



**Community
Preservation
Corporation**

Optimizing Energy Efficiency in Large Multifamily buildings

Harnessing Building Data to Reduce Energy Use and Cut Costs

August 16, 2023

TODAY'S AGENDA

Welcome and Introductions

HVAC Micromanagement

Multifamily M&V with Utility Bills

Open Q&A

Danielle Donnelly, CPC

Parity

Bright Power

DANIELLE DONNELLY

AVP, CLIMATE FRIENDLY HOMES FUND AND SUSTAINABILITY PROGRAMS

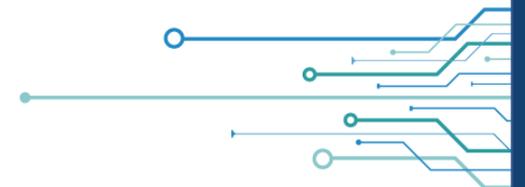
CPC

Danielle Donnelly is the AVP of Sustainability Programs, leading CPC's efforts to improve the built environment and mitigate the effects of climate change on our communities. She is responsible for working with CPC's internal originations and equity staff, as well as its borrowers and external partners to advocate for, and implement financing solutions to improve the built environment and support the development of high-performance housing.

Since joining CPC in March 2018, Danielle has played a key role in developing and implementing the company's sustainability initiatives and practices to encourage adoption of high-performance retrofits and new construction practices as part of its strategic loan offerings and equity investments. Danielle works with CPC's customers, community partners, and housing agency partners to advocate for common-sense climate and energy policies, develop resources highlighting new technologies and programs to support decarbonization, and provides technical assistance to CPC borrowers pursuing energy efficiency and high-performance design projects.



CPC WEBINAR

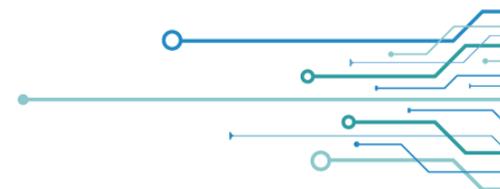


JAMES HANNAH

MANAGING DIRECTOR, UNITED STATES

Parity

James Hannah leads the U.S. business for Parity, a Toronto based HVAC optimization as a service company focused on the multifamily and hospitality sectors. His career has been concentrated on accelerating the adoption of clean energy solutions within the real estate sector, especially for multifamily investors and property managers. He's worked closely with many of the largest real estate companies in the country and has advised governments, utilities, and other stakeholders on energy related policy matters. Prior to joining Parity in 2021, James spent ten years at Bright Power where he held several positions, including Chief Customer Officer. Prior to Bright Power, James held positions in the renewable energy and financial services sectors. James holds a bachelor's degree from the University of Pennsylvania.

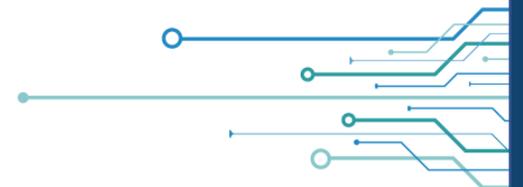
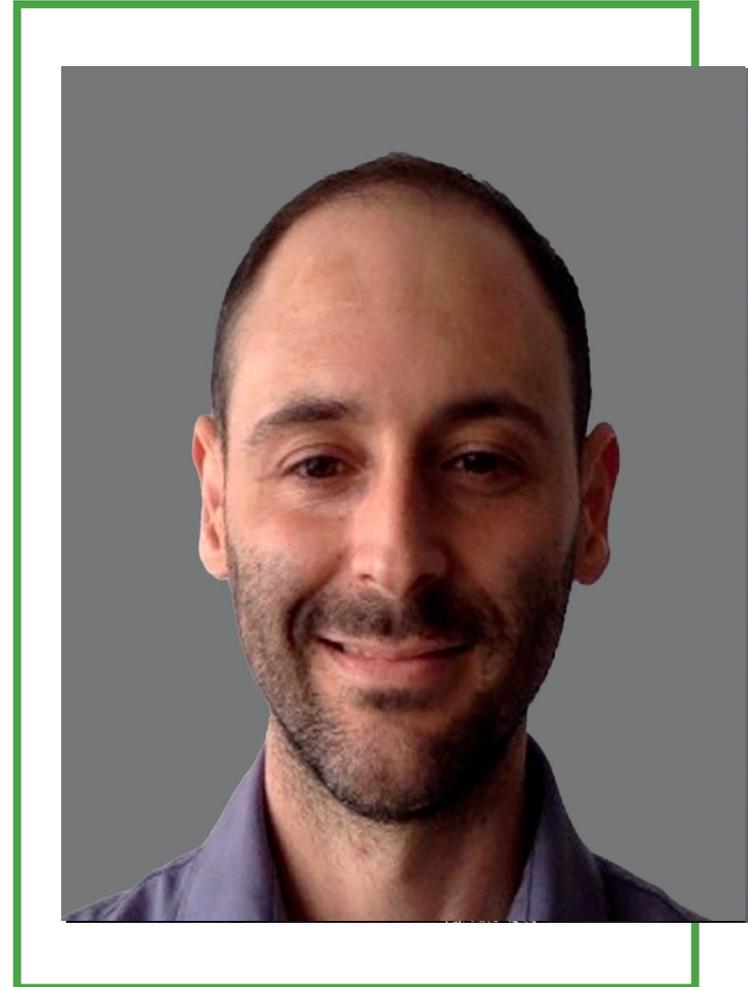


JOE CASCIO

DELIVERY MANAGER

Parity

Joe Cascio is the Service Delivery Manager for Parity's US customers. Parity is a Toronto based HVAC optimization as a service company focused on the multifamily and hospitality sectors. Prior to joining Parity, Joe has enjoyed over 10 years working in various building related energy spaces such as energy auditing, demand response, and energy efficiency utility program implementation.

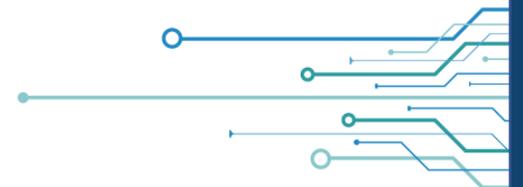
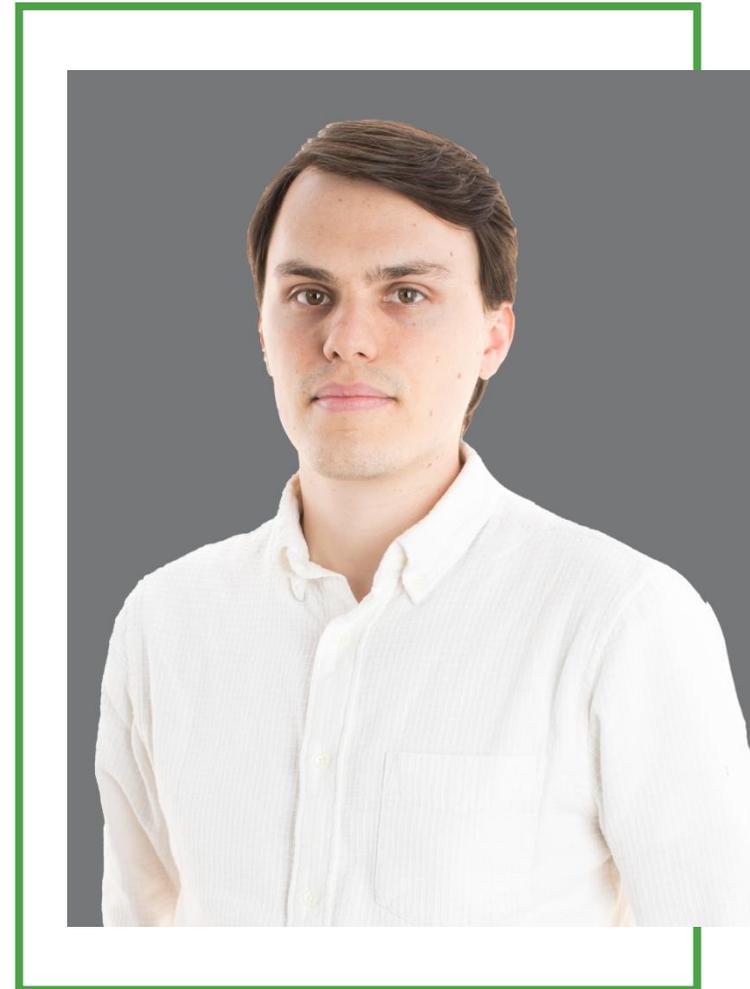


CALEB SMEETH

TECHNICAL DIRECTOR OF ANALYSIS

Bright Power

Caleb Smeeth, Technical Director of Analysis, has been working with multifamily building owners and operators for nearly a decade, helping to analyze portfolios in order to uncover opportunities for efficiency improvement and track project performance after the completion of capital upgrades.

