Light Commission May 28, 2024 meeting minutes

To: Light Commission: Commissioners
Light Department: J. Kowalik, General Manager
From: Jean-Jacques Yarmoff, Secretary
Date: May 29, 2024
Re: Commission Meeting Public Session, May 28, 2024

A quorum being present, Chair Wolf brought the meeting to order at 4:00 pm. The meeting was held in person and with remote internet access, both available to public participation. A recording of the meeting is made available to the public at the following link.

Participated in meeting:

Commissioners:	Commissioners Frechette, Hull, Wolf and Yarmoff participated in person. Commissioner Smith was excused
Light Department:	General Manager, J. Kowalik; Business Manager, Matt Barrett
Invited:	Marblehead Fire Department, Chief Jason Gilliland; Marblehead Building Department, Inspector Ben Lebowitz; Massachusetts Municipal Wholesale Electric Company (MMWEC) Sustainable Energy Policy & Program Senior Manager, Zoe Eckert.

Marblehead Land Acknowledgment declaration was read by Commissioner Frechette.

Comments from the Public

George Hooper commented that he had been told three years ago that residential batteries were not allowed, but he would still like to install a Tesla wall in his house. Is this possible?
A discussion ensued regarding the process residents need to follow to get a battery installation approved and connected. Please see below.
Pal Bickford, Chair of the Trees and urban Forestry group of Sustainable Marblehead and member of the Marblehead Green Committee enquired about the possibility of planting trees at the High School, where the parking lot represents a heat island. If possible, it would be great to plan for some tree planting in the fall, or next spring. The General Manager explained that Marblehead has applied for a grant to build a solar canopy. The design has not been finalized, but the size of the array is as determined in the NREL study that took place a couple of years ago. It would not make much sense to plant trees and then have to move them because of the installation of the solar array. Chair Wolf suggested that the parties review the NREL study.

Outstanding items from previous meetings

Application process for DER Interconnection Application. The General Manager presented the flow chart for the application process. The most recent iteration of the interconnection application is shown in annex below (pages 3 – 6). It will be published on MMLD's web site after finalization. Both the Fire Chief Jason Gilliland and Building Inspector Ben Lebowitz were present and commented on the process, which allows for appropriate communication between MMLD and the Building department.

Resident George Hooper was encouraged to use this document and to "test out" the process.

Employee Survey. The General Manager discussed with Polco's Laurence Matthews on 5/28: we are waiting for Polco to provide a sample survey adapted to MMLD's needs. In the discussion, it was suggested that board members would be welcome to contact Polco as well.

Time of Use Working Group. Commissioners Smith and Yarmoff were nominated to this working group.

MMWEC Virtual Power Plant presentation: Zoe Eckert.

Zoe Eckert, MMWEC's Sustainable Energy Policy & Program Senior Manager presented a Virtual Power Plants program being discussed with Duracell and Municipal Light Plants. See slides p 7-14. Municipal Light Plants like MMLD can use programs such as this to manage demand, and infrastructure build-up. This can help reduce energy costs and infrastructure build-up costs. It is complementary to the Utility Scale BESS MMLD is pursuing. Several possible pilot programs were presented, where the ownership of the battery may be with MMLD or with the home-owner. ROI for MMLD and owner were presented under a variety of scenario: stand-alone, couple with solar, in the case of TOU rates. The next step is for MMLD to determine how the Department may want to participate in this program, if it does.

General Manager Updates

Village 13 upgrade. The delivery of the transformers is now scheduled for June 27 and 28: this is now during the school vacation period, which makes it easier to temporarily restrict traffic or parking on Pleasant street, Bessom Street and the Railroad RoW. These dates might still change as travel restrictions for oversized loads are imposed by states, and are not unified. Testing of the transformers at the Virginia Transformer facility has not yet been scheduled.

Tioga Way parcel preparation. The General Manager presented the work that was done by Bill Capone from Bayside Engineering to survey the plot, and determine the possible locations of BESS installations. Two areas were deemed possible (C2 and C3, shown on page 15). In both cases, it would be necessary to build retaining walls to have a level site. Next steps include developing a cost estimate for the two sites, evaluate their suitability taking into consideration Access, Drainage and Conservation concerns, and meeting with abutters.

Fencing 80 Commercial St Building is underway, with fence posts being set, pre-cast footings for the sidewalk repair and railing to be completed by mid-June.

