Welcome!

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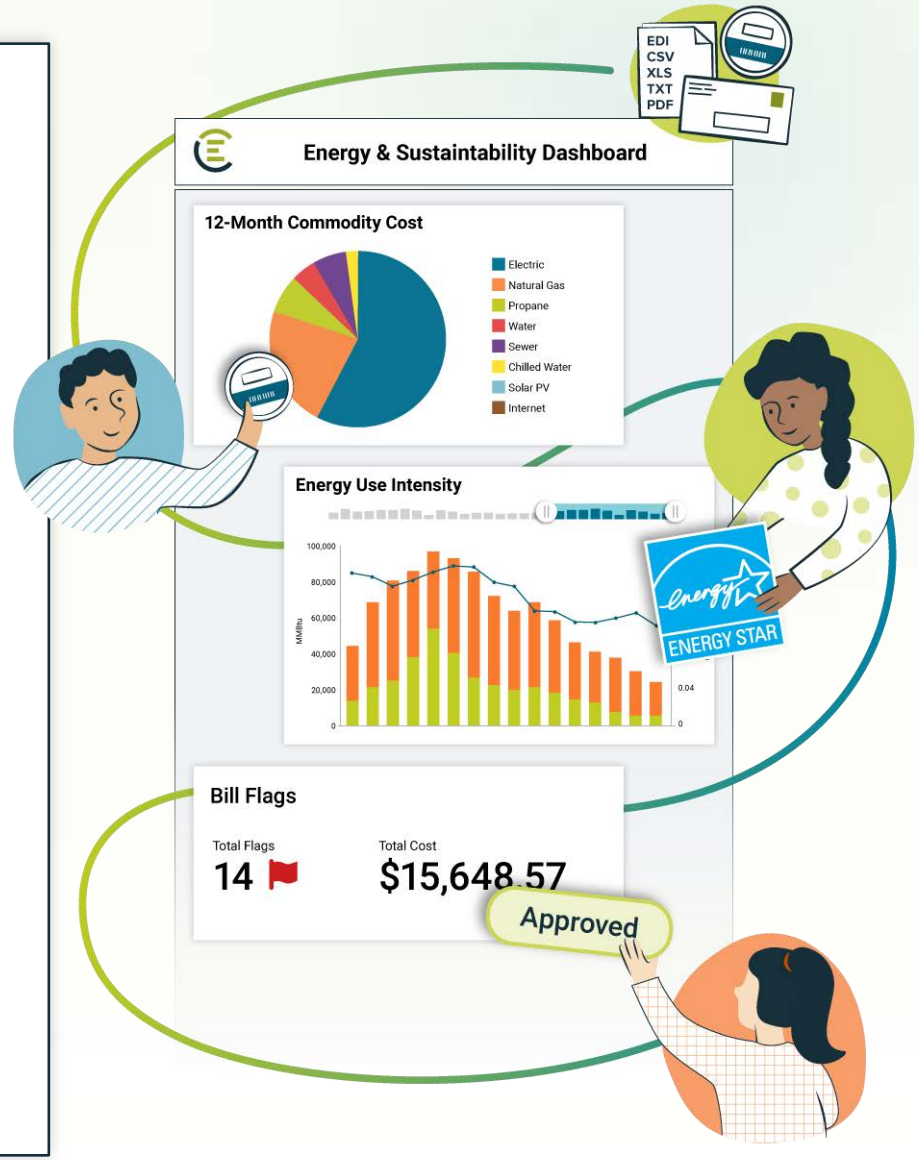
ENERGYCAP®

State of Tennessee Training:

Energy Projects & Cost Avoidance



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State Facility Utility Management (SFUM)

Jeremy McBride
Senior Data Analyst/Energy Consultant

Natalie Dallriva
OEP Budget Administrator

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EnergyCAP

John Pierce, Director & SME
Project Management Office

Beth Calehuff, Manager
Customer Success

Housekeeping

The Webinar is being recorded and will be distributed

Please enter questions into the 'Q&A'

If you have questions after the webinar, please reach out to the SFUM Team at TDEC.SFUM@tn.gov

A step-by-step guide will also be distributed

Additional Training Opportunity – EnergyCAP's Catalyst User Group Conference

April 25-27, 2023 in State College, PA

Info & Registration

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Overview

Energy Projects and Savings (AKA Cost Avoidance)

- Demonstrate how these features allow you to document an Energy Conservation Project
- Example project is LED Lighting Retrofit
- Using a demo database, but scenarios mimic existing

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Energy Projects

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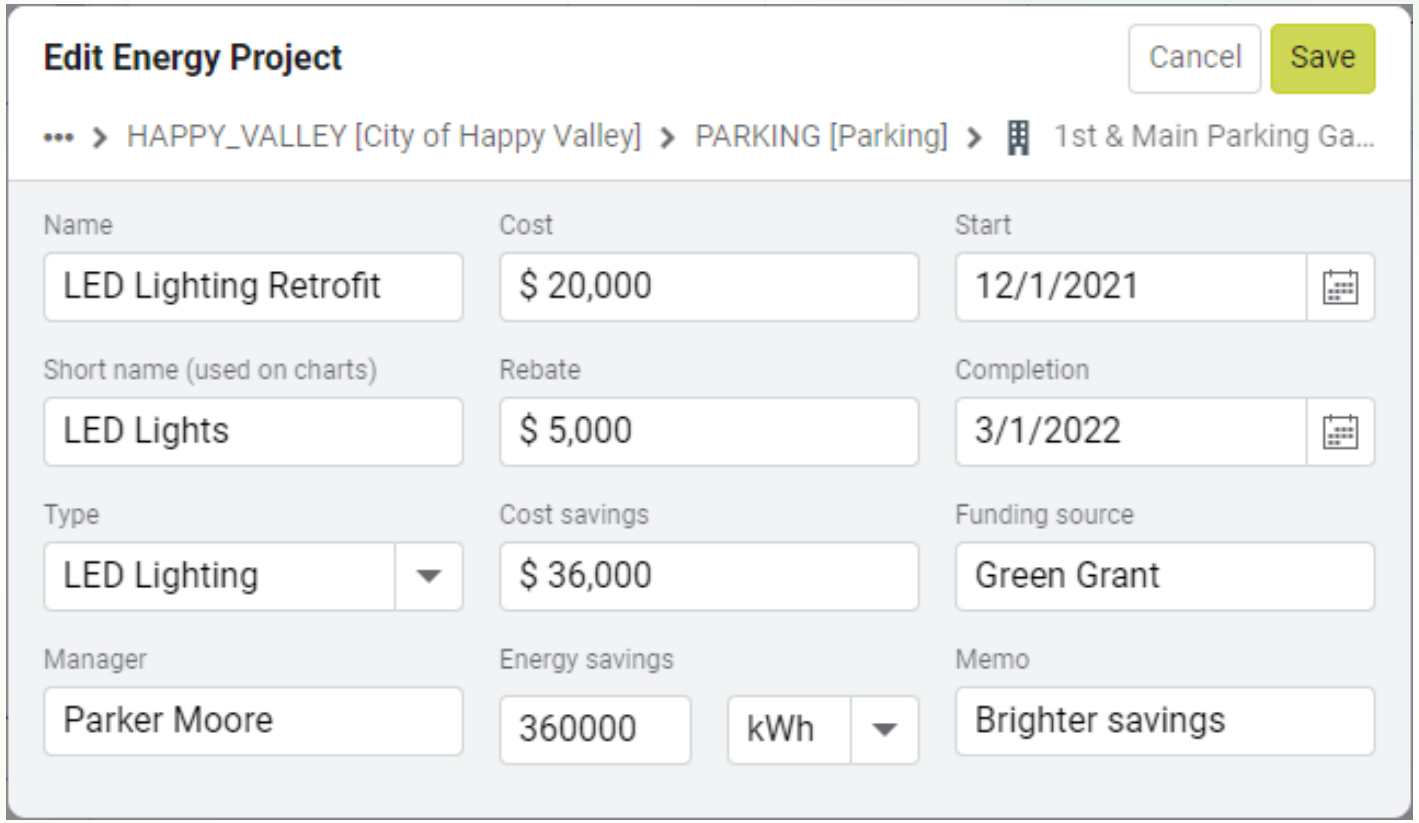
Energy Projects

