WELLESLEY MUNICIPAL LIGHT PLANT

Greenhouse Gas Emission Reduction
Consultant Scope of Service

Objective: To retain the services of a professional consultant to perform two detailed cost-benefit evaluations identifying viable, near term (through 2030) and long term (to 2050) opportunities available to the Wellesley Municipal Light Plant[1] ("WMLP") to reduce Greenhouse Gas[2] ("GHG") emissions.

Anticipated Award Date: December 11, 2017

2018 – 2030 Report Delivery Date: February 14, 2018

2031 - 2050 Report Delivery Date: To Be Determined

Engagement

The WMLP will be retaining a consultant with an expertise in the evaluation of GHG reduction alternatives currently available or, in the opinion of the consultant, highly likely to be available to the WMLP in the future. The end products of this engagement are two formal reports that detail a systematic reduction of GHG emissions, a strategic plan to achieve the reduction, the methodology utilized to calculate the reduction and the costs the WMLP can expect to incur from the implementation of each recommended strategy. The Wellesley Municipal Light Board ("Board") has not established specific reduction benchmarks. The Board intends to adopt a strategy based, in large part, on the recommendations contained within the final reports. At a minimum the consultant must have an expertise in the following areas:

- **Energy Conservation.** Identify programs and technologies that have a demonstrated history of success the WMLP could implement to reduce electricity usage, with a premium placed on the reduction of monthly and annual peak demand. The Board has a history of prioritizing energy conservation initiatives within the Town of Wellesley's boarders.

- **Renewable Power.** Ability to evaluate the WMLP's current power supply portfolio (Attachment B) and identify opportunities to expand renewable power sources.

- **Renewable Energy Certificates ("REC").** Understanding of Massachusetts solar and class 1 RECs and the ability to opine on the advantages and disadvantages.

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[1] The Wellesley Municipal Light Plant is a municipally-owned electric utility established and governed by Massachusetts General Law, Chapter 164; a copy of Standard & Poor's Credit Profile is included as Attachment A.

[2] Greenhouse Gas includes carbon dioxide CO_2, nitrous oxide N_2O and methane CH_4.

- **Alternative Strategies.** Identify cost-benefits of existing and future strategies including, but no limited to, battery storage, carbon sequestration investment, Smart Grid deployment, time-of-day rates, demand response, etc.

- **Increased Electrical Usage.** Identify those technologies that will increase electricity usage such as electric vehicles, geothermal installations, mini-split heat pumps and other applications.

- **Financial Modeling.** Ability to prepare complex financial models capable of predicting GHG emission reductions, associated costs and financial impact for milestone years 2020, 2025, 2030, 2040 and 2050.

Wellesley Conservation/Renewable Initiatives

The WMLP relies on Energy New England ("ENE") to fulfill all of our wholesale power requirements. Since 2008 the WMLP has offered a voluntary renewable energy option to municipal, residential and commercial customers. Based on the Environmental Protection Agency's ("EPA") ranking, the WMLP's participation rate was as high as third nationally behind only Palo Alto California and Portland, Oregon. Wellesley's current percentage of customers' participation remains in the top five at 11%. In addition, the Town of Wellesley has earned the EPA's "Green Power Community" designation every year since 2013 mainly due to the participation of Wellesley College and Babson College. There are very few opportunities for large solar installations in Town with the cost of building lots routinely reaching $1,000,000. The two largest solar installations in Town, High School (50 kW) and WMLP garage (76 kW) were both funded and are owned by the WMLP. In 2015 the WMLP also funded $115,000 in rebates resulting in the installation of 70 new roof top solar installations and 600 kW's of renewable power. For the past fifteen years the WMLP has provided residential customers with free home energy audits and appliance rebates.

The WMLP has also been the primary source of funding for municipal energy conservation initiatives. Attachment C is an itemized listing of energy conservation projects approved by the Board.

ENE Carbon Reduction Report

In September 2017 the WMLP retained the consulting services of ENE to evaluate the WMLP's carbon emission reduction from 2007 through 2017. A copy of ENE's report is included as Attachment D. The WMLP requested this report to calculate the progress made in the electricity sector in support of the Town's goal to reduce GHG emissions by 25% in 2020.

2018 - 2030 Report

The consultant's 2018 – 2030 Report is expected to be very specific with respect to available renewable opportunities in addition to the projected effectiveness of conservation initiatives and the associated costs. To be clear, general references as to the availability of future proposed off shore wind farms and Canadian Hydro projects are not

acceptable unless, in the consultant's expertise, the project has a high likelihood of achieving commercial operation, a realistic megawatt-hour ("MWH") price is known and the project(s) will be available to the WMLP. Proposed energy conservation projects also are expected to be very specific. For example, if the consultant should recommend "time-of-day" rates, the recommendation must identify the megawatt-hours (MWH) eliminated, the GHG benefits from transferring peak MWH's to off-peak hours and the cost of implementation. Identifying specific projects/strategies will be left to the sole discretion of the consultant. The WMLP understands and accepts the premise that the longer the forecast duration, the less specific recommended strategies can be. To that end, the 2020 and 2025 strategies and costs should have a fairly high degree of specificity with declining specificity through 2030.

The Board's overall expectation is the Final Report will be factually based and completely objective. The consultant is expected to approach this engagement with an open mind and present any, and all, strategies and associated costs on those industry-accepted events, technologies and availability with a high likelihood of implementation.

2031 – 2050 Report

After 2025, and especially beyond 2030, the WMLP recognizes any GHG emission reduction strategy must be based on somewhat theoretical and speculative strategies and technologies. Arguments can be made that battery storage combined with solar applications will all but eliminate electric utilities. Others may argue electric vehicles and improved geothermal efficiencies will increase electricity consumption long term. This component of the engagement will rely on the expertise of the consultant. It is possible the consultant may have a high degree of confidence the demand for electricity will increase from 2031 to 2050 and the long term strategies will reflect this supposition. Alternatively, the consultant may be undecided on the increase/decrease of electricity and provide a final 2031 – 2050 Report that covers both scenarios.

Expression of Interest/Submission of Proposals

The WMLP will be accepting proposals from qualified consultants until 2:00 PM, November 29, 2017. Proposals should include a demonstrated history of the successful completion of similar projects, references, pricing, timeline for completion and a commitment the 2018 – 2030 Report will be completed on, or before, February 14, 2018.

Proposals can be submitted via email to Richard F. Joyce, Director, at djoyce@wellesleyma.gov or via U.S. Mail:

Wellesley Municipal Light Plant
4 Municipal Way, Wellesley, MA 02481
Attn: Richard F. Joyce, Director

Questions should be directed to Richard F. Joyce via email: djoyce@wellesleyma.gov or telephone, 781-235-7601.

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STANDARD & POOR'S RATINGS SERVICES
McGRAW HILL FINANCIAL

RatingsDirect®

Summary:

Wellesley Municipal Light Plant, Massachusetts; Retail Electric

Primary Credit Analyst:
Doug Snider, Centennial 303-721-4709; doug.snider@standardandpoors.com

Secondary Contact:
David N Bodek, New York (1) 212-438-7969; david.bodek@standardandpoors.com

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Summary:

Wellesley Municipal Light Plant, Massachusetts; Retail Electric

Credit Profile		
Wellesley Mun Light Plant ICR		
Long Term Rating	AA/Stable	Affirmed

Rationale

Standard & Poor's Ratings Services has affirmed its 'AA' issuer credit rating (ICR) on Wellesley Municipal Light Plant (WMLP), Mass. The outlook is stable.

The rating reflects our view of WMLP's:

- Very strong coverage of fixed costs;
- Well-managed power supply portfolio that limits exposure to fuel-price volatility;
- Very competitive electric rates; and
- Very strong economic service area, with high incomes and easy access to the broad and diverse Boston-Lawrence-Lowell-Brockton metropolitan statistical area.

Somewhat tempering these strengths, in our view, is the utility's liquidity, which we view as just adequate for the 'AA' rating level.

WMLP's business risk profile score of '3' reflects what we believe to be a prudent and proactive management team, sound operations, a supportive state regulatory environment, and a strong competitive position. We assign business risk profiles on a scale from '1' to '10', '1' being the strongest.

The utility provides electric service to more than 10,000 mostly residential customer meters in the town of Wellesley, Mass. and other unincorporated areas. Wellesley, in Norfolk County, is a 10.5 square mile, mostly residential community, approximately 13 miles west of Boston. Although the 10 leading customers accounted for about 27% of 2015 revenue, the stability of the leading customers, most of whom are educational or financial service establishments, mitigates our concern regarding concentration. Leading customers include Babson College, Sun Life Financial Inc., and Wellesley Office Park Association.

Wealth and income levels in Wellesley are very high, in our view, at 197% of state and 240% of national household effective buying income. The unemployment rates in the town are extremely low, well below the state and national averages. For 2015 the unemployment rate was 3.5%, lower than the state's 4.9% and nation's 5.3%.