System Planning. A meeting with National Grid took place on April 11 to review 5-year load forecasts as well as long term power forecasts. There were no specific plans shared with regards to possible grid upgrades or battery storage for the Salem/Swampscott area that also serves Marblehead.

Update on hiring. MMLD is currently reviewing applications for the Engineering Project Manager position. Interviews will take place in the next couple of weeks.

The meeting concluded at 5:55 pm at which point a motion to adjourn was proposed, seconded and adopted.

----****----

Marblehead Municipal Light Department (MMLD)

Customer Distributed Energy Resource (DER) *Interconnection* Application

This document includes:

- A Flow Chart with numbered steps, detailing the Town of Marblehead's complete Interconnected Distributed Energy Resource (DER) Permitting process: for a Solar PV array, a Battery electric storage system, or both, from start to finish.
- The MMLD Interconnection Application – a two-page document that's Step 2 in the Interconnected DER Permit process.
- Interconnected DER – Customer Terms and Conditions- a three-page supplement to the general Customers Terms and Conditions of Electrical Service.

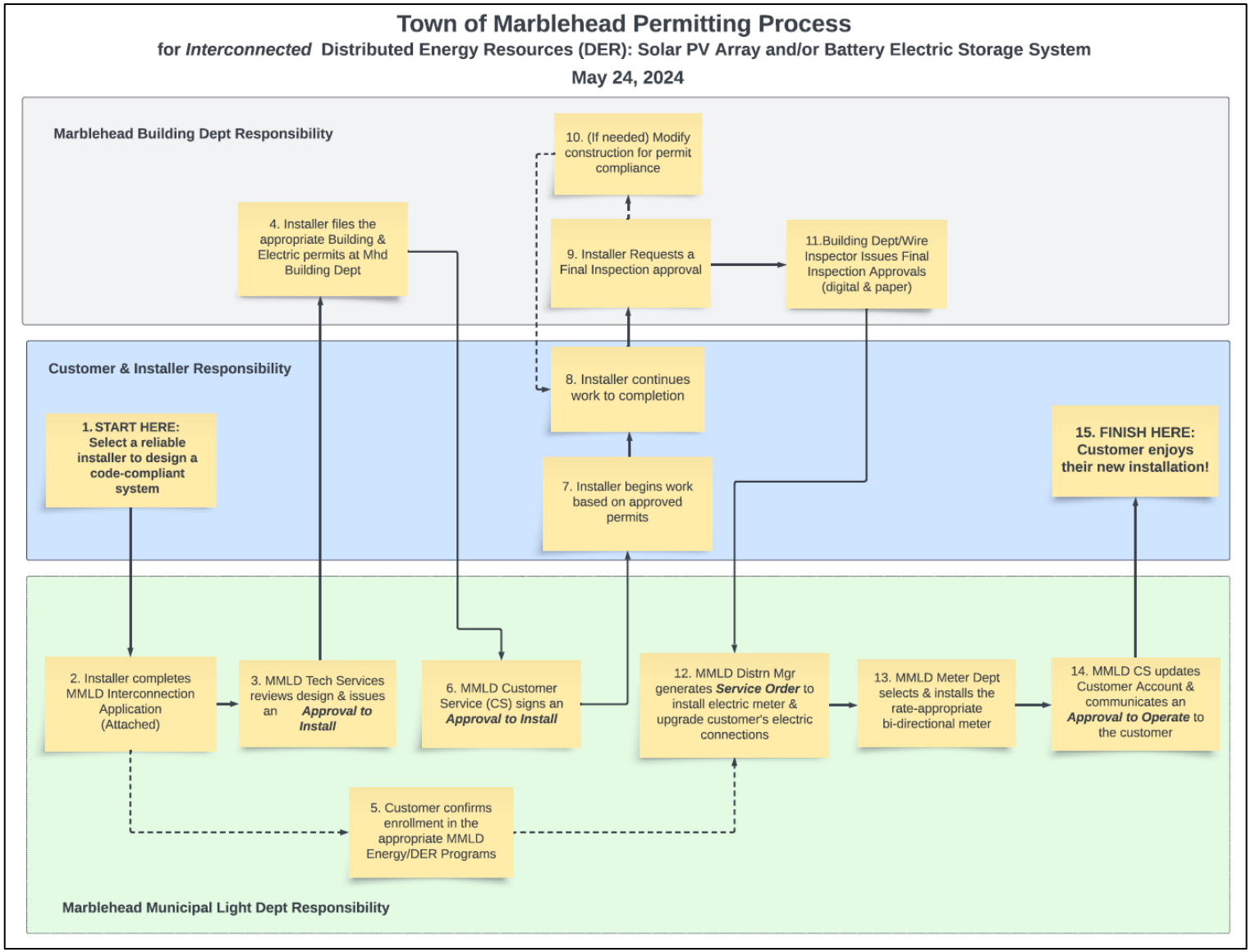
If you have any questions:

- General questions and questions about the application process, please contact our Customer Service representatives at 781-631-5600, email us at customerservice@mhdld.com, or stop by our office at 80 Commercial St.
- Of a technical nature, contact our Engineering Manager Colin Coleman at 781-631-0240 or email ccoleman@mhdld.com.
- Other questions or concerns, contact our General Manager Joe Kowalik at 781-631-0240 or jkowalik@mhdld.com.

Town of Marblehead Permitting Process

for *Interconnected* Distributed Energy Resources (DER): Solar PV Array and/or Battery Electric Storage System

May 24, 2024



Marblehead Municipal Light Department (MMLD)

Customer Interconnection Application and Service Agreement

For Solar PV arrays and/or Battery Storage Systems

Applicant Contact Information:

Customer Name (print):_____

Address of Interconnection Facility: _____

Mailing Address, if different from above: _____

City: _____ State: _____ Zip Code: _____

Telephone (mobile): _____ (home): _____

E-Mail Address: _____MMLD Account #: _____

Installation Vendor Contact Information: (System Installation Contractor):

Vendor Name: _____ Key Contact Name: _____

Mailing Address:_____

City: _____ State: _____ Zip Code: _____

Telephone (mobile):_____ (Office): _____

E-Mail Address: _____

(If separate from above) Electrical Contractor:

Vendor Name: _____ Key Contact Name: _____

Mailing Address:_____

City: _____ State: _____ Zip Code: _____

Telephone (mobile):_____ (Office): _____

E-Mail Address: _____

New Equipment Information:

Energy Resource(s): Solar PV ☐ Battery ☐ Other_____

Estimated Installation Date: _____ Estimated In-Service Date: _____

Solar PV Panel: Manufacturer & Model: _____ # of Panels: _____

Inverter Manufacturer & Model: _____ # of Inverters: _____

Is the Inverter UL1741 approved? Yes ☐ No ☐

Max Output Power of Each Inverter: _____ (Watts) @ _____ (Volts AC) Single ☐ or Three ☐ Phase

Total PV System Output 1 (# of panels x max power/panel (W DC) x CEC inverter efficiency/1,000): _____ (kW)

Total PV System Output 2 (maximum power output per inverter (W) x # of inverters/1,000): _____ (kW)

REQUIRED: Please attach a one-line electrical diagram for the proposed electrical system.

Battery Storage System: Manufacturer and Model: _____ # of Units: _____

Is the battery system UL9540 approved? Yes ☐ No ☐

Total Battery System Charge/Discharge Power kW (DC): _____ Total Battery System Energy kWh (DC): _____

Total Battery System Charge/Discharge Power kW (AC): _____ Total Battery System Energy kWh (AC): _____

REQUIRED: Please attach a one-line electrical diagram for the proposed electrical system.

Customer Signature

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true and I agree to the Terms and Conditions on the following pages:

Interconnecting Customer Signature: _____

Title (if Company): _____ Date: _____

Installer Name _____ Signature: _____ Date: _____

Please complete and return this document to:

Marblehead Municipal Light Department
PO Box 369
80 Commercial St.
Marblehead, MA 01945

Or email to: customerservice@mhdld.com

Approval to INSTALL Facility (For MMLD use only)

Installation of the Facility is approved contingent upon the terms and conditions of this Agreement and MMLD approval of any MMLD or customer system modifications, if required. Are system modifications required? Yes ☐ No ☐

MMLD Signature: _____ Title: _____ Date: _____

Approval to OPERATE Facility (For MMLD use only)

Installation of the Facility is approved contingent upon the terms and conditions of this Agreement, and MMLD approval of any MMLD or customer system modifications, if required. Are system modifications required? Yes ☐ No ☐

If yes, please explain an end of application.

