically on during daylight hours when the cloud ceiling is less than 1000 ft or horizontal visibility is less than 3 nautical miles.

Lighting Fixture	Quantity	Existing	Proposed
Taxiway edge	320	45 W quartz halogen	ADB L860 FAA-approved LED
High mast lighting	130	1000 W high pressure sodium (HPS)	LED high mast
Wall packs	6	150 W HPS	LED wall pack
Wall packs	6	250 W HPS	LED wall pack

An LED retrofit of these fixtures would generate energy savings and reduce the maintenance and costs associated with replacing the existing halogen quartz lamps. The fixtures proposed for the runway and taxiway lights are manufactured by ADB and are approved for their intended use by the FAA. These specialty fixtures are not listed on the Design Lights Consortium (DLC) list of approved LED fixtures, but this is to be expected because of their niche application; there is no DLC category for runway lights.

The auditor used the information provided by the BIA on the existing fixture quantities and technologies and a energy savings calculator from the manufacturer to estimate the savings associated with the runway and taxiway LED retrofit. Astronomical data on civil twilight start (dusk) and civil twilight end (Dawn) for Bangor was used to calculate the annual run-time hours. In addition, typical meteorological year weather data was reviewed to determine the average number of daylight and peak demand period hours per year during which the lights would operate because of inclement weather conditions².

The estimated project cost is based on the values provided by BIA for the runway and taxiway lights and on historical cost data for the high mast and wall pack fixtures. The annual electric savings are based on estimates and assumptions. A detailed lighting audit should be performed to identify costs and savings for this EEM.

EEM-3: Fire Department Lighting Retrofit

All three buildings that compose the Bangor FD use fluorescent lighting indoors and HID fixtures outdoors. Retrofitting the outdoor HID fixtures with LED fixtures can dramatically reduce the total kW load represented by those fixtures and is typically very cost-effective. Even highly efficient fluorescent lighting retrofitted to LED has been shown to be cost-effective and would be especially effective at the Central Fire facility, where fixtures are manually controlled and the building is continuously occupied. The energy savings in Table 1 were estimated by counting the fixtures and assuming values for the existing wattages and were based on experience from previous lighting retrofits, assuming an equivalent LED fixture wattage.

² Operation during daylight hours is at the discretion of the control tower (FAA, not BIA). However, the lights are typically on during daylight hours when the cloud ceiling is less than 1000 ft or horizontal visibility is less than 3 nautical miles.

EEM-4: Fire Department Rooftop Unit Retrofits

Fire Chief Tom Higgins, who is responsible for managing all three FD buildings and their crews, reports that the FD's priority related to these facilities is retrofitting the Central Fire RTUs, which were installed when the building was built more than 30 years ago. While the RTUs are functional, the technology has progressed immensely and these units now represent substantial energy losses. They provide air conditioning only, and the energy savings were calculated by assuming an existing efficiency and a proposed efficiency that would have met Efficiency Maine Prescriptive Program requirements before the incentives for such equipment were suspended combined with the published equivalent full-load cooling hours for this region.

EEM-5: Waste Water Treatment Plant Blower Automation Controls

The primary measure identified and discussed with the WWTP is installing automated blower controls to allow the automatic adjustment of the blowers to regulate the aeration process in response to dissolved oxygen (DO) levels in the waste water. Amperage and DO levels were provided for a trended period of 58 days, spanning periods from January, February, July, and September. This data indicates that the average DO in the aeration tanks over the trended period is 5.3 mg/L, which is well above the 1.5–2 mg/L that represents ideal operating conditions. This indicates that the aeration being provided is well in excess of what is required and represents a savings opportunity by regulating the blower and DO levels more closely. The energy savings were estimated by considering the industry rules of thumb against the savings achieved for the same measure at other WWTP facilities and the amount of energy being consumed by the blowers.

ADDITIONAL ENERGY EFFICIENCY MEASURES

The following measures were identified but were not explored due to time and budget constraints. These measures could be investigated at a later date by an appropriate contractor or re-addressed during a detailed audit. Some measures are specifically

Cross Insurance Center De-stratification Fans

During the site visit, the CIC was observed to have very high ceilings (20'-30'), and limited implementation of de-stratification fans. De-stratification fans work by pushing down and mixing hot air that has risen due to density in rooms with high ceilings. Rooms with very high ceilings can often have air temperature differences of 10-20°F between the floor and ceiling. Because the coldest air temperatures are at the floor where the occupants are, without fans, the facility will end up wasting fuel to heat air near the ceiling of the rooms. De-stratification fans have been shown to be a very cost effective measure and they are available in different sizes and shapes.

Waste Water Treatment Plant Operation Building Ventilation Controls

During the site visit it was observed that the operation building's ventilation system was running excessively. The installation of sensors to monitor the air quality and controls to automatically regulate the ventilation could provide significant fuel and electrical energy savings.