WMLP has no generation facilities of its own and purchases the majority of its power through Energy New England (ENE). For fiscal 2015 (year ended June 30), it had contracts for 95% of its power requirements, purchasing the remaining 5% on the spot market through ENE. WMLP implemented a 100% fixed-block hedging strategy in fiscal

2016 to reduce its exposure to spot market volatility. As part of the new strategy, the utility has contracted 98% of fiscal 2016, 96% of fiscal 2017, 95% of fiscal 2018, 94% of fiscal 2019, and 71% of fiscal 2020 power requirements. We understand that WMLP has kept a 30% open position for fiscal 2020 while it continues to evaluate the requirements of the Massachusetts Global Warming Solutions Act legislation. Wellesley also has a 10% entitlement (11 megawatts) in the Braintree Watson Peaking Plant. It is responsible for 10% of the payments associated with debt issued to build the plant. The entitlement runs for 20 years, a WMLP can extend for one or more five-year periods.

The utility's distribution system is well-maintained; all but one of the nine supply lines are underground (with the one exception reserved for emergency use), and all are less than 20 years old. Two of its three substations have been completely rebuilt in the past 10 years, with the third scheduled to be replaced in 2020. In addition, the utility is on track to replace all of its 33 distribution circuits over a rolling 35-year period. Management's proactive maintenance has resulted in what we view as a manageable five-year capital program, totaling $17.45 million.

We believe Wellesley's retail electric rates are very competitive. According to 2014 Energy Information Administration data, the overall rate for customers was only 81% of the state average. WMLP is conducting a cost-of-service study in 2016. However, we understand that management does not expect to change rates as a result, nor does it have any rate changes planned in the next five years.

Although deregulation became law in Massachusetts in 1997, public power systems in the commonwealth operate in a very supportive regulatory environment. They have the option to prohibit retail choice in their service area as long as they are not selling generation service to customers outside of their territory. By 2003, however, the commonwealth required public power systems that have not offered retail choice to engage in a retail choice study. Under current law, municipal entities are required to do no more than engage in a study; they are not required to open up their service area. WMLP has not opened its service area for retail choice, but we believe it is well-positioned to compete in a retail access environment given its strong financial performance, rates that are currently competitive and likely to be even more so, and good relationships with its major customers.

Unrestricted cash plus the depreciation fund (designated for capital investment, but also available for working capital purposes) provided what we view as adequate liquidity, equaling approximately 70 days' worth of operating expenses in fiscal 2015. Management expects liquidity to remain above 80 days' operating expenses over the next five years, which we also view as adequate. Projected amounts include the funding and subsequent draw-down of a $5 million rate stabilization fund, which management plans to use to absorb increased capacity costs, in lieu of rate increases.

Fixed cost coverage, which compares net income minus the payment in lieu of taxes to the town plus the capacity charge included in purchased power costs, plus both on- and off-balance-sheet debt, was 1.82x in 2015, and has exceeded 1.8x over the past five years. Management projects fixed cost coverage to drop to a just-adequate 1.15x, or 1.40x after a transfer from a rate stabilization fund, due to increased capacity costs in 2018. We expect fixed cost coverage to rise to 1.96x by 2020.

Outlook

The stable outlook indicates our expectation that WMLP will maintain strong financial metrics appropriate for the 'AA' rating.

Upside scenario

We do not expect to raise the rating during the two-year outlook period because we expect the utility will maintain fixed cost coverage in line with historical levels.

Downside scenario

If WMLP's liquidity or fixed charge coverage levels decline significantly, or if the utility does not make the rate stabilization fund transfers necessary to maintain fixed cost coverage levels, we could lower the rating.

Related Criteria And Research

Related Criteria

- USPF Criteria: Electric And Gas Utility Ratings, Dec. 16, 2014
- USPF Criteria: Methodology: Definitions And Related Analytic Practices For Covenant And Payment Provisions In U.S. Public Finance Revenue Obligations, Nov. 29, 2011
- USPF Criteria: Assigning Issue Credit Ratings Of Operating Entities, May 20, 2015
- Criteria: Use of CreditWatch And Outlooks, Sept. 14, 2009

Certain terms used in this report, particularly certain adjectives used to express our view on rating relevant factors, have specific meanings ascribed to them in our criteria, and should therefore be read in conjunction with such criteria. Please see Ratings Criteria at www.standardandpoors.com for further information. Complete ratings information is available to subscribers of RatingsDirect at www.globalcreditportal.com. All ratings affected by this rating action can be found on Standard & Poor's public Web site at www.standardandpoors.com. Use the Ratings search box located in the left column.

Wellesley Weekly Update: 10/18/2017

Annual Budget Summaries

** Updated July 25th to Include June Power Costs **			
FY 16/17	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 13,636,740	$ 13,636,740	$ -
Total MWH's	245,560	245,560	0
Total Hedged	256,869	256,869	0
% Hedged	104.6%	104.6%	0.0%
Cost / MWH	$ 55.53	$ 55.53	$ -
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 4,780,265	$ 4,780,265	$ -

** Updated September 21st to Include August Power Costs **			
FY 17/18	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 13,610,085	$ 13,610,807	$ (723)
Total MWH's	246,565	246,565	0
Total Hedged	254,493	254,493	0
% Hedged	103.2%	103.2%	0.0%
Cost / MWH	$ 55.20	$ 55.20	$ (0.00)
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 4,882,258	$ 4,881,535	$723

Calendar 2019 prices are up about $0.37 since the last report.			
FY 18/19	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 14,796,401	$ 14,799,845	$ (3,444)
Total MWH's	250,323	250,323	0
Total Hedged	258,723	258,723	0
% Hedged	103.4%	103.4%	0.0%
Cost / MWH	$ 59.11	$ 59.12	$ (0.01)
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 3,977,835	$ 3,974,391	$3,444

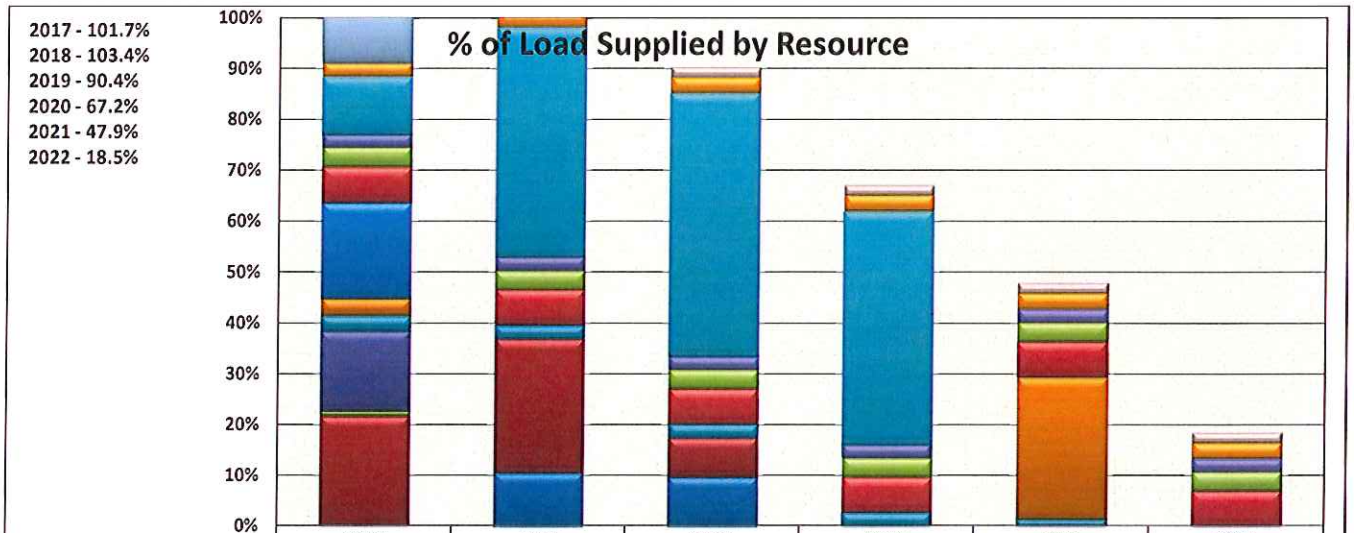
Calendar 2020 prices are up about $0.33 since the last report.			
FY 19/20	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 12,649,995	$ 12,632,337	$ 17,658
Total MWH's	251,278	251,278	0
Total Hedged	200,079	200,079	0
% Hedged	79.6%	79.6%	0.0%
Cost / MWH	$ 50.34	$ 50.27	$ 0.07
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 6,195,853	$ 6,213,511	-$17,658

