Albuquerque Public Schools
Energy & Water Management

October 2024

Council of the Great City Schools

Success Story

ALBUQUERQUE PUBLIC SCHOOLS

WECC
Water and Energy Conservation Committee
Making a Difference for Albuquerque Public Schools

M&O

MOUNTAIN VECTOR ENERGY

ALBUQUERQUE PUBLIC SCHOOLS
APS STRONG

Contents:

Serving the APS educational experience while reducing energy and water waste.

Introduction:

Approximately 10 years ago, Albuquerque Public Schools (APS) established an energy and water policy aimed at reducing utility usage by 20% over a decade. This ambitious goal set the stage for a district-wide initiative focused on sustainability and financial efficiency.

APS Board of Education Conservation Policy EC-1

• Albuquerque Public Schools shall reduce net water consumption by twenty percent (20%) and net energy consumption by twenty percent (20%) by the end of the 2023-2024 school year as compared to an established 2013-2014 school year baseline

• To support this effort, the superintendent shall ensure full commitment by all employees and involved entities, including administrators, teachers, students, support personnel, contractors, suppliers and communities using APS facilities

Ratification of this policy allowed WECC to build the necessary infrastructure to address water and energy management and create the APS Energy Team

To advance the initiative, APS formed the Water and Energy Conservation Committee (WECC). This group was tasked with overseeing the policy implementation and developing actionable plans to meet the district's energy and water goals.

What is WECC?

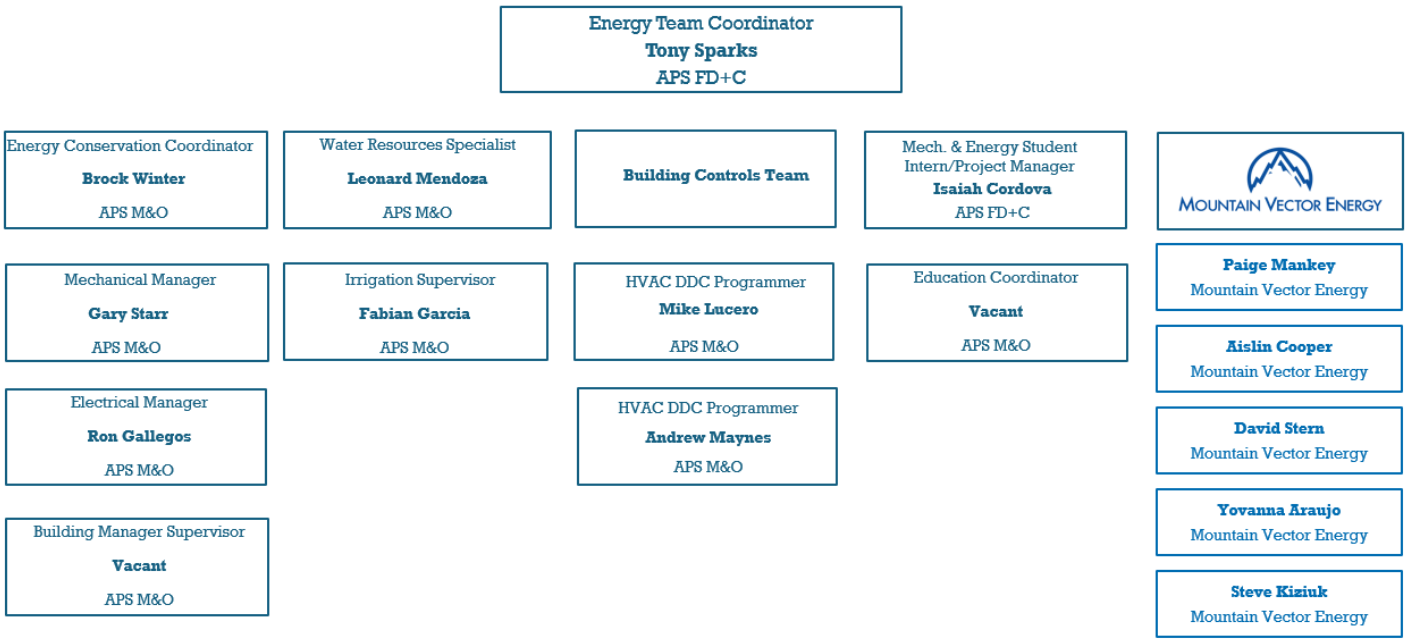
• Standing committee comprised of high-level thinkers and decision-makers. Includes representatives from all three utility providers (gas, water, electric); APS Executive Leadership and Department Managers; other school districts and municipal entities; community leaders from private industry and trade associations, as well as the State of NM's Energy Conservation & Management Office

• Functions as a 'Think Tank' for conservation and sustainability.

• Meets bi-monthly to review progress against the goal and provide oversight, support, and the sharing of ideas.

With support from executive management, an APS Energy Center and the APS Energy Team was established as a committee with existing staff. Regular meetings were established to keep everyone aligned with our goal.

APS Energy Team



APS Summary

Albuquerque Public Schools (APS) Energy Team manages over 214 buildings, 17,056,642 square feet with 856 live connected data streams and 1,097 utility accounts. This represents approximately $20M per year in direct costs to the district for electric, gas and water.