Found in the Buildings & Meters hierarchy

- Create at the Building level
- Summarized at higher Organization level(s)



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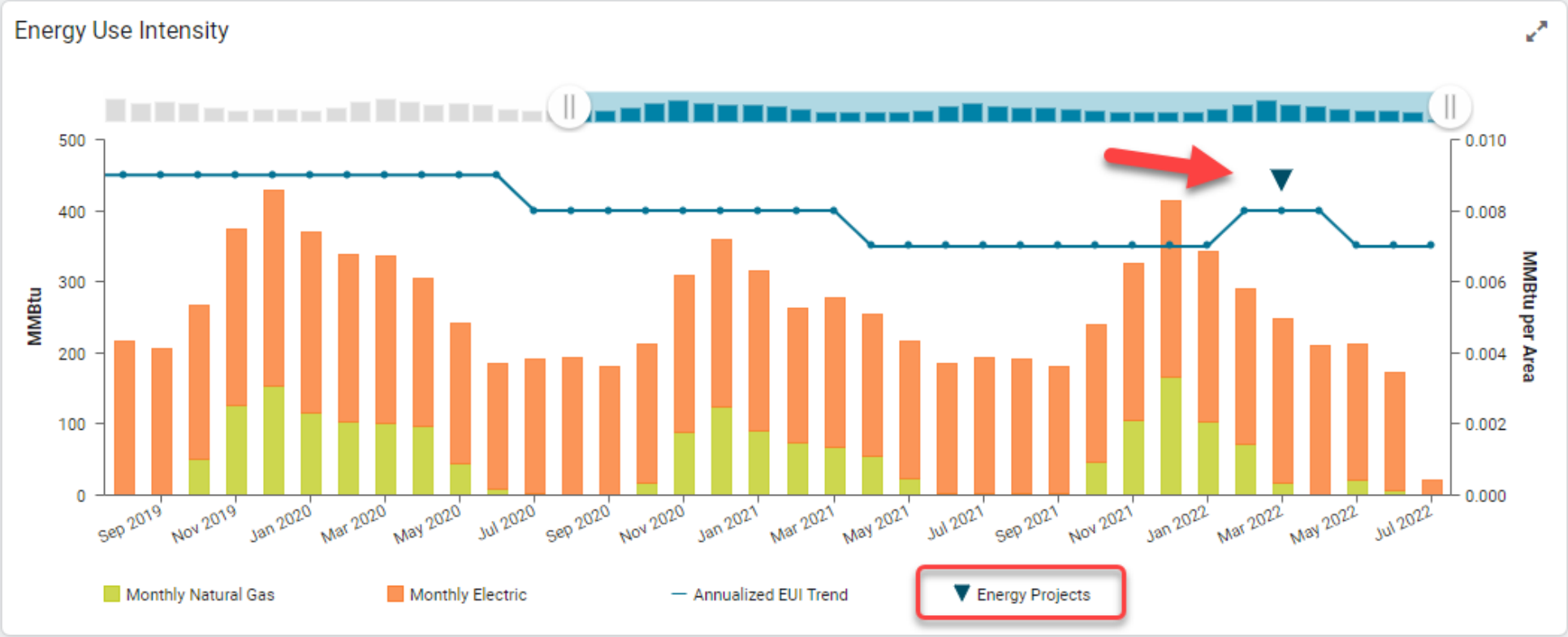
Energy Projects

Completed Energy Projects shown by symbol on the EUI Chart for the Building

Not intended to be a comprehensive project management tool, but rather serves to indicate the impact of completed Energy Projects on the EUI Charts



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Savings
(AKA Cost Avoidance)

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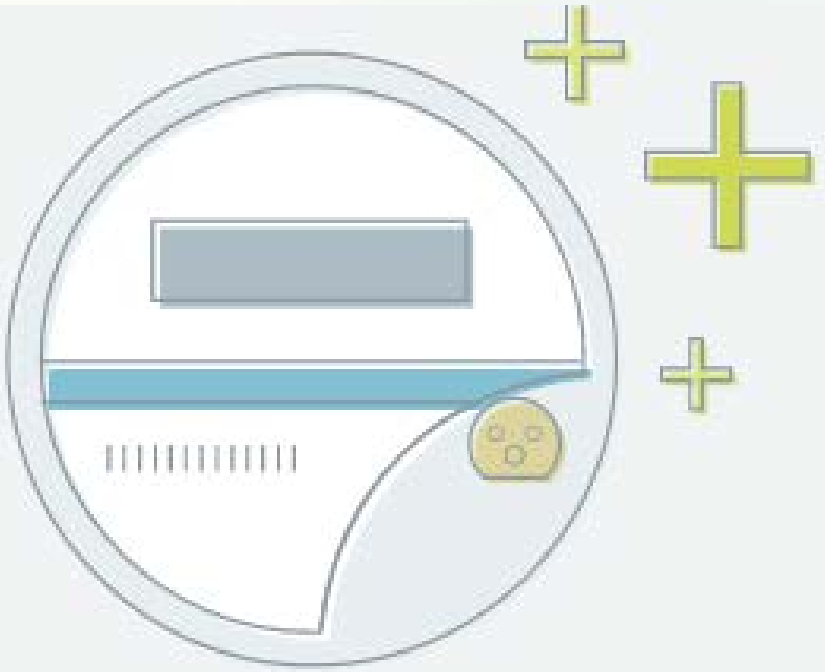
Savings

Savings are found in the Buildings & Meters hierarchy

Compliant with IPMVP Option C ("Whole building") approach

Cost Avoidance is the Measurement and Verification (M&V) of energy and cost savings due to energy management projects and is the dollars that you **avoided** spending.

Current bills are compared with an adjusted baseline year. The adjusted process takes into account major variables including weather (degree days), billing period length, floor area changes and commodity price, and allows special adjustments for other changes such as occupancy, schedule and equipment retrofits.



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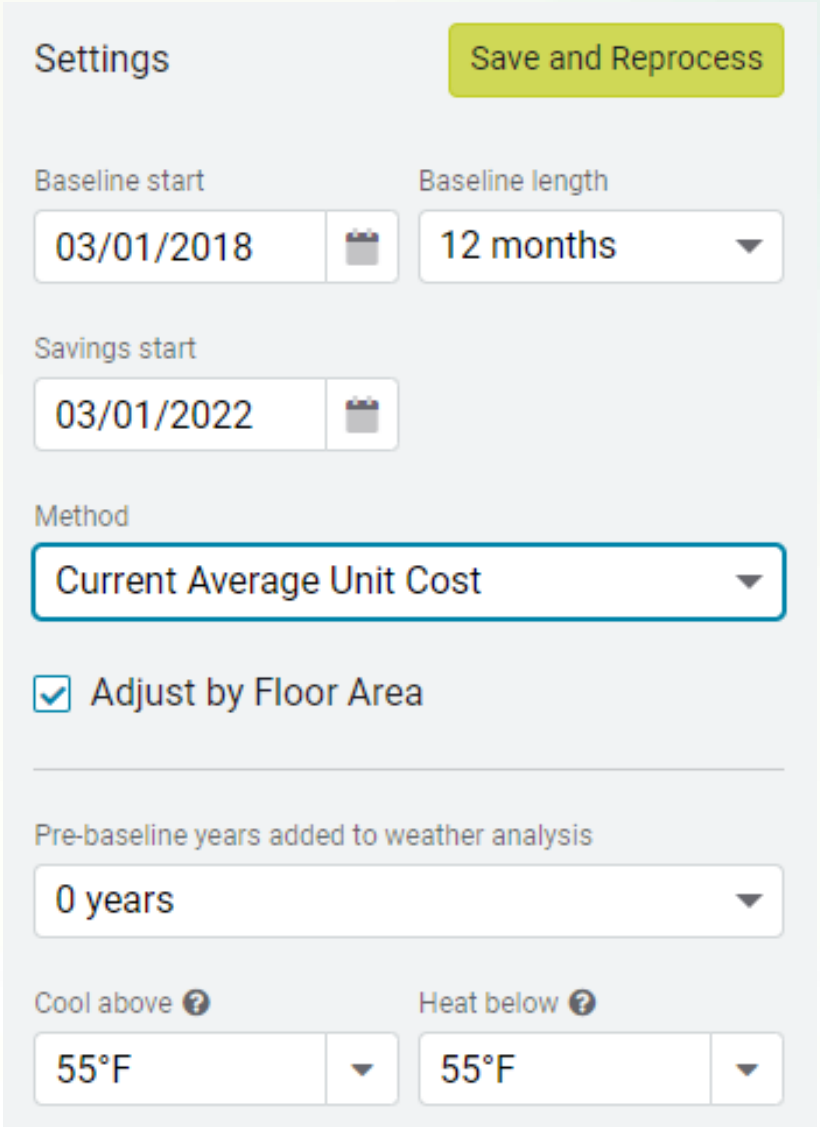
Baseline