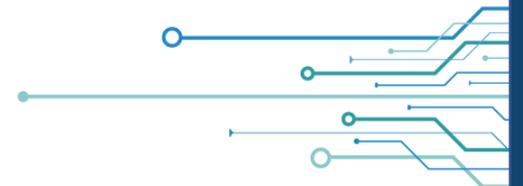
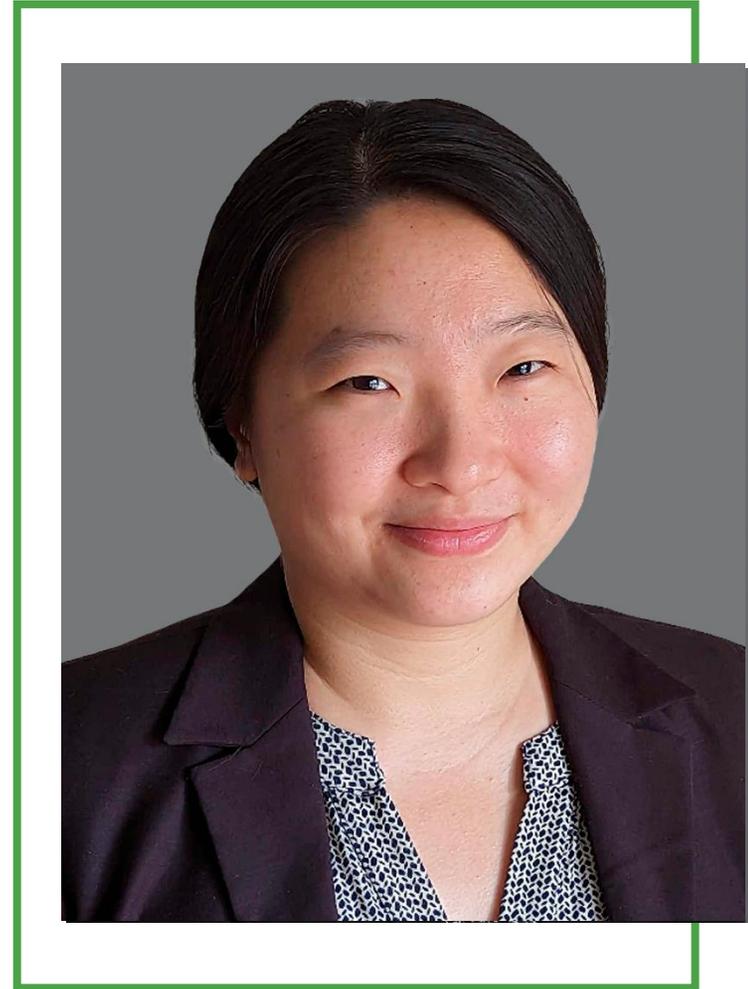


CINDY YAO

SENIOR MANAGER OF LENDER BENCHMARKING

Bright Power

Cindy Yao, Senior Manager of Lender Benchmarking, has been involved in every aspect of utility data collection and reporting over the past five years, from calling owners for bill scans to designing scalable workflows that make it possible for her team to benchmark over 3,000 properties each year.

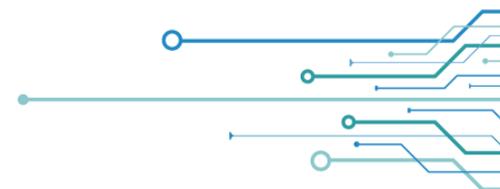


JON BRAMAN

STRATEGIC INITIATIVES

Bright Power

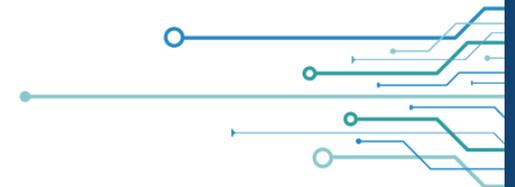
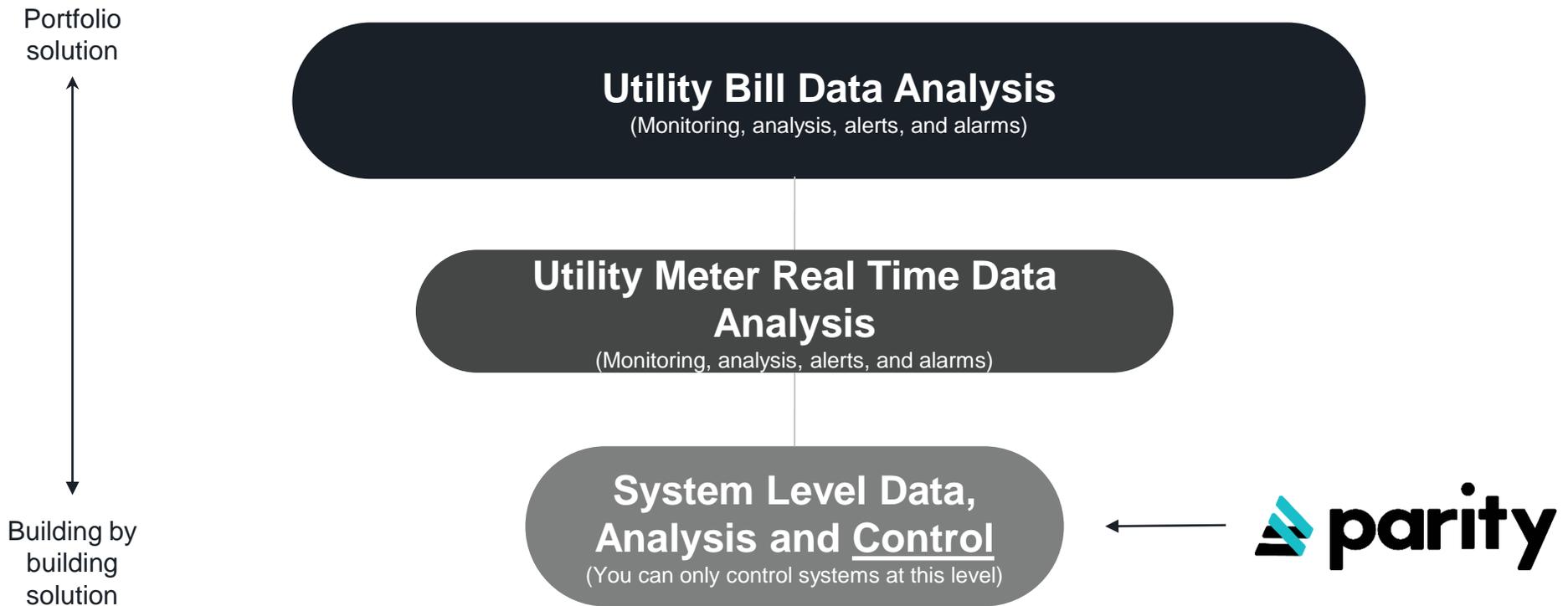
Jon Braman leads Bright Power's Strategic Initiatives team in supporting building owners, lenders and agencies in driving multifamily decarbonization via Bright Power's data management, analytics and technical expertise.





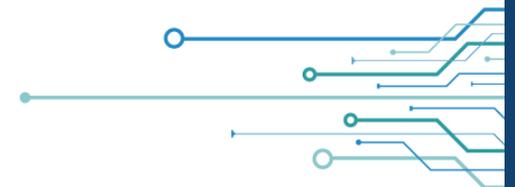
HVAC Micromanagement

The deeper down you get, the more you need to know about the building.





- **Utility rates are rising** in NYC
- Heating, Cooling and Ventilations systems represent a **big opportunity for savings**
- ~**30%** of HVAC related energy consumption in buildings can be wasted
- **Automation** allows for ongoing savings without burdening building staff



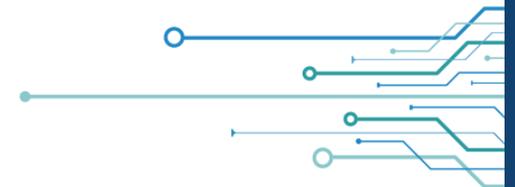
HVAC OPTIMIZATION IS A MID-CYCLE SOLUTION FOR AFFORDABLE HOUSING



Capital Event

Capital Event

Relatively low integration costs allows buildings to maximize performance of their systems before year 15 or other capital schedules.