Journey Framework to Success

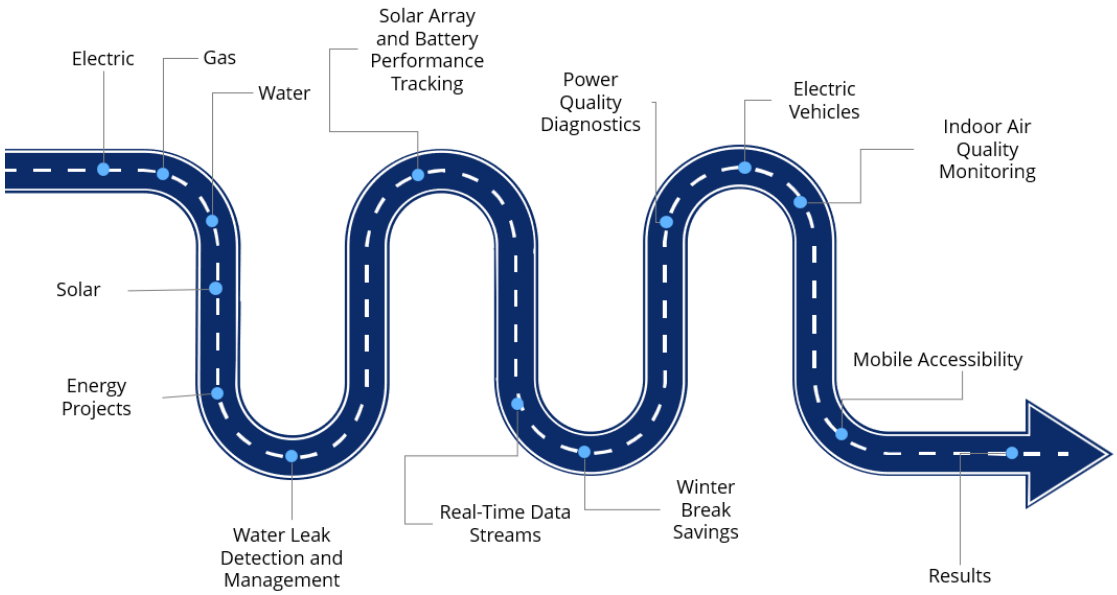
There was no single silver bullet to ensure success. We did a lot of little things well, as a team, to drive positive outcomes.

Energy Projects Over the Years: 2013-14 through 2023-24

- Building Buddies – Quarterly incentives for reduced electricity usage
- NXM2G – Optimized boiler controls
- Building Controls Team
- Occupancy scheduling/overrides – More about empowering occupants to override
  - Internet-connected timeclocks
  - Video links for thermostat overrides
  - Red buttons for gyms – mentioned in video
- Spring/Summer/Winter Break shutdowns – unoccupied setbacks
  - Summer consolidation – Energy Team helped initiate
- Irrigation controls upgrades
- Artificial turf installations
- Solar installations
- ECMs
- LED retrofits - rebates
- PNM Time-of-Day (TOD) Pilot
- PNM Peak Saver Program
- PNM composite billing conversion from summary billing
- Power quality monitoring
- ESSER-funded projects
- Indoor air quality
- Looking ahead: carbon reduction goal

Technological Advancements

Technological advances, enabled by our partner Mountain Vector Energy, speed up ‘data to decision’ timing



