Albuquerque Public Schools Energy & Water Management



Success Story









Water and Energy Conservation Committee

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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

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 highlevel 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

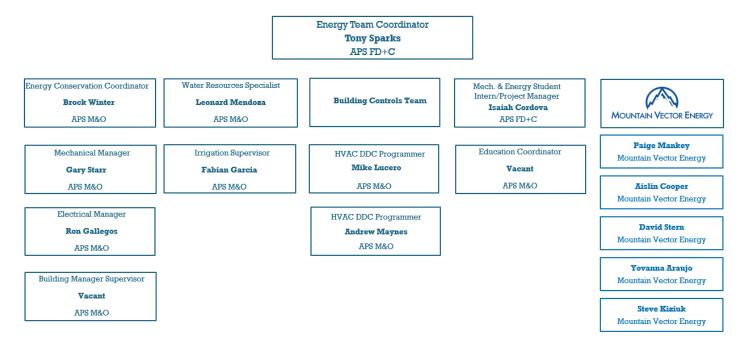
• Functions as a 'Think Tank' for conservation and sustainability.

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



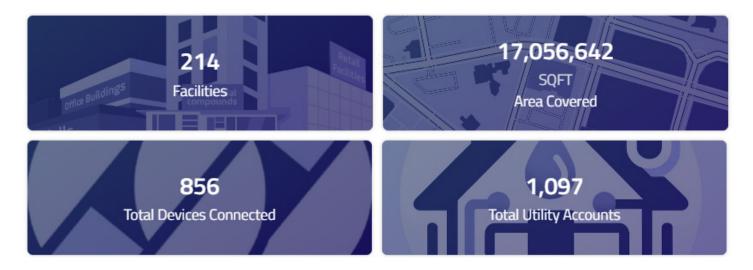
Ratification of this policy allowed WECC to build the necessary infrastructure to address water and energy management and create the APS Energy Team With support from executive management, an APS Energy Center and the APS Energy Team was established as a committee with existing staff. Regular meetings 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

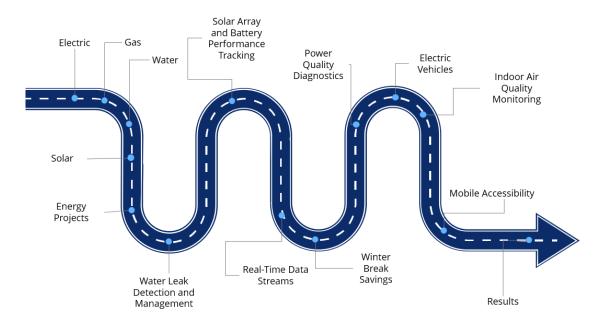
There was no single silver bullet to ensure success. We did a lot of little things well, as a team, to drive positive outcomes.

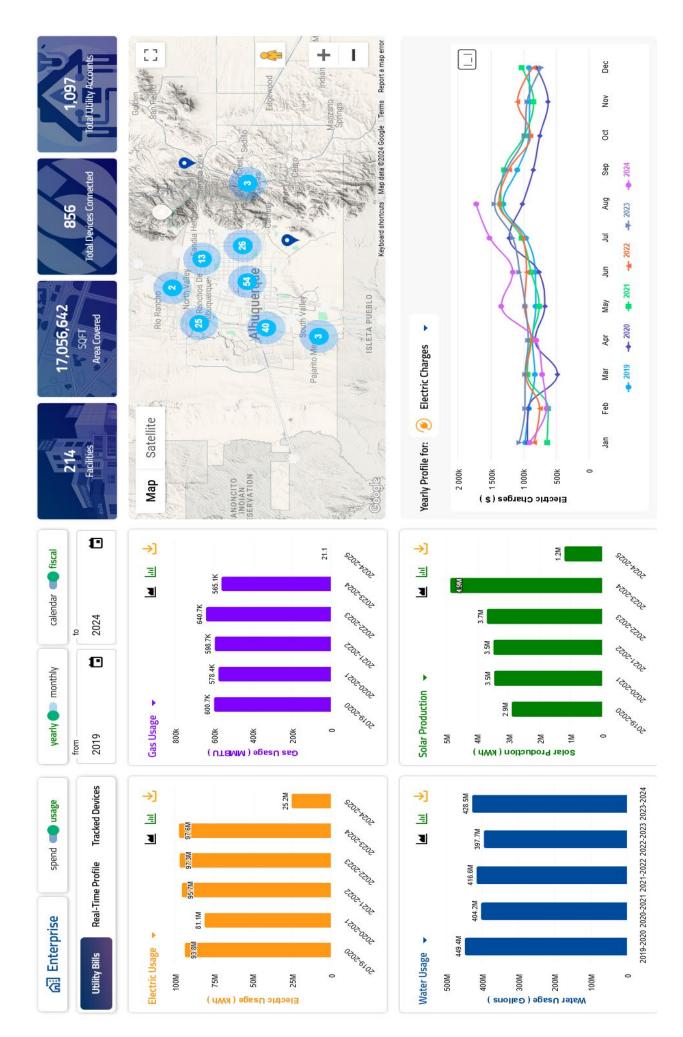
Energy Projects Over the Years: 2013-14 through 2023-24