Settings

- Create at the Meter level
- Summarized at the Building and higher Organization level(s)
- Baseline start
- Baseline length
- Savings start
- Method
- Adjust by Floor Area
- Cool above
- Heat below



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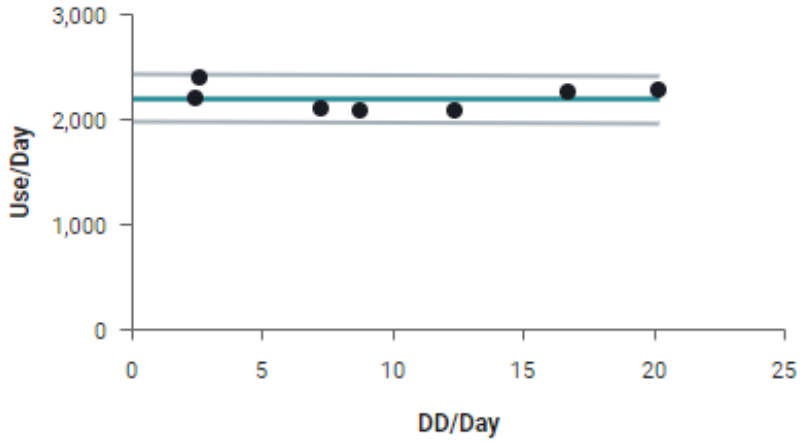
Baseline

Use vs. Weather Regression Analysis

Cooling Adjustment

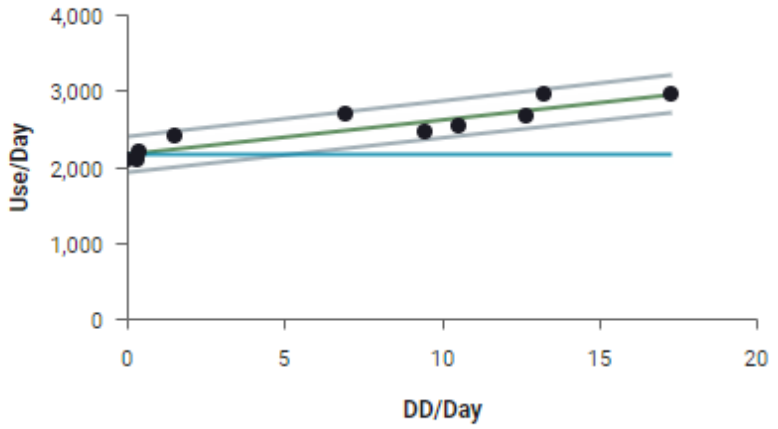
Off On



Base load	2,199.01 kWh/day
Weather factor	-0.37 kWh/CDD 0.00 (t-stat)
R2	0.00
Minimum R2	
Adjusted R2	
CVRMSE	
NDB	
Standard Error	

Heating Adjustment

Off On



Base load	2,170.36 kWh/day
Weather factor	45.61 kWh/HDD 6.30 (t-stat)
R2	0.83
Minimum R2	0.30
Adjusted R2	0.83
CVRMSE	0.05
NDB	0.00
Standard Error	137.85

data point outlier user-removed best fit 2 standard deviations base load

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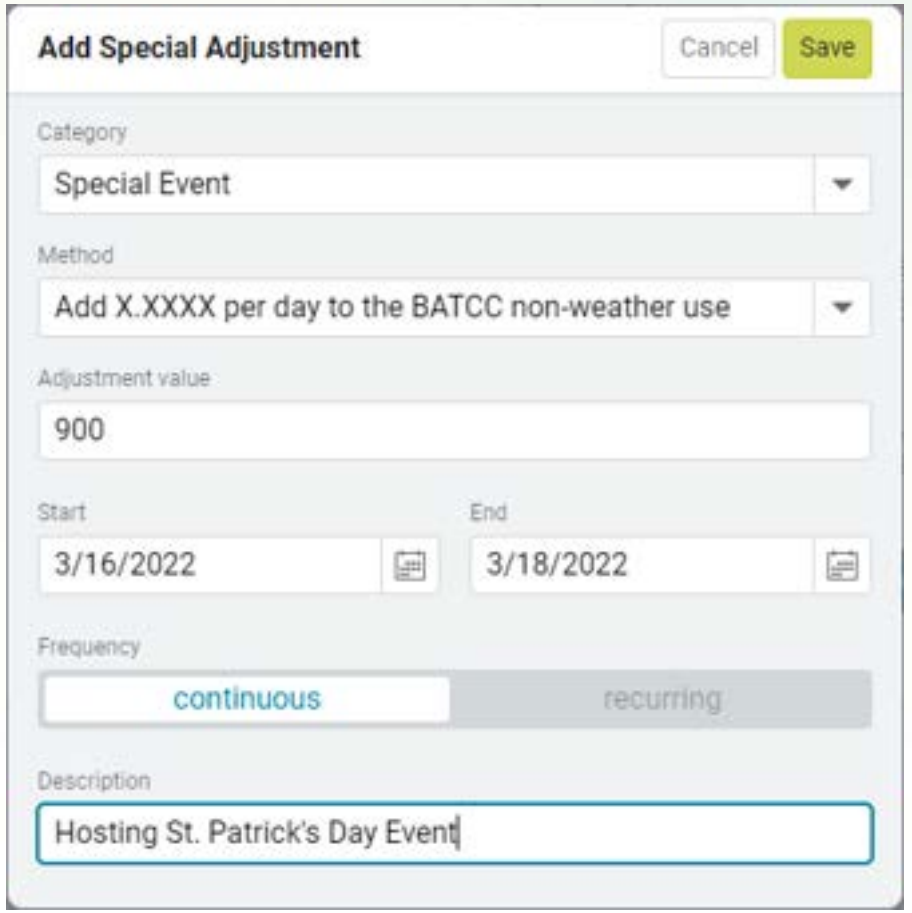
Special Adjustments

A special adjustment is needed if there has been a change in the energy use of a building meeting these conditions:

- It occurred AFTER the baseline year
- It is NOT the result of an Energy Manager's actions
- It is NOT weather related

Such uncontrollable conditions, if left unadjusted, can unfairly make the energy management results appear better or worse than reasonable.

