Office of Energy Strategy
2023 End of Year Program Report

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Section I: Office of Energy Strategy Background

OES Background

In 2023, San Antonio Water System spent approximately $47 million or 10 percentage of its annual operating budget on energy, making it the fourth largest use of funds behind debt service, salaries and wages, and water procurement. In the last 10 years, SAWS' cost of energy has increased 15 percent mainly because of increasing fuel adjustment charges. Strategically managing energy consumption will be key to reducing the impact of future energy cost increases.

A recent commitment to strategic energy management has emphasized the need for planning and developing committed goals for energy reduction. As a result, SAWS has adopted its first Energy Strategy Master Plan. This plan will amplify SAWS efforts by identifying energy savings measures and committing resources towards achieving energy savings goals.

The Office of Energy Strategy is responsible for a multitude of tasks including paying utility bills, developing utility budget forecasts, serving as CPSE liaisons, and identifying and implementing energy savings reduction efforts. Currently, the OES consists of five staff members including:

Name	Title	Department
Jaime Castillo	Senior Vice President	Ops Support/Chief of Staff
Chris Wilcut	Director	District Cooling/OES
Brandon Leister	Energy Manager	Office of Energy Strategy
Stephen Turner	Resource Analyst Coord.	Office of Energy Strategy
Alfred Rocha	Resource Analyst	Office of Energy Strategy
Chantay Griffin	Administrative Assistant	Office of Energy Strategy

2023 OES Highlights

- In 2023, SAWS developed its first ever Energy Strategy Master Plan. In addition to reducing utility expenditures, this plan will be key in supporting the City of San Antonio's climate action goals. The Master Plan serves as a guide for future energy conservation to **reduce its energy intensity (kWh/unit) by 10 percent by 2028.**

- In total, 2023 energy saving efforts produced $766,112 in utility bill savings for SAWS. The reason that the utility budget continues to increase despite these savings is that on the Production side we are having to rely much more heavily on energy intensive sources than in years past due to drought and Edwards permit issues (i.e. moving away from Edwards water is more energy intensive and costly).
- CPS Energy's Demand Response program is a voluntary load curtailment program designed to reduce CPS Energy's peak load growth by incentivizing customers to shed electrical loads on peak summer days. This year SAWS participated in 27 events and reduced demand by more than 7.5 MW and earned $551,225 in incentives.
- SAWS utilizes four different CPS Energy utility tariff structures, and each tariff has its own unique billing structure and minimum term of service. SAWS has several utility accounts in each of the four tariff categories and can request a change in tariff if potential cost savings can be verified. In order to identify cost savings opportunities, the Office of Energy Strategy performs a monthly analysis and recorded $112,269 in savings in 2023.
- One of CPS Energy's programs under the umbrella of STEP includes the Commercial Solutions Program. This program incentivizes commercial customers who implement projects aimed at reducing energy consumption, since 2018 SAWS has accumulated $969,521 in rebate incentives.
- Reducing the energy intensity is pursuing low- cost energy conservation measures identified within SAWS' water, wastewater and district cooling systems. In 2023, these measures have already provided significant energy savings for the wastewater and district cooling systems, reducing energy intensity by 6.3 percent and 4.7 percent, respectively, while water operations increased by 12.8 percent. 2023 was a challenging year as there was a significant drought causing our Edwards Aquifer water source to be under strict usage restrictions. This caused SAWS to use other more energy intensive water sources to supplement the Edwards Aquifer water.
- From 2012 to 2023, utility costs increased 78 percent or 5.4 percent annually. Of this annual growth rate, 4.1 percentage point growth was related to consumption increases, while price increases attributed to 1.3 percentage point annual increases.
- Kilowatt hours increased 56 percent from 2012 to 2023, or 4.1 percent compounded annually. Increases were fairly flat until 2020 when additional water supplies from the Vista Ridge project came online. 2022 and 2023 saw increased KWH usage as both years had significant abnormally high temperatures and were 64 percent and 38 percent lower than normal rainfall, respectively.

Section II: Utility Data

2023 Energy Intensity Performance

As outlined in the 2023 Energy Strategy Master Plan, SAWS has committed to decreasing the energy intensity of its operations by 10 percent over the next five years. The plan provides recommendations on potential projects and process modifications for SAWS to consider in order to achieve this goal.