Wellesley Weekly Update: 10/18/2017

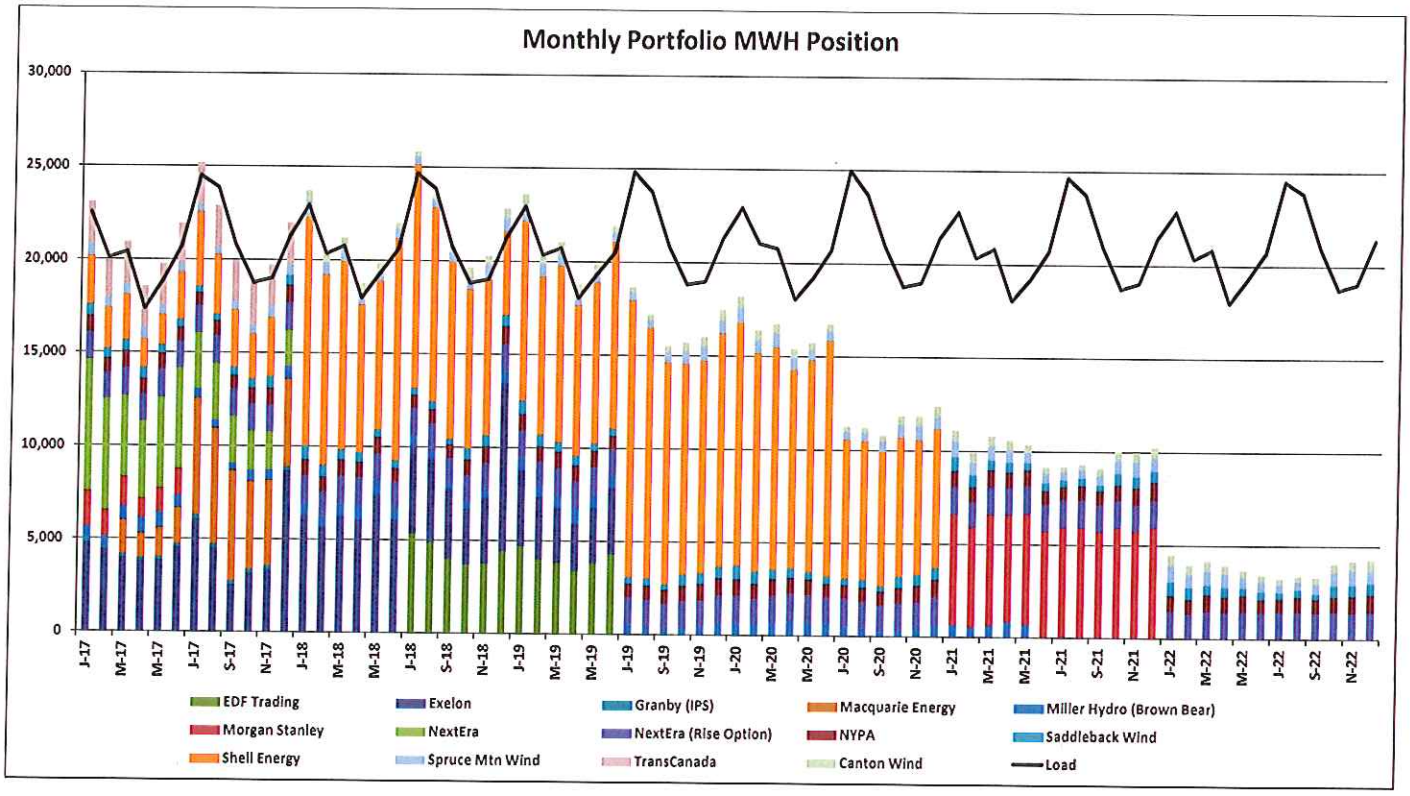
Annual Budget Summaries

Calendar 2021 prices are up about $0.3 since the last report.			
FY 20/21	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 11,798,850	$ 11,766,861	$ 31,989
Total MWH's	250,648	250,648	0
Total Hedged	131,604	131,604	0
% Hedged	52.5%	52.5%	0.0%
Cost / MWH	$ 47.07	$ 46.95	$ 0.13
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 6,999,725	$ 7,031,714	-$31,989

Calendar 2022 prices are up about $0.15 since the last report.			
FY 21/22	10/18/2017	10/11/2017	Weekly Change
Total Costs	$ 11,610,957	$ 11,584,507	$ 26,450
Total MWH's	250,534	250,534	0
Total Hedged	81,777	81,777	0
% Hedged	32.6%	32.6%	0.0%
Cost / MWH	$ 46.34	$ 46.24	$ 0.11
Target	$ 75.00	$ 75.00	$ -
Projected P&L	$ 7,179,065	$ 7,205,515	-$26,450



	2017	2018	2019	2020	2021	2022
Canton Wind	0.00%	2.09%	2.09%	2.09%	2.09%	2.09%
TransCanada	10.58%	0.00%	0.00%	0.00%	0.00%	0.00%
Spruce Mtn Wind	2.64%	3.09%	3.09%	3.09%	3.09%	3.09%
Shell Energy	11.47%	45.27%	51.71%	45.88%	0.00%	0.00%
Saddleback Wind	2.53%	2.58%	2.58%	2.58%	2.58%	2.58%
NYPA	3.80%	3.78%	3.77%	3.77%	3.78%	3.78%
NextEra (Rise Option)	7.06%	7.00%	6.99%	6.99%	7.00%	7.00%
NextEra	18.77%	0.00%	0.00%	0.00%	0.00%	0.00%
Morgan Stanley	3.45%	0.00%	0.00%	0.00%	27.98%	0.00%
Miller Hydro (Brown Bear)	3.00%	2.77%	2.77%	2.77%	1.42%	0.00%
Macquarie Energy	15.71%	0.00%	0.00%	0.00%	0.00%	0.00%
Granby (IPS)	1.08%	0.00%	0.00%	0.00%	0.00%	0.00%
Exelon	21.66%	26.33%	7.68%	0.00%	0.00%	0.00%
EDF Trading	0.00%	10.53%	9.70%	0.00%	0.00%	0.00%


Monthly Portfolio MWH Position
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EDF Trading
Exelon
Granby (IPS)
Macquarie Energy
Miller Hydro (Brown Bear)
Morgan Stanley
NextEra
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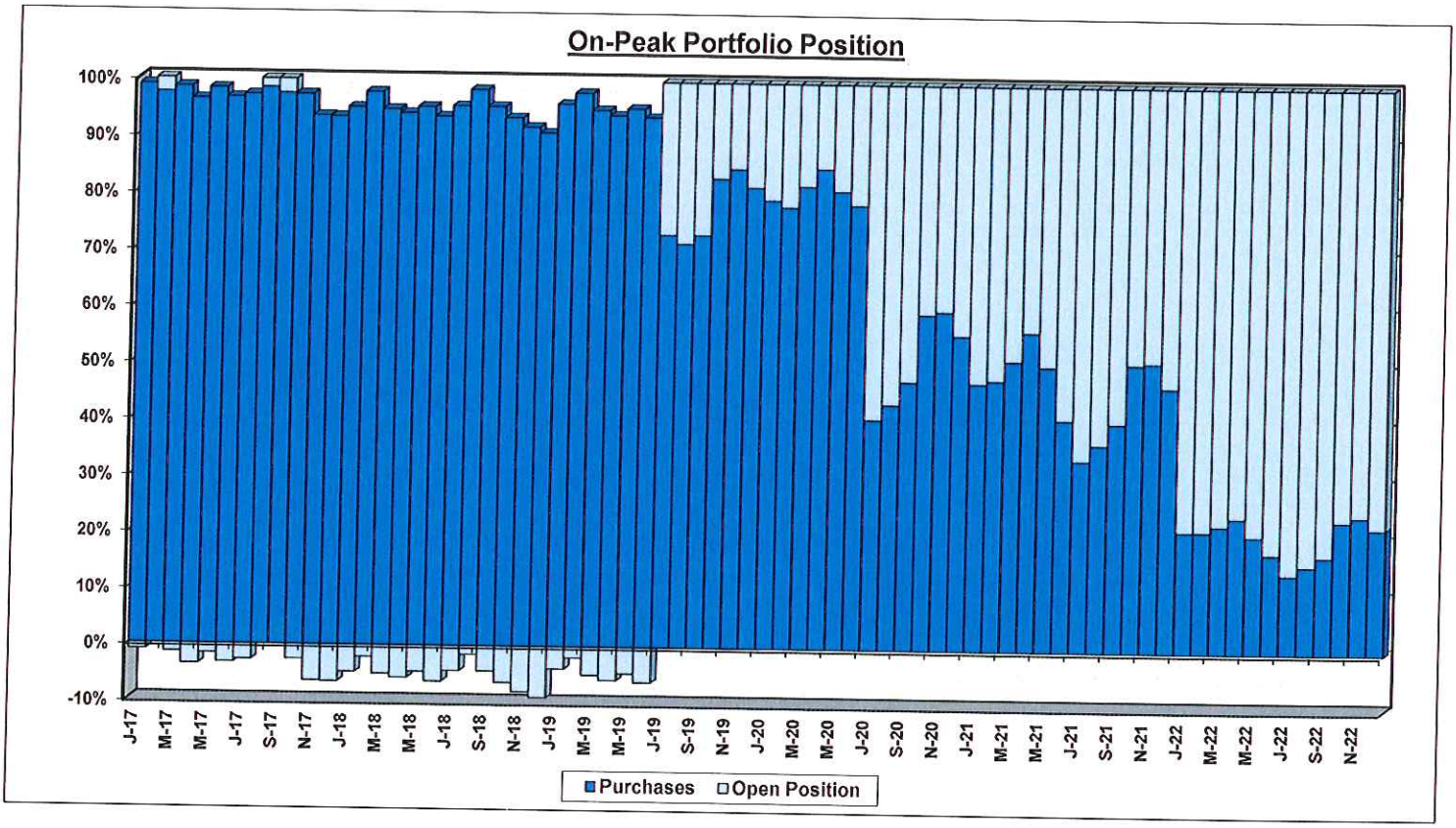
NYPA
Saddleback Wind
Shell Energy
Spruce Mtn Wind
TransCanada
Canton Wind
Load