+ Add Special Adjustments



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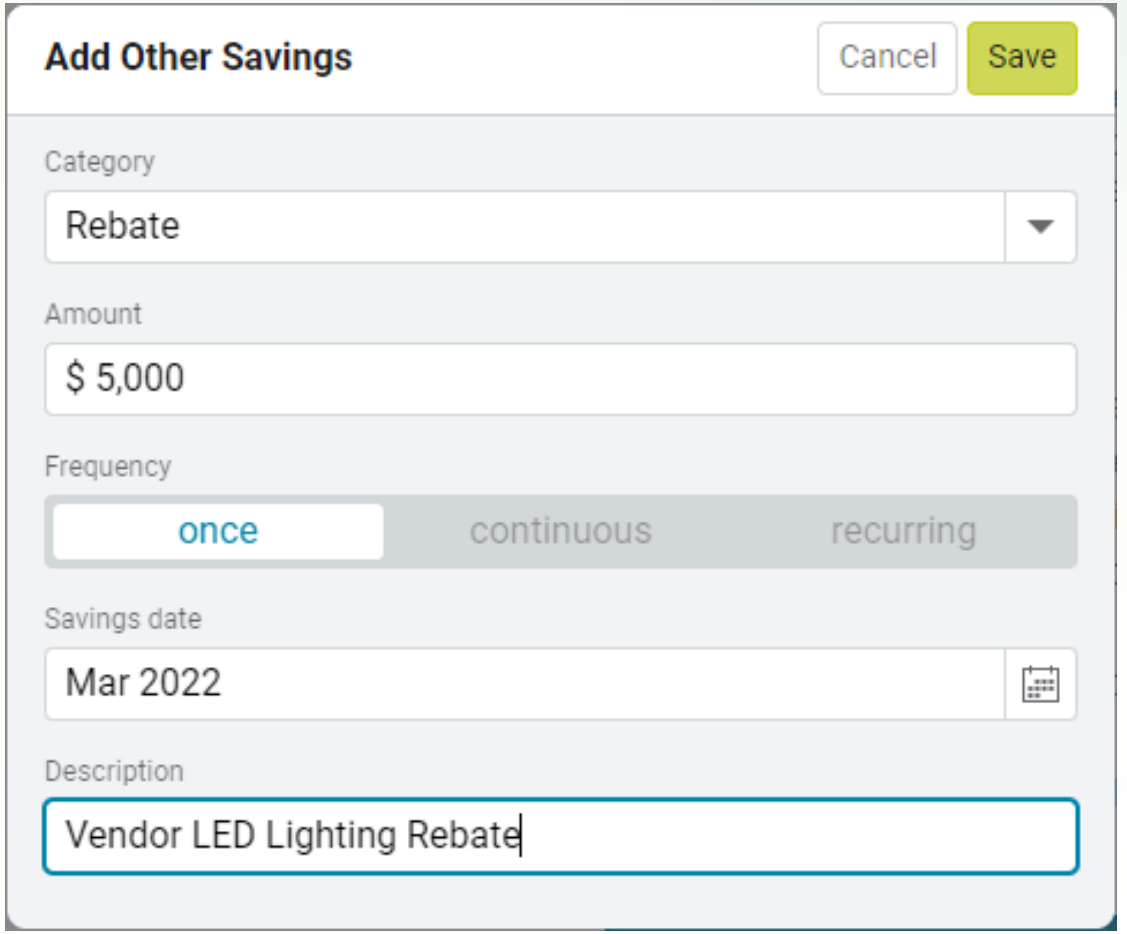
Other Savings

Other Savings are one-time or recurring cost reductions that don't fit within the normal cost avoidance calculations of today's bills vs. baseline bills. However, they are valid savings attributable to energy management activities.

Examples:

- A rebate or refund negotiated with a vendor
- A lower cost rate schedule/tariff
- Savings in personnel, equipment, supplies, or maintenance due to reduced runtimes of lighting, HVAC and other equipment
- Savings due to consolidation of accounts, meters, or operations
- Eliminated capital expenditures due to lower loads and runtimes

+ Add Other Savings



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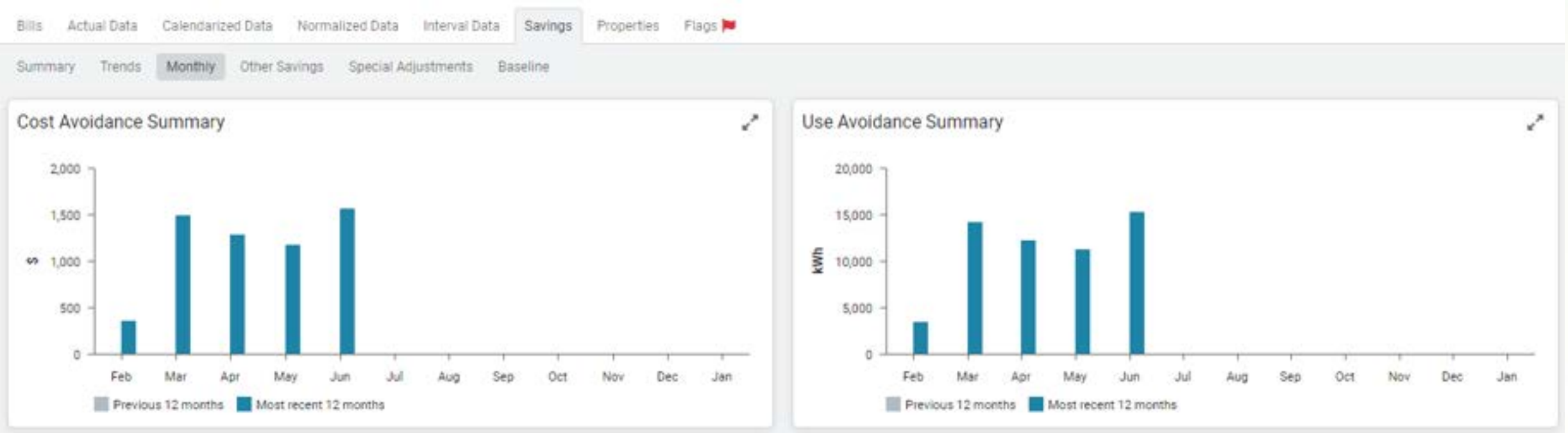
Monthly

Meter-level PowerViews include:

- Monthly
  - Comparing a rolling 24-months



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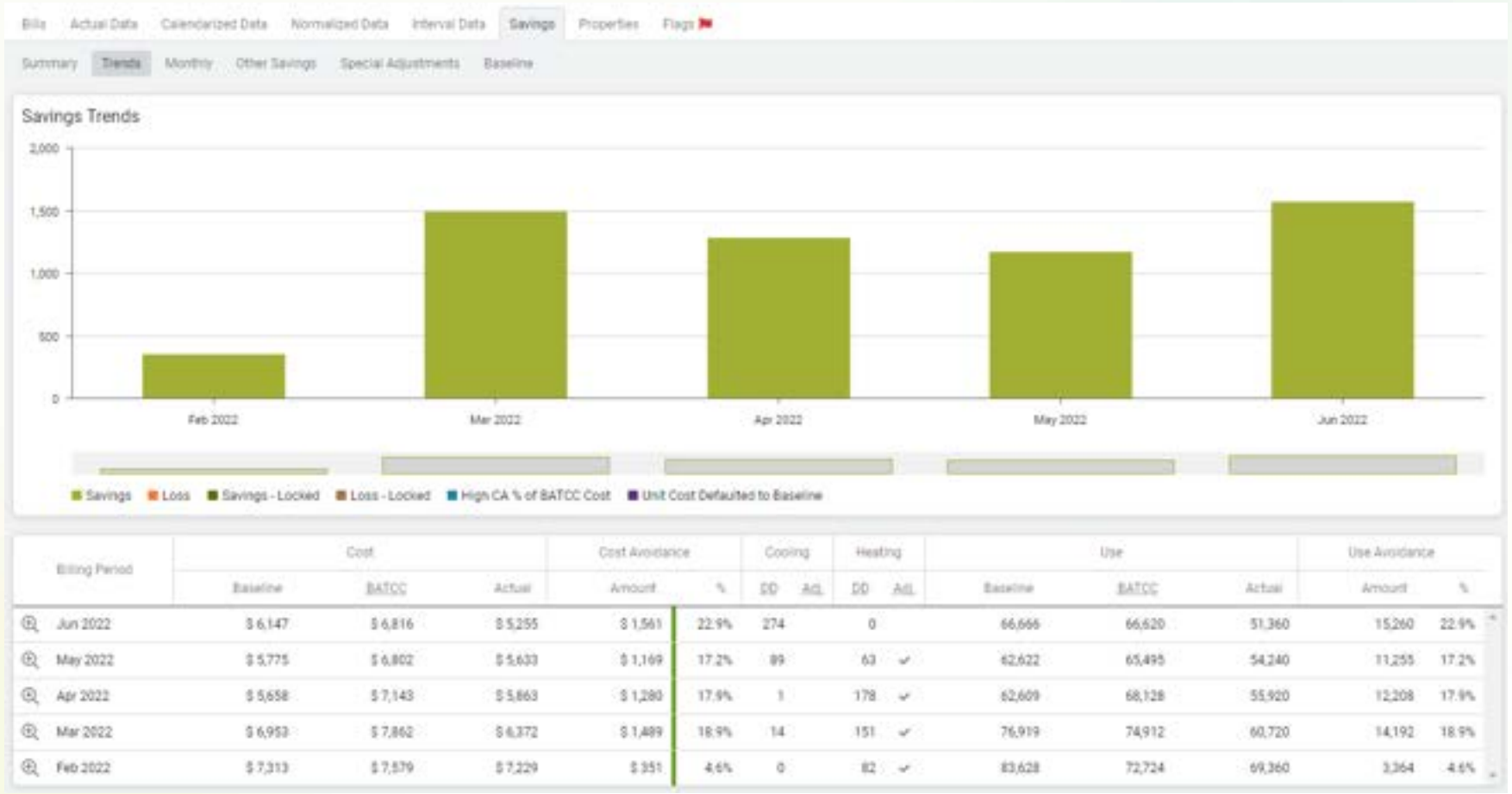
Trends