MMLD Signature: _____ Title: _____ Date: _____

Explanation of Modifications, if any:

_____

_____

_____

_____

Virtual Power Plants: A Versatile Tool for Decarbonization Impacts

Marblehead Municipal Light Plant Pilot

MMWEC
MASSACHUSETTS MUNICIPAL WHOLESALE ELECTRIC COMPANY
Public Energy Partners

Why Demand Response is Needed

What is the ultimate goal of load shedding during peaks? :To get your peak load to 0 kWh

- Do you BESS reduce your peak load to zero?
- Do your BESS systems account for load growth?
- How far away are you from TOU?
- Are your customers aware of demand response and ready for TOU?
- Getting a battery in a home readies it for TOU in the future

What is a VPP?

Virtual power plants (VPPs) are aggregations of distributed energy resources (DERs) such as smart appliances, rooftop solar with batteries, EVs and chargers, and commercial and industrial loads that can balance electricity demand and supply and provide grid services like a traditional power plant.

The Program

Connected Homes 2.0

Mission: To drive at home and town level resiliency by power sharing methods **between municipal light departments and residents**

Potential Manufacturing Partner

- The Duracell Power Center is an AC coupled Energy Storage System that provides 5kW of rated power and 14.2 kWh capacity
- The battery can power up to 100A of critical loads in case of a power outage, providing carbon-free resiliency to the homeowner
- Manufactured and assembled in the US
- The Duracell Power Center Essential uses LFP (lithium iron phosphate) batteries
- Duracell will train installers and unionized electricians from the MLP

Model Variations

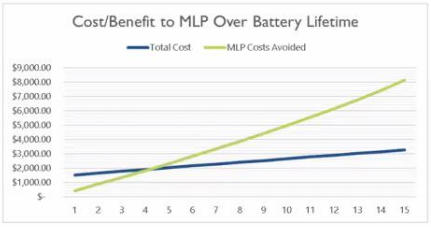
- Battery with Solar
- Battery with TOU
- Battery owned by MMLD, no solar
- Battery owned by homeowner, no solar
- Crowninshield Pilot

Battery With Solar Pilot

- MLP Provides $100 / kWh incentive and requires enrollment into Connected Homes for the lifetime of the battery. Batteries to not receive Connected Homes incentive and are not able to opt out of a peak event.
  - When you participate in Connected Homes, you will allow Virtual Peaker to automatically manage your battery during periods of peak demand. Reducing demand during control events helps stabilize the electric grid by using your solar charged battery to reduce energy use.
- When we call a peak event for the day, your battery will charge up to full and remain at full until the peak discharge time. After MLP discharges the battery, it will recharge at the earliest time possible from the solar system.
- Homeowner will always have 40% of the battery reserved. Homeowner is able to choose how to use the remaining 40% of their battery. Either reserve for outage or save for other uses.
- Non-event periods make the entire amount of the battery available for your use.

Breakeven for MLP

NextZero VPP Residential Battery Program	
Battery System Details	
Battery Inverter Capacity (kW)	3.0
Total System Capacity (AC kWh)	7.7
Round Trip Efficiency	96%
Useful Lifetime (Years)	15
Number of Units	1
Lifetime Cost Avoidance for MLP	
Avoided Energy Costs from Load Shifting	$58
Avoided Capacity Costs from Peak Shaving	$1,590
Avoided Transmission Costs from Peak Shaving	$6,511
Total Avoided Costs for MLP	$8,159
Total Program Costs	
Incentive Cost	$1,400
Total MMWEC Admin Fees	$1,875
Total Expenses	$3,275
Net Value	
Net Value over System Lifetime	$4,884
Breakeven Timeframe (Years)	5.00



Breakeven for Customer

Model TBD

- MMWEC will take the cost of the battery and graph that will a home's bill savings from charging from solar system and discharging at night, minus expected peak shaving events over lifetime of battery.
- MMWEC needs a typical Marblehead residential load curve to do this analysis. Awaiting Groton's version and can use their load curve model as stand in.