HOW OUR CONTROL OPTIMIZATION WORKS

1.

The local controls and/or BMS is connected to the Parity cloud. We pull operational and equipment data into our database.

2.

Parity's **ML algorithms** use this data to redesign operations based on weather, demand, temperature, and various building/system characteristics.



3.

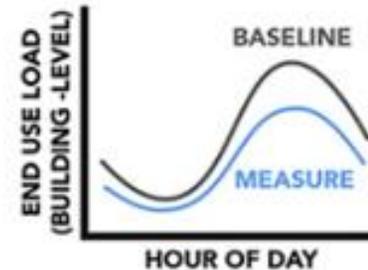
Optimized HVAC instructions are streamed to the building.

4.

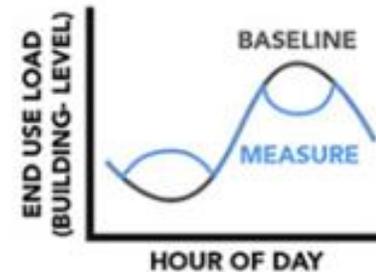
The process is constantly repeated and monitored for variations from our engineered outcome to guarantee performance.

- Efficiency can be combined with **demand management through automation**
- **Automated curtailment** for demand response events **can generate revenue for the building** in addition to the efficiency savings
- Con Edison has several active programs aimed at **incentizing load reduction** in certain areas of their grid

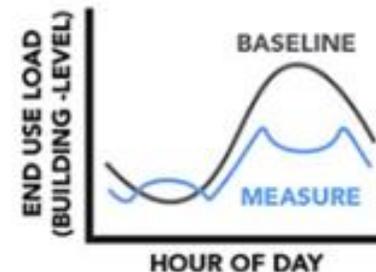
Energy efficiency

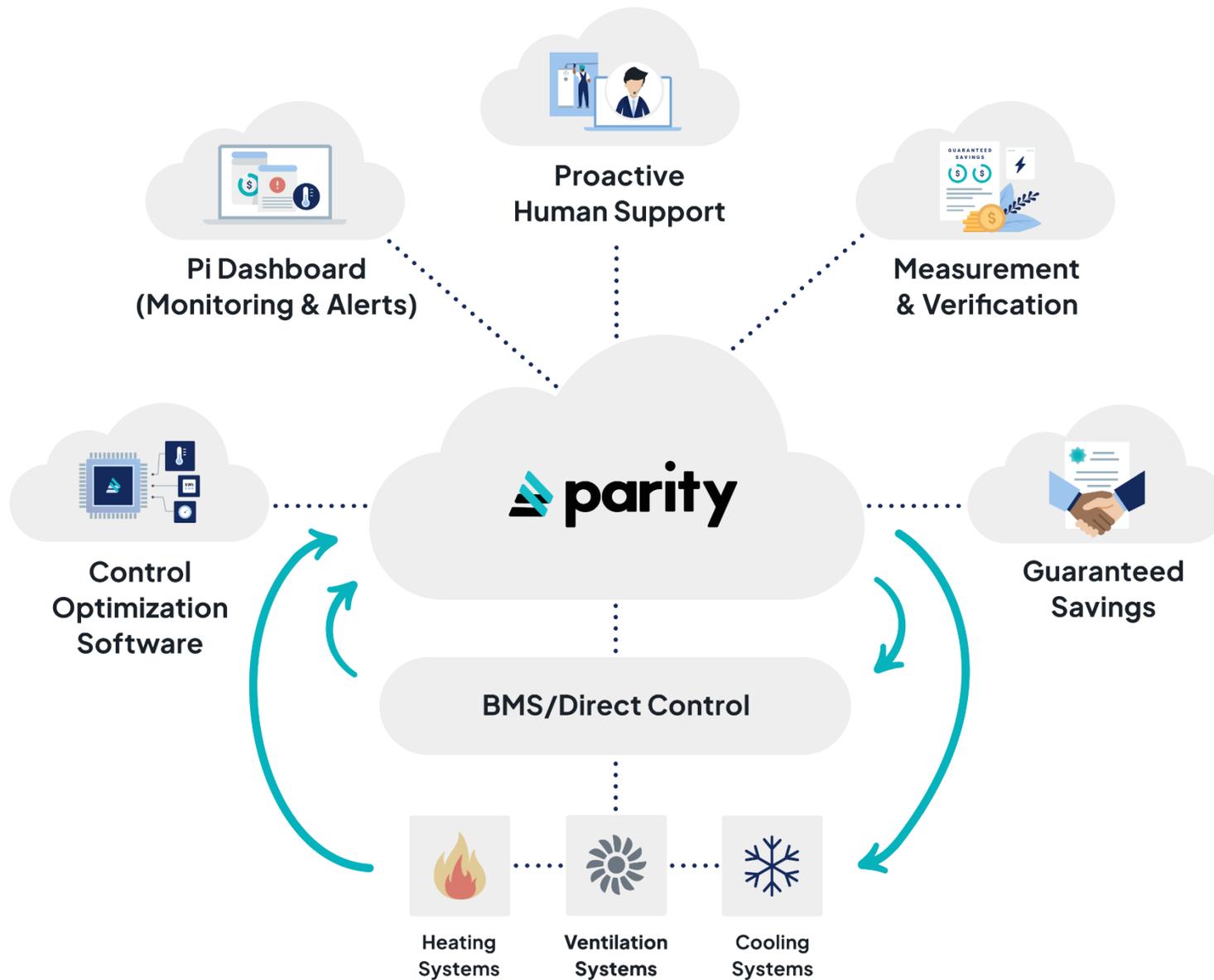


Demand flexibility



Efficiency + flexibility





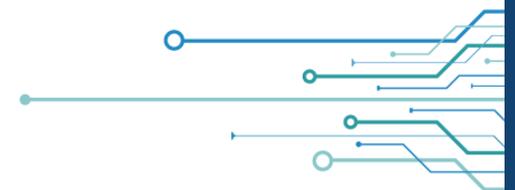
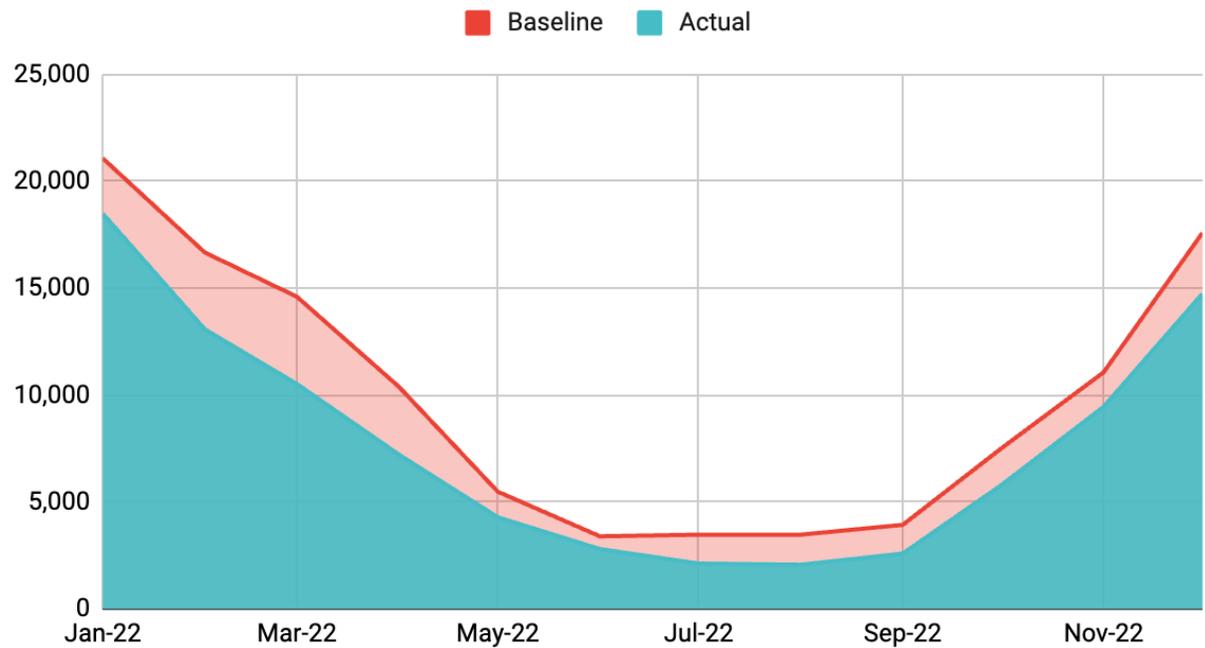
EXAMPLE SAVINGS – DOWNTOWN MANHATTAN:



Building Profile

- 151 Units
- Built in 1998
- Rental
- Central Boiler & Steam PTACs
- Year One Actual Savings: \$51,628

Baseline and Actual (Therms)



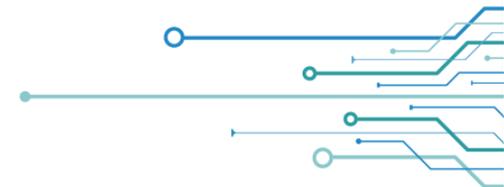
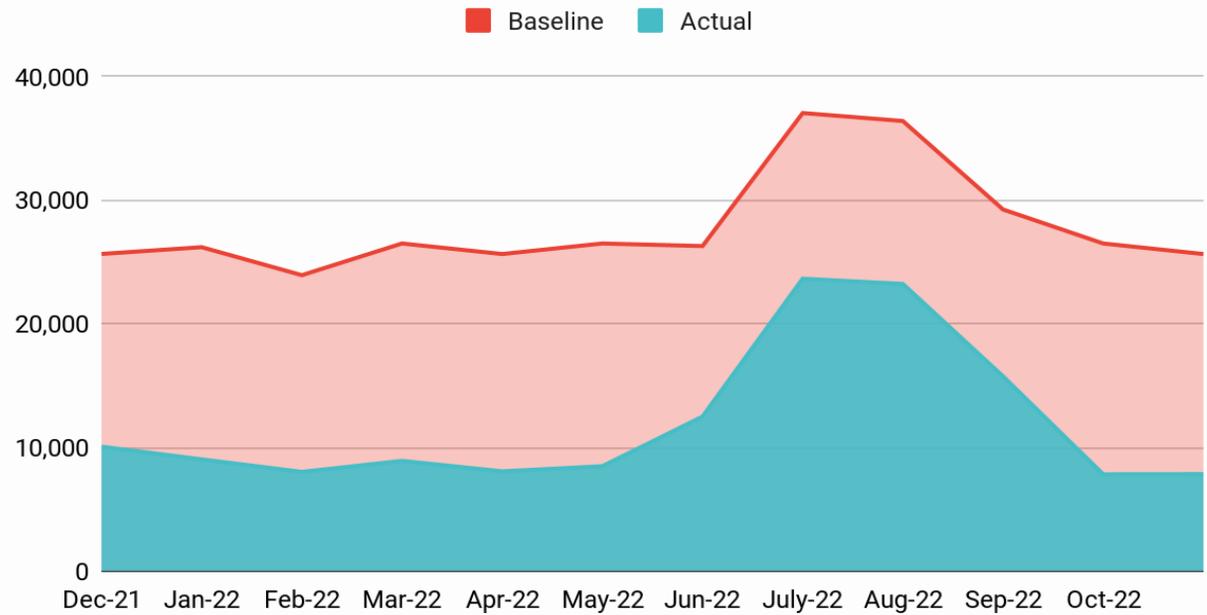
EXAMPLE SAVINGS - HARLEM:

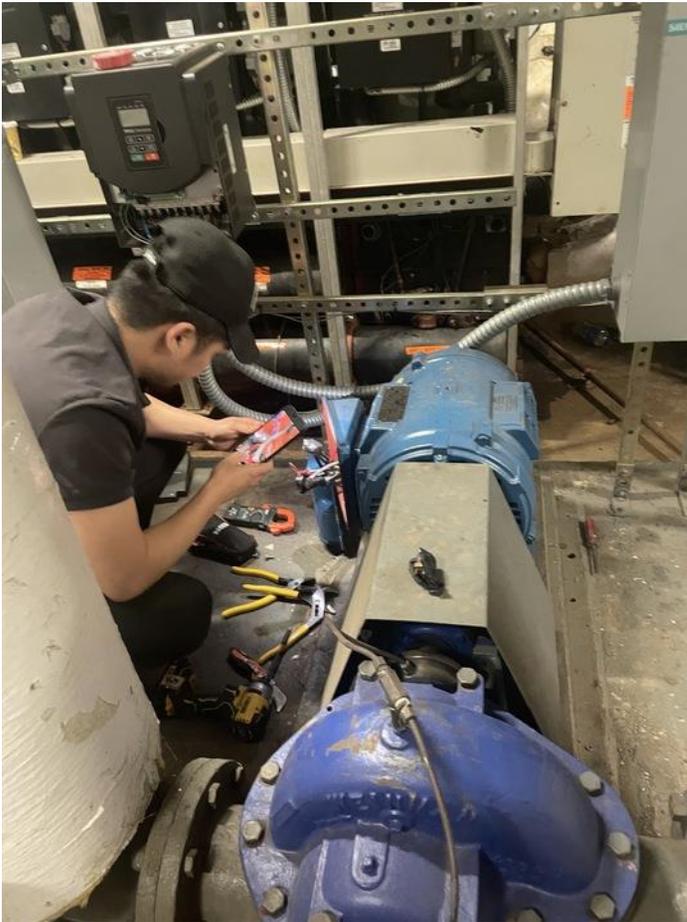


Building Profile

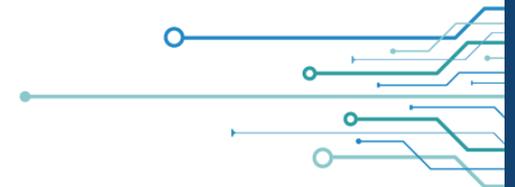
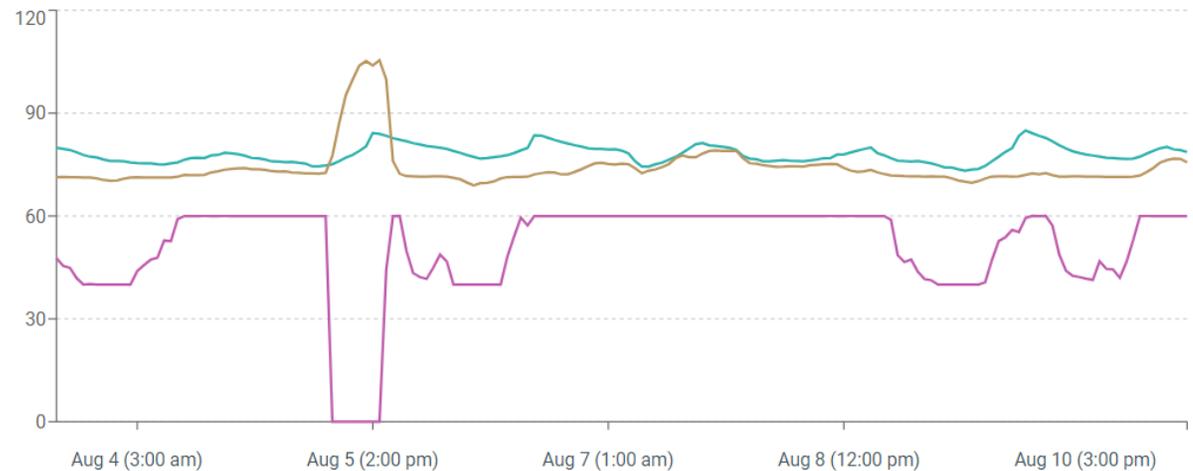
- 129 Units & 8 Stories
- Built in 2003
- Condo
- Central Heating & Cooling
- Year One Actual Savings: \$65,080**

Baseline and Actual (kWh)



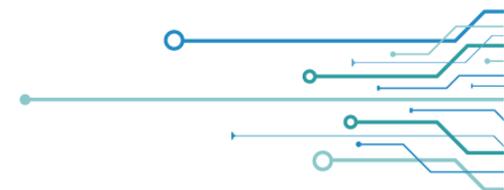


Parity's Pi dashboard can identify HVAC operation issues before they become tenant complaints.



35% ROI with a less than 3-year payback period.