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

Technological Advancements

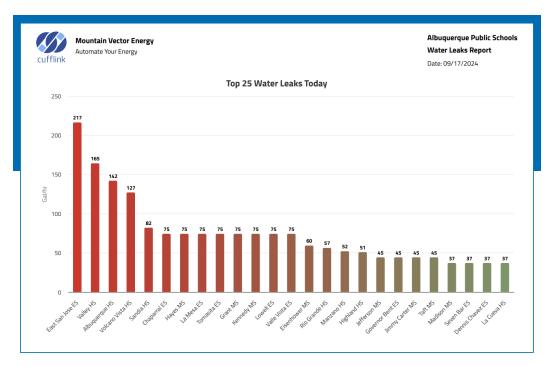
Technological advances, enabled by our partner Mountain Vector Energy, speed up 'data to decision' timing





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.

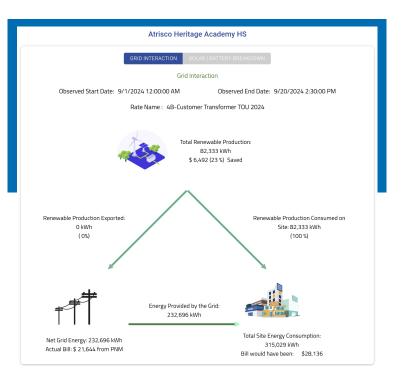


Solar Array and Battery Performance Tracking

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.

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	⇒ Menu Ä Solar Perform	mance								
8	UTILITY SOLAR PERFORMANCE	DEVICE SOLAR PERFORM	ANCE							
<u></u>	2,648 kW Total Solar Array Size	4,269,912 kWh Total Actual Production	4,681,648 H Total Expected		01.21 % iotal Percent of Expected	From		то 2024		٦
2	↓↑ Sort Worst to Best Perfor	mer				Map Satel	ite		B	51
3 7	Janet Kahn School of Integrated Arts Magnet ES	95 kW Solar Array Size	323,396.00 kWh Actual Production	194,450.49 kW Expected Producti			GH RESORT		Y	1
619 61	Atrisco ES	68 kW Solar Array Size	116,103.00 kWh Actual Production	95,189.97 kWh Expected Producti		VENTA 2 LANCE	North Valley	NOR E .	Sandia H	eignts
	Navajo ES	97 kW Solar Array Size	213,160.00 kWh Actual Production	183,127.99 kW Expected Producti			Albuquerque	CADE MY RES NORTH	HIGH D S Y JACKSO	
	CEC	1 94 kW Solar Array Size	405,200.00 kWh Actual Production	355,894.94 kW Expected Producti		WEST LOS VOLCA	2 A DOWNTOWN 3:0B HIL		•	
	Rio Grande HS	220 kW Solar Array Size	437,731.00 kWh Actual Production	395,030.31 kW Expected Producti		WESTGATE	4 SUNPORT	PRUMBULL VILLAGE	SINGING ARR	Autorities and
	Onate ES	57 kW	98,850.00 kWh	91,851.33 kWł	107.62 %	T	South V.Qr Standard	×	CIRTLAND AFE	*

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.