The first step in reducing energy intensity is to pursue low- and no-cost energy conservation measures identified within SAWS' water, wastewater and district cooling systems. In 2023, these measures provided significant energy savings for the wastewater and district cooling systems, reducing energy intensity by 6.3 percent and 4.7 percent, respectively.

Energy intensity of water operations increased by 12.8 percent in 2023. The year was challenging due to persistent drought conditions which triggered the Edwards Aquifer pumping restrictions. This caused SAWS to use other, more energy intensive water sources to meet customer demand.

Due to persistent drought conditions the Edwards Aquifer level dropped from 648 feet to 626 feet above sea level. This lowering of the water table caused the water to be pumped farther to reach the surface, using more energy.

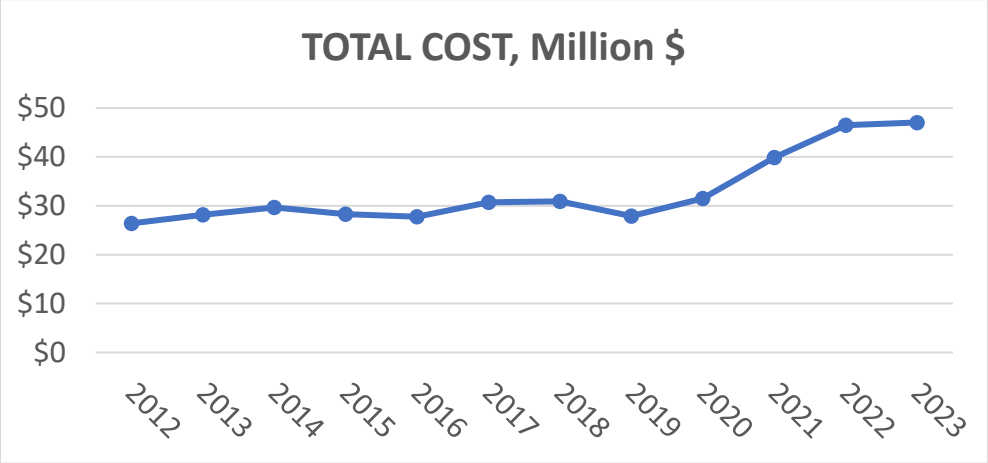
Operation	EI METRIC	EI BASELINE	2023 EI	PERCENTAGE CHANGE
WATER	KWH / MG	3,502	3,949	12.8
WASTEWATER	KWH / FLOW MG	1,743	1,633	-6.3
DISTRICT COOLING	KWH / 1000 TON-HRS	1,006	958	-4.7
BUILDINGS	KWH / SQUARE FT.	13	13	-1.5
TOTAL		2,890	3,250	12.5

Costs by Year 2012-2023

From 2012 to 2023, costs increased 78 percent overall or 5.4 percent annually. Of this annual growth rate, 4.1 percent was related to consumption increases, while price increases attributed to the remaining 1.3 percent growth.

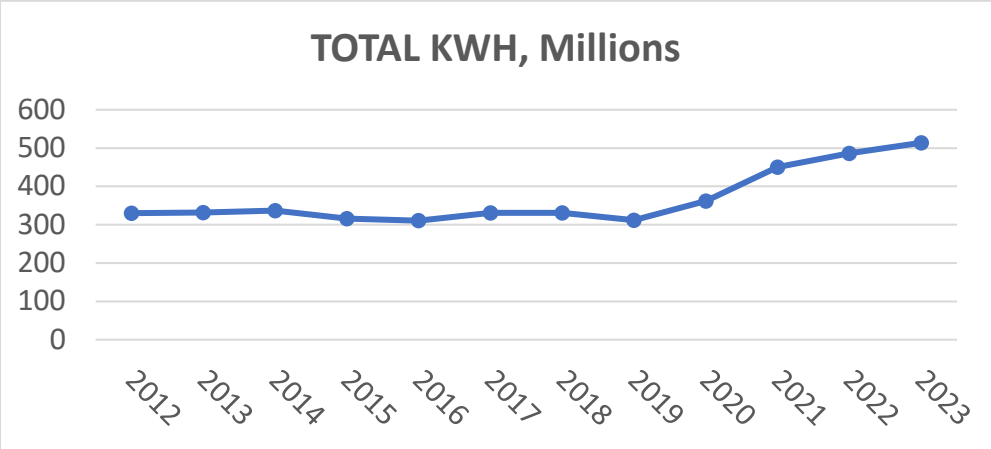
Costs were relatively stable until 2020 when the Vista Ridge water supply project came online. This project utilizes non-Edwards Aquifer water sources requiring more energy to deliver water from the Carrizo/Simboro Aquifer in Burleson County.