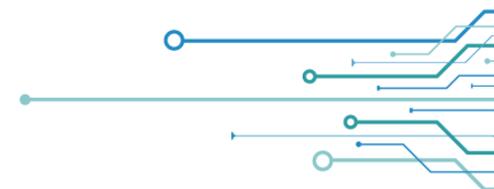
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Savings:										
Utility Savings	\$57,885	\$59,332	\$60,815	\$62,335	\$63,893	\$65,490	\$67,127	\$68,805	\$70,525	\$72,288
Expenses (Excl Tax):										
Setup & Installation	\$126,189									
Software and Support	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000
Net Operating Savings	(\$82,304)	\$45,332	\$46,815	\$48,335	\$49,893	\$51,490	\$53,127	\$54,805	\$56,805	\$58,288
Cumulative Savings	(\$82,304)	(\$36,972)	\$9,843	\$58,178	\$108,071	\$159,561	\$212,688	\$267,493	\$324,018	\$382,306



NO UPFRONT INVESTMENT ECONOMICS

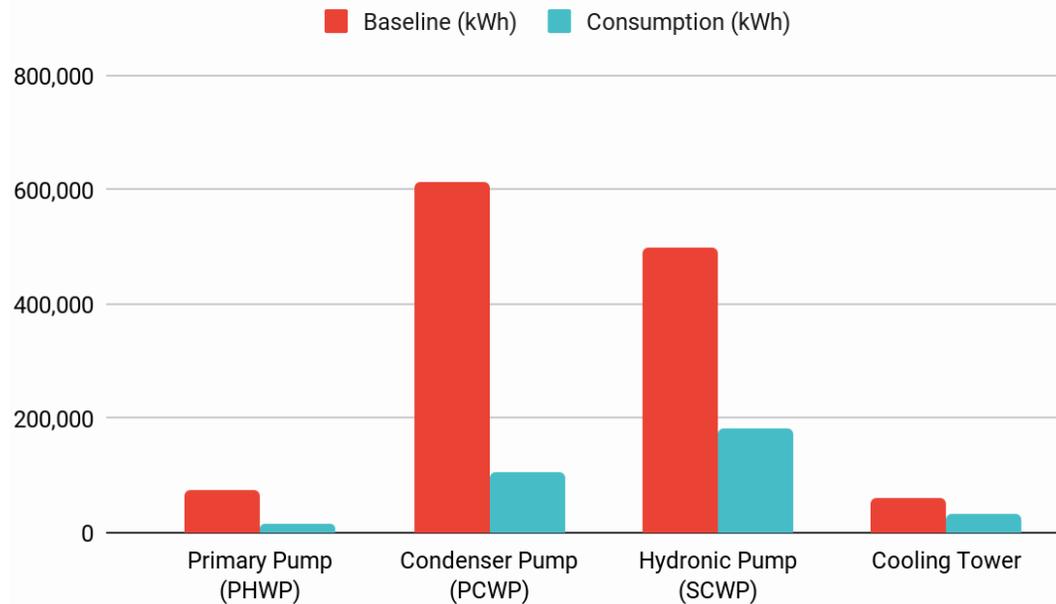
Cashflow positive throughout the term of financing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Savings:										
Utility Savings	\$57,885	\$59,332	\$60,815	\$62,335	\$63,893	\$65,490	\$67,127	\$68,805	\$70,525	\$72,288
Expenses (Excl Tax):										
Setup & Installation	\$31,434	\$31,434	\$31,434	\$31,434	\$31,434					
Software and Support	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000
Net Operating Savings	\$12,451	\$13,898	\$15,381	\$16,901	\$18,459	\$51,490	\$53,127	\$54,805	\$56,805	\$58,288
Cumulative Savings	\$12,451	\$26,349	\$41,730	\$58,631	\$77,090	\$128,580	\$181,707	\$236,512	\$293,037	\$351,325

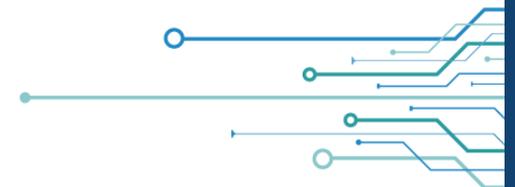


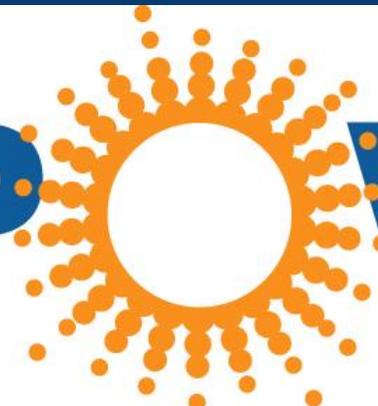
OPTION B SAVINGS CALCULATION METHODOLOGY

- **International Performance Measurement and Verification Protocol (IPMVP)**
 - Best practice guidance document for measuring, computing, and reporting savings achieved by energy or water efficiency projects
 - **Option B**
 - Parity collects real-time energy consumption data from monitored devices
- **Savings Calculation**
 - Energy savings are calculated by comparing measured energy **consumption** against the **baseline**
 - **Equipment Baseline**
 - Monitored power consumption is combined with known seasonal operation



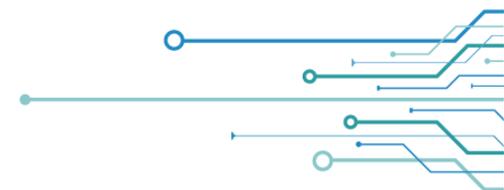
Option B - kWh Savings - Observed 6/2022 - 5/2023



BRIGHT P**OWER**

Multifamily M&V with Utility Bills

Why Measure Energy Impacts?	▪	25
Property M&V (Option C)	▪	26
Process and Stakeholders	▪	30
Annual Tracking	▪	31
Portfolio Impacts	▪	32





Demo Q
0000 Belmont Ave, Bronx, NY, 10457

Tools

Owner Energy
Partial

A

43 kBTU/ ft²/yr



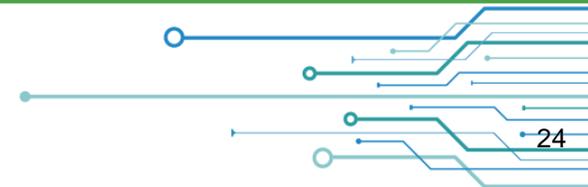
Most Recent Year - Owner
Feb 2012 - Jul 2023

Energy Spending Carbon

Cooling Common Area	B	1.2 BTU/ ft ² /CDD		\$ 1,193
Heating Whole Building	A	6.3 BTU/ ft ² /HDD		\$ 41,830
Electric Baseload Common Area	A	1,333 kWh/unit/yr		\$ 26,653
Fossil Fuel Baseload Whole Building	A	9.13 mmBTU/bdrm/yr		\$ 15,182
Water	A	71.9 gal/bdrm/day		\$ 32,199

Electric \$27,846	Gas \$57,013	Water \$32,200	Total Spend \$117,059
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Multifamily M&V With Utility Bills

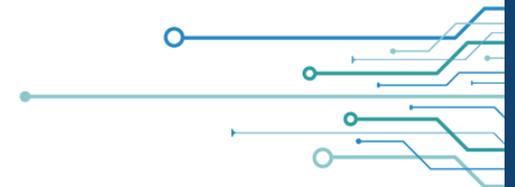


Benefits

- Available for all buildings with no new hardware!
- Measuring actual impacts for long-term goals, industry learning, trust building.
- Whole building data access increasing (slowly)
- Weather-regression analysis to separate heating, cooling, baseload
- Separate owner and tenant use, expenses, solar production

Limitations

- Requires access information from owner or tenant
- Metering may not allow assessment of measure-level savings
- Other activity can mask impacts
- Data collection and entry from utilities, third-parties, is time consuming



Utility bill collection must include tracking accounts, bills, grouping by fuel, correctly handling dates.

