NON-CARBON EMITTING COST ANALYSIS AND UTILITY-SCALE OPTIONS

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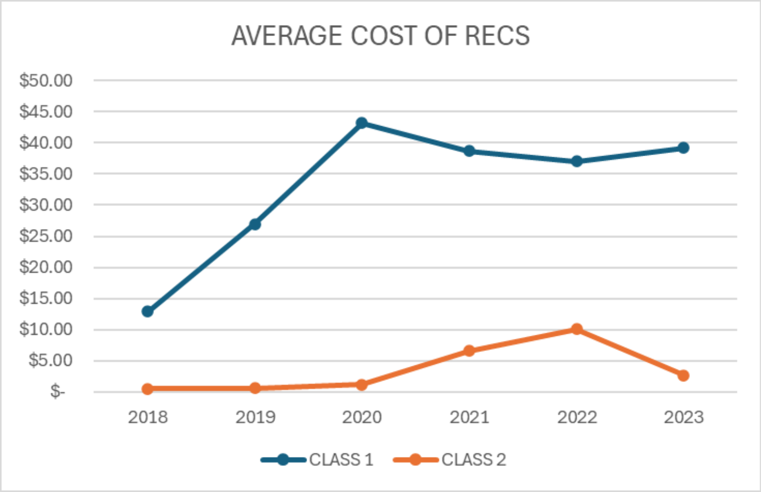
Non-Carbon Emitting Requirements

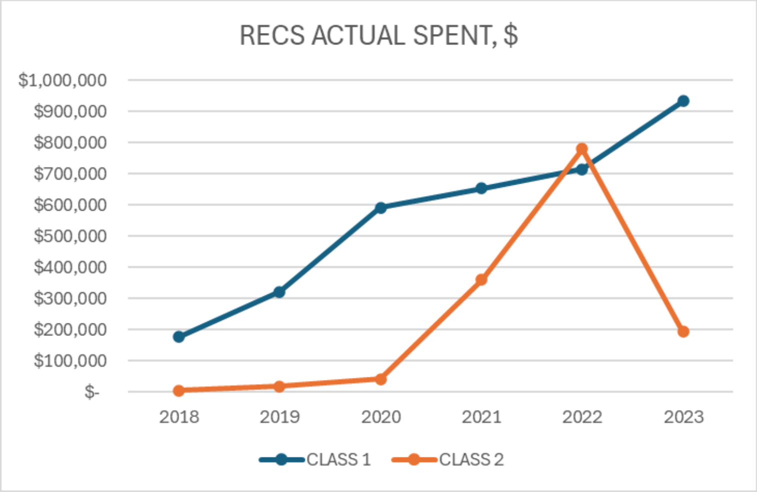
Municipal Lighting Plant Greenhouse Gas Emissions Standard (GGES):

- ✓ minimum percentage of non-carbon emitting energy sold to retail end-user customers purchasing electricity: (i) 50% non-carbon emitting energy by 2030; (ii) 75% by 2040; and (iii) energy sales achieving net-zero greenhouse gas emissions by 2050.

- ✓ non-carbon emitting sources: (1) solar photovoltaic; (2) solar thermal electric; (3) hydroelectric, including imports into the New England wholesale electric market as administered by ISO New England Inc.; (4) nuclear; (5) marine or hydrokinetic energy; (6) geothermal energy; (7) landfill methane; (8) anaerobic digester gas; (9) wind energy; and (10) any other generation qualifying for renewable portfolio standards pursuant to section 11F or the department of environmental protection's clean energy standard regulation pursuant to 310 C.M.R. 7.75

Analysis of historical cost of RECs and Belmont Light RECs Spent (2018 – 2023)





RECS	2018	2019	2020	2021	2022	2023
CLASS 1	$ 12.87	$ 27.00	$ 43.17	$ 38.69	$ 37.06	$ 39.21
CLASS 2	$ 0.50	$ 0.63	$ 1.15	$ 6.63	$ 10.06	$ 2.69

RECS	2018	2019	2020	2021	2022	2023
CLASS 1	$ 175,573	$ 320,276	$ 591,882	$ 652,556	$ 714,286	$ 932,715
CLASS 2	$ 4,400	$ 18,227	$ 41,324	$ 359,485	$ 779,739	$ 192,940

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Analysis of power supply portfolio and non-generating (supplemental) RECs purchasing scenarios for 2024

RECS CLASS	*DIRECT CONTRACTS*		*SUPPLEMENTAL PURCHASES ESTIMATE*			
			SCENARIO I		*SCENARIO II*	
	%	*$*	*%*	*$*	*%*	*$*
CLASS I	10%	$ 1,084,562	18%	$ 817,880		
CLASS II	23%	$ 1,671,531	49%	$ 173,359	67%	$ 234,702
TOTAL	**33%**	**$ 2,756,093**	**67%**	**$ 991,239**	**67%**	**$ 234,702**