Overall, price increases were mostly due to increases in the fuel adjustment charges from CPS Energy, our largest provider of electric power.



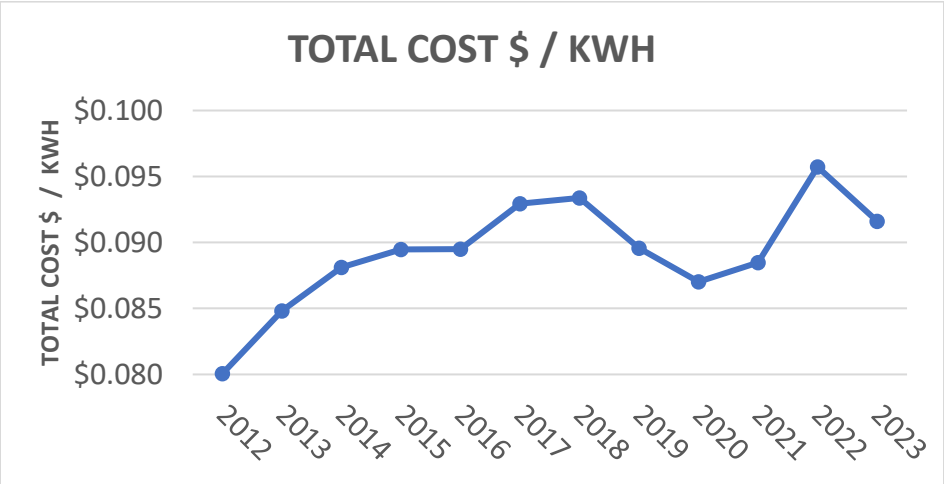
kWh by Year 2012-2023

Kilowatt hours increased 56 percent from 2012 to 2023, or 4.1 percent compounded annually. Increases were fairly flat until 2020 when additional water supplies from the Vista Ridge project came online. In 2022 and 2023 increased kWh due to extreme temperatures and lower than average annual rainfall (64 percent and 38 percent respectively). This weather caused more water to be pumped to meet customer demand, thus increasing electric consumption.



Cost per kWh 2012-2023

SAWS' total energy costs have risen through the years, and it is expected that SAWS' four electrical providers will have rate increases. The metric used to track energy costs is $/kWh. Essentially, this is the blended cost SAWS pays for a single unit of energy. One of the biggest influences on costs per kWh are fuel adjustment and regulatory charges which can impact the cost per kwh as shown in the chart below:



2023 Costs by Utility Provider

SAWS receives its electricity from four different electrical providers. CPS Energy is the largest provider at 77 percent of total costs. Guadalupe Valley Electrical Cooperative, Bluebonnet Electrical Cooperative Utility and New Braunfels Utilities make up the remaining 23 percent. The annual cost breakdown of the four utilities are shown below:

UTILITY PROVIDER	PERCENT OF TOTAL	TOTAL COST $
CPS	76.7	$36,155,331
GVEC	8.2	$3,862,333
BLUEBONNET	15.1	$7,097,394
NEW BRAUNFELS UTILITY	0.002	$1,031
TOTAL	**100**	**$47,116,089**

Energy Use by Water Source 2023

SAWS has a diverse water portfolio, including sources outside of San Antonio's extraterritorial jurisdiction. SAWS' oldest and main water source remains the Edwards Aquifer which still accounts for 60 percent of SAWS' total water production. The below represents annual energy consumption by water source:

WATER SOURCE	TOTAL (kWh)	PERCENT OF TOTAL
EDWARDS	144,521,422	42.4
VISTA RIDGE	139,001,296	40.8
ASR PRODUCTION	34,865,188	10.2
REGIONAL CARRIZO	10,011,847	2.9
TRINITY	5,396,429	1.6
LOCAL CARRIZO	4,944,768	1.5
DESALINATION	2,182,849	0.6
TOTAL	**340,923,799**	**100**

Section III: 2023 Energy Projects

Strategic Energy Management (SEM) Summary

Total Savings of $539,426

Location	Energy Savings (kWh)	Cost Savings ($)
Clouse WRC	1,201,294	$108,116
Leon Creek WRC	1,757,130	$158,142
Medio Creek WRC	1,012,447	$91,120
H2Oaks	2,022,758	$182,048
GRAND TOTALS	***5,993,629***	***$539,426***

Background

SAWS' existing operations consume significant amounts of electricity as water distribution and treatment are inherently energy intensive. Reducing energy consumption would result in significant cost savings and a reduction in SAWS' carbon footprint.

Project Description

Traditionally, there are two types of energy conservation measures: Retrofit type projects (replace existing equipment with new equipment) and behavioral, operational projects. Due to the magnitude and complexity of SAWS operations, behavioral type projects present a more attractive opportunity because they require far less capital and yield more immediate savings resulting in a better return on investment.

In 2021, SAWS partnered with Cascade Energy to begin a Strategic Energy Management project that focused on optimizing existing equipment by making behavioral and operational modifications. This project began by establishing energy teams comprised of key water/wastewater staff and operators. These energy teams attended training sessions focused on energy education and ways to save energy within their specific operations.

In 2023, wastewater took a significant step forward and implemented several strategic energy conservation measures resulting in more than $500,000 in cost savings (highlighted above). A few project examples include reducing aeration when ammonia is low, automating UV systems, and lighting/HVAC setbacks. The water energy teams also began implementing projects late in 2023 but savings results are not yet available.

Notes

Energy consumption and cost savings are verified by a software platform called Energy Sensei. Energy

Sensei includes models that pull in water/wastewater data, such as flows, and combine it with weather information and energy data from CPSE Energy. These models highlight assumed energy consumption based on specific variables vs. actual energy consumption, and the delta between the two is the energy savings.

CPS Energy 2023 Demand Response Program Summary

Project Summary: SAWS Total Incentive Amount of $551,226

Location	Contract kW Reduction	Average kW Reduction	Percentage Reduction	Incentive Amount
Chilled Water Plant	2,500	3,511	140%	$254,756.12
Basin PS	1,000	758	76%	$54,250.19
34th St PS	250	657	263%	$48,158.54
Micron PS	1,400	1,458	104%	$106,379.00
Golden PS	225	171	76%	$12,785.16
Seale PS	275	482	175%	$36,022.61
Leon Creek Recycle	300	255	85%	$18,984.10
Pearsall Recycle	150	189	126%	$14,070.21
Leon Creek WRC	125	44	35%	$3,092.66
Medio Creek WRC	225	7	3%	$2,727.12
GRAND TOTALS	***6,450***	***7,534***	***117%***	***$551,225.71***

Background

CPS Energy's Demand Response program is a voluntary load curtailment program for its commercial and industrial customers. The program is designed to reduce CPS Energy's peak load growth by incentivizing customers to shed electrical loads on peak summer days.

Project Description

CPS Energy's Demand Response program runs from June 1 through Sept. 30. During this time, CPS Energy can call demand response or "curtailment" events any weekday and events typically take place between 3 p.m. and 6 p.m.

In 2023, SAWS enrolled all feasible locations in Demand Response Option 2, which gives a two-hour notice and pays $70 per kW reduced. In previous years SAWS has participated in both the Option 1 (30-minute notice) and the Option 2 program. In total, CPS Energy called 27 demand response events this year. For reference, SAWS' average demand reduction of 7.5 MW is enough electricity to power 1,500 Texas homes on a hot summer day.

Electrical demand at Production, Treatment and Recycle locations was reduced by strategically shutting off pumps and motors where possible. At the Central chilled water plant, demand was reduced by utilizing thermal energy storage.

Notes

Special thank you to all Production, Treatment, Recycle and District Cooling staff who made this possible.