Portfolio >

Property >

- Scorecard
- Year-to-Year
- Account Analysis
- Property Info
- Accounts & Bills
- Energy Events
- Property Reports
- Alerts 2

Actions ▾ Columns ▾

Owner Accounts

<input type="checkbox"/>	<input type="button" value="▲"/>	Account	Utility Provider	# Bills	Rate	Last Bill	Tags		
<input type="checkbox"/>	<input type="button" value="⊕"/>	Combined: 2 Electricity accounts	ConEd - Consolidated Edison - Electricity	72	\$0.20/kWh	08/01/2023		<input type="button" value="Model"/>	
<input type="checkbox"/>	<input type="button" value="⊕"/>	4-21 27th Ave ENT-Elec	ConEd - Consolidated Edison - Electricity	72	\$0.18/kWh	08/01/2023		<input type="button" value="Edit"/>	
<input type="checkbox"/>	<input type="button" value="⊕"/>	4-21 27th AVE (Supply)-Elec	Calpine Energy Solutions	10	\$0.00/kWh	07/01/2021		<input type="button" value="Edit"/>	
<input type="checkbox"/>	<input type="button" value="⊗"/>	4-21 27th Ave ENT-Gas	ConEd - Consolidated Edison - Gas	72	\$1.11/Therms	08/01/2023		<input type="button" value="Model"/>	<input type="button" value="Edit"/>
<input type="checkbox"/>	<input type="button" value="⊗"/>	Combined: 2 Gas and HeatingOil accounts	ConEd - Consolidated Edison - Gas	72	\$10.4/mmBTU (Million BTU)	08/01/2023		<input type="button" value="Model"/>	
<input type="checkbox"/>	<input type="button" value="⊗"/>	4-21 27th Ave HEAT-Gas	ConEd - Consolidated Edison - Gas	72	\$1.02/Therms	08/01/2023		<input type="button" value="Edit"/>	
<input type="checkbox"/>	<input type="button" value="⊗"/>	4-21 27th Ave-Fuel Oil #2	Paragon Oil	39	\$2.06/Oil #2 Gallons	04/23/2021		<input type="button" value="Edit"/>	
<input type="checkbox"/>	<input type="button" value="⬇"/>	4-21 27th Ave-Water	NYC DEP	80	\$0.10/Cubic Feet	03/01/2023		<input type="button" value="Model"/>	<input type="button" value="Edit"/>

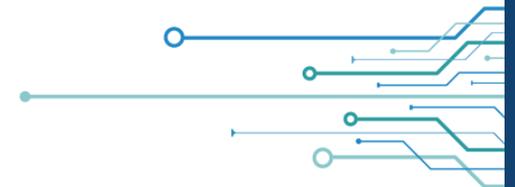
Commercial Tenants

<input type="checkbox"/>	<input type="button" value="▲"/>	Account	Utility Provider	# Bills	Rate	Last Bill	Tags		
<input type="checkbox"/>	<input type="button" value="⊕"/>	4-21 27th Ave FACT-Elec	ConEd - Consolidated Edison - Electricity	71	\$0.17/kWh	08/01/2023		<input type="button" value="Model"/>	<input type="button" value="Edit"/>

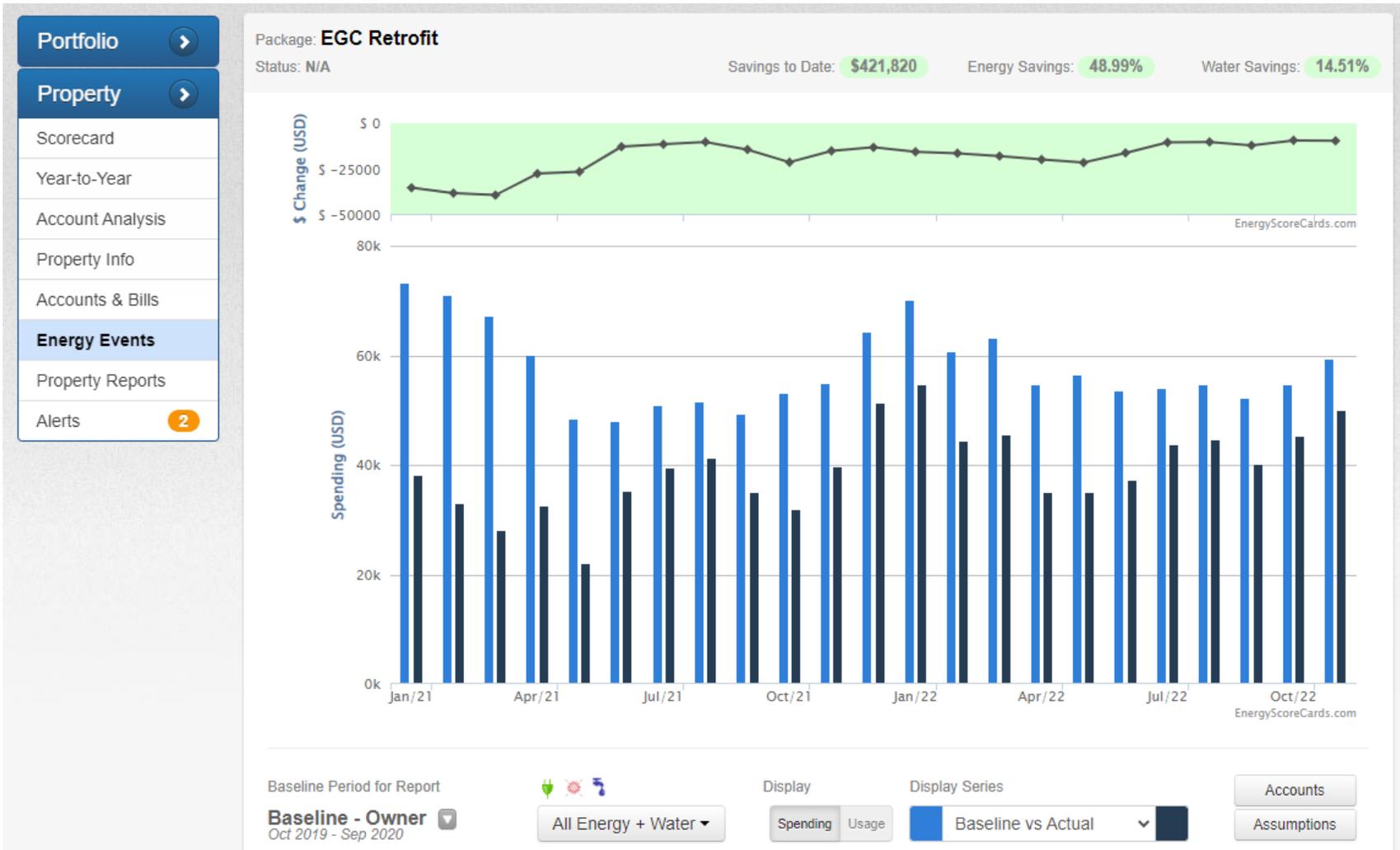
To track savings from a retrofit, you need complete data before (baseline) and after the retrofit and information on what was installed, when it was installed, and costs and projected savings associated with the work.

Sample Project Scope

Category	Measure Installed	Implemented On	Measure Cost	Predicted Annual Savings
Lighting	Exterior Lighting Upgrade	7/15/2020	\$5,000	\$500
Lighting	Common Area Lighting Upgrade	8/13/2020	\$25,000	\$10,000
Lighting	In-Unit Lighting Upgrade	7/31/2020	\$35,000	\$10,000
Heating	Boiler Controls Upgrade	9/1/2020	\$15,000	\$900
Heating	Boiler/Furnace Upgrade	9/1/2020	\$150,000	\$60,000
Ventilation	Exhaust Fan Installation	12/1/2020	\$10,000	\$1,000
Water	Low-flow Faucet Aerators	8/1/2020	\$5,000	\$10,000
Water	Low-Flow Toilets	8/1/2020	\$80,000	\$10,000
Water	Water Monitoring System Install	8/30/2020	\$35,000	\$1,000
Total			\$360,000	\$103,400



To accurately understand utility changes happening after a retrofit it's essential to control for factors not related to the upgrade. Weather and utility prices are always changing and must be accounted for. Other factors could include occupancy changes or unrelated property repairs.