Meter-level PowerViews include:

- Trends
  - Showing the historical trend
  - Gateway to the Explanation of Savings



Billing Period	Cost			Cost Avoidance		Cooling		Heating		Use			Use Avoidance	
	Baseline	BATCC	Actual	Amount	%	DD	Adj	DD	Adj	Baseline	BATCC	Actual	Amount	%
Jun 2022	$ 6,147	$ 6,816	$ 5,255	$ 1,561	22.9%	274		0		66,666	66,620	51,360	15,260	22.9%
May 2022	$ 5,775	$ 6,802	$ 5,633	$ 1,169	17.2%	89		63	✓	62,622	65,495	54,240	11,255	17.2%
Apr 2022	$ 5,658	$ 7,143	$ 5,863	$ 1,280	17.9%	1		178	✓	62,609	68,128	55,920	12,208	17.9%
Mar 2022	$ 6,953	$ 7,862	$ 6,372	$ 1,489	18.9%	14		151	✓	76,919	74,912	60,720	14,192	18.9%
Feb 2022	$ 7,313	$ 7,579	$ 7,229	$ 351	4.6%	0		82	✓	83,628	72,724	69,360	3,364	4.6%

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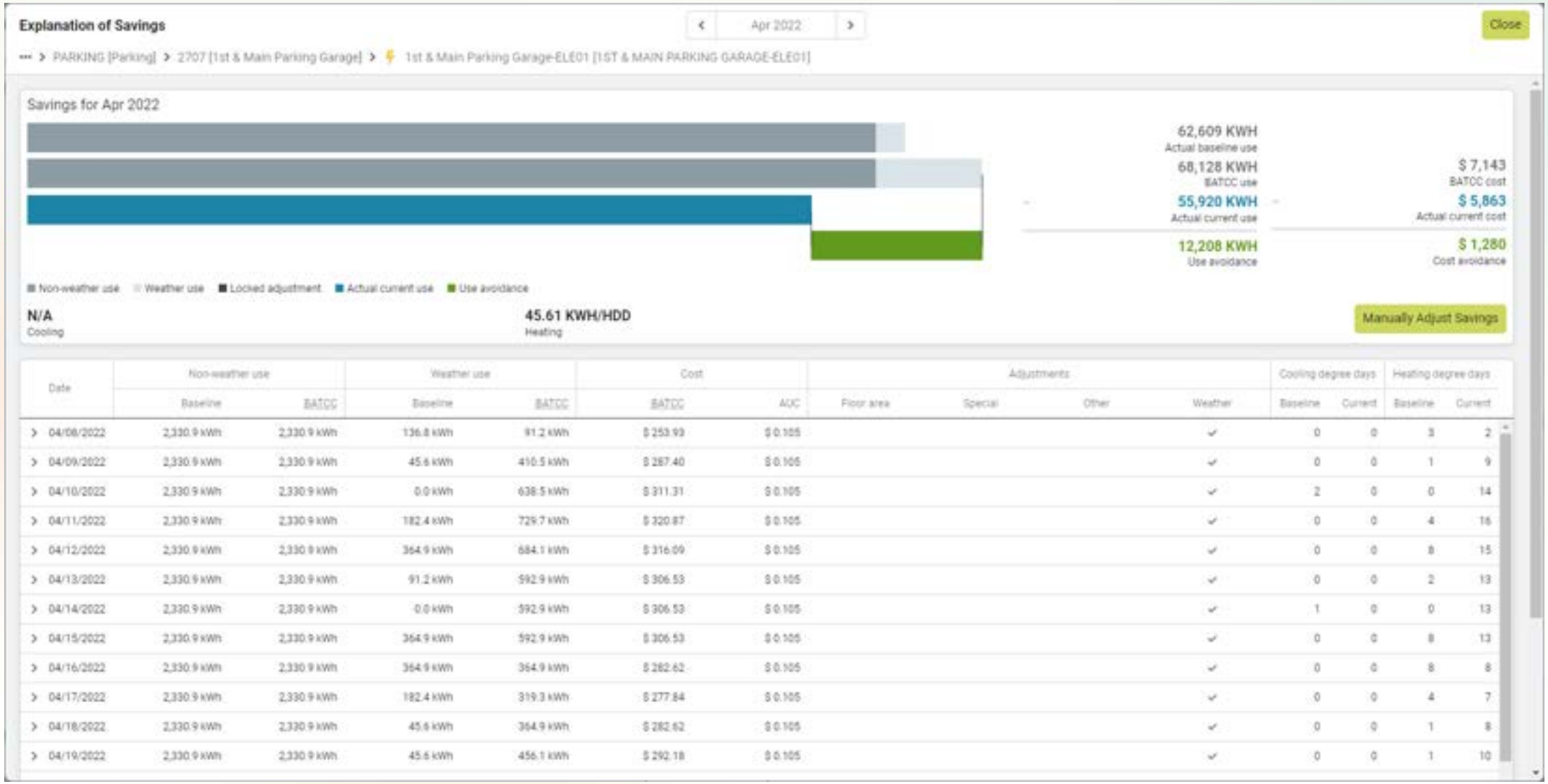
Explanation of Savings



Date	Non-weather use		Weather use		Cost		Adjustments				Cooling degree days		Heating degree days	
	Baseline	BATCC	Baseline	BATCC	BATCC	AUC	Floor area	Special	Other	Weather	Baseline	Current	Baseline	Current
04/08/2022	2,330.9 kWh	2,330.9 kWh	136.8 kWh	91.2 kWh	$ 253.93	$ 0.105				✓	0	0	3	2
04/09/2022	2,330.9 kWh	2,330.9 kWh	45.6 kWh	410.5 kWh	$ 287.40	$ 0.105				✓	0	0	1	9
04/10/2022	2,330.9 kWh	2,330.9 kWh	0.0 kWh	638.5 kWh	$ 311.31	$ 0.105				✓	2	0	0	14
04/11/2022	2,330.9 kWh	2,330.9 kWh	182.4 kWh	729.7 kWh	$ 320.87	$ 0.105				✓	0	0	4	16
04/12/2022	2,330.9 kWh	2,330.9 kWh	364.9 kWh	684.1 kWh	$ 316.09	$ 0.105				✓	0	0	8	15
04/13/2022	2,330.9 kWh	2,330.9 kWh	91.2 kWh	592.9 kWh	$ 306.53	$ 0.105				✓	0	0	2	13
04/14/2022	2,330.9 kWh	2,330.9 kWh	0.0 kWh	592.9 kWh	$ 306.53	$ 0.105				✓	1	0	0	13
04/15/2022	2,330.9 kWh	2,330.9 kWh	364.9 kWh	592.9 kWh	$ 306.53	$ 0.105				✓	0	0	8	13
04/16/2022	2,330.9 kWh	2,330.9 kWh	364.9 kWh	364.9 kWh	$ 282.62	$ 0.105				✓	0	0	8	8
04/17/2022	2,330.9 kWh	2,330.9 kWh	182.4 kWh	319.3 kWh	$ 277.84	$ 0.105				✓	0	0	4	7
04/18/2022	2,330.9 kWh	2,330.9 kWh	45.6 kWh	364.9 kWh	$ 282.62	$ 0.105				✓	0	0	1	8
04/19/2022	2,330.9 kWh	2,330.9 kWh	45.6 kWh	456.1 kWh	$ 292.18	$ 0.105				✓	0	0	1	10