2023 Utility Tariff Analysis and Adjustment Project

Background

San Antonio Water System utilizes four different CPS Energy utility tariff structures: General Service (PL), Large Lighting and Power Service (LLP), Extra Large Power Service (ELP) and Super Large Power Service (SLP) rate. Each tariff has its own unique billing structure and minimum term of service. The SLP rate has a five-year minimum term, the ELP and LLP rates have a one-year minimum term, and the PL rate has no minimum term. SAWS has several utility accounts in each of the four tariff categories and can request a change in tariff if potential cost savings can be verified.

Project Cost and Savings Summary

Account/Location	Description	Annual Cost Savings
Agua Pura/Medina Treatment Plant/Pump Station	PL TO LLP	$6,172
ASR Plant/East Pumps	ELP TO PL	-$65,546
West Top Pump Station	PL TO LLP	-$51,826
Potranco Secondary Pump Station	PL TO LLP	$8,806
Golden Boster Pump Station	PL TO LLP	$7,295
Commerce/Central Chilled Water Plant	SLP TO ELP	$9,912
Lemonwood Primary Pump Station	LLP TO PL	$1,922
Loma Linda Secondary Pump Station	LLP TO PL	$5,434
Marbach 2 (Bear Springs) Primary Pump Station	PL TO LLP	$8,499
Port San Antonio Bldg. #1625 Chilled Water Plant	ELP TO LLP	$35,069
Sutton Secondary Pump Station	LLP TO PL	$11,540
Turtle Creek #2 Primary Pump Station	LLP TO PL	$55,884
Wurzbach Primary Pump Station	ELP to SLP	$79,108
2023 TOTAL		**$112,269**
PROGRAM DECEMBER 2023 YTD		**$1,224,872**

Project Description

Due to the nature of SAWS operations, utility accounts and energy consumption do not always remain consistent for long periods of time. Therefore, what may have been the most cost-effective utility tariff for an account one year, may not be the most cost-effective tariff the next.

Being aware of these changes in energy consumption and the ability to request a new tariff presents SAWS with a significant opportunity for utility cost savings.

In order to identify cost savings opportunities, the Office of Energy Strategy performs a monthly analysis to calculate the "would be" utility costs of each of the four tariff structures for all of SAWS' nearly 600 CPS Energy utility accounts. This analysis highlights specific accounts where SAWS would be saving money by being in a different tariff than the one currently utilized. Once accounts are identified, OES meets with applicable SAWS staff to understand the account's operational consumption, peak demand, seasonality, outliers, and maintenance/construction schedules. These meetings help provide the needed assurance that the existing operations will remain consistent and warrant a tariff change. This is a critical step because it helps avoid a scenario where SAWS requests a rate change based on previous months of utility data and ends up losing revenues as a result of significant operational changes down the line. Ultimately this step verifies the proposed tariff change is appropriate.

Aside from verifying operational behavior, OES also considers the minimum terms associated with each rate category. PL tariff changes pose little to no risk because SAWS can switch out of that rate at any given time, whereas LLP and ELP rates lock the account into that tariff for a year. Therefore, LLP and ELP requests are only made when operational stability can be verified with high confidence. PL rate requests are also made with high confidence.

Notes

Cost savings opportunities are identified by taking several months of previous energy consumption data for each account and calculating what the bill would look like in each of the four tariff categories, resulting in four potential bills per account, per month. If the calculated bill with the lowest total is from a different tariff than is currently utilized, then a cost savings opportunity is present.

Making a rate change request only makes sense when a pattern has been established, so only accounts with cost savings over several months are considered. Cost savings are quantified by subtracting the new tariff costs (i.e. the new request) from the costs under the previous tariff.

Per CPS Energy's request, SAWS provides several months of cost savings to verify why a tariff change request is being presented. The timeframes provided to CPS range from 10 to 16 months of identified cost savings. The figures in the *Annual Cost Savings* column of the summary table are real dollars saved by SAWS in 2023.

2023 Open/Closed Valve Pilot Summary

Approximate Savings: $700,000

Background

SAWS has a diverse and complex water distribution network containing several different pressure zones. In some cases, large valves along the distribution system remain closed after a repair or operational change.