On-Peak Portfolio Position
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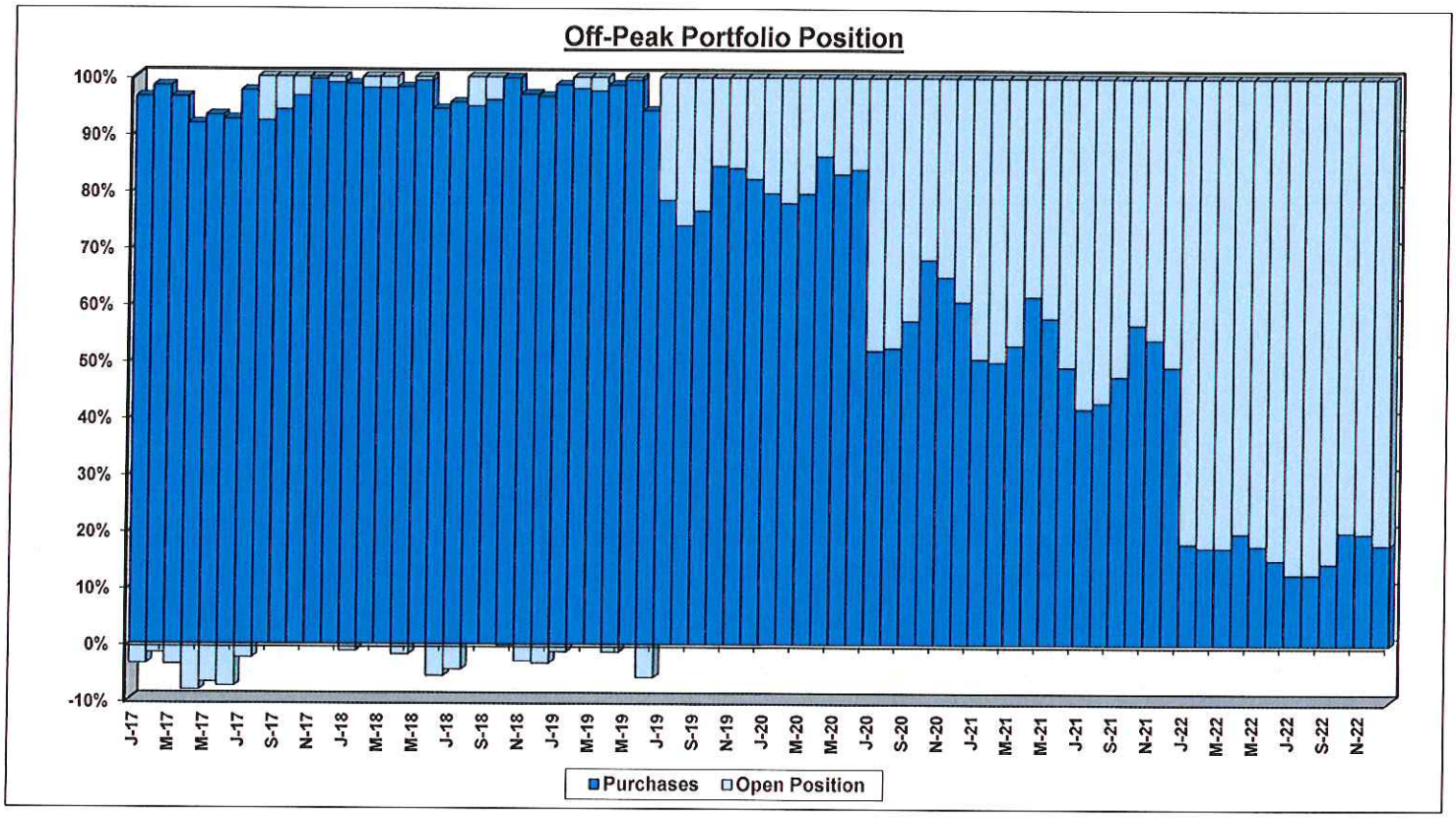
Purchases
Open Position


Off-Peak Portfolio Position
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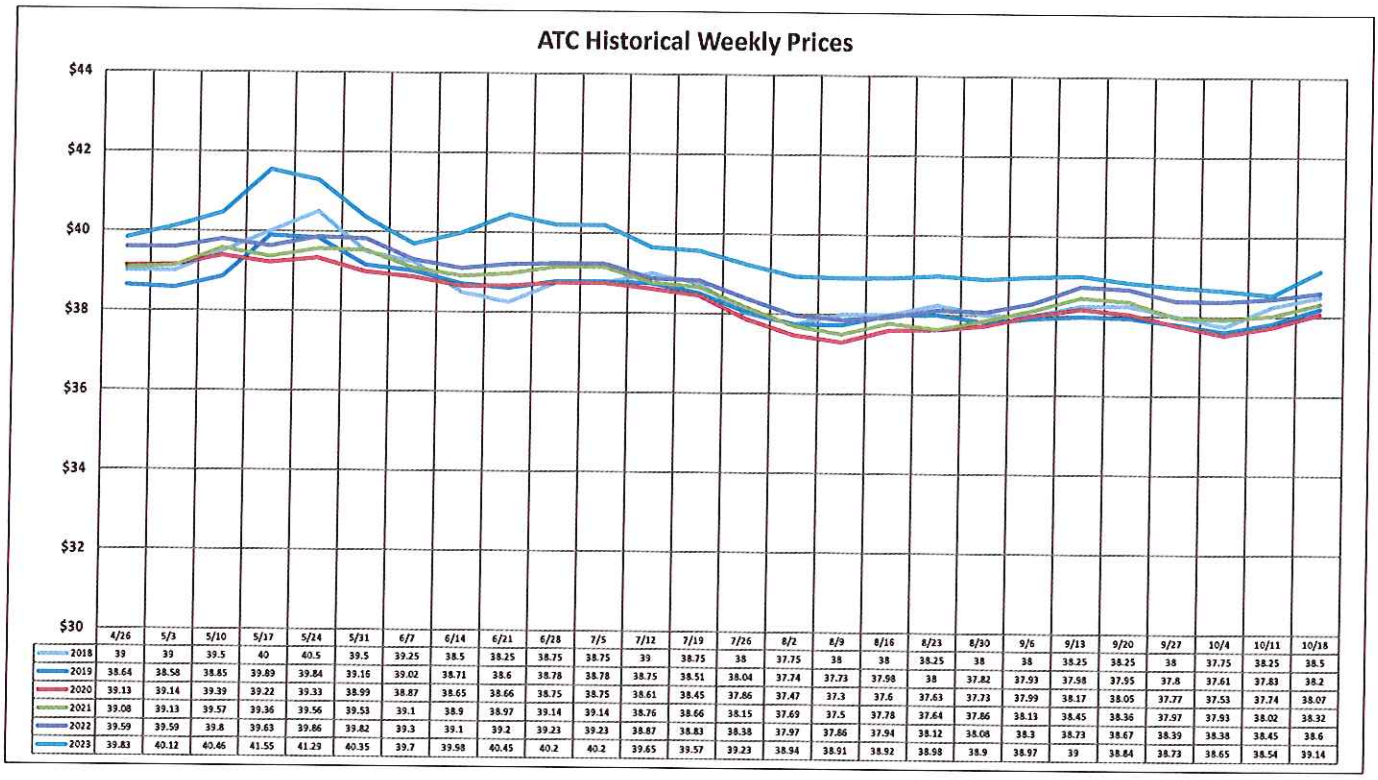
Purchases
Open Position