Enterprise | spend usage | yearly monthly | calendar fiscal

Utility Bills | Real-Time Profile | Tracked Devices

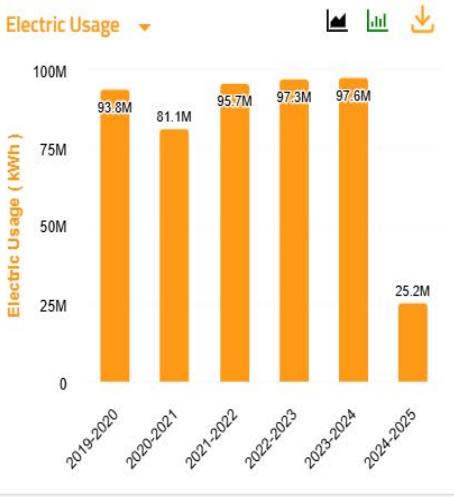
from 2019 to 2024

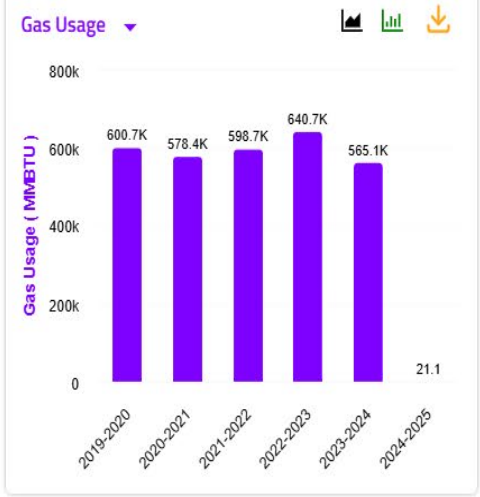
214 Facilities

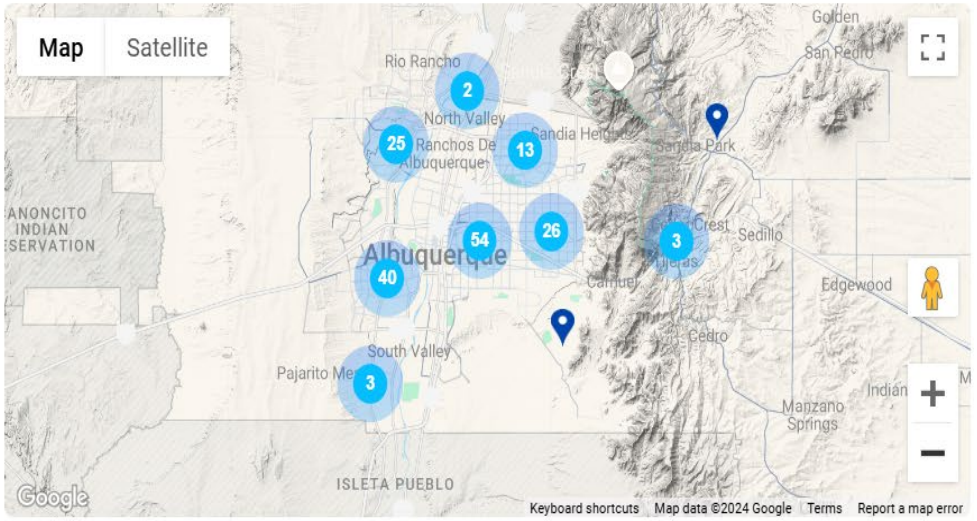
17,056,642 SQFT Area Covered

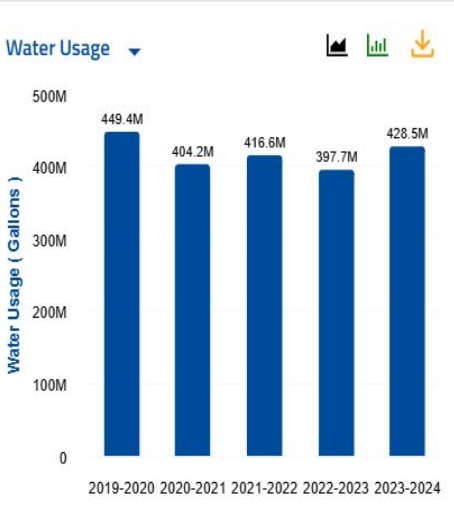
856 Total Devices Connected

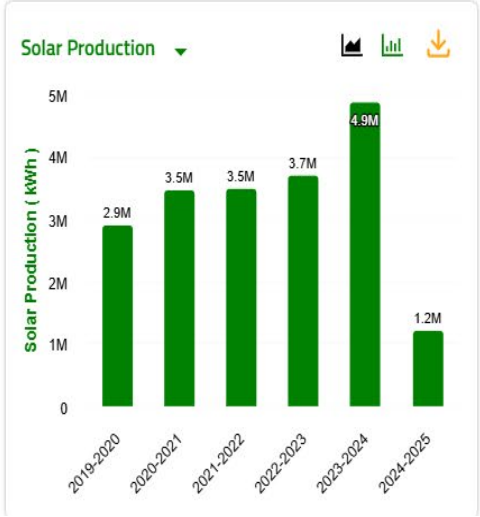
1,097 Total Utility Accounts

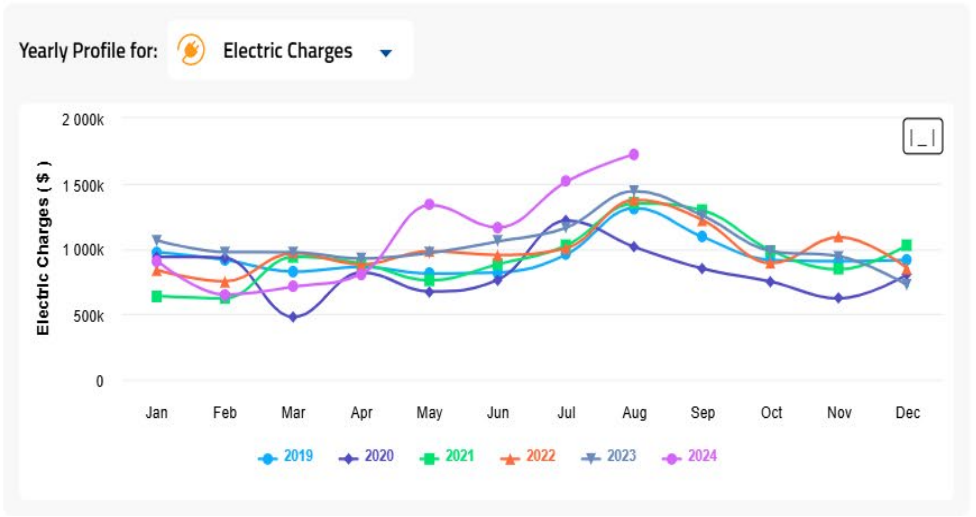






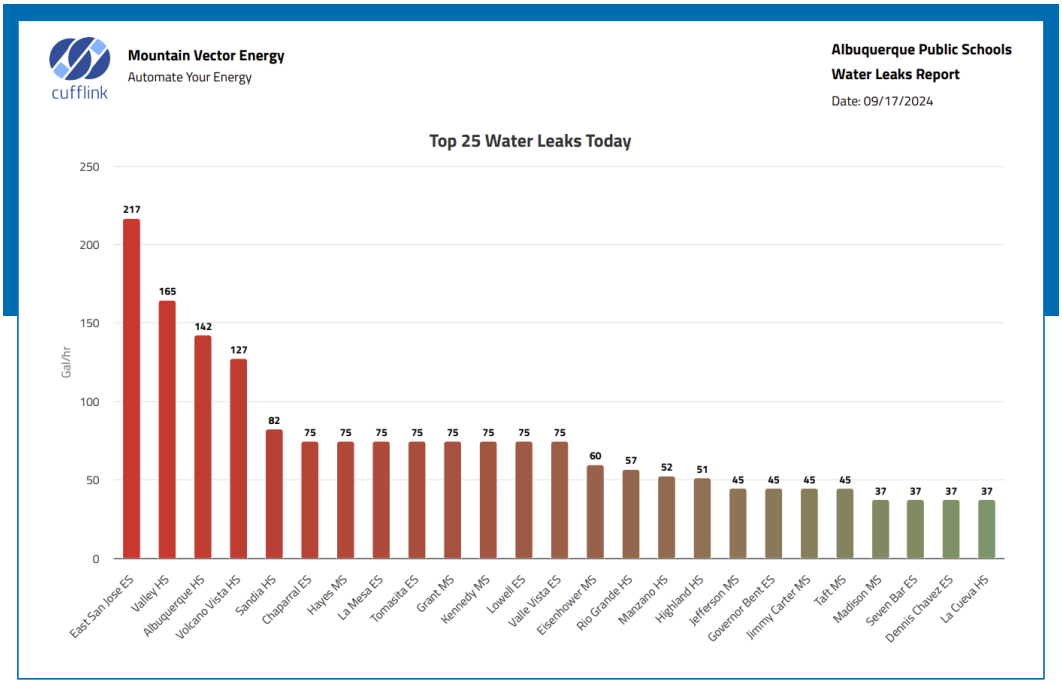






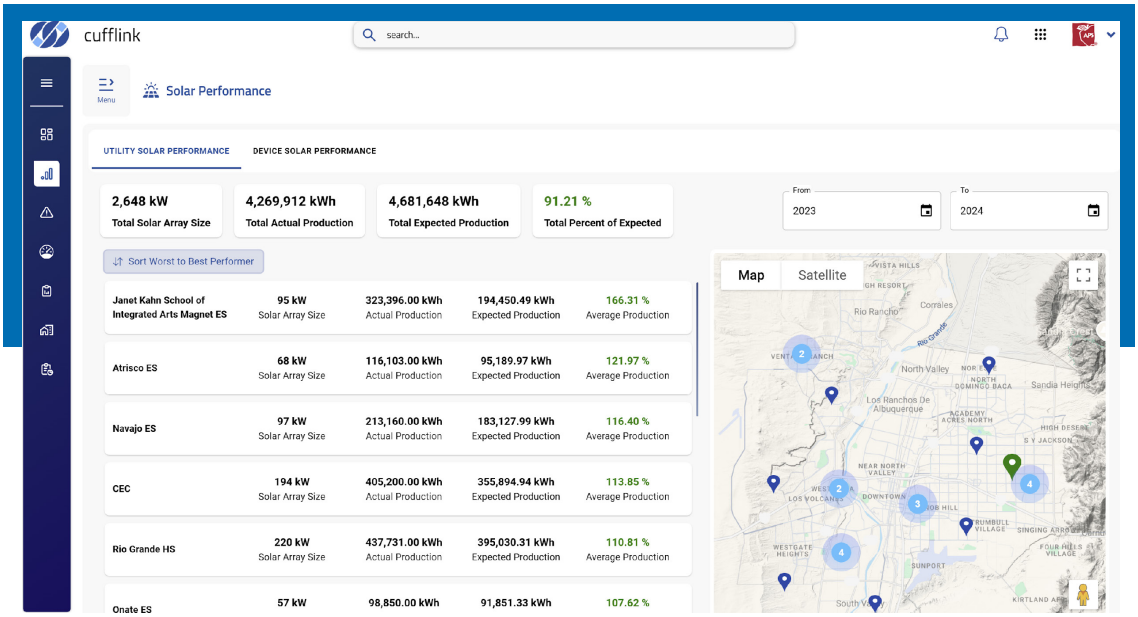
Water Leak Detection and Management