Project Description

When valves inadvertently remain closed, high service pumping head is increased resulting in excess energy use. SAWS' Master Planning team analyzed the hydraulic model to identify locations where valves may be closed.

Crews were then sent out to the field to verify the valve placement and open if necessary. Opening these valves results in better hydraulic performance and improved pump station energy efficiency.

To validate the above energy savings, pump station energy intensity was compared before and after the valves were opened. External factors like pumping volume were removed to identify the true savings associated with the valve positioning.

Notes

Moving forward, SAWS' Master Planning team hopes to use these energy savings as a justification for identifying and opening additional closed valves. OES is not recording these savings for 2023 as they as based on engineering estimates. OES and Master Planning will be conducting field verifications for this pilot in 2024.

CPSE Incentive Rebates Summary 2018 - 2023

Total Rebate Amount of $969,522

Project	Program Year	Rebate Amount ($)
Central CHW Plant VFDs	2023	$229,678.30
GRAND TOTALS 2018-2023		***$969,521.77***

Background

In 2009, CPS Energy launched its first energy efficiency and conservation plan known as the "Save for Tomorrow Energy Plan", or STEP. The plan established a goal of saving 771 MW of energy by 2020. Through community participation and shared commitment, this goal was met ahead of time. In June 2022, the City of San Antonio authorized a new initiative titled the "Sustainable Tomorrow Energy Plan", which established a goal of reducing community demand by 410 MW by 2027.

Project Description

One of CPS Energy's programs under the umbrella of STEP includes the Commercial Solutions Program. This program incentivizes commercial customers who implement projects aimed at reducing energy consumption. CPS Energy helps customers identify energy conservation measures and then pays the customers up to $0.05/kWh and $325/kW, depending on the project type. Some common projects include lighting, variable frequency drives, chillers, refrigeration and more.

Many of SAWS' construction projects inherently save energy because outdated infrastructure is being replaced with newer and more efficient equipment. When a qualifying project is identified, the Office of Energy Strategy staff works closely with CPS Energy's program administration team, CLEAResult, to maximize the rebate potential. Moving forward, staff hopes to capture rebates on a more regular basis.

Section IV: Fleet Electrification

Background

In recent years, SAWS has begun its journey toward fleet electrification in order to reduce emissions and support San Antonio's climate action goals.

Project Description

In April of 2023, CPS Energy partnered with a consultant, NEXTera Energy, to provide a fleet electrification study for key customers, one of which included SAWS. The intent was for CPS Energy to use the results of the study to plan for future infrastructure needs as large organizations like SAWS begin electrification of their fleets. The study provided SAWS with recommended vehicle makes and models, economic comparisons between electrical vehicles vs traditional internal combustion engines, charging station cost estimates, and potential emissions reductions.

The study evaluated more than 800 SAWS fleet vehicles and identified 74 vehicles which were considered technically and economically feasible for transition to EV. This means the electric versions of the current vehicles are a suitable operational replacement and have a lower lifetime cost of ownership. The total cost of ownership associated with the 74 potential electric vehicles is just over $4.8M (with approximate 10 years of ownership).

SAWS has already begun the process of electrifying its fleet. Currently there are twenty electric vehicles in the fleet. This is made up of nine Chevrolet Bolts, two Ford E-Transit Vans, nine Ford lightnings, and installation of a fifteen Level II charging stations. Currently, staff is working on additional EV charging capacity (with CPS Energy), that will involve significant capacity upgrades at SAWS facilities, and procurement of additional electric vehicles as they become available.

SAWS Benefits:

- Support of San Antonio's climate action goals.
- Reduced vehicle fuel and maintenance costs.
- Potential rebate/incentive opportunities for new EVs.
- Estimated emissions reductions of approximately 287 metric tons of CoO2 annually (assuming electrification of the 74 internal combustion vehicles).