Download Sort* Best to Worst by Spend Reduction *	CARD BAD		198.90 Image: Constraints 199.90 Image: Constraints 199.90 <td< th=""></td<>
Atrisco Heritage Academy HS > Cufflink Electric Meter 12/22/2023 - 1/7/2024 \$ 16,739 vs 12/1/2023 - 12/17/2023 12/22/2023 - 1/7/2024 Usage vs 12/1/2023 - 12/17/2023 174,437 kWh -32,114 kWh (-18.4 %)	Sandia HS > Cufflink Electric Meter 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 Spend - \$ 4,689 (-59,9 %) \$ 7,828 - \$ 12/17/2024 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 Usage vs 12/1/2023 - 12/17/2023 80,768 kWh -25,840 kWh (-32.0 %)	Cibola HS > Cufflink Electric Meter 12/22/2023 - 1/7/2024 Spend \$ 10,048 vs 12/1/2023 - 12/17/2023 - \$ 3,176 (-31.6 %) 12/22/2023 - 1/7/2024 Usage vs 12/1/2023 - 12/17/2023 -28,147 kwh (-34.1 %)	Seven Bar ES > Cufflink Electric Meter 12/22/2023 - 1/7/2024 Spend \$1,774 vs 12/1/2023 - 12/17/2023 - \$ 2,962 (-167.0 %) 12/22/2023 - 1/7/2024 Usage 16,133 kWh vs 12/1/2023 - 12/17/2023 -7,667 kWh (-47.5 %)
Albuquerque HS > Cufflink Electric Meter 12/22/2023 - 17/2024 Spend \$ 11,959 12/22/2023 - 12/17/2023 \$ 2,834 (-23.7 %) 12/22/2023 - 17/7/2024 Usage 111,879 kWh \$ 22/1/2023 - 12/17/2023 -12,541 kWh (-11.2 %) \$ 2	Dolores Gonzales ES > Cufflink Electric Meter 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 Spend - \$ \$ 2,731 (-42.4 %) 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 Usage - 10,003 kWh (-15.1 %)	Volcano Vista HS Cufflink Electric Meter 12/22/2023 - 17/17/2024 Spend vs 12/1/2023 - 12/17/2023 s 10,301 -\$ 2,688 (-26.1 %) 12/22/2023 - 1/7/2024 Usage vs 12/1/2023 - 12/17/2023 86,169 kWh -11,167 kwh (-13.0 %)	Before: 12/1/2024 – 12/17/2024 Winter Break: 12/22/2023 – 1/07/2024
Tony Hillerman MS > Cufflink Electric Meter 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 \$ 4,087 - \$ 2,304 (-56.4 %) 12/22/2023 - 1/7/2024 vs 12/1/2023 - 12/17/2023 Usage -12,599 kWh (-35.0 %)	Desert Ridge MS > Cufflink Electric Meter 12/22/2023 - 1/7/2024 ys 12/1/2023 - 12/17/2023 s 2,872 - \$ 2,269 (-79.0 %) 12/22/2023 - 1/7/2024 ys 12/1/2023 - 12/17/2023 usage -13,355 kWh (-45.0 %)	Materials Management Cufflink Electric Meter 12/22/2023 - 1/7/2024 Spend vs 12/1/2023 - 12/17/2023 \$ 6,364 - \$ 1,990 (:31.3 %) 12/22/2023 - 1/7/2024 Usage vs 12/1/2023 - 12/17/2023 63,385 kWh - 8,582 kWh (:13.5 %)	Usage delta: 445,544 kWh Spend delta: \$92,199

Power Quality Diagnostics

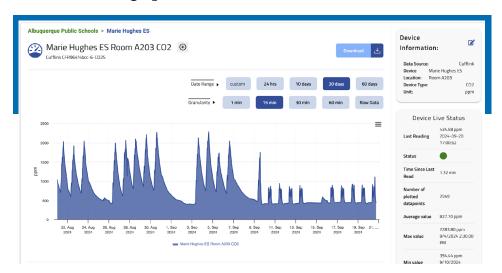
Power quality issues are being diagnosed at a bus depot ahead of new electric bus charging infrastructure investments. Before power quality was visible in real time, it was impossible to determine if power bumps were caused by equipment inside the building or upstream on the utility side. Now, phase-specific 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 CO₂ 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

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		No L	eaks	Less th	ian 300 g	al/hr	Over 30	0 gal/hr		e: 10-01-2024	~
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		08-28 7.48 gal/hr.	08-27 7.48 gal/hr.	08-26 7.48 gal/hr.	08-25 7.48 gal/hr.	08-24 7.48 gal/hr.	08-23 7.48 gal/hr.	08-22 7.48 gal/hr.	Report Date FlexID: 1550	e: 10-01-2024 2386	Moderat
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Water Look Alext

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.