Water leak detection is fully automated across the entire Albuquerque Public Schools footprint. Daily leak reports are distributed to the facilities team every morning by leadership. Work orders are generated, and leaks can be addressed on the same day, not months in the future.

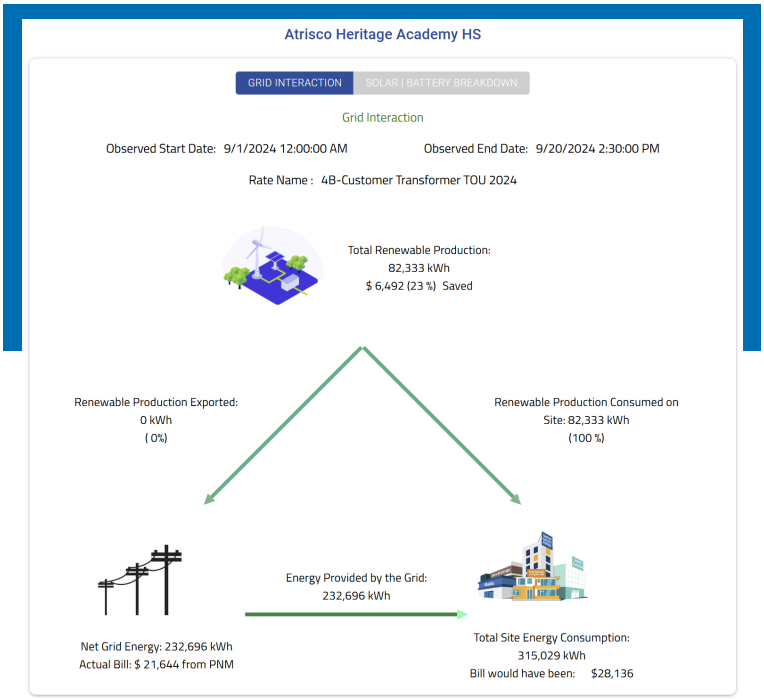


Solar Array and Battery Performance Tracking

Solar array performance is tracked in real time. Individual inverter output is compared to expected production metrics. Underperformance is flagged and sent as an alert to the facilities team to respond to outages within days, not weeks or months.