Batteries with TOU Rates

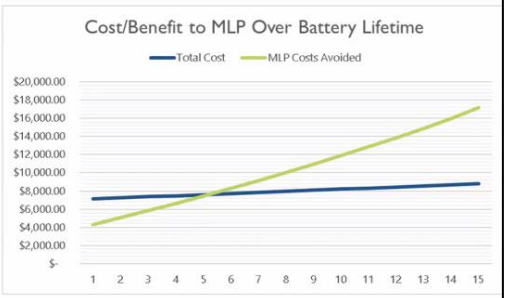
- Homeowner would purchase the battery and program it to charge during off peak times, and discharge during on peak times.
- MLP would see the assumed TOU peak shaving cost avoidance results, and homeowner would not have to change their energy consumption habits.
- MLP to provide incentive to customer to lower barrier to entry on technology adoption.
- *Breakeven Analysis for homeowner investment pending Groton model analysis. Coming soon.*

MLP Owned, Grid Powered Batteries

- Municipal light department will lease the battery to a homeowner
- Municipal light department will use the battery in the range of 10 times a month to subsidize the cost of the battery with expected value of peak shaving cost avoidance savings
- The homeowner will have access to the battery during outages as a clean alternative to a generator
- The battery is maintained at 100% charged, waiting for a power outage for the customer of the peak purpose for the light department
- The battery recharges at night when energy is the cheapest, creating arbitrage cost savings
- The customer will see the energy consumption of the battery being recharged in their portal but will then see all bill credits when the battery is used during peak events

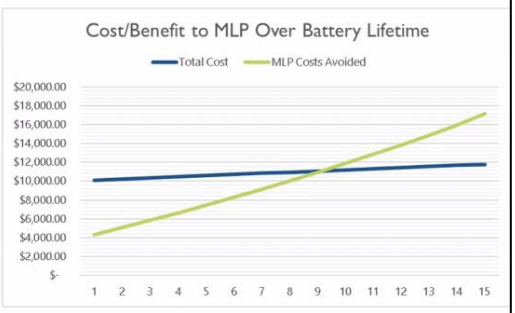
Current Per Unit ROI Details

NextZero VPP Residential Battery Program	
Battery System Details	
Battery Inverter Capacity (kW)	5.0
Total System Capacity (AC kWh)	12.8
Round Trip Efficiency	96%
Useful Lifetime (Years)	15
Number of Units	1
Lifetime Cost Avoidance for MLP	
Avoided Energy Costs from Load Shifting	$96
Avoided Capacity Costs from Peak Shaving	$2,649
Avoided Transmission Costs from Peak Shaving	$10,852
Total Program Payment from Homeowner	$3,600
Total Avoided Costs for MLP	$17,198
Total Program Costs	
Unit Purchase Price	$6,000
Installation Costs	$1,000
Total MMWEC Admin Fees	$1,800
Total Expenses	$8,800
Net Value	
Net Value over System Lifetime	$8,398
Breakeven Timeframe (Years)	5.25



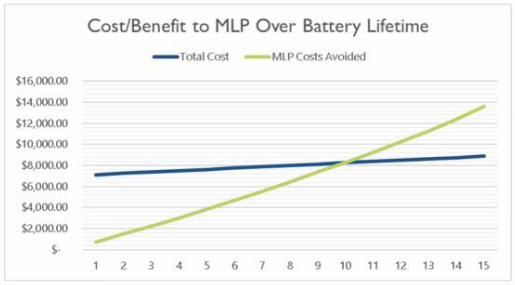
Future Assumed Per Battery ROI Details

NextZero VPP Residential Battery Program	
Battery System Details	
Battery Inverter Capacity (kW)	5.0
Total System Capacity (AC kWh)	12.8
Round Trip Efficiency	96%
Useful Lifetime (Years)	15
Number of Units	1
Lifetime Cost Avoidance for MLP	
Avoided Energy Costs from Load Shifting	$96
Avoided Capacity Costs from Peak Shaving	$2,649
Avoided Transmission Costs from Peak Shaving	$10,852
Total Program Payment from Homeowner	$3,600
Total Avoided Costs for MLP	$17,198
Total Program Costs	
Unit Purchase Price	$9,000
Installation Costs	$1,000
Total MMWEC Admin Fees	$1,800
Total Expenses	$11,800
Net Value	
Net Value over System Lifetime	$5,398
Breakeven Timeframe (Years)	10.00