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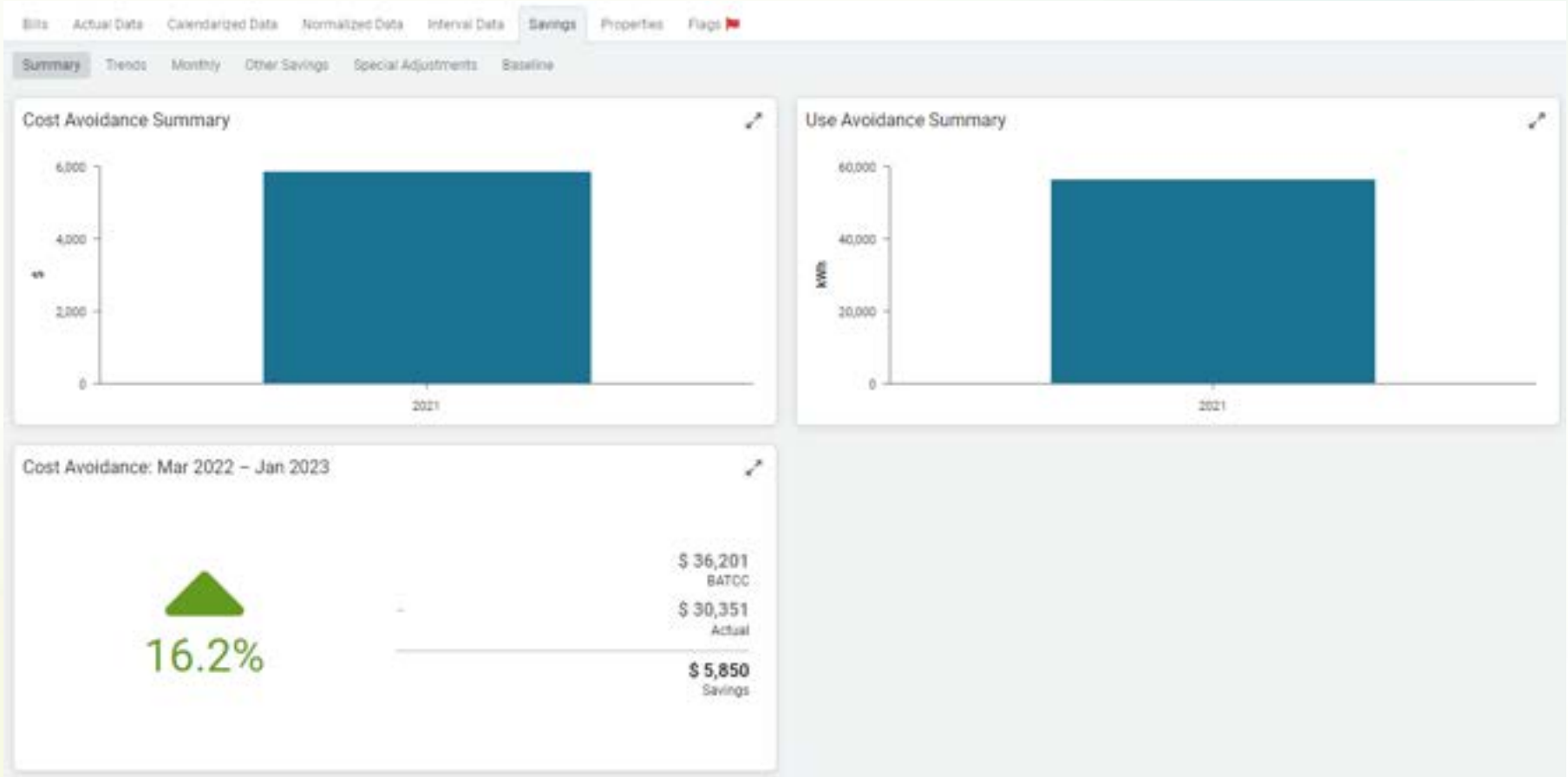
Summary

Meter-level PowerViews include:

- Summary
  - Showing yearly summarization



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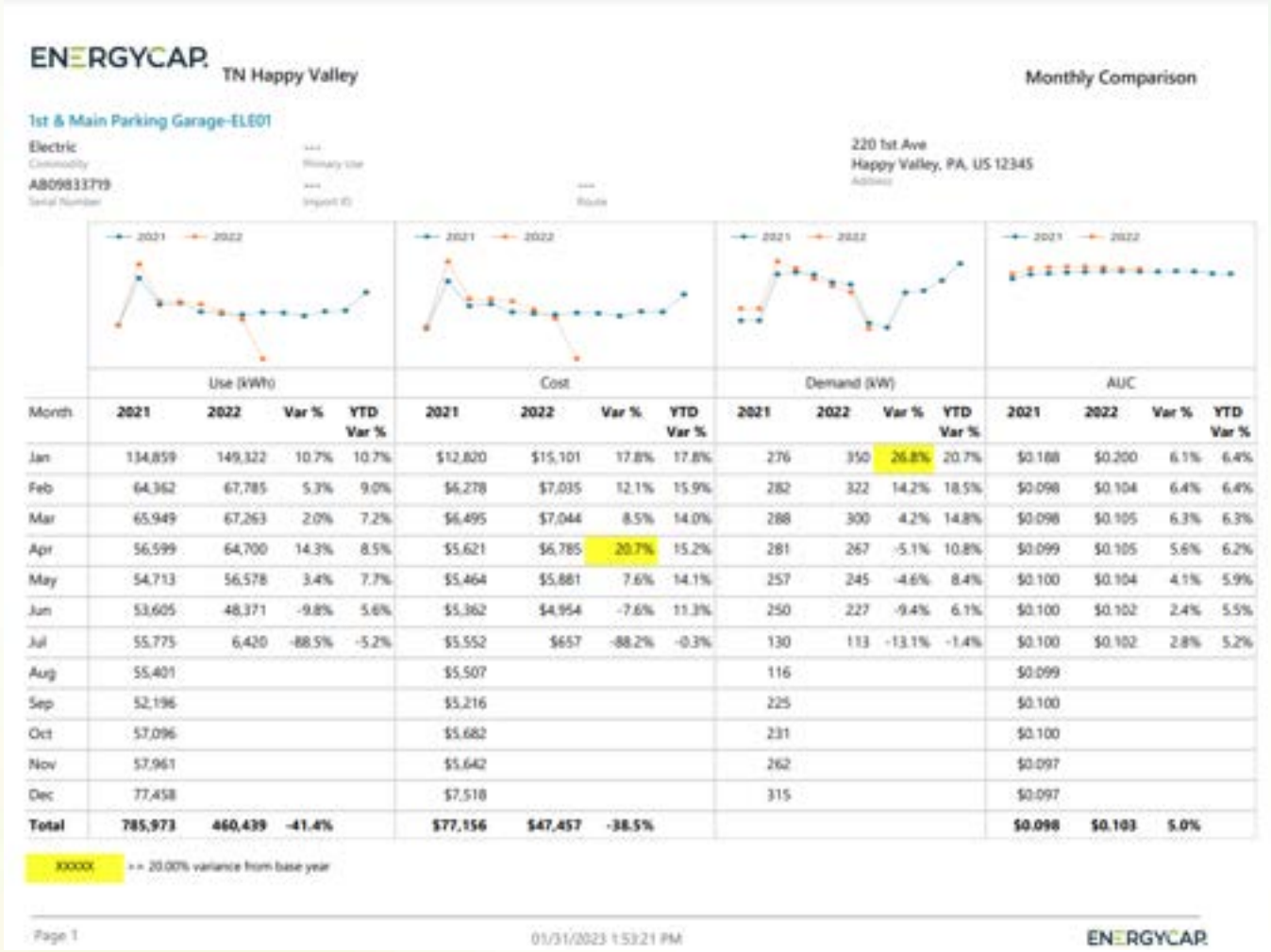
Quick Reports - Meter