	4/26	5/3	5/10	5/17	5/24	5/31	6/7	6/14	6/21	6/28	7/5	7/12	7/19	7/26	8/2	8/9	8/16	8/23	8/30	9/6	9/13	9/20	9/27	10/4	10/11	10/18
2018	39	39	39.5	40	40.5	39.5	39.25	38.5	38.25	38.75	38.75	39	38.75	38	37.75	38	38	38.25	38	38	38.25	38.25	38	37.75	38.25	38.5
2019	38.64	38.58	38.85	39.89	39.84	39.16	39.02	38.71	38.6	38.78	38.78	38.75	38.51	38.04	37.74	37.73	37.98	38	37.82	37.93	37.98	37.95	37.8	37.61	37.83	38.2
2020	39.13	39.14	39.39	39.22	39.33	38.99	38.87	38.65	38.66	38.75	38.75	38.61	38.45	37.86	37.47	37.3	37.6	37.63	37.73	37.99	38.17	38.05	37.77	37.53	37.74	38.07
2021	39.08	39.13	39.57	39.36	39.56	39.53	39.1	38.9	38.97	39.14	39.14	38.76	38.66	38.15	37.69	37.5	37.78	37.64	37.86	38.13	38.45	38.36	37.97	37.93	38.02	38.32
2022	39.59	39.59	39.8	39.63	39.86	39.82	39.3	39.1	39.2	39.23	39.23	38.87	38.83	38.38	37.97	37.86	37.94	38.12	38.08	38.3	38.73	38.67	38.39	38.38	38.45	38.6
2023	39.83	40.12	40.46	41.55	41.29	40.35	39.7	39.58	40.45	40.2	40.2	39.65	39.57	39.23	38.94	38.91	38.92	38.98	38.9	38.97	39	38.84	38.73	38.65	38.54	39.14

WELLESLEY MUNICIPAL LIGHT PLANT

	MONTH	YEAR	ENERGY CONSERVATION ACTIVITY	MLP FUNDING	
1	JUN	2006	Compact fluorescent lighting retrofit Hardy School	$36,700	
2	FEB	2007	Compact fluorescent lighting retrofit Town Hall	$21,900	
3	FEB	2007	Compact fluorescent lighting retrofit Hunnewell School	$38,500	
4	MAR	2007	Compact fluorescent lighting retrofit Fire Station #2	$17,900	
5	APR	2007	Compact fluorescent lighting retrofit DPW/MLP Administrative Building	$17,500	
6	APR	2007	Retained energy efficiency expert Alan Mulak to conduct two seminars for municipal and commercial customers	$2,100	
7	JUL	2007	Replace RDF motors and infra red heaters, retrofit incandescent and metal halide lighting	$70,000	
8	NOV	2007	Offer demand side management to ten municipal buildings/facilities; three participated	$7,700	
9	JAN	2008	Sponsor/participate in "Power of One" presentation; extend invitation to all municipal departments	$0	
10	MAR	2008	Replace the inverter to re-activate High School solar panels and provide real-time data	$8,800	
11	APR	2008	Approved funding of the energy efficiency modeling for the High School	$42,500	
12	APR	2008	Approved funding of occupancy sensors at the Police Station	$16,200	
13	APR	2008	Approved funding for the retrofit of the Library parking garage	$20,000	
14	DEC	2008	Accepted Green Ribbon Committee's recommendation to change municipal utility bill format to promote conservation	$0	
15	JUL	2009	Established "Grounded Power" program at the Town Hall, Library and Middle School	$30,000	
16	AUG	2009	Initiated "Power Down" event at Town Hall; all electricity (except elevator) shut-off to demonstrate high consumption uses	$0	
17	SEP	2009	Replaced all mercury vapor and many metal halide streetlights with high pressure sodium	$34,000	
18	DEC	2009	Replaced Central Street ornamental streetlights with LED fixtures	$56,900	
19	JAN	2010	Committed to funding one half of Sustainable Energy Coordinator position	$20,000	/year
20	MAR	2010	Retrofitted 105 ornamental streetlights with LED fixtures	$56,300	
21	JUL	2010	Removed old High School solar panels and offered to all Town Departments, no interest, now ground mounted at Municipal Light Plant	$2,000	
22	JUL	2010	Awarded 50 kW solar installation on Municipal Light Plant garage	$243,400	
23	OCT	2010	MLP, Selectmen, NRC and Library sponsored "Sustainable Energy Day" for municipal and commercial accounts to communicate 10% reduction goal	$1,700	

	MONTH	YEAR	ENERGY CONSERVATION ACTIVITY	MLP FUNDING	
24	NOV	2010	Commercial grade energy audit of Town Hall	$3,900	
25	NOV	2010	Commercial grade energy audit of the Middle School	$7,000	
26	JAN	2011	Municipal Light Board agreed to fund 15 - 20 kW Middle School solar installation with the enrollment of 100 new voluntary renewable participants	$0	
27	FEB	2011	Retained solar consultant Richard Chase to provide guidance to municipal departments and non-profits	$0	
28	MAR	2011	Funded analysis to justify Middle School conversion from oil to natural gas	$500	
29	MAR	2011	Sponsored the "Wellesley Green Classroom" certification program	$500	
30	APR	2011	Retained Simpson, Gumpertz & Hager to conduct load carrying analysis for the potential solar installation on the Middle School roof	$11,000	
31	APR	2011	LED retrofit of 403 remaining ornamental streetlights	$226,500	
32	JUN	2011	Agreed to fund the 40 kW High School solar installation	$188,500	
33	JUN	2011	Initiated "Summer Cooling" campaign with the Sustainable Energy Committee and Sustainable Wellesley, MLP reached out to all Town Departments	$1,100	
34	APR	2012	Funded "Energy Mizer" installation at the Warren Building	$9,000	
35	JUN	2012	Town of Wellesley received "Green Power Community" designation from USEPA, 5% enrollment in voluntary renewable program for municipal electricity	$0	
36	JUN	2012	MLP enrolls at 100% voluntary renewable program	$24,000	/year
37	MAY	2013	Partnered with Facilities Maintenance Department to utilize MGL 25A, Section 14 to retrofit parking lot lights at Bates and Sprague ($69,000).	$0	
38	DEC	2013	MLP adopts and promotes "*LESS*" (Lights, Equipment, Supplies and Seasonal) program to all Town Departments	$0	
39	OCT	2014	Municipal Light Board authorizes LED conversion of 125 Route 9 streetlights	$116,900	
40	DEC	2015	Agreed to fund one-half of Sustainable Energy Coordinator position	$20,000	/year
41	FY	15/16	Provides fiber connectivity to Facilities Maintenance Department and other Town buildings to monitor and control energy usage	$20,000	
42	MAY	2016	Established preliminary Wellesley College and municipal load shedding program with Tangent	$4,000	
43	AUG	2016	Municipal Light Board authorizes submission of $281,000 LED grant application to retrofit 3,111 streetlights	$0	
44	OCT	2016	Municipal Light Board approved funding for the LED retrofit of the remaining 125 streetlights on Route 9	$113,800	
45	DEC	2016	Municipal Light Board Chair requests and receives Board of Selectmen partial LED funding of $105,000	$0	
46	MAR	2017	Municipal Light Board approves funding for the retrofit of the remaining 3,111 streetlights	$281,700	

Attachment D

ENE
Energy New England

Portfolio Emissions Evaluation

WELLESLEY MLP
MUNICIPAL LIGHT PLANT
DEDICATED TO EXCELLENCE

Wellesley Municipal Light Plant

Energy New England, LLC
100 Foxborough Boulevard,
Suite 110
Foxborough, MA 02035

October 31, 2017

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A. Executive Summary

The Wellesley Municipal Light Plant ("WMLP") requested that Energy New England ("ENE") compare its power supply greenhouse gas emissions from 2007 to today's portfolio. For the first three calendar quarters of 2007, WMLP was served by an "All Requirements" contract with Constellation Energy. This provided all of WMLP's needs aside from its entitlement in hydropower from the New York Power Authority, which equates to 3-4% of WMLP's annual energy needs. ENE began tracking WMLPs settlement data in the fourth quarter of 2007, and assumed the Constellation contract provided a New England Power Pool ("NEPOOL") average emission profile. We have also used average regional emissions for WMLP's current open position to the wholesale market.