Without Customer Payment

NextZero VPP Residential Battery Program	
Battery System Details	
Battery Inverter Capacity (kW)	5.0
Total System Capacity (AC kWh)	12.8
Round Trip Efficiency	96%
Useful Lifetime (Years)	15
Number of Units	1
Lifetime Cost Avoidance for MLP	
Avoided Energy Costs from Load Shifting	$96
Avoided Capacity Costs from Peak Shaving	$2,649
Avoided Transmission Costs from Peak Shaving	$10,852
Total Avoided Costs for MLP	$13,598
Total Program Costs	
Unit Purchase Price	$6,000
Installation Costs	$1,000
Total MMWEC Admin Fees	$1,875
Total Expenses	$8,875
Net Value	
Net Value over System Lifetime	$4,723
Breakeven Timeframe (Years)	10.00



Battery Owned by Customer, No Solar

- Customer purchases battery
- Customer sheds energy to the grid during peak times
- MMLD pays customer net metering amount
- Customer sees breakeven and payback on the battery
- MMLD sees cost avoidance on transmission and capacity costs

Tesla Opportunity

- In order for Tesla to be willing to integrate with Virtual Peaker to allow us to load shed, they are expecting
  - A take or pay contract of at least 500 batteries (1000 batteries would make this slam dunk).
  - A $1000 incentive for a customer to enroll the battery in Connected Homes, and a $500 a year incentive if the battery performs at least 75% of the peak events called.

A Crowninshield Road Pilot?

23 customers in the Crowninshield Road neighborhood have experienced three outages so far this year from extreme weather causing wave action that floods their underground service that needs to be upgraded.

What can MMLD incentivize and still see a transmission and capacity cost avoidance savings.

Household	Daily Average	Critical Load	Max Duration	Product	kW	kWh	Price
1	48	29	58	Duracell Max Hybrid	10 kW	60 kW	$ 28,750
3	117	70	140	Duracell Max Hybrid	10 kW	80 kW	$ 36,750
4	59	36	71	Duracell Max Hybrid	10 kW	80 kW	$ 36,750
5	21	13	25	Duracell Max Hybrid	10 kW	40 Kw	$ 20,750
6	41	25	49	Duracell Max Hybrid	10 kW	60 Kw	$ 28,750
8	60	37	73	Duracell Max Hybrid	10 kW	80 Kw	$ 36,750
12	55	34	67	Duracell Max Hybrid	10 kW	80 Kw	$ 36,750
17	145	87	174	Duracell Max Hybrid	10 kW	80 Kw	$ 36,750
18	31	19	38	Duracell Max Hybrid	10 kW	40 Kw	$ 20,750
22	42	26	51	Duracell Max Hybrid	10 kW	60 Kw	$ 28,750

Battery Safety

- MA State Fire Marshall and Division of Professional Licensure issues a Joint Memorandum on Guidance for Energy Storage System Installations in Residential Homes.
- This guidance document aims to create consistency with issuing building, fire and electrical permits for ESS across the Commonwealth and provide minimum safeguards for the occupants of one- and two-family dwelling structures.
- The ESS must be listed and labeled in accordance with UL 9540 and be installed in accordance with the manufacturer's instructions and NFPA 70. [2020 NFPA 855: 15.2]
- ESS shall only be installed in basements not used for living or sleeping purposes, and shall only be installed in utility closets, storage closets, or storage spaces within basements (when not installed on exterior walls or in detached or attached garages).
- A hardwired-powered smoke alarm shall be installed in the immediate vicinity of the ESS and interconnected with the smoke alarms installed throughout the dwelling in compliance with 780 CMR R314.
- Individual ESS units shall not exceed a maximum rating of 20 kWh. The aggregate rating of the ESS shall not exceed:
  - **40 KWh within enclosed utility closets or storage spaces.1**
  - **80 KWh in attached or detached garages, or detached accessory structures.**
  - **80 KWh in outdoor/exterior wall installations. [2020 NFPA 855:15.7.1]**

Duracell Fire Safety

- The Duracell Power Center Essential uses LFP (lithium iron phosphate) batteries, which are less prone to thermal runaway and do not release oxygen if they catch fire, making them safer than traditional lithium-ion batteries.
- The Duracell Power Center Essential has obtained all required safety certifications including UL9540A, which ensures cells and packs do not cause thermal runaway condition when its temperature is increased for any reason.
- The included Battery Management System (BMS) acts as a layer of protection to ensure cells are operated within its safe operating region while the Power Control System will prevent the system from further operation if the BMS detects an issue.