A. Montoya ES		A. Montoya ES		Albuquerque Public Schools	
		Cufflink Electric Meter		Overall Device Status	
pevices (1)	(^)	89.28 kW 202	4-09-04 09:30 AM	Online: 120 (95.24%)	
		120	1	Offline: 6	
Cufflink Electric 89.28 kW		100		Total Devices: 126	
		80		Aggregate Utility Bills	>
Alerts				View Aggregate Spend & Usage Utility Bills	
View All Alerts For This Facility	>	60		Real-Time Consumption View Aggregate Utility Live Readings	>
Utility Bills View Spend & Usage Bills	>	20 marshere Willer Man	had	Reports View All Reports	>
Media Photos & Files	>	0 1HR 12HRS 1D 3D	1W 1M	Alerts View All Alerts	>
		Device's Information			
Get Directions 24 Public School Rd, Tijeras NM, 87059	>	Status		Water Leaks View Water Leak Alerts	>
		Device Type	Electric Meter		
North Valley Sandia Park		Time Since Last Read	7m	Tracked Devices	+
		Estimated Spend (3D)	\$ 373.66	A. Montoya ES	$\widehat{}$
Edgewoo	d	Estimated Usage (3D)	2,881.26 kWh	Cufflink Electric	89.28 kW
Google	Mori	Estimated Bills	>	Meter	03.20 NW

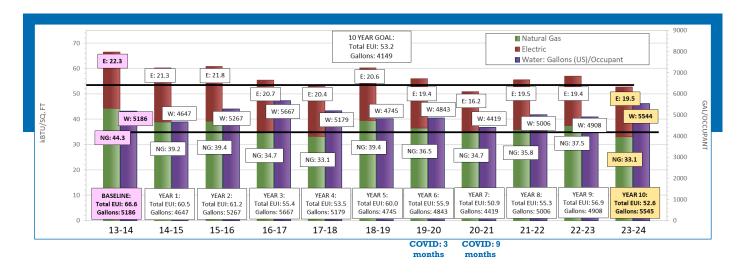
Results

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.

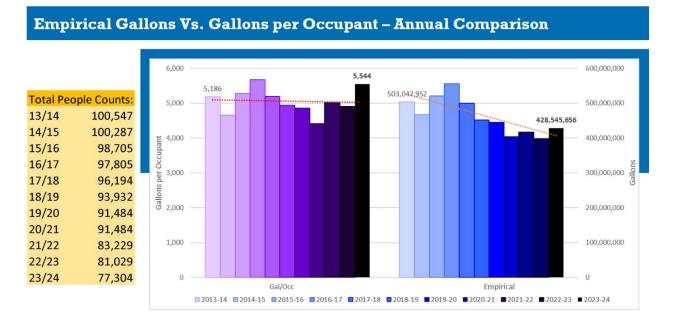


Objective

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.

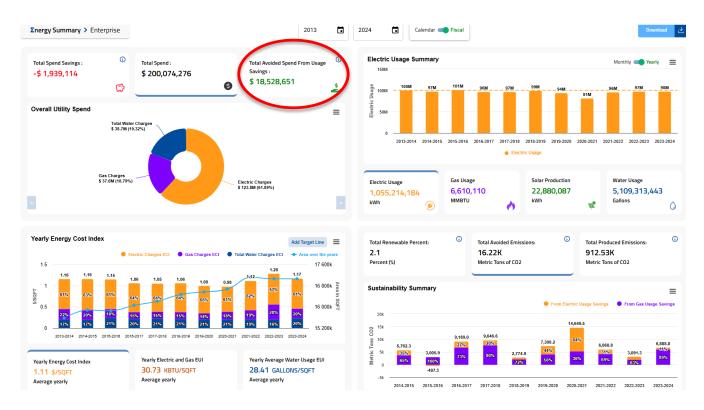


We are committed to measuring the actual utility financial performance throughout the project, as illustrated below. Despite utility rate increases, we successfully generated a positive financial impact of \$3.6 million over the project's lifetime through rebates and facility rentals.

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 <i>,</i> 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'.



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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.