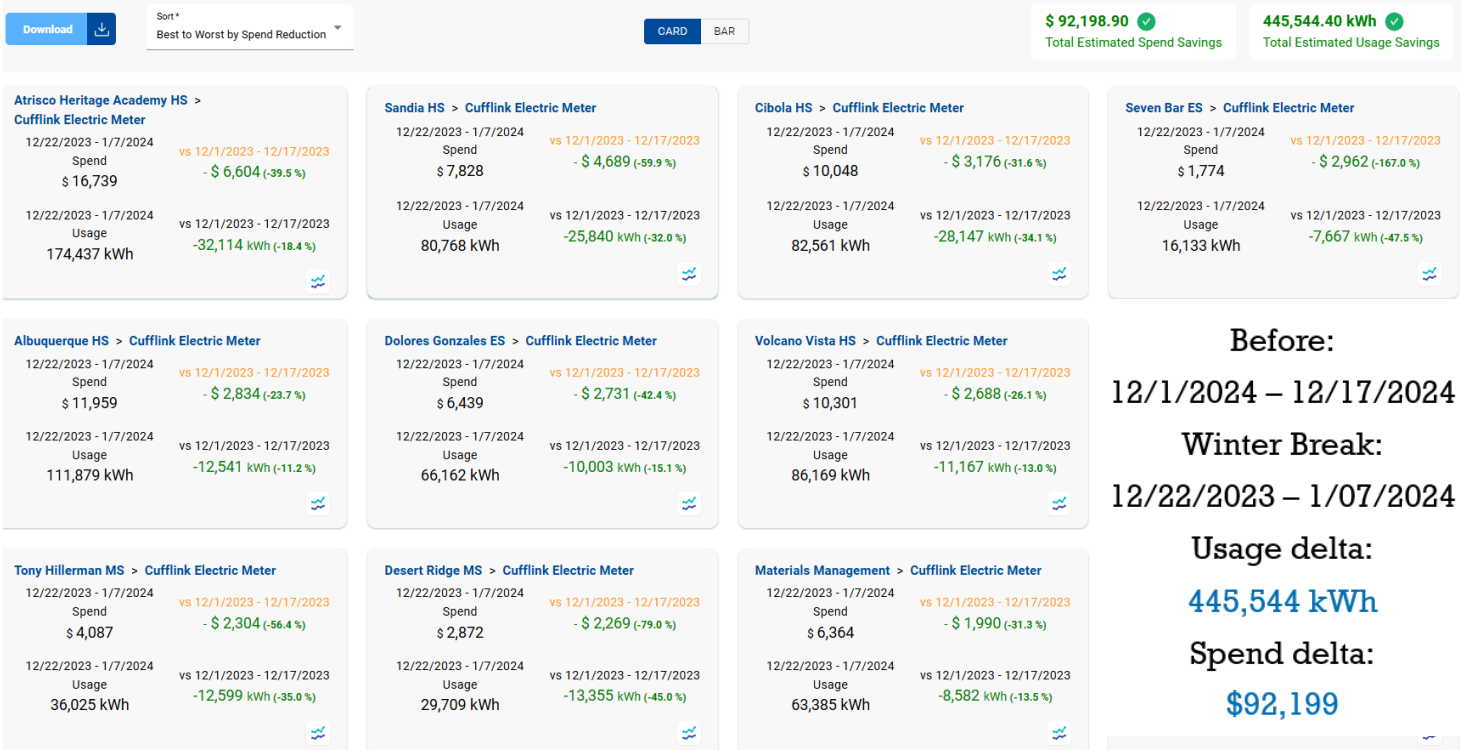


The interaction between building, solar, and battery is precisely characterized using interval data. Imported, exported, and consumed energy amounts are quantified. Additionally, the impact on overall site utility spend is quantified and tracked over time to verify investments are performing to specification.



Real-Time Data Streams - Winter Break Savings

Every real time data stream across the footprint can be quantified in terms of energy usage and utility spend. Winter break shutdown performance is quantified below. Energy and spend impact were calculated with a single click, the next day back from break.



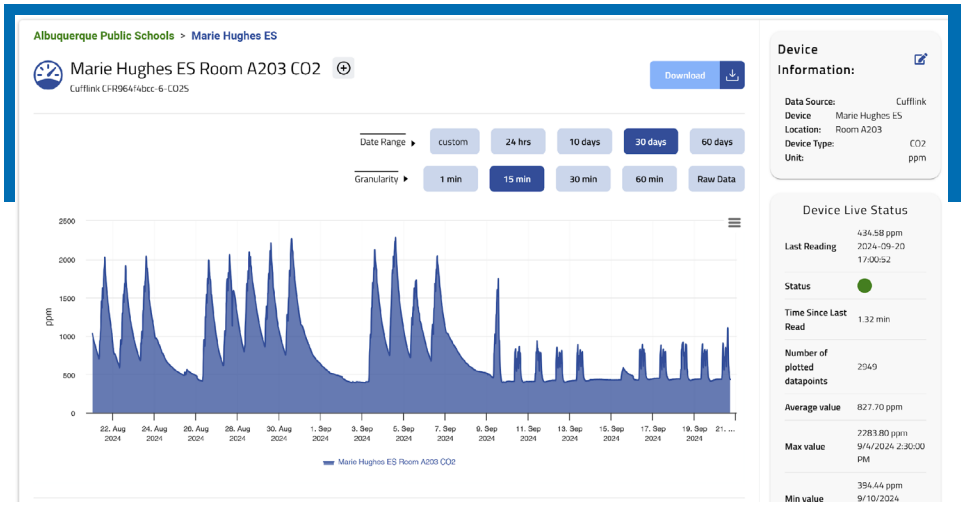
Power Quality Diagnostics

Power quality issues are being diagnosed at a bus depot ahead of new electric bus charging infrastructure investments. Before power quality was visible in real time, it was impossible to determine if power bumps were caused by equipment inside the building or upstream on the utility side. Now, phase-specific diagnostics are automated and tracked over time.