ENE utilized WMLP's annual Department of Public Utilities of Massachusetts report for retail sales data as well as WMLP's Green House Gas Reports for Renewable Energy Credits (RECs) for non-emitting MWH totals. Emission rates for each year can be found in ISO-NE final emission reports for each year.[1] ENE focused on the ISO's method of average system emission rates for the CO_2. Given there are other components of GHG such as CH_4 and N_2O, EPA states "in the U.S., CO_2 emissions represent more than 99 percent of the total CO_2-equivalent GHG emissions from all commercial, industrial, and electricity generation combustion sources CO_2 emission rates."[2]

ENE's forecast not only shows WMLP increasing their renewable portfolio but also reducing energy consumption. From 2007 to 2017 the retail sales load data decreased 1.1%. The forecast for 2018 is a reduction of 2.6% from 2017. ENE assumed that WMLP's sales would decrease due to energy efficiency and solar projects. The renewable increase is due to renewable energy credit (REC) retention. Below in Table 1 ENE has made assumptions that WMLP will retain all

[1] https://www.iso-ne.com/static-assets/documents/genrtion_resrcs/reports/emission/
[2] https://www.epa.gov/sites/production/files/2016-03/documents/stationaryemissions_3_2016.pdf

the wind and hydro RECs for both 2017 and 2018. The large increase from 2017 to 2018 is the Canton Wind project beginning in 2018. With WMLP increasing their REC portfolio it has helped reduce the carbon emission for their portfolio.

Table 1 WMLP Retail Sales and REC/Attribute Retention

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sales (MWH)	246,127	242,810	236,468	243,556	239,564	243,044	247,319	243,491	245,029	238,855	243,361	237,000
NYPA	10,880	11,434	9,303	8,518	8,671	9,281	8,996	9,727	10,601	10,854	10,880	10,880
Spruce MT					372	5,736	7,276	7,664	6,629	4,171	6,557	7,740
Saddleback MT								76	1,281	3,448	6,281	6,461
Canton MT												5,239
MILLER											7,444	6,941
Less Renewable	(10,880)	(11,434)	(9,303)	(8,518)	(9,043)	(15,017)	(16,272)	(17,467)	(18,511)	(18,473)	(31,162)	(37,261)

Show below in Table 2 ENE compares CO_2 emission reduction for WMLP by assuming 100% REC retiring vs. retiring the voluntary REC program amount plus Miller RECs.

If WMLP retires 100% of all their wind and hydro RECs from 2007 to 2017 the reduction would be 25.5% and 29.9% for 2018. ENE assumed the 2016 voluntary program REC amount for 2017 and 2018. If WMLP maintains the same REC amount as the 2016 for their voluntary program plus NYPA and Miller RECs, the estimated reduction in 2017 would be 23.7% and 25.8% for 2018.

Table 2 WMLP's carbon reduction from 2007 to projected 2017 and 2018

Assuming 100% REC Retention in 2017 and 2018

	2007	2017	2018
Sales (MWH)	246,127	243,361	237,000
Less Renewable	(10,880)	(31,162)	(37,261)
Pool Purchase	235,247	212,199	199,739
CO_2 rate (lb/MWH)	905	747	747
CO_2 Emission (sTons)	106,449	79,256	74,603
YoY		-25.5%	-29.9%

Assuming 2016 Voluntary REC Amount Retention in 2017 and 2018 plus NYPA and Miller RECs

	2007	2017	2018
Sales (MWH)	246,127	243,361	237,000
Less Renewable	(10,880)	(25,943)	(25,440)
Pool Purchase	235,247	217,418	211,560
CO_2 rate (lb/MWH)	905	747	747
CO_2 Emission (sTons)	106,449	81,206	79,018
YoY		-23.7%	-25.8%

B. Emission Calculation

ENE chose to calculate WMLP's emission rates using ISO-NE's yearly ISO New England Electric Generator Air Emissions Report. Although the report is published on a two year lag the methodology used to create the emission rate best suits WMLP's portfolio emission estimates. The ISO uses a total system emission rate calculation method. It is based on the emissions by all the ISO New England generators during a calendar years' worth of production. They use actual run time for on and off peak generation at the emission rate for each month. The emission rate uses reported CO_2 from actual US EPA's Clean Air Market Division (CAMD) database, the Clean Air Interstate Rule (CAIR) and the Regional Greenhouse Gas Initiative (RGGI); lastly for those units that information is not available they use the system information from the annual emission rates from EPA's eGRID.

All units that are dispatched are included in the emission rate calculation. The calculation is:

$$\text{Annual System Emission Rate (lb/MWh)} = \frac{\text{Total Annual Emissions (lb) all generators}}{\text{Total Annual Energy (MWh) all generators}}$$

Using ISO data is important because not all generation is operational at the same or all of the time. The ISO tracks the air emissions from the NE system Grid while taking into consideration:

- Forced and scheduled maintenance outages
- Fuel and emission allowance costs
- Imports and exports to and from NE region
- System energy consumption
- Water availability, etc.

These considerations are significant factors that separate ISO emissions verses eGRID's methods. EPA's eGRID states "Emissions and emission rates in eGRID represent emissions and rates at the point(s) of generation . . . they do not take into account any power purchases, imports, or exports of electricity into a specific state or any other grouping of plants, and they

do not account for any transmission and distribution losses between the points of generation and the points of consumption. Also, eGRID does not account for any pre-combustion emissions associated with the extraction, processing, and transportation of fuels and other materials used at the plants or any emissions associated with the construction of the plants."[3]

C. Portfolio and Trends

Figure 1 shows the fuel mix in the ISO New England control area in 2006 compared to 2015. We use 2015 as it is the most recent period for which the ISO regional emissions report is available. Coal has decreased the most over the period, dropping from 15% to 4%. Oil generation was cut in half from 4% to 2%. This has resulted from a combination of tightening emission requirements, relatively higher operating and maintenance expenses of solid fuel and older thermal generating facilities compared to natural gas ones, and market forces, namely low natural gas prices over the past several years. The latter is due to the merchant generator boom that occurred in the late 1990's and early 2000's, resulting in the building out of thousands of MW of high efficiency, natural gas fired generating capacity. This moved natural gas to become the dominant marginal fuel in New England, where it now sets the marginal wholesale electricity price 60% of the time or more. This means that all generating technologies' fortunes are affected by the price and availability of natural gas.

[3] https://www.epa.gov/sites/production/files/2017-02/documents/egrid2014_technicalsupportdocument_v2.pdf

Figure 1 Percentage energy generation by fuel type 2006 to 2015[4]

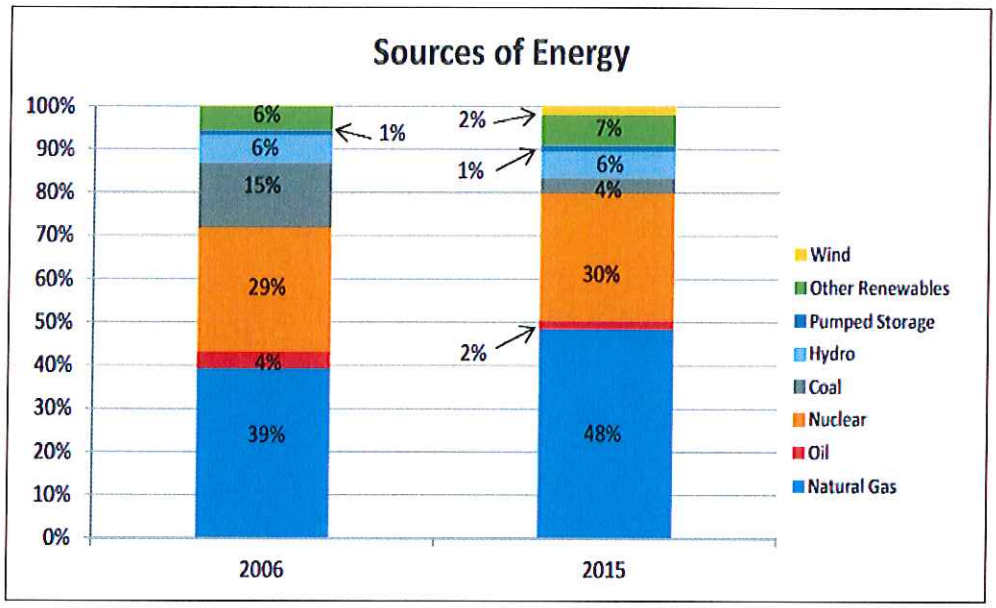


Table 3 shows New England's average yearly CO_2 emission rates. Following the build out of merchant, gas fired generating capacity in the late 1990's and early 2000's, these rates continue to trend downward slightly as the underlying resource mix changes with less reliance on coal and oil generation. These rates were used to determine WMLP's supply emission profile for its open position and bilateral commodity energy contracts since these purchases are not tagged to a particular generator.

Table 3 Regional Annual CO_2 Emissions in lb/MWH

Annual System (NE)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CO_2 Emission lb/MWH	905	890	828	829	780	719	730	726	747	747	747	747

[4] https://www.iso-ne.com/static-assets/documents/2017/01/2015_emissions_report.pdf

WMLP's current power supply portfolio is made up of a number of entitlements and contracts. This includes hydropower from the New York Power Authority (NYPA), landfill gas, run of river hydro, wind, gas fired peaking resources and spot market purchases.