Two-Year Monthly Comparison



ENERGYCAP TN Happy Valley — Monthly Comparison

1st & Main Parking Garage-ELE01

Electric

AB09833719

220 1st Ave
Happy Valley, PA, US 12345

Month	Use (kWh) 2021	Use (kWh) 2022	Use (kWh) Var %	Use (kWh) YTD Var %	Cost 2021	Cost 2022	Cost Var %	Cost YTD Var %	Demand (kW) 2021	Demand (kW) 2022	Demand (kW) Var %	Demand (kW) YTD Var %	AUC 2021	AUC 2022	AUC Var %	AUC YTD Var %
Jan	134,859	149,322	10.7%	10.7%	$12,820	$15,101	17.8%	17.8%	276	350	26.8%	20.7%	$0.188	$0.200	6.1%	6.4%
Feb	64,362	67,785	5.3%	9.0%	$6,278	$7,035	12.1%	15.9%	282	322	14.2%	18.5%	$0.098	$0.104	6.4%	6.4%
Mar	65,949	67,263	2.0%	7.2%	$6,495	$7,044	8.5%	14.0%	288	300	4.2%	14.8%	$0.098	$0.105	6.3%	6.3%
Apr	56,599	64,700	14.3%	8.5%	$5,621	$6,785	20.7%	15.2%	281	267	-5.1%	10.8%	$0.099	$0.105	5.6%	6.2%
May	54,713	56,578	3.4%	7.7%	$5,464	$5,881	7.6%	14.1%	257	245	-4.6%	8.4%	$0.100	$0.104	4.1%	5.9%
Jun	53,605	48,371	-9.8%	5.6%	$5,362	$4,954	-7.6%	11.3%	250	227	-9.4%	6.1%	$0.100	$0.102	2.4%	5.5%
Jul	55,775	6,420	-88.5%	-5.2%	$5,552	$657	-88.2%	-0.3%	130	113	-13.1%	-1.4%	$0.100	$0.102	2.8%	5.2%
Aug	55,401				$5,507				116				$0.099			
Sep	52,196				$5,216				225				$0.100			
Oct	57,096				$5,682				231				$0.100			
Nov	57,961				$5,642				262				$0.097			
Dec	77,458				$7,518				315				$0.097			
Total	**785,973**	**460,439**	**-41.4%**		**$77,156**	**$47,457**	**-38.5%**						**$0.098**	**$0.103**	**5.0%**	

XXXXX = = 20.00% variance from base year

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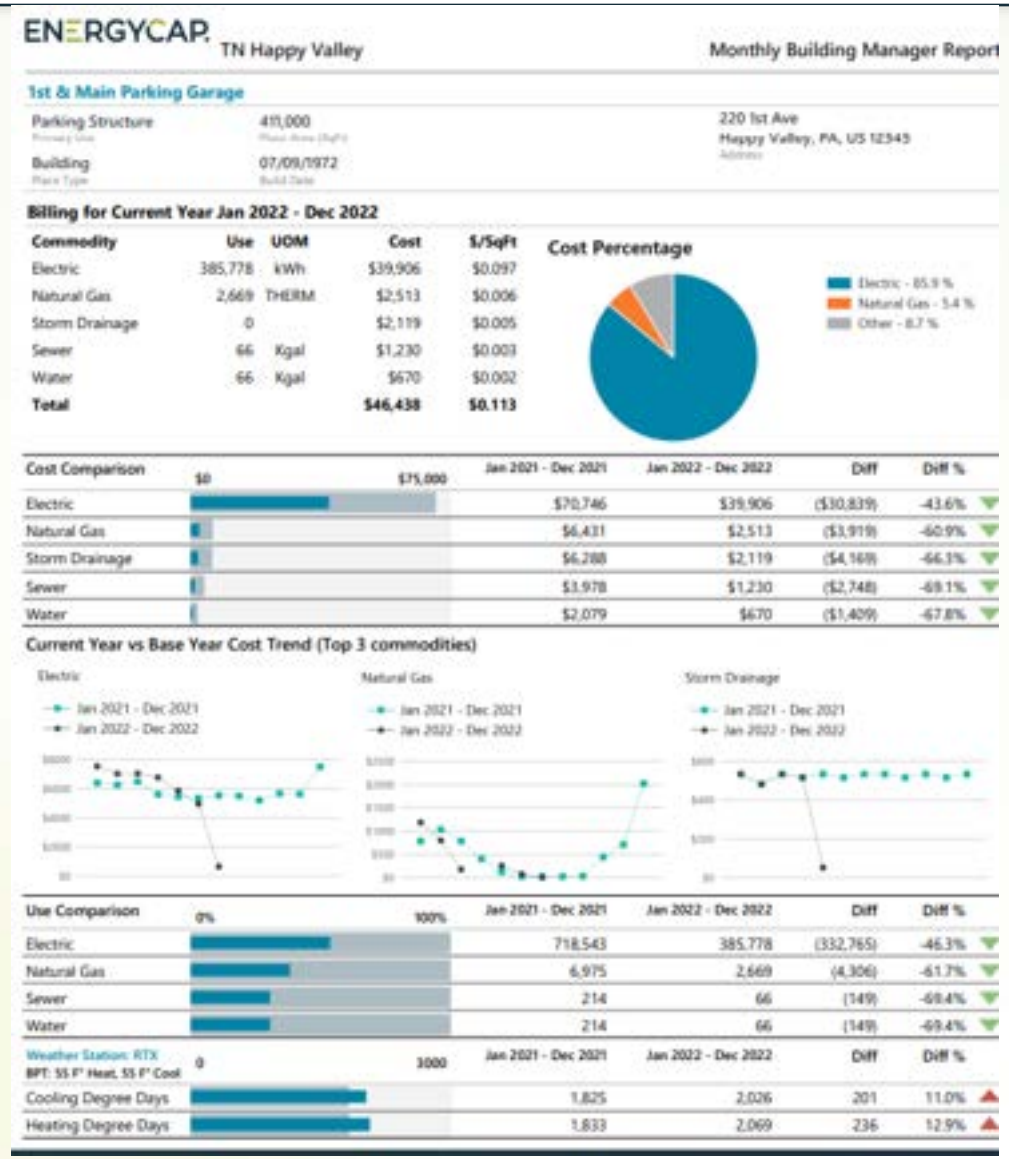
Quick Reports - Building

Building Performance Report



ENERGYCAP TN Happy Valley — Monthly Building Manager Report

1st & Main Parking Garage

Parking Structure	411,000	220 1st Ave Happy Valley, PA, US 12345
Building	07/09/1972	

Billing for Current Year Jan 2022 - Dec 2022

Commodity	Use	UOM	Cost	$/SqFt
Electric	385,778	kWh	$39,906	$0.097
Natural Gas	2,669	THERM	$2,513	$0.006
Storm Drainage	0		$2,119	$0.005
Sewer	66	Kgal	$1,230	$0.003
Water	66	Kgal	$670	$0.002
Total			**$46,438**	**$0.113**

Cost Percentage

Cost Comparison ($0 – $75,000)	Jan 2021 - Dec 2021	Jan 2022 - Dec 2022	Diff	Diff %
Electric	$70,746	$39,906	($30,839)	-43.6%
Natural Gas	$6,431	$2,513	($3,919)	-60.9%
Storm Drainage	$6,288	$2,119	($4,169)	-66.3%
Sewer	$3,978	$1,230	($2,748)	-69.1%
Water	$2,079	$670	($1,409)	-67.8%

Current Year vs Base Year Cost Trend (Top 3 commodities)

Use Comparison (0% – 100%)	Jan 2021 - Dec 2021	Jan 2022 - Dec 2022	Diff	Diff %
Electric	718,543	385,778	(332,765)	-46.3%
Natural Gas	6,975	2,669	(4,306)	-61.7%
Sewer	214	66	(149)	-69.4%
Water	214	66	(149)	-69.4%
Weather Station: RTX BPT: 55 F° Heat, 55 F° Cool (0 – 3000)	Jan 2021 - Dec 2021	Jan 2022 - Dec 2022	Diff	Diff %
Cooling Degree Days	1,825	2,026	201	11.0%
Heating Degree Days	1,833	2,069	236	12.9%