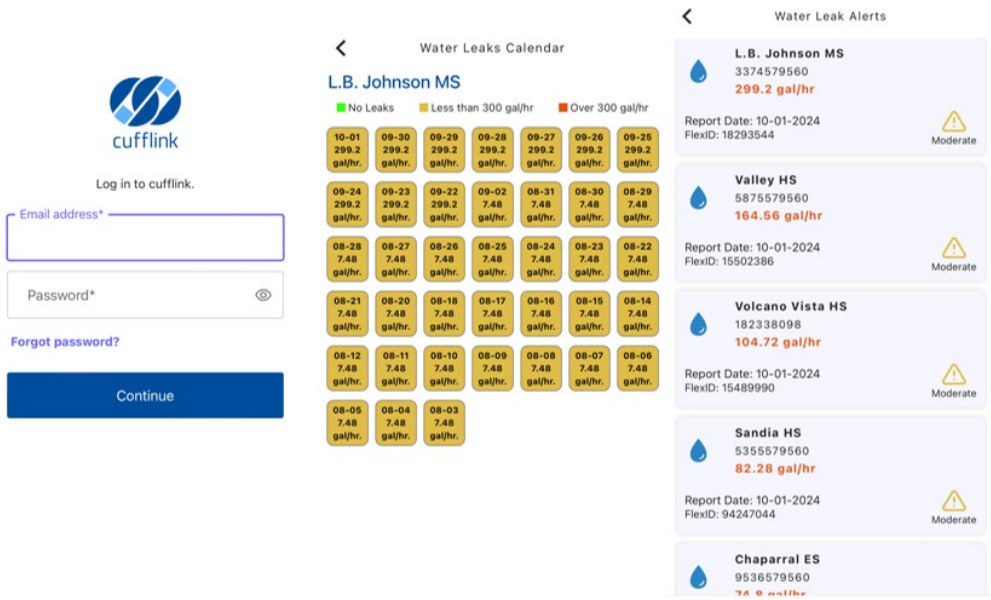
Indoor Air Quality Monitoring (IAQ)

Permanent indoor air quality sensors installed in school facilities continuously monitor and detect suboptimal conditions in real time. Cufflink immediately alerts the building automation team when anomalies are detected, enabling them to quickly identify and address malfunctioning or underperforming HVAC equipment, thus maintaining a healthy learning environment.

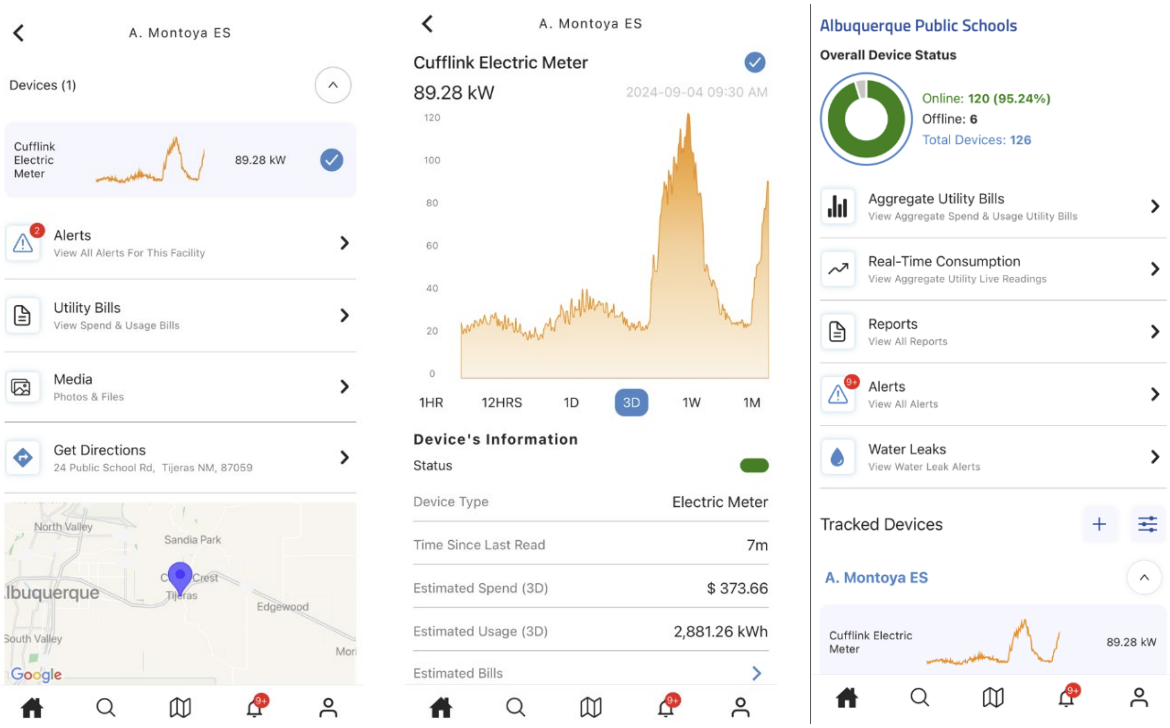
For example, in one classroom, a real-time alert from Cufflink prompted an urgent response from the APS team, which discovered a malfunctioning energy recovery ventilator (ERV) that prevented outside air from being introduced. This issue caused continuous cycling of indoor air, leading to elevated CO_2 levels that could negatively impact students' health and learning. The team swiftly restored the classroom's air quality, safeguarding students' well-being and maximizing the effectiveness of the learning space.



Mobile Accessibility



Facilities personnel are frequently in the field, away from their desks, making timely communication crucial. Cufflink's mobile app and email alerts ensure that all notifications, reports, and actionable data are delivered directly to staff, providing the APS team with real-time updates wherever they are. Leadership utilizes daily reports to inform the team each morning of any anomalies that require immediate attention—drastically reducing resource waste and improving efficiency. This immediate access to information is a significant improvement over the traditional 30-45 day wait for utility bills to uncover potential issues that may have otherwise gone unnoticed.