Benchmarking

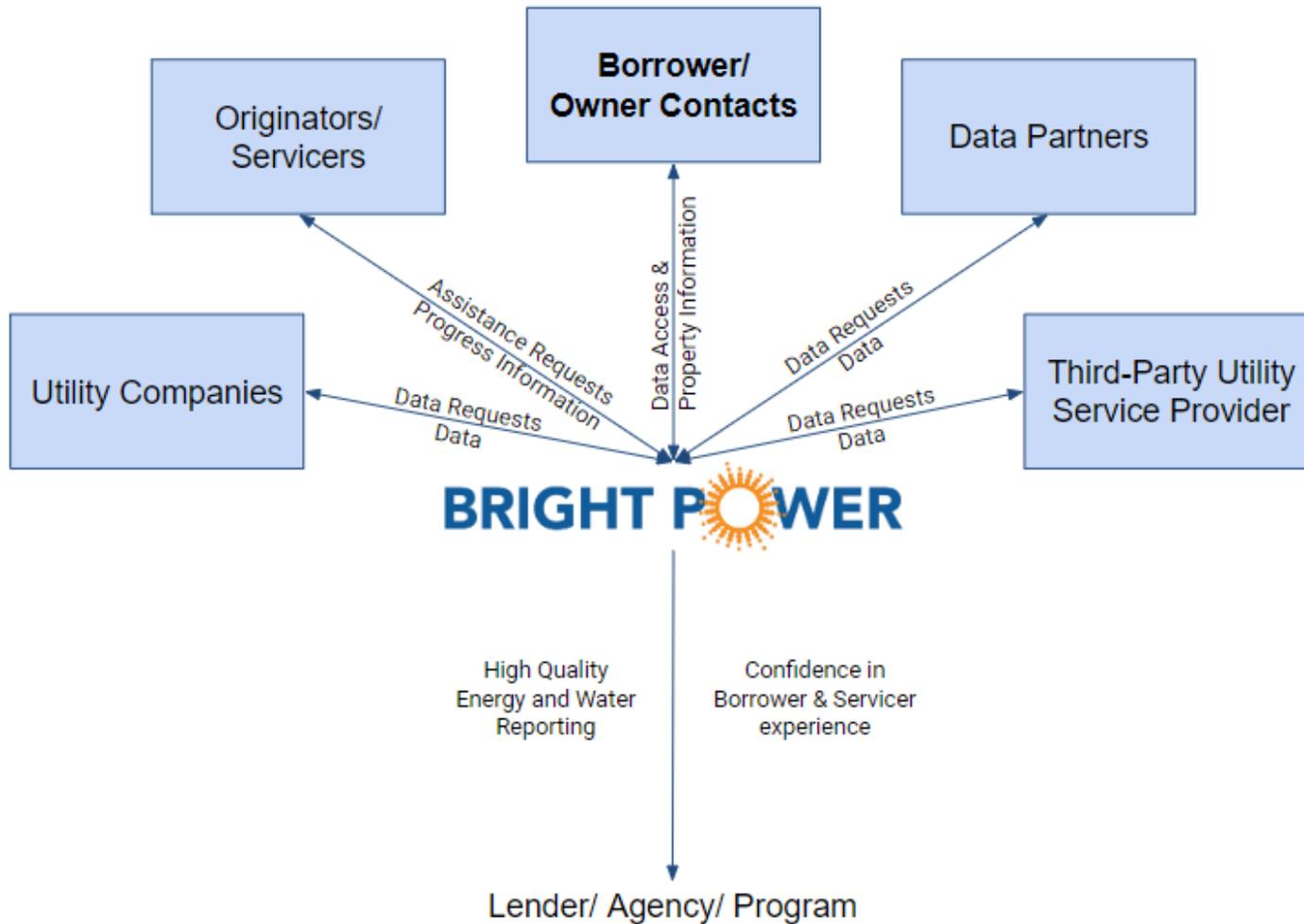
- Annual collection of utility data
- Often for jurisdiction or program requirements
- Allows understanding of broad trends
- See differences between building types (with big enough data set and smart analysis)

Measurement and Verification (Impact)

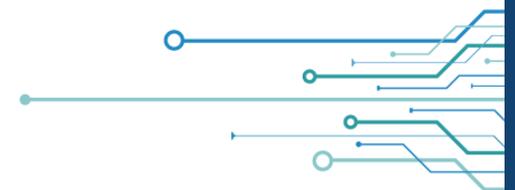
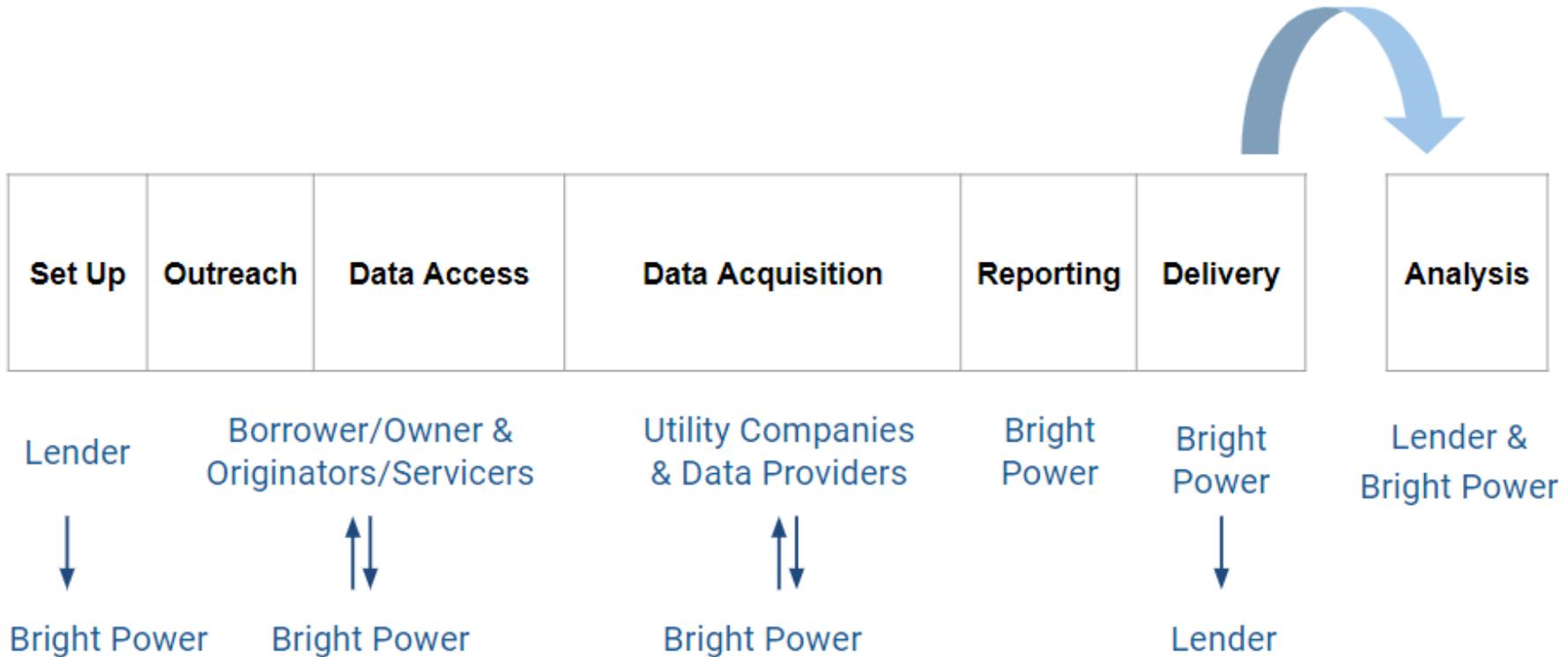
- Annual collection of utility data
- Weather and cost normalization
- Program status (e.g. loan closing, installation completion)
- Green attributes (e.g. upgrades, green certification)
- Data quality checks and filters to correctly group and interpret information
- Analyze consumption before and after retrofits
- Compare energy, cost, carbon impacts to goals and projections

M&V STAKEHOLDERS (IT TAKES A VILLAGE)

Especially in the context of an incentive or green loan program, benchmarking can require coordination of a number of different individuals and organizations



A typical benchmarking process involves many steps to get from an initial list of properties from the lender to analysis on building performance.



PORTFOLIO INSIGHTS – TRENDS AND OPPORTUNITIES

Portfolio Performance Report

Client Name	Portfolio Name	Current Period	Prior Period	Energy Validity	Water Validity
Sample Client	All	Full Year 2021	Full Year 2020	TRUE	All

Total Properties	Total Square Footage	Annual Owner Spend	Potential Energy Savings	Potential Water Savings
86	15,483,000	\$22,473,080	\$1,365,543	\$1,494,131

Portfolio Summary

Energy Grade Distribution	Utility Type	Full Year 2020				Full Year 2021			
		Full Year 2020	Full Year 2021	Difference	% Change	Full Year 2020	Full Year 2021	Difference	% Change
A(!) 1	Electricity (kWh)	53,906,881	52,923,919	-982,962	-2%	\$6,945,584	\$7,414,305	+\$468,721	7%
A 35	Gas (therms)	5,392,736	5,203,241	-189,495	-4%	\$4,195,784	\$4,695,403	+\$499,620	12%
B 23	Oil (mmBTU)								
C 12	Propane (Gal)								
D 13	Steam (MLbs)	15,021	14,167	-853	-6%	\$401,433	\$402,495	+\$1,063	0%
D(!) 1	Water (kGal)	970,744	719,236	-251,508	-26%	\$10,098,517	\$9,960,877	-\$137,641	-1%
Null 1									