Waste Water Treatment Plant Lighting Retrofit

It was also observed that the exterior lighting was mostly outdated MH lighting and that most of the interior lighting was T-8 fluorescents. While the lighting is not expansive enough to represent a large opportunity, retrofits of MHs and T-8 fluorescents have been shown to be cost-effective.

Bangor International Airport Heating System

The airport personnel report that a fair amount of the offices use electric resistance heaters to maintain comfort levels despite the distribution of steam radiators. By converting to a distributed hot water system or implementing cold weather-rated heat pumps, the airport could drastically reduce the cost of heating these spaces. An interim solution could be to implement a steam trap maintenance plan, which could help to alleviate issues with the current heating system and improve overall heating efficiency.

Bangor International Airport Rooftop Unit #6 Retrofit

The airport staff report that they would like to replace the oldest rooftop unit (RTU), RTU #6. It was indicated that a proposal has been received for the cost of \$140,000 to \$160,000 for the replacement of this unit. RTU technology has progressed significantly in the last 10-20 years with improvements driven by energy and building code advancements. Significant energy savings could be achieved through the replacement of this unit, the level of which would depend heavily on the existing unit's use and loading.

Bangor International Airport High Speed Hanger Doors or Infrared Heating

The airport staff indicate that the facility includes a number of hangers, some with very large doors for entry and exit of aircraft. These doors are often left open for long periods of time due to the length of time it takes them to open or close. One solution may be to investigate the availability of high speed hangar doors. Another potential efficiency measure, depending on the space heating equipment for these spaces, could be infrared heaters. Infrared heaters work by heating objects in the space rather than the air. This increases the efficiency of heating and occupant comfort especially in spaces with high levels of outdoor air ventilation.

Bangor City Hall Window Replacements

The Bangor City Hall currently has approximately 83 single pane, double hung wooden windows. The city has asked about the efficiency opportunity of replacing these windows. While generally not considered to be a highly cost effective measure, under certain conditions window replacements can be cost effective and meet program requirements.

A recently approved project under the Efficiency Maine Green House Gas Program saw window replacements proposed at a college campus. The college was able to obtain quotes for Energy Star rated windows installed at \$385 per window including disposal of the old windows. These windows proved to be cost effective. Other windows, for historically significant buildings, were proposed at approximately \$800 per window installed. In this case, the windows were not cost effective.

Depending on the level of air infiltration through the existing windows, initial calculations indicate the City Hall could achieve energy savings of 10% to 15% of their existing fuel consumption through replacement of all existing windows. Based on these preliminary findings, this measure would be cost effective from a program standpoint and potentially eligible for incentive funding through the Green House Gas Program, if the costs were less than \$550 per window installed.

Bangor City Hall Heating System Retrofit

The existing heating system for the Bangor City Hall is steam based, and the city has no maintenance plan for the radiators located throughout the building. Staff reports that the traps are checked only when issues of noise, water leakage, lack of heat, or too much heat are reported. Retrofitting poorly maintained steam heating systems with hot water baseboard type heat distributions systems can achieve significant energy savings on the order 10% to 30% of overall building fuel consumption. This measure could be eligible for incentive support through the Green House Gas Program.

CONCLUSIONS

The Efficiency Maine scoping audit has identified multiple opportunities for energy savings at the City of Bangor facilities. Potential groupings of measures that the scoping audit identified that could qualify for large customer incentive funding are:

- Lighting retrofits at BIA with or without the CIC and FD contributions
- Lighting retrofit at BIA with or without contributions of lighting scope from CIC, WWTP blower automation, or FD RTU retrofits

Efficiency Maine welcomes this opportunity to work with the City of Bangor and is at their disposal to assist with submitting an application covering any combination of the measures proposed. The next steps for implementing any of these measures are to make contact with a qualified partner who is familiar with the Efficiency Maine program in order to develop a scope of work, cost, and final estimated energy savings.

I would like to discuss at your earliest convenience plans for implementing any or all of the above measures. I will reach out to you by Monday Jan 25 to discuss next steps. Please feel free to contact me in the interim with any questions.

Jesse Remillard, PE

Office Direct: 207.358.7046

[Jremillard@ERS-INC.com](mailto:jremillard@ERS-INC.com)

APPENDIX 1: SITE VISITS AND DATES COMPLETED

Site Visit Location	Date	Participants
WWTP	9/1/2015	Brad Moore Keefe Cyr Richard Doughty Jesse Remillard
CIC	9/24/2015	Joe Imbracio Jesse Remillard
City Hall	9/24/2015	Debbie Cyr Jesse Remillard
BIA	10/7/2015	Tony Caruso Robbie Beaton Nick Collins Jesse Remillard
FD	10/13/2015	Tom Higgins Jesse Remillard