

Interim Report for the Town of Falmouth

LED Streetlighting Conversion

Revision 4

February 14, 2018

O-0512

Primary Contact

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February 14, 2018

The Town of Falmouth
271 Falmouth Road
Falmouth, ME 04105

Dear Mr. Poore,

We have conducted a preliminary analysis of your street light system to reflect the proposed upgrade to LEDs based on the Field Audit Data collected. The street light upgrade, not including the addition of the 33 new LED light locations, stands to provide approximately 80% in yearly operating cost savings.

The estimated total project cost is approximately \$475,455 (including acquisition cost from Central Maine Power), with a projected payback of 5.2 years (excluding 33 new Lights). The enclosed interim report includes an analysis based on preliminary LED replacements, however, the project cost and savings presented in this report will be finalized during the completion of the Investment Grade Audit.

This revision of the report includes a detailed breakdown of project costs, return on investment, and operating cost savings summarized by Fixture type and ownership. In addition, we included Section 3.2 Site Specific Luminaire Replacements to include images that illustrate the luminaires in Scope (Before and After LED Streetlight upgrade).

We look forward to moving your project to the next phase. We will arrange for a conference call to discuss the contents of this report in the next few days, but until then please feel free to contact us should you have any questions.

Yours truly,



Sean Neely, President
sneely@realtermenergy.com

1. EXECUTIVE SUMMARY

Title		Town of Falmouth LED Street Light Conversion			
		Central Maine Power	Town	New LED Luminaires	Total
Technical/ Environmental Assessment	Ownership				
	Baseline	500 HID ⁽¹⁾ Cobrahead fixtures, 93 HID Decorative fixtures 593 HID fixtures Total demand: 57.7 kW Annual energy consumption: 245,972 kWh Annual operating hours: 4,260	74 HID Decorative fixtures 9 HID Flood lights 83 HID fixtures Total demand: 13.1 kW Annual energy consumption: 55,785 kWh Annual operating hours: 4,260	N/A. Addition of 33 new LED Cobrahead Luminaires	500 HID ⁽¹⁾ Cobrahead fixtures, 167 HID Decorative fixtures 9 HID Flood lights 676 HID fixtures Total demand: 70.8 kW Annual energy consumption: 301,757 kWh Annual operating hours: 4,260
	Technology Employed	Smart ready LED Fixtures	Smart ready LED Fixtures	Smart ready LED Fixtures	Smart ready LED Fixtures
	Technology Provider(s)	Acuity Brands	Acuity Brands	Acuity Brands	Acuity Brands
	Technical Specifications	7-PIN, Smart ready fixtures Color temperature: To be determined Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: To be determined Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: To be determined Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: To be determined Average life ≥ 100,000 hours
	Fixture Warranty	10 years	10 years	10 years	10 years
	Annual Energy Savings	165,250 (67%)	36,074 (65%)	N/A	201,323 (67%)
Financial Assessment	Financing Scheme	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)
	LED Streetlight Upgrade Project Cost	\$298,542 (\$503.40 per fixture)	\$86,578 (\$1,043.10 per fixture)	\$25,315	\$385,120 (\$410,435 including new Lights)
	Acquisition Cost ⁽²⁾	\$65,020	\$0.00	\$0.00	\$65,020
	Total Project Cost	\$363,562	\$86,578	\$25,315	\$450,140 (\$475,455 including new Lights)
	Project Reference Period ⁽³⁾	23 Years	23 Years	23 Years	23 Years
	Payback Period	4.6 Years	13.5	N/A	5.2 Years ⁽⁴⁾

(1) High Intensity Discharge

(2) Acquisition Cost from Central Maine Power, included for analysis purpose only

(3) The Maine PUC uses 29 years when establishing SL and SE Rates. 23 Years is used in this report as the Luminaire life is 100,000 hours divided by the Operating Hours.

(4) Payback period does not consider the addition of 33 new lights.