NOTES:

*Supplemental purchases scenarios:

Scenario I - continue follow CES requirements for Class I RECs %-age in the portfolio

Scenario II - GGES requirements for non-emitting sources, 100% non-emmiting goal

** Estimates as of May 2024

*** Cost of RECs:

Class I - $40

Class II - $3

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Potential re-allocation of funds

<u>Legal opinion:</u>

Currently, utilizing revenue generated from power supply charges for projects targeting reductions in Belmont Light transmission, capacity, and energy costs, such as utility-scale battery storage and residential utility owned battery storage, along with other utility-owned load-shifting technologies, is permissible with the existing rates.

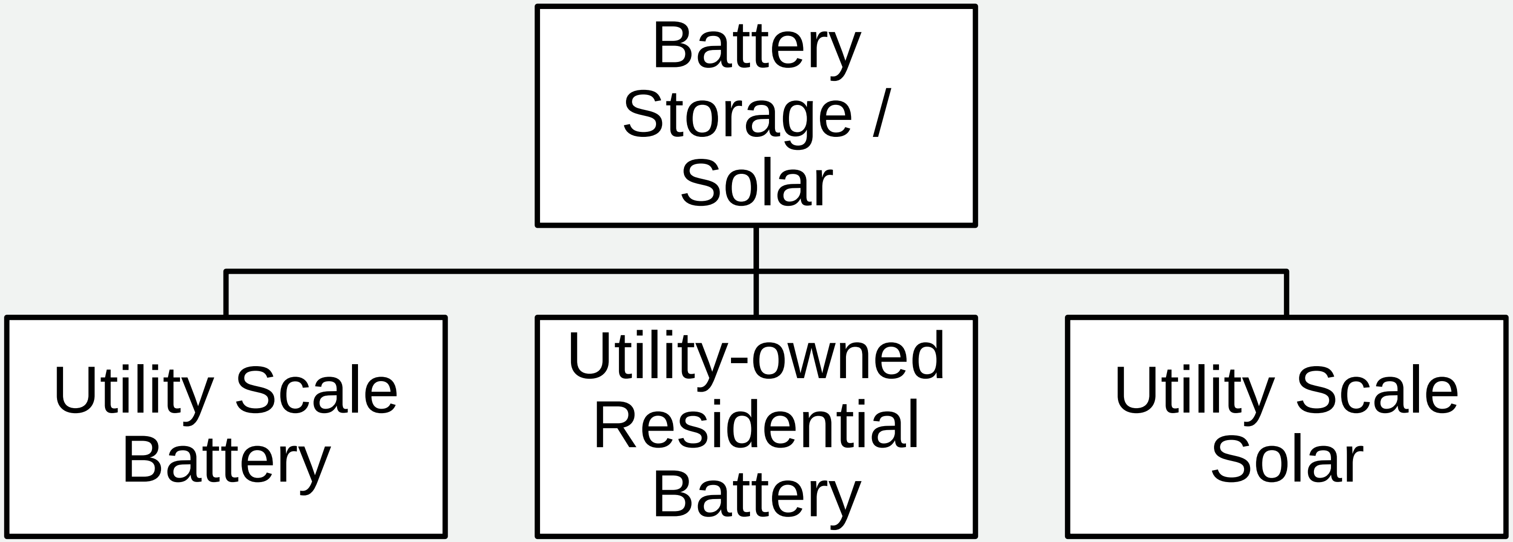
"…depending how BMLD's rates are structured, BMLD potentially could treat annual costs and rebates for energy storage facilities as power supply costs.", indicating that the mentioned projects could be considered within annual power generation costs.

Demand Side Management programs expenses cannot be treated as power supply expenses and should be recovered separately. Presently, these costs are partially covered by a conservation charge of the rate.

Daymark, our energy consulting firm, supports including utility-scale battery storage costs in the ongoing cost-of-service study and rate design, to be recuperated through rates as part of power generation expenses.

If Belmont Light spends less on REC purchases, how should we use the "savings?"