Battery End of Life Plan

While currently lithium-ion battery recycling is focused on those from cell phones and laptops, in the coming years residential batteries and EV batteries will more predominantly be the technology that needs to be recycled.

Likely, point of sale manufacturers will be those to collect and recycle/sell the end-of-life residential battery.

Next Steps

Really depend on what MMLD wants done.

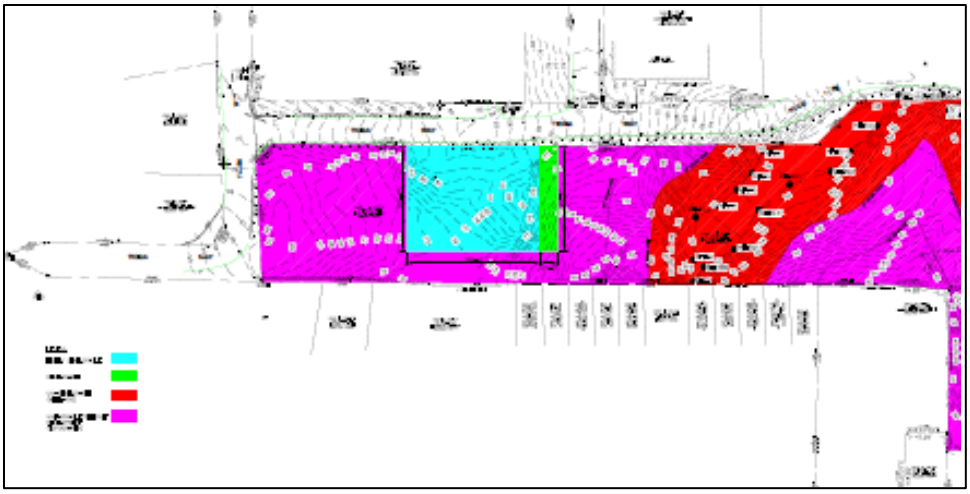
1. Solar Connected Residential Battery Incentive
2. TOU Rate Optional Pilot for Residents
3. MLP Owned Battery for Non-Solar Residents
4. Battery Owned By Customer, No Solar
5. Crowninshield Road Pilot

Village 13 update

- Virginia Transformer 4/16 delivery schedule delay: 5/20 to 6/27 and 5/6 to 6/28
- Attended 5/15 Select Board meeting to gain approval for parking restrictions and roadway closures for 6/27 and 6/28
- Prior VT contract issues…being resolved

Tioga Way update – steps completed

- Bayside Engineering has completed the site survey, showing one-foot elevations
- Bayside has categorized every sq ft on the parcel for development potential:
  - Highly developable
  - Developable
  - Un-developable (wetlands)
  - Unfavorable/Difficult Developable
- See drawings C2 (north) and C3 (south)



Tioga Way update – Next steps

- Bayside Structural/Civil Engineer Bill Capone, P.E. determining rough cost estimates for the two sites – leveling & retailing walls
- Meet with Town Engineer/Conservation Officer Charlie Quigley & Stormwater Engineer Maggie Wheeler
  - Develop access options to sites – with or without easements
  - Develop a Drainage plan
  - Address conservation concerns
- Meet with all abutters

80 Commercial Fence & Gates

- Fence posts are now being set.
- Trenches dug for UG electric conduit for electric gates
- Precast footings to be moved to Commercial St from Village 13 starting 5/29…expected to be a 4-day project
- Child safe railings to be installed by 2nd week in June
- New monopole will be installed after the fence
- CZM reimbursable expenses must be completed by 6/30/2024

System Planning MMLD's longer term power needs

- April 11 technical meeting held with National Grid (NGrid), MMLD, and MMWEC participating.
- NGrid plans by geographic area. Mhd is in the Salem-Swampscott area. Future area system load and power quality needs are based on an NGrid-internal 15-year load forecast.
- MMLD & MMWEC discussed our 5-year load forecast methodology.
- MMLD proposed working with NGrid forecasting team to apply their 15-year methodology, comparable to their Swampscott forecast methodology.
- ***MMLD also identified the need for increasing resiliency in future grid infrastructure planning***.
- NGrid did not share any specific plans for planned Salem/Swampscott area grid upgrades. No NGrid comments on planned battery storage in the area

New MMLD employee hiring

- Engineering Project Manager (EPM) candidates are now being vetted…scheduling leading candidate for onsite interview later this week/next week.

---****---