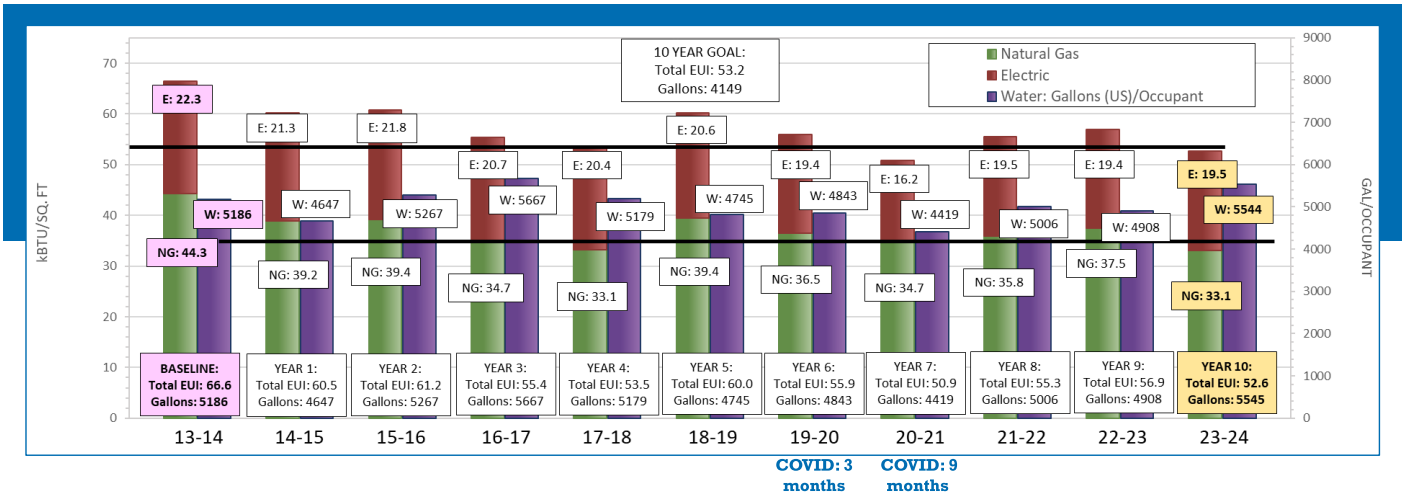


Results

The APS Energy Team established a baseline and clear methodology to measure progress during the life of the 10-year savings initiative. Electric and gas performance are measured in kBtu per square foot, and water is measured in gallons per occupant as shown below.

Objective

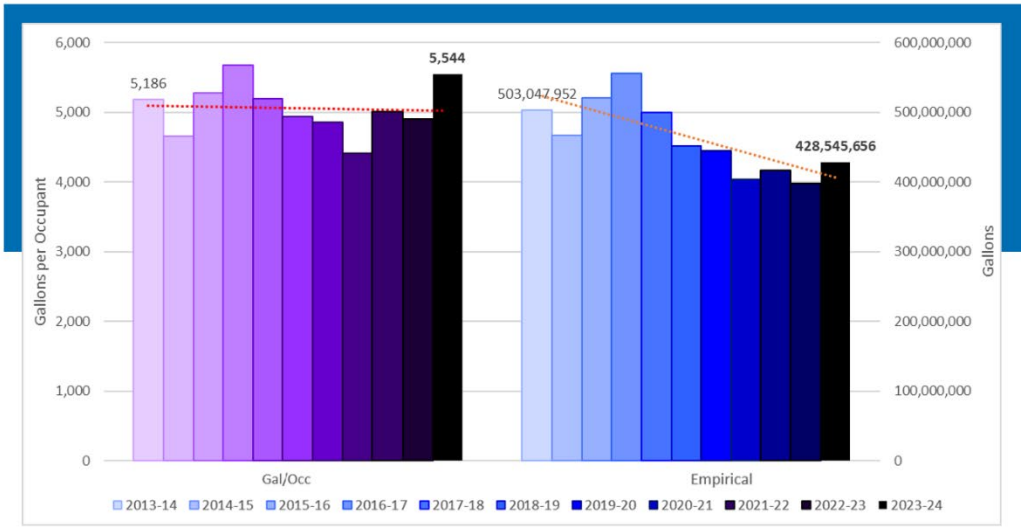
- Reduce the entire school district's energy and water



While empirical water savings totaled 131.7M gallons, the decline in student enrollment affected our metric of gallons per occupant, as shown by the blue vertical bars below. Moving forward, over the next 10 years, we plan to tie water usage to square footage rather than enrollment, given that despite declining student numbers, APS continues to increase its square footage.

Empirical Gallons Vs. Gallons per Occupant – Annual Comparison

Total People Counts:	
13/14	100,547
14/15	100,287
15/16	98,705
16/17	97,805
17/18	96,194
18/19	93,932
19/20	91,484
20/21	91,484
21/22	83,229
22/23	81,029
23/24	77,304