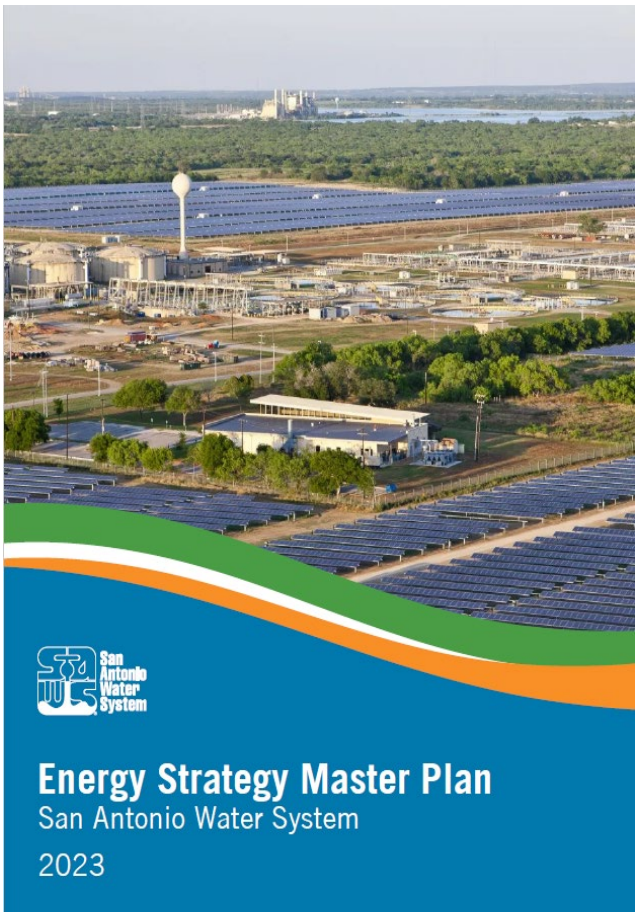
CPS Energy Benefits:

- Information necessary to plan for future electrical infrastructure needs associated with upcoming electrification efforts.
- Increased revenue associated with electricity needed for EV charging.

Notes

Because the electric vehicle market is an emerging technology SAWS will continue to monitor conditions moving forward and will adjust planning efforts accordingly. It is expected that SAWS and CPS Energy will continue to work closely to plan for the needed charging infrastructure.

Section V: Energy Strategy Master Plan



In 2023, SAWS developed its first ever Energy Strategy Master Plan. In 2023, SAWS spent approximately $47 million or 10percent of its annual operating budget on energy, making it the fourth largest use of funds behind debt service, salaries and wages, and water procurement. Every year, SAWS' cost of energy is rising due to rate increases and changes in fuel adjustment charges. Strategically managing energy consumption will be key in reducing the impact of future energy cost increases.

In addition to reducing utility expenditures, this plan will be key in supporting the City of San Antonio's climate action goals. In October 2019, the city adopted the San Antonio Climate Action and Adaption Plan. The plan set a goal for San Antonio to achieve carbon neutrality by 2050. Energy use is responsible for 48percent of San Antonio's greenhouse gas emissions and since SAWS is one of the largest energy consumers in the city, this plan can have a real impact on San Antonio's carbon neutrality goal.

SAWS is a national leader in water conservation. Drawing on SAWS' history in water conservation, developing this Energy Strategy Master Plan can guide future energy conservation to achieve SAWS' operating cost, energy and emissions reduction goals without compromising water quality or water conservation. This plan establishes **an initial commitment for SAWS to reduce its energy intensity (kWh/unit) by 10percent by 2028**. Reaching this goal will require the support of SAWS' Board, Executive Team and staff.

Section VI: Next Steps

The Office of Energy Strategy is committed to making energy efficiency a sustainable practice within SAWS. The areas below highlight key areas of focus moving forward:

Strategic Energy Management

OES staff and energy teams will continue to identify and implement low- and no-cost energy conservation measures associated with the strategic energy management project.

Renewable/Alternative Energy

SAWS will continue to explore renewable and alternative energy projects to reduce energy costs and promote San Antonio's efforts towards carbon neutrality. Potential projects include solar and hydropower energy generation.

Thermal Energy Storage

Today, SAWS district cooling utilizes thermal energy storage to reduce the peak energy demand needed during the day. SAWS will continue to work with CPS Energy in an effort to expand this technology to existing and future chilled water plants.

Engineering and Finance

In 2024 and beyond, OES will work closely with both SAWS Engineering and Finance departments. Engineering will be critical in implementing efficiency projects and Finance will play a key role in