Utility-scale Opportunities



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Compare Battery / Solar Options for BL

A. **Battery Storage**

1. **Utility Scale Battery**

*break-even estimated for **10** years

~$1.33M/MW BL cost = break-even*

+ : Large scale, rapid increase in capacity, simpler infrastructure, all customers benefit

- : Little customer involvement

2. **Utility-owned Residential Batteries**

+ : Utility controls asset, customer resilience (outages), low customer cost

- : Small scale, slow ramp up, no customer TOU savings/Connected Homes, resilience not as valuable to Belmont

a) Green Mountain Power / Liberty Utilities
~$2.17M/MW cost = loss

b) MMWEC
~$1.65M/MW BL cost = break-even*/small gain (100% participation in peak events/$3,600 customer payment)

B. **Solar**

1. **Utility Scale Solar**

~$2.7M/MW (incinerator site/ice rink)

+ : Large scale, rapid capacity increase, simpler infrastructure, BL owns power, energy

- : Little customer involvement

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Utility Scale Battery

5MW Storage at Energy Park (former incinerator site)

- Developer X
  - 5MW Battery Storage = $4M-$5.6M (software and maintenance not included)
  - (4 to 5 hour battery - 20MWh to 25MWh)
  - **$.8M-$1.12M/MW plus software and maintenance**

- Developer Y
  - 5MW Battery Storage = $7.5-$10M including Energy Toolbase software
  - (2 to 4 hour battery) - 10MWh to 20MWh Tesla Megapack XL
  - **$1.5M-$2M/MW plus maintenance**

- General Internet Research
  - 5MW Battery Storage = $4M-$8M
  - **$.8M-$1.6M/MW**

Average: $1.33M/MW

Advantages:

- ✓ Capacity cost savings = close to “break even”
- ✓ **Large Scale = 5MW all at once**
- ✓ Central Location
- ✓ Infrastructure needs simple
- ✓ Administration needs minimal
- ✓ Belmont Light controls capacity
- ✓ All customers benefit indirectly from reduced capacity charges

Disadvantages:

- ✓ No direct customer involvement
  - ✓ (but customer options exist for solar)

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Utility-owned Residential Batteries – Examples

1-Green Mountain Power

- 25MW total – 2500 customers – 2 Tesla Powerwalls (10kW-27kWh/customer)
  - Total cost to each customer **$5000** (to cover infrastructure)
    - New pilot: **3** Tesla Powerwalls for new all-electric development
- ~$25,000 utility cost per customer
- **$2.5M/MW** (100 customers x $25,000)

2-Liberty Utilities

- 1MW Total – 100 customers – 2 Tesla Powerwalls (10kW-27kWh/customer)
- Caterpillar dispatches batteries
  - Total cost to each customer **$6000** (to cover infrastructure)
- ~$17,000-$20,000 utility cost per customer
- **$1.7M-$2M/MW** (100 customers x $17K-$20K)

Average: $2.175M/MW

Advantages:

✓ Capacity Cost Savings (but not "break even")
✓ Utility controls batteries = no "opt out"
✓ Resilience during regular outages (VT, NH)
✓ Low cost to customer

Disadvantages:

✓ Small Scale = 100 customers over 2(?) years
✓ Customer can't benefit from TOU
✓ Customers can't benefit from Connected Homes
✓ Service /transformer upgrades
✓ Outages not a large concern in Belmont

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Utility-owned Residential Batteries – MMWEC

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	2
Lifetime Cost Avoidance for MLP	
Avoided Energy Costs from Load Shifting	$193
Avoided Capacity Costs from Peak Shaving	$5,299
Avoided Transmission Costs from Peak Shaving	$21,705
Total Program Payment from Homeowner	$3,600
Total Avoided Costs for MLP	$30,796
Total Program Costs	
Unit Purchase Price	$12,000
Installation Costs	$2,000
Total MMWEC Admin Fees	$3,750
Total Expenses	$17,750
Net Value	
Net Value over System Lifetime	$13,046
Breakeven Timeframe (Years)	5.00

3-MMWEC

- 2 Duracell batteries 10kW/25.6kWh
- Goal: 100 customers over 2(?) years
- **$3,600** customer payment to BL - upgrades
- **$16,500** 10-year cost to BL
  - (15-year $17,750)
- 10-year cost avoidance **$20,530**
  - (15 year $30,796)
- **$1.65M/MW**

$1.65M/MW

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Utility Scale Solar

Incinerator Site – 2MWDC – 90% ballasted ground mount/10% canopy
$5.775M ($2.89/watt)

Ice Rink – 455kWDC – 100% roof mount
$1.1M ($2.50/watt)

Advantages:

- ✓ Renewable energy added to Belmont grid
- ✓ Progress toward Climate Action Plan
- ✓ **Belmont Light owns power/energy produced**
- ✓ **Belmont Light controls asset**
- ✓ Belmont Light generates Class I RECs
- ✓ Potential **midday** peak shaving*
- ✓ **Large Scale = 2MW all at once**
- ✓ Central Location
- ✓ Infrastructure needs comparatively simple
- ✓ Easily Paired with Battery Storage
- ✓ Administration needs minimal
- ✓ All customers benefit indirectly from reduced capacity charges
- ✓ Popularity with Town, Energy Committee, etc.

Disadvantages:

- ✓ No direct customer involvement

Average:
$2.7M/MW