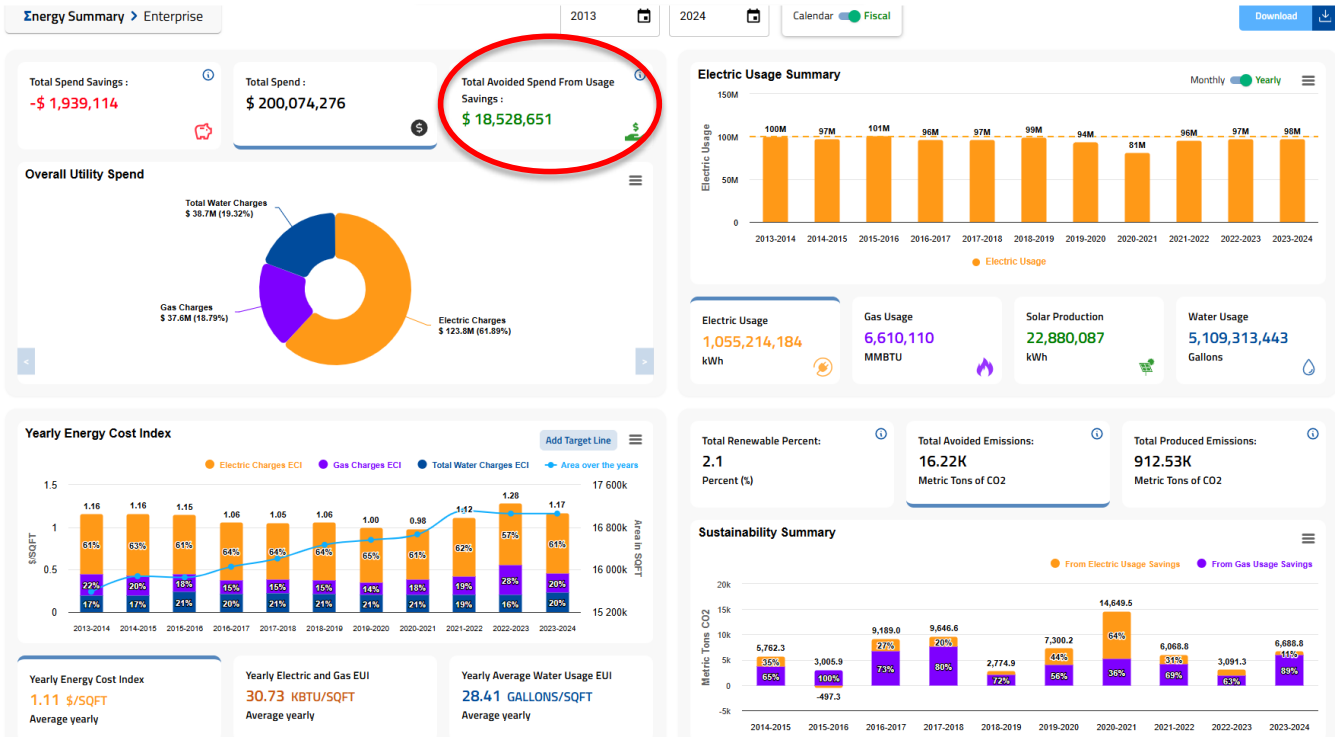
We are committed to measuring the actual utility financial performance throughout the project, as illustrated below. Despite utility rate increases, we successfully generated a positive financial impact of $3.6 million over the project's lifetime through rebates and facility rentals.

Central to this success is the building manager, responsible for maximizing rental energy management and ensuring efficient space usage to reduce energy waste. This includes implementing effective strategies, monitoring consumption, and optimizing operations.

APS Change in Annual Spend – Baseline through 2023-24 – Historical Savings

	Change in Annual Spend (Positive Number = Savings)											
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	TOTAL
Electric	-	-$701,063	$555,208	$194,546	$58,719	-$372,363	$516,077	$1,022,151	-$2,220,523	-$535,207	$395,513	-$1,086,941
Gas	-	$284,400	$279,745	$749,964	$19,521	-$82,017	$300,485	-$544,883	-$741,916	-$2,428,579	$2,138,992	-$24,289
Water	-	-$64,718	-$602,811	$311,388	-$164,532	$54,948	$210,141	-$128,314	-$62,163	$113,575	-$508,679	-$841,164
Rebates*	$48,645	$113,279	$220,390	$336,476	$288,100	$287,559	$125,980	$120,901	$69,836	$69,054	$82,189	$1,762,408
Rentals	$349,114	$318,303	$296,427	$426,933	$299,654	$339,859	$217,665	$138,781	$452,785	$303,732	$469,099	$3,612,348
Summer School**	-	-	$183,606	Energy Only	Energy Only	TBD	N/A	N/A	N/A	N/A	N/A	$183,606
TOTAL	$397,758	-$49,799	$932,564	$2,019,307	$501,461	$227,985	$1,370,348	$608,636	-$2,501,981	-$2,477,426	$2,577,113	$3,605,967

The amount of utility spend we avoided over 10 years, through a host of energy savings initiatives, is $18.5M. This is calculated by converting all the saved kW, kWh, MMBtu, and gallons saved over 10 years and multiplying by the monthly rate of electric, gas and water to produce 'avoided spend'.



Conclusion

Albuquerque Public Schools' decade-long success in energy and water conservation is a direct result of strong leadership and collaboration throughout the district. With the support of executive management and the establishment of a dedicated Energy Team, APS has achieved remarkable milestones—avoiding $18.5 million in utility costs and generating $3.6 million in positive financial returns.

With 4,881 kW of solar across 32 solar installations combined with 721 kW of battery storage, APS has made great strides to advance with the modern grid. Over the last 10 years, APS has offset 3,265,916 kWh annually (3.27%) and reduced our carbon footprint by 22,828 metric tons of CO_2 (22.84%).

By embracing innovative technology and real-time data analytics, APS has automated critical processes such as water leak detection and solar performance monitoring, leading to faster, more informed decision-making. These efforts have not only improved operational efficiency but also reinforced APS's commitment to sustainability and responsible resource management.

As a recognized leader in reducing utility costs per square foot, APS sets an example for other districts. The collaborative work between executive leadership and the facilities team demonstrates how strategic energy management can drive measurable results, benefiting both the district's financial stability and its educational environment.