Summary of Energy Performance

Usage
 Spend

Top Performers

Property A	-57%
Property B	-52%
Property C	-42%
Property D	-31%
Property E	-30%
Property F	-19%
Property G	-15%
Property H	-14%
Property I	-14%
Property J	-14%

Opportunities for Savings

Property K	+44%
Property L	+33%
Property M	+31%
Property N	+20%
Property O	+15%
Property P	+10%
Property Q	+10%
Property R	+9%
Property S	+8%
Property T	+7%

CPC CONNECTIONS WEBINAR SERIES

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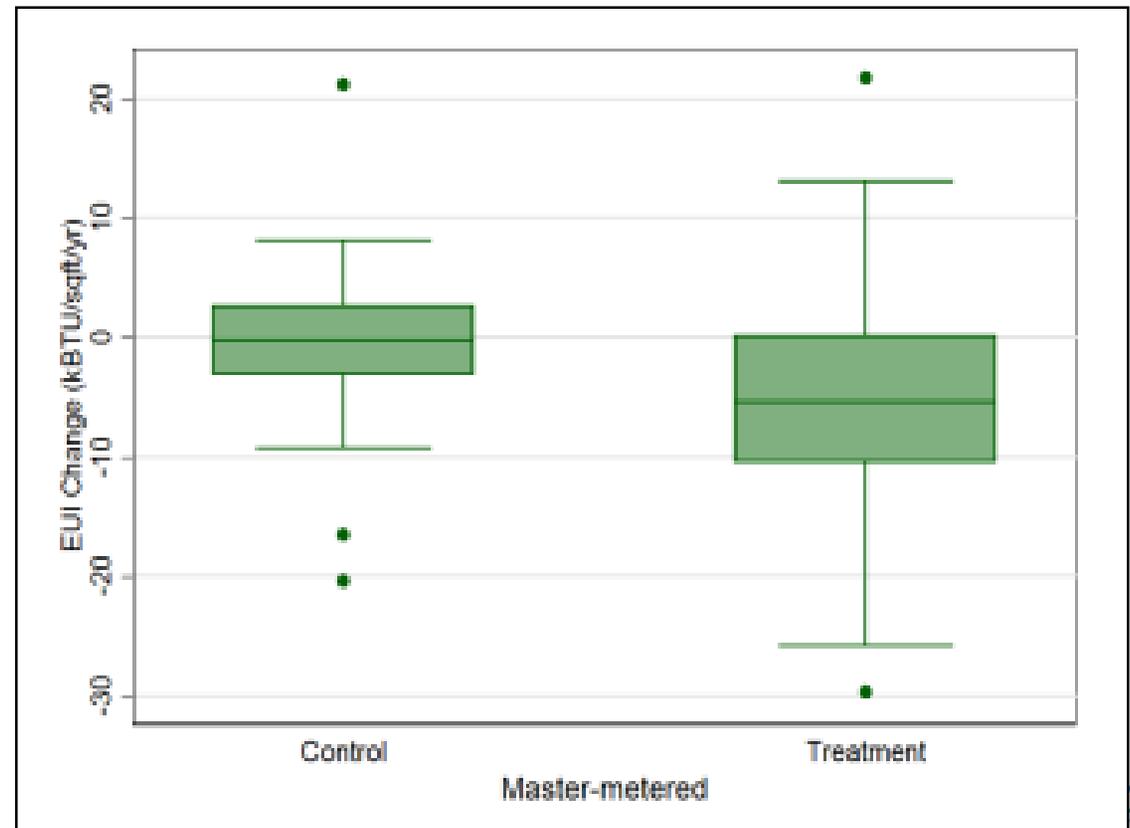
Property Trends

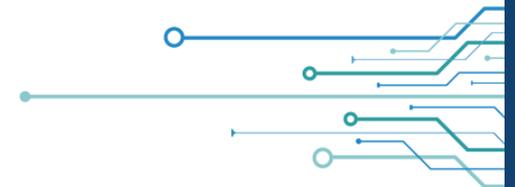
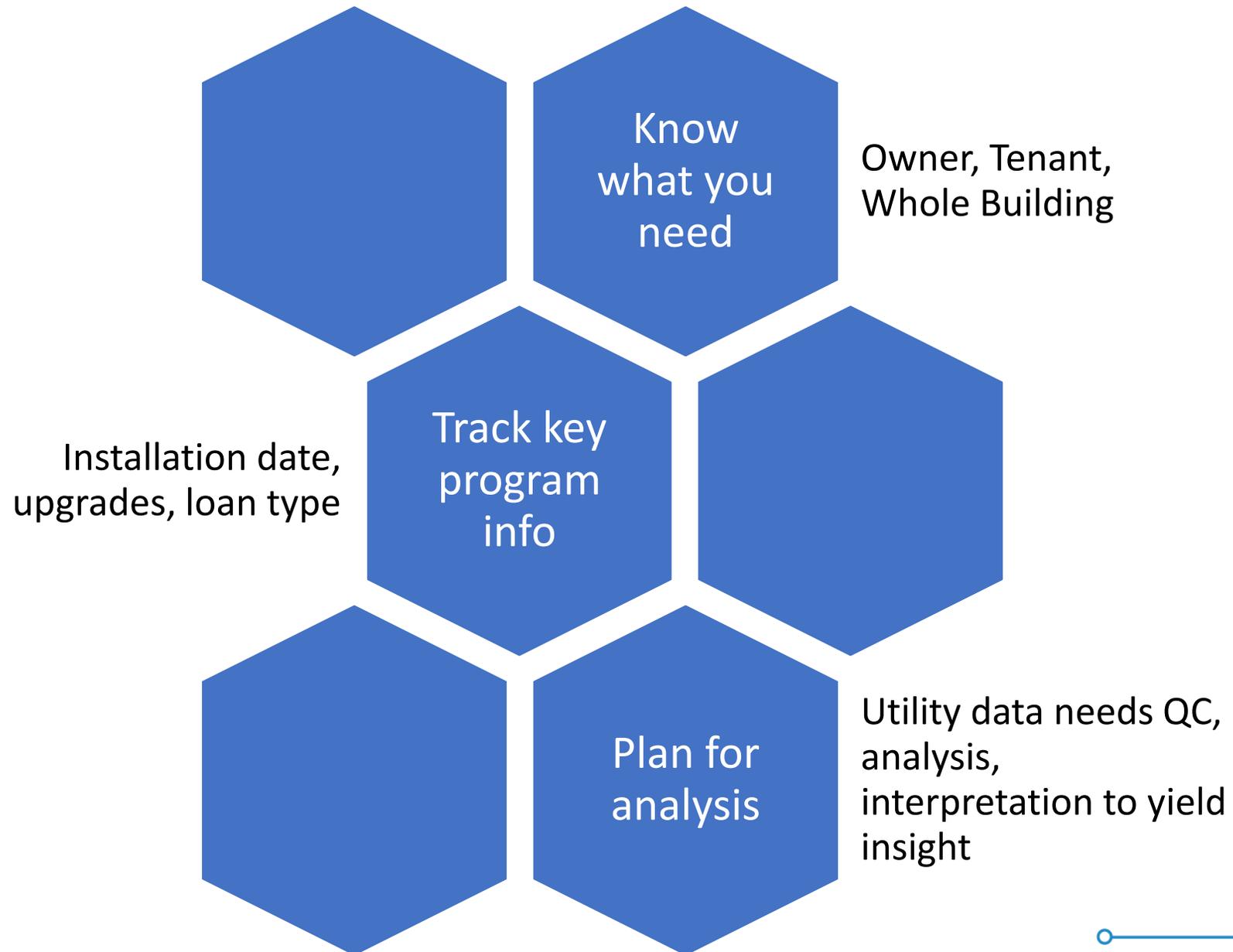
Name	ference - Energy Usage (mmBTU)	Energy Usage - % Change
	+54	+2%
	-477	-3%
	-1	+0%
	-2,923	-14%
	-297	-4%
	+375	+65%
	-85	-1%
	+14	+0%
	-211	-2%
	-45	
	-1,248	
	-264	
	-650	
	-41	
	-392	
	-12	
	-570	

Property Names

Analysis (including weather-normalization) can show energy changes (savings) from one year to the next.

With rigorous tracking, we can compare "Program" groups with upgrades to "Control" groups (without upgrades) to distinguish impacts from background trends.





Thank you!

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Questions?

THANK YOU FOR TUNING IN

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