Figure 2 WMLP's CO_2 Emissions and Carbon Free Portfolio

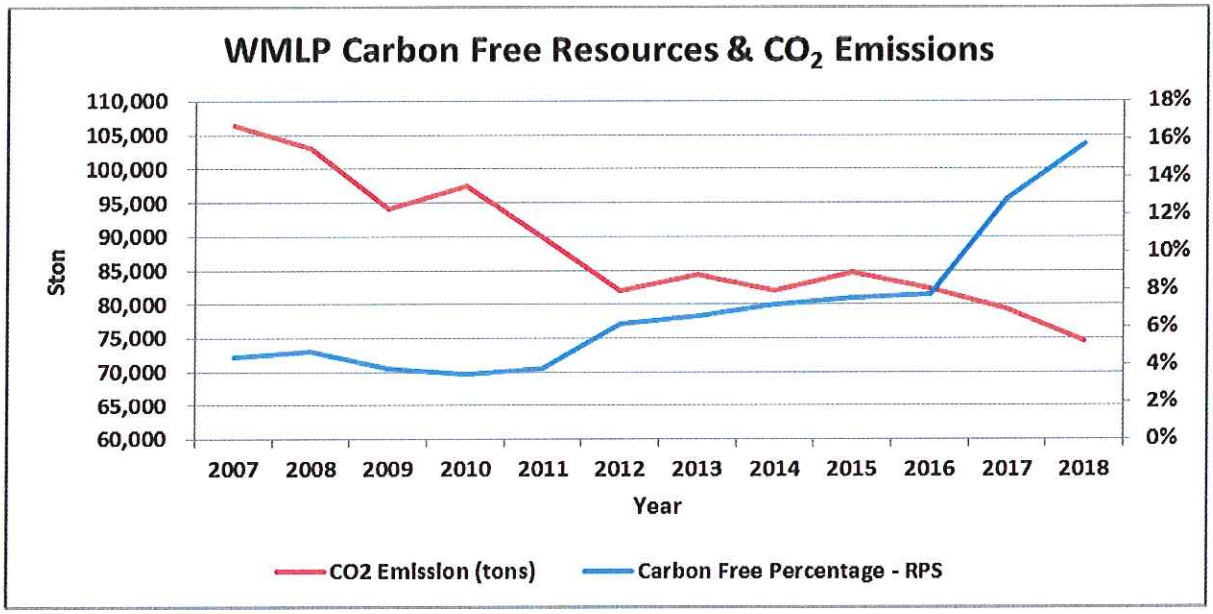


Figure 2 above shows WMLP's portfolio greenhouse gas emissions of about 106,000 tons CO_2 in 2007, which dropped to around 85,000 in 2015. Our projection for 2018 shows a little less than 75,000 tons. WMLP increased their renewable portfolio by executing contracts with two wind projects, Spruce Mountain and Saddleback Ridge, and one run of river, Miller Hydro. These three contracts include renewable attributes. By retiring the attributes, the contribution of CO_2 has declined by 15.5% from 2007 to 2011, and an additional reduction of 5.3% from 2011 to 2013. Beginning in 2018 Canton Mountain Wind will add to WMLP's carbon free portfolio.

Over the 2007-2015 period for which regional emissions information is available, average regional emissions dropped by 17.5%. Over the same period, WMLP's portfolio carbon emissions dropped 20.5%. We carried the 2015 regional emissions data forward to show the

impact of further WMLP clean energy contracting. This shows 2007-2018 regional reductions of 17.5%, with WMLP's carbon emissions dropping by nearly twice that amount, or 29.9% as seen below in Figure 3. WMLP has increased the number of RECs retired from the wind projects along with load reduction by energy efficiency projects and solar resources.

Figure 3 WMLP Portfolio CO_2 changes vs. the New England grid

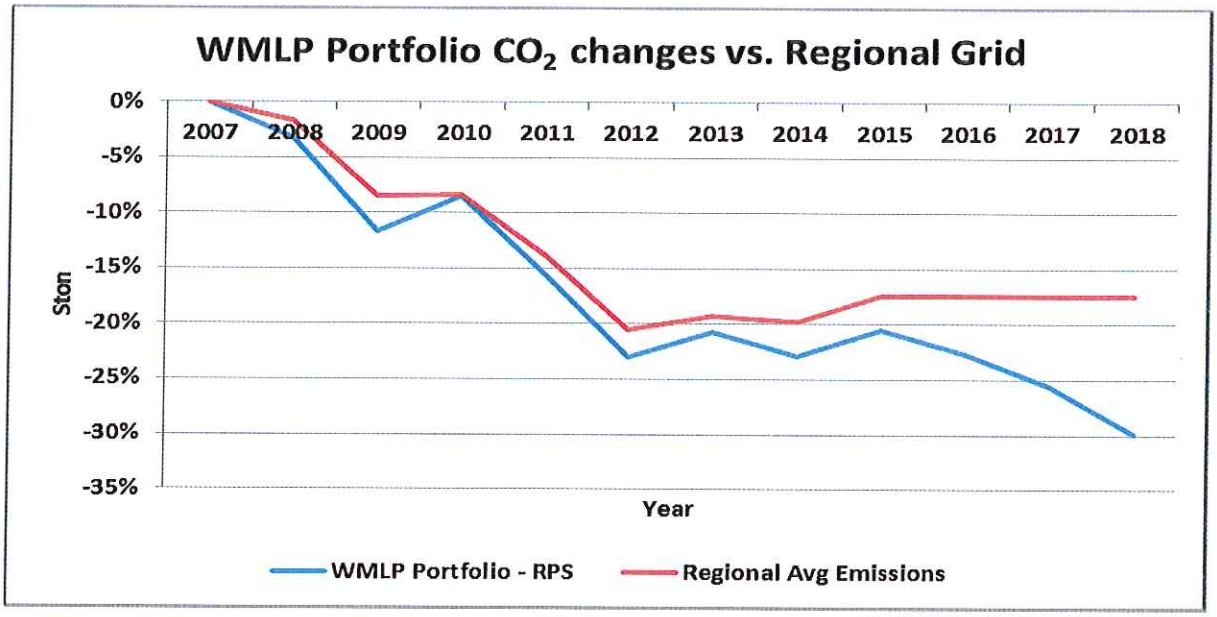
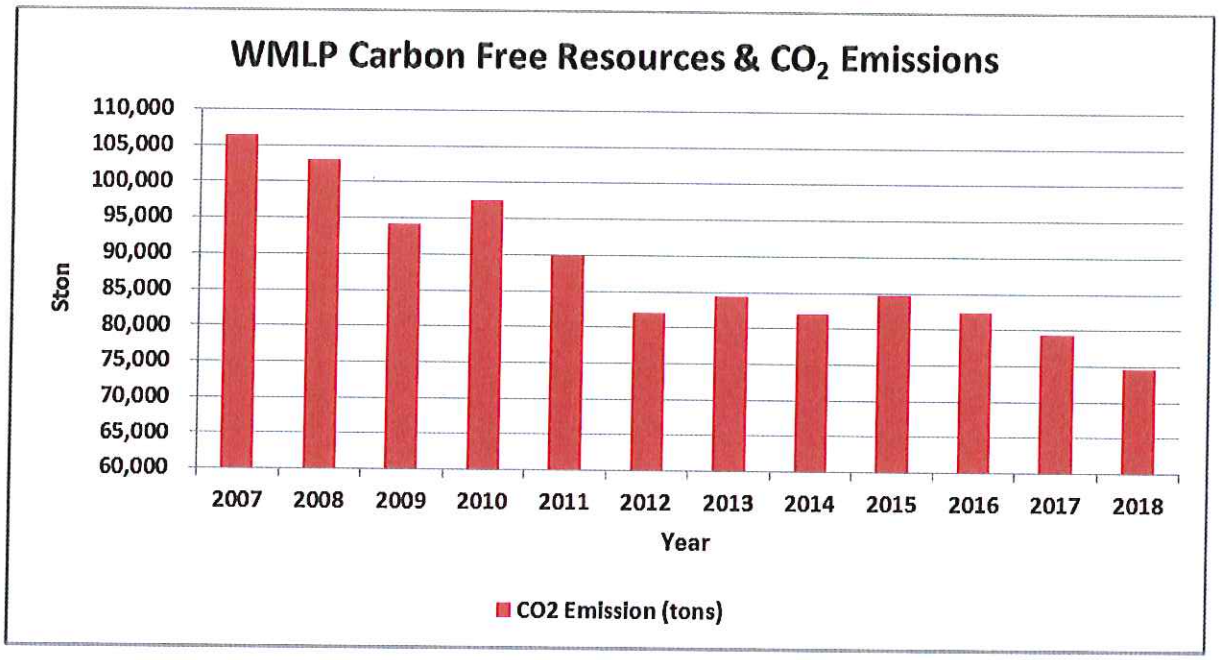


Figure 4 below represents WMLP's forecast of carbon reduction against the 2007 levels. Here we can see the increase of renewable portion of the portfolio as well as the load forecast reduction due partly to energy efficiency within WMLP's system.