2. GPS MAPPING

RealTerm Energy conducted a complete GIS inventory of the Town of Falmouth's street lights and used the information derived from this review to develop a detailed picture of Falmouth's current street lighting network which includes the following:

- Accurate count of all fixtures and fixture types
- Wattage of each existing fixture
- Length of fixture arms, fixture heights, setbacks from roadway, pole spacing, etc.
- Exact GPS coordinates
- Road classifications
- Utility pole ID numbers (when available)

A detailed breakdown of the revised lighting inventory, obtained from the GIS/GPS audit is presented below:

2.1. GIS/GPS Inventory (Actual)

OWNERSHIP		TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
COBRAHEAD FIXTURES					
CMP		Cobrahead - HPS - 50W	65	213	13.8
CMP		Cobrahead - HPS - 70W	95	207	19.7
CMP		Cobrahead - HPS - 100W	130	59	7.7
CMP		Cobrahead - HPS - 150W	195	19	3.7
CMP		Cobrahead - HPS - 250W	300	1	0.3
CMP		Cobrahead - HPS - 400W	465	1	0.5
		Subtotal (Cobrahead)		500	45.7
DECORATIVE FIXTURES					
CMP		Decorative - Victorian Lantern Post Top - 100W	130	93	12.1
Town		Decorative - Bell Downlighting - 100W	130	37	4.8
Town		Decorative - Bell Downlighting - 175W	210	2	0.4
Town		Decorative - Box Top - 100W	130	3	0.4
Town		Decorative - Box Top - 150W	195	11	2.1
Town		Decorative - Box Top - 175W	210	13	2.7
Town		Decorative - Box Top - 50W	65	3	0.2
Town		Decorative - Other Post Top - 100W	130	5	0.6
Town		Floodlight - 150W	195	9	1.8
		Subtotal (Decorative)		176	25.2
TOTAL				676	70.8

3. PRELIMINARY LED REPLACEMENT INVENTORY

Our team has developed an initial LED assessment for illustrative purposes. For any assumptions made regarding the inventory ownership, please refer to Section 5: *Calculation Assumptions*, of this report. For the analysis presented, we have used Acuity Brands LED fixtures with comparative light outputs for all existing HPS fixtures recorded in the inventory. This analysis is only a starting point and demonstrates the energy savings that are possible using LED technology while deploying industry standard roadway practices.

3.1. LED Replacements (one-for-one)

OWNERSHIP	TYPE	WATTAGE	QTY	DEMAND (kW)
Town	19W_ATBS-A-MVOLT-RX-3K-MP-NL-P7-AO	19	157	3.0
Town	31W_ATBS-C-MVOLT-RX-3K-MP-NL-P7-AO	31	284	8.8
Town	40W_ATBS-E-MVOLT-RX-3K-MP-NL-P7-AO	40	38	1.5
Town	60W_ATBS-H-MVOLT-RX-3K-MP-NL-P7-AO	60	20	1.1
Town	164W_ATBM-H-MVOLT-RX-3K-MP-NL-P7-AO	164	1	0.2
Subtotal (Cobrahead - Retrofit)			500	14.6
OWNERSHIP	TYPE	WATTAGE	QTY	DEMAND (kW)
Town	31W_ATBS-C-MVOLT-RX-3K-MP-NL-P7-AO (New Luminaires)	31	32	1.0
Town	60W_ATBS-H-MVOLT-RX-3K-MP-NL-P7-AO (New Luminaires)	60	1	0.1
Subtotal (Cobrahead – New Luminaires)			33	1.1
Subtotal (All Cobrahead)			533	15.7

OWNERSHIP	TYPE	WATTAGE	QTY	DEMAND (kW)
Town	25W_Acuity_ATB0	25	3	0.1
Town	36W_Acuity_ATB0	36	13	0.5
Town	48W_Acuity_ATB0	48	2	0.1
Town	87W_Acuity_ATB0	87	12	1.0
Town	79W_Acuity_ACPOLED	79	9	0.7
Town	60W_Acuity_HPLED	60	1	0.1
Town	51W_Acuity_MSPL2	51	39	1.9
Town	46W_Acuity_247CL	46	97	4.5
Subtotal (Decorative)			176	8.9
TOTAL			709	24.6