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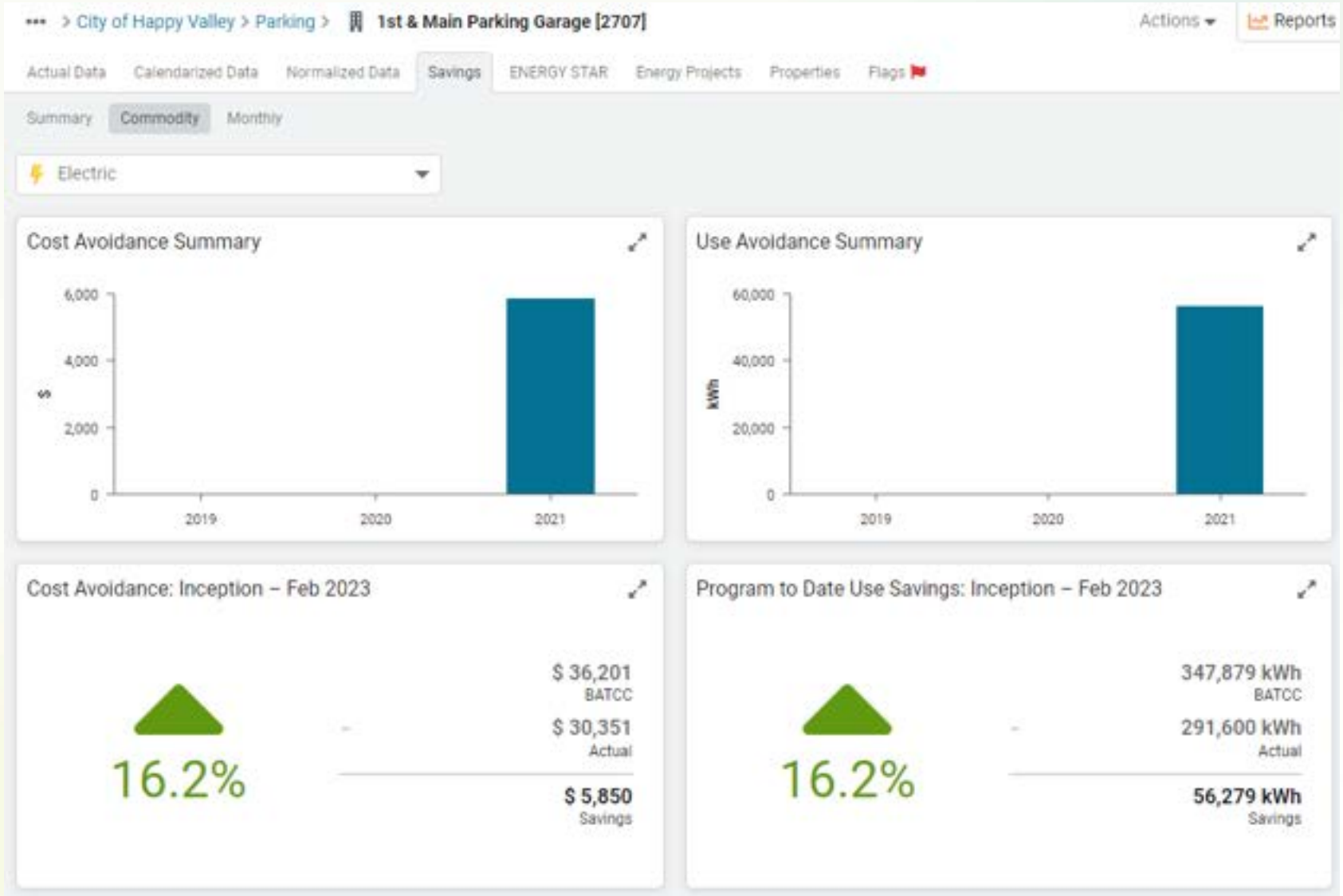
Commodity

Building-level PowerViews include:

- Summary
  - Showing yearly summarization
- Commodity
- Monthly



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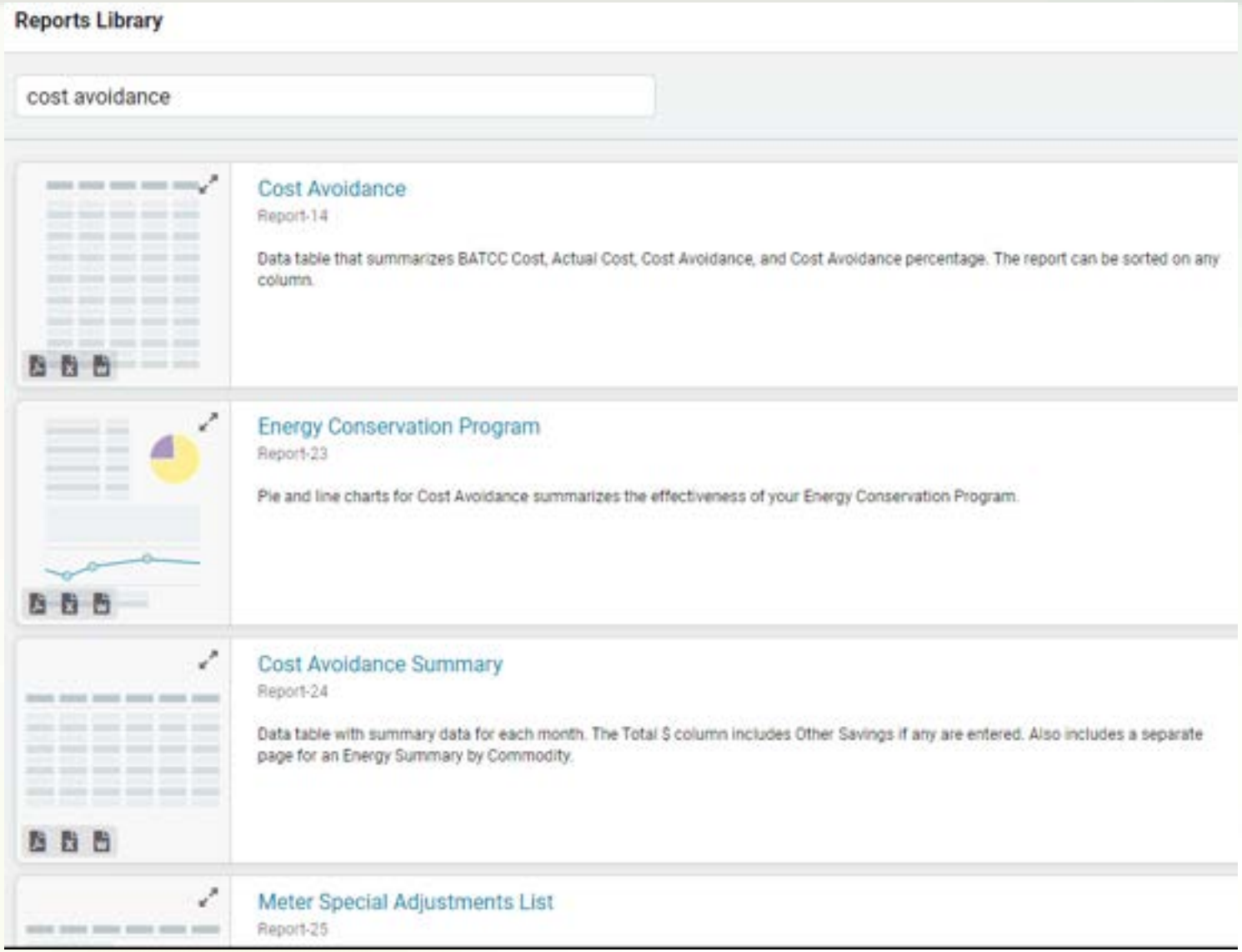
Reports – Savings (Cost Avoidance)



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Dashboard

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Calculate Savings (Cost Avoidance Calculations)

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Recap

Demonstrated:

- Energy Projects
- Savings (AKA Cost Avoidance)
- Using an example project of an LED Lighting Retrofit
- Shown in a demo database, but scenarios mimic existing

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Questions?

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Thank you!