Figure 4 WMLP's Carbon Reduction



Importantly, this includes participation in the Spruce Mountain, Saddleback Ridge, and Canton Mountain wind projects. In these cases, WMLP, along with a group of municipal utilities, agreed to purchase all attributes from the project, including energy, capacity, and RECs. Irrespective of what happens to the RECs after they are generated, these purchase power agreements allowed the developer to obtain financing, construct and operate the projects. Participation in the Canton Mountain wind project, which is presently in construction and expected to enter commercial operation in late 2017, will increase WMLP's renewables by 3%. When completed, the three wind projects WMLP participates in will produce up to 77 MW of power, and will produce around 260 million KWH annually, which is around 4% higher than all energy consumption in WMLP's territory.

Over the same period, WMLP has also pursued run of river hydro and landfill gas energy. The contract for the run of river hydro energy from the Miller Hydro facility in Maine, has allowed the 19 MW facility to remain operational in a low commodity cost environment. The same can be said for the Granby landfill contract, where landfill methane is collected, processed, and burned in reciprocating engines. This combustion process reduces the greenhouse gas impact

on the order of twenty five times compared to allowing the landfill methane to leach into the atmosphere. It also exacts useful work from the landfill gas as opposed to flaring it locally.

Figure 5 and Figure 6 below illustrate WMLP's move to diversify its portfolio by adding green energy resources to its mix. In the eleven years shown, WMLP's clean energy component has increased from around 4% to 15% of its portfolio, once the Canton Mountain wind project enters operation.

Figure 5 WMLP Portfolio Resource Mix 2007-2018

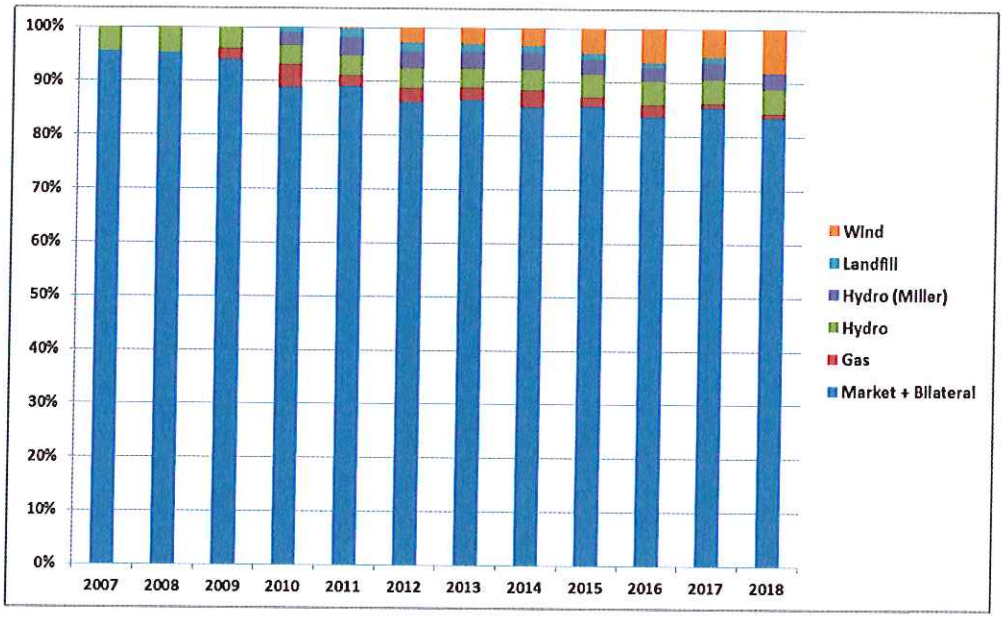
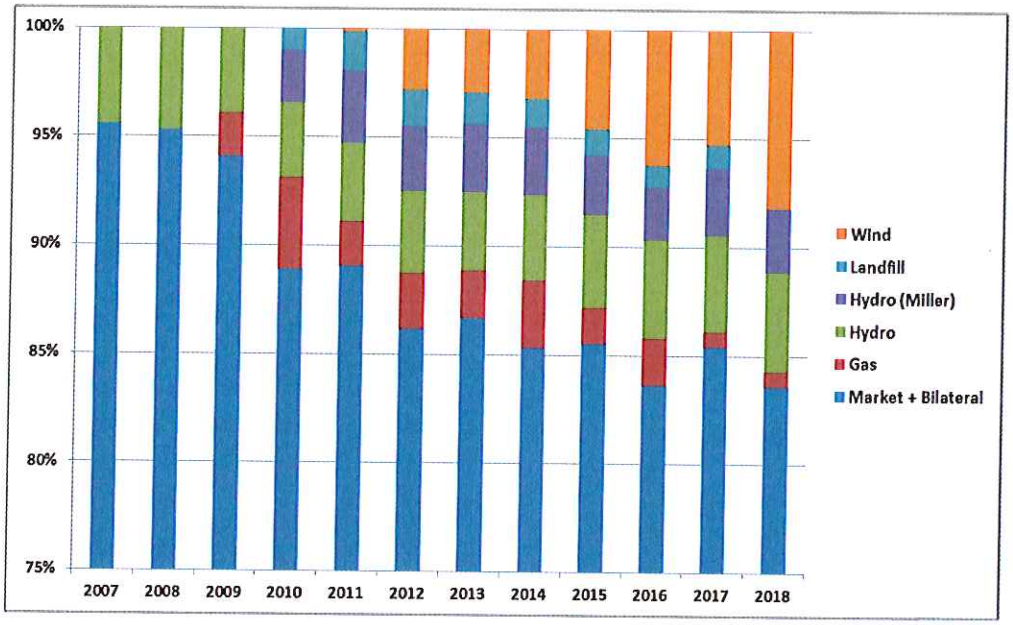


Figure 6 WMLP Resource mix 2007-2018 exploded to illustrate project participation



D. Summary

As presented in this evaluation, carbon emissions in WMLP's power supply portfolio has dropped by almost twice the regional average between 2007 and 2018. 2017 and 2018 include forecasted data, with the assumption of REC retention of the total wind output. In the last 10 years WMLP has migrated from a virtually single source all-requirements supply arrangement to an actively managed portfolio. Around 1/7th of its supply is now directly sourced from carbon free resources, keeping pace or exceeding goals of the Commonwealth without a regulatory mandate to do so. In 2018 Canton Wind project is forecasted to be commercial and therefore boosts WMLP wind generation by the equivalent 3% of its retail sales, or up to 6,000 MWH annually.

Going forward, WMLP will have the opportunity to continue to evaluate and pursue power resources that balance carbon intensity with cost and rate impact to its customers. This will

include the potential to renew and extend its intermediate term purchase agreements for run of river hydro power and landfill gas energy. Other opportunities under review include base load contracting with existing carbon free resources at market prices. Further, WMLP is reviewing opportunities to add additional wind energy to its portfolio. Other alternatives include balancing contracts with large hydropower owners such as Brookfield Renewable Energy Marketing and First Light Power Resources, where hydro energy can be contracted to balance the intermittent nature of wind production. This balancing will enable WMLP to add even more renewable energy to its portfolio in a reasoned manner to avoid having too much energy under contract at times of high wind production and to avoid having higher spot market exposure (and its higher carbon profile) when wind production is low. Last, while the new solar market program does not include municipal light plants like WMLP, discussions are ongoing with solar developers to evaluate contracting opportunities in a post solar-REC environment.

Future power supply purchases and voluntary renewable program will affect WMLP's portfolio CO_2 profile. ENE will assist WMLP in evaluating future renewable generation and power resources to further reduce the carbon footprint of WMLP's supply portfolio.

About ENE

Energy New England (ENE) was founded in 1998 to enhance the competitive position of public power entities in response to deregulation and to attain operating efficiencies in energy risk management and retail account management. We are a municipal light plant cooperative established under Chapter 164, Section 47C of the Massachusetts General Laws. Our ownership is made up of light departments in Braintree, Taunton, Concord, Hingham, and Wellesley, Massachusetts.

ENE is the largest wholesale risk management and energy trading organization serving the needs of municipal utilities in the northeast. We currently manage the power supplies of over twenty municipal electric systems serving more than 1100 MW of electric load and more than 550 MW of generation in all six New England states. We advise on and/or conduct more than one billion kilowatt hours in wholesale power transactions and 100-150 million kilowatt hours in retail transactions annually. We also manage up to 250,000 therms of natural gas per day within our customers' portfolios, as well as up to 5,000 barrels per day of fuel oil.

ENE works with numerous businesses, residents and utilities to help promote the principles of conservation, efficiency, and environmental stewardship, and advances the many benefits available through integrated sustainability planning. The ENE service portfolio encompasses the 4 C's of sustainability: Conservation, Carbon Mitigation, Commodity Services, and Clean Technologies.