3.2. Site Specific Luminaire Replacements

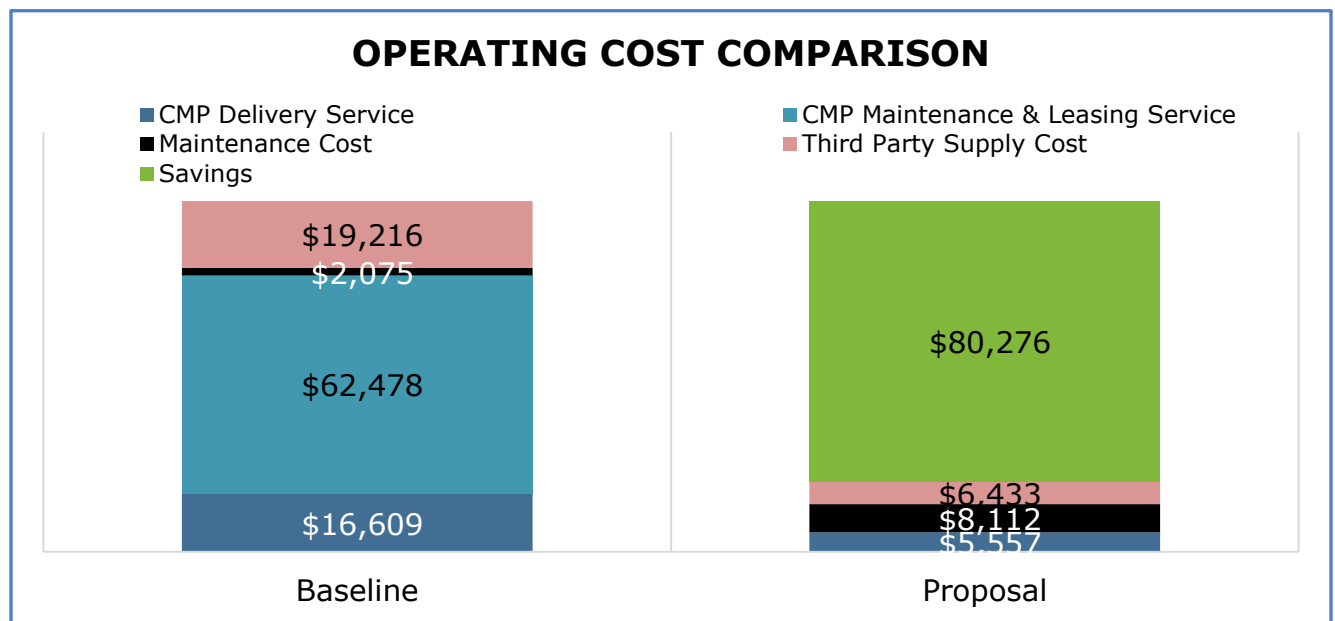
Type	Qty	Replacement	Before	After
Cobraheads				
Cobrahead	499	Acuity ATBS		
Cobrahead	1	Acuity ATBM		
Cobrahead	33	Acuity ATBS	New Luminaire	
Box Tops				
Box Tops	30	Acuity ATB0		
Floodlight	9	Acuity ACP0LED		

Type	Qty.	Replacement	Before	After
Post Tops				
Post Top	97	Acuity 247CL		
Other Decorative	1	Acuity HPLED		
Bell Downlights				
Bell Downlights	39	Acuity MSPL2		

3.3. Expected Savings

CURRENT STATUS	BEFORE UPGRADE	POST UPGRADE ⁽¹⁾	VARIANCE	PERCENT
Number of Fixtures	676	676		
Annual Electricity Consumption (kWh)	301,757	100,434	201,323	67%
CMP Delivery Service	\$16,609	\$5,557	\$11,052	66%
CMP Maintenance & Leasing Service	\$62,478	\$0	\$62,478	N/A
Third party Energy Supply Cost	\$19,216	\$6,433	\$12,783	66%
Town Annual Maintenance Cost	\$2,075	\$8,112	(\$6,037)	N/A
Total Street Lights Expenditures	\$100,378	\$20,102	\$80,276	80%
Average Annual Cost per Fixture	\$148	\$30	\$119	80%

(1) The above chart does not include the 33 new LED luminaires into the analysis.



3.4. Operating Costs Breakdown by Fixture Type:

Fixture Type	Qty	Pre Retrofit						Post Retrofit					Operation Cost Savings
		Energy (kWh)	Energy Supply Cost (\$0.06405/kWh)	Delivery Service Costs (\$0.055332/kWh)	Total Maintenance & leasing (CMP owned)	Estimated Total Maintenance Town Owned (\$25/Fixture)	Total	Energy (kWh)	Energy Supply Cost (\$0.06405/kWh)	Delivery Service Costs (\$0.055332/kWh)	Total Maintenance by the town (\$1/fixture/month)	Total	
Cobras Only	500	194,469	12,415	\$10,737	\$52,519	\$0	\$75,672	62,498	\$4,003	\$3,458	\$6,000	\$13,461	82%
Box Tops & floods	39	30,736	1,969	\$1,701	\$0	\$975	\$4,644	10,198	\$653	\$564	\$468	\$1,686	64%
Post Tops	98	54,272	3,405	\$2,938	\$9,959	\$125	\$16,427	19,264	\$1,234	\$1,066	\$1,176	\$3,476	79%
Bell Downlights	39	22,280	1,427	\$1,233	\$0	\$975	\$3,635	8,473	\$543	\$469	\$468	\$1,480	59%
Total	676	301,757	\$19,216	\$16,609	\$62,478	\$2,075	\$100,378	100,434	\$6,433	\$5,557	\$8,112	\$20,102	80%

* This table does not include the 33 new LED Cobrahead fixtures

4. PROJECT COSTS

In a Capital Purchase financing option, or a “Design, Upgrade and Transfer”, the Town arranges the financing of the project.

4.1. Project Costs, Savings and Investment Return

PROJECT COSTS	
Number of Fixtures	676 (709 including 33 new Luminaires)
Total Project Costs	\$385,120 (\$410,435 including 33 new Luminaires)
Acquisition Cost from CMP	\$65,020
Net Project Costs	\$450,140 (\$475,455 including 33 new Luminaires)

The total estimated project cost is inclusive of a 17% RTE margin on the costs for the procurement of fixtures and installation related charges. In addition, the estimated project cost includes a charge of \$10.50 per pole for data collection and the preparation of an Investment Grade Audit (IGA).

INVESTMENT RETURN

The estimated payback period of the project, including acquisition from Central Maine Power, before including any financing costs is **5.2 years** (excluding 33 new Luminaires).

4.2. 10 Year Cash Flow

Year	0	1	2	3	4	5	6	7	8	9	10
Initial Investment	\$475,455	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Annual Savings	\$0	\$79,345	\$81,790	\$84,309	\$86,905	\$89,581	\$92,338	\$95,179	\$98,107	\$101,124	\$104,233
Annual Net Savings	(\$475,455)	(\$396,110)	(\$314,320)	(\$230,011)	(\$143,106)	(\$53,525)	\$38,813	\$133,992	\$232,099	\$333,223	\$437,456

Annual Net Savings over 10-year

As shown above, this project is cashflow positive from the onset with significant net savings.

5. CALCULATION ASSUMPTIONS

1. The electricity consumption and cost savings were calculated based on Central Maine Power's current rates valid at the date of the preparation of this report. This information can be obtained online at Central Maine Power's pricing schedules¹. Any changes in the data obtained will change the energy consumption and cost savings depicted in this report.
2. For this analysis, the inventory ownership has been broken-down by combining a preliminary review of RealTerm Energy's GIS audit results and the existing inventory billed from Central Maine Power as shown in the table below:

Summary of Existing Inventory Ownership and Tariff		
	SL Rate Category	Quantity of Lights
Before Upgrade	SL-1 (CMP Owned)	593
Before Upgrade	SL-2 (Town Owned)	83
Post Upgrade*	SL-2 (Town Owned)	709

(*) – Includes the new luminaires

3. Existing maintenance cost is for the portion of the inventory estimated to be Town-owned (refer to Section 2: GPS Mapping). Existing HID maintenance cost (applicable only to existing Town-owned luminaires) is estimated at \$25/fixture/year.
4. Following the acquisition of the lights from Central Maine Power, Falmouth will be responsible for the maintenance cost of the new LED lighting system. Post Upgrade LED maintenance cost is estimated at \$1/fixture/month and includes only the labor cost associated with replacing failed LED fixtures and photocells during the warranty period of the products.
5. Installation cost is based on labor assumptions and is inclusive of connection and fusing as per Central Maine Power Section 53.7 Terms and Conditions for Municipal-owned street lights². Installation price includes fusing material approved by Central Maine Power. If traffic control services (Flaggers and Police details) are required, this may result in an increase in the projected installation cost.
6. For the 33 new fixtures, this interim report includes only the approximate cost of supply and installation a new 6' bracket, fuse kit, and wiring. It is assumed that the existing pole can be used to mount bracket, LED luminaire, and Photocell. At this stage, any engineering costs, additional duplex wiring, and/or connection fees by CMP have not been included. These costs, if applicable, will be assessed during the completion of the IGA.

¹ Central Maine Power Pricing Schedules: <https://www.cmpco.com/YourHome/pricing/pricingSchedules/default.html>

² Central Maine Power Terms and Conditions: Section 53 - Municipal Ownership of Streetlights: <https://www.cmpco.com/YourHome/pricing/pricingSchedules/TermsCondition.html>

7. The total project cost does not include any of the following costs:
 - Elliptical bracket replacement for retrofitted fixtures
 - Modification of fixture mounting
 - Relocation of fixtures
 - The replacement of the fixtures near high voltage wires or in the restricted zone
 - Any applicable Sales Tax
8. RealTerm Energy will work with the Town of Falmouth and Efficiency Maine in applying and obtaining any available incentives from the street light upgrade. In order to apply for the incentives, the finalized part numbers (obtained from the photometric designs) will be required. In addition, any additional important information for qualification of the incentive, for example, pole ownership, would have to be verified and confirmed.
9. The report includes acquisition cost from Central Maine Power of \$65,020. The acquisition cost is included for analysis purpose only.
10. After the first year, energy and maintenance cost's inflation rate is 3% and 2% respectively.

6. CONCLUSION AND RECOMMENDATION

RealTerm Energy recommends the Town of Falmouth initiate the process of acquiring the street light asset from Central Maine Power to parallel RealTerm Energy's finalization of your Investment Grade Audit (IGA) to speed the installation process. As depicted in this interim report, a Town-owned street light upgrade presents substantial long-term savings. Furthermore, the project can be personalized to meet the Town's needs:

1. Selection of LED manufacturer(s) and Color Temperature
2. Schedule and timing of the installation
3. LED Photometric Designs
4. Possibility to include Decorative fixtures within the program upgrade
5. Ability to incorporate LED fixtures that are smart control ready should the Town wish to incorporate controls today, or in the future

If the Town of Falmouth chooses to move forward with the Design, Upgrade and Transfer option, the total project cost, including acquisition, will approximately be \$475,455. The Town should expect a payback period of approximately 5.2 years on the retrofitted fixtures only (no new lights considered). The actual project cost and savings will be updated in your final IGA.

The next steps to start the implementation of this new technology and start seeing energy and maintenance savings are as follows:

- Meeting between the Town staff and RealTerm Energy to review Interim Report
- Acquisition of street lights from Central Maine Power
- Preparation and review of the IGA report
- Review and apply for any available incentives through Efficiency Maine

APPENDIX A: PROJECT PRICE BREAKDOWN BY FIXTURE TYPE



Project Price Breakdown:

The below table shows the project cost breakdown and the payback period.

Fixture Type	Qty	Material Costs	Installation Cost	RTE fees	Total	Acquisition Costs	Total Costs	Payback Period ⁽¹⁾
Cobrahead	500	\$63,622	\$123,296	\$47,566	\$234,485	\$55,126	\$289,610	4.4
Box Tops	39	\$10,765	\$9,617	\$4,175	\$24,557	\$0	\$24,557	7.6
Post Tops	98	\$31,877	\$24,166	\$11,479	\$67,522	\$9,894	\$77,416	5.6
Downlights	39	\$38,985	\$9,617	\$9,955	\$58,557	\$0	\$58,557	20.5
New Cobrahead Luminaires	33	\$4,212	\$16,800	\$4,304	\$25,315	\$0	\$25,315	N/A
ALL	709	\$149,461	\$183,497	\$77,478	\$410,435	\$65,020	\$475,455	N/A
<i>ALL (excluding New Lights)</i>	676	\$145,249	\$166,697	\$73,175	\$385,120	\$65,020	\$450,140	5.2

(1) Payback periods were calculated including the estimated acquisition cost from CMP (if applicable).

Note: The total project costs may increase if the fixtures are not converted in the same time due to higher mobilization and demobilization costs.

APPENDIX B: CMP OWNED LED TARIFF ANALYSIS



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Analysis of Central Maine Power LED offering

The following analysis compares the upgrade of a typical HPS street light network to LEDs through either a municipality-owned upgrade or through Central Maine Power’s (CMP) new proposed tariff offering. Both the LED upgrade options are compared versus the existing baseline of Central Maine Power owned HID (High Intensity Discharge) equipment.

Overview of Project Scenarios:

Base Case	CMP LED	Municipal LED Upgrade
HID fixtures Owned and maintained by CMP. Customer Charges: Delivery Service, Lighting Service and Supply. CMP charges as per Rate SL full service lighting.	LED fixtures Owned and maintained by CMP. Customer Charges: Delivery Service, Lighting Service and Supply. CMP charges as per new LED offered tariff.	LED fixtures owned and maintained by the municipality. Customer Charge: Cost of upgrade (including acquisition from CMP) and ongoing Maintenance is responsibility of Municipality. Energy Delivery and Supply change, as per CMP Delivery-Only Service Lighting.

Assumptions:

1. Analysis is for Cobrahead fixtures only, as CMP proposed LED tariff would currently be indicative of being applicable to Cobraheads only.
2. Energy delivery rate of \$0.05533/kWh as per CMP published rates, supply rate (third party) estimated at \$0.06405/kWh.
3. Customer owned LED maintenance estimated at \$1/fixture/month with an applied correction in year 11-20 to account for the replacement of failed fixtures and photocells following the 10-year warranty.
4. Project cost within the municipal LED upgrade includes estimated costs for: LED fixtures with photocells, fuse material, installation, Central Maine Power connection and fusing, and RealTerm Energy fees for a Turn Key LED approach. The project cost also includes the estimated acquisition cost from Central Maine Power.
5. The financing option is inclusive of a 10-year loan at 3% interest rate, paid annually.
6. This analysis excludes addition of new luminaires.

Summary of LED Upgrade Analysis – Cumulative Operating Cost and Savings

Municipality	Scenario ⁽¹⁾	10 Year – Operating Cost	20 Year - Operating Cost	10 Year – Operating Savings	20 Year – Operating Savings
Falmouth	Base Case	\$828,584	\$1,838,624	-	-
	CMP LED	\$641,655	\$1,423,829	\$186,929	\$414,795
	Municipality LED (no financing)	\$464,450	\$652,120	\$364,135	\$1,186,504
	Municipality LED (with financing)	\$518,713	\$706,384	\$309,871	\$1,132,240

Note:

- (1) – Under the Municipality LED scenario, estimated total project cost including acquisition is included in the operating savings and cost figures. The results from the table above have been summarized in the graphs displayed below.

Conclusion

While Central Maine Power’s new LED offering allows for a savings opportunity to the municipality as compared to the existing baseline, there is substantially greater savings potential from a municipality owned-upgrade. In addition, projects can be further personalized to meet the municipalities needs:

1. Selection of LED manufacturer and Colour Temperature
2. Schedule and timing of the upgrade to meet the municipality’s needs
3. LED Photometric Designs (Beyond a simple 1-1 replacement)
4. Possibility to include Decorative fixtures within the upgrade
5. Ensuring LED fixtures are smart control ready should the municipality wish to incorporate controls today, or in the future.

Graphical Summary – Cumulative Operating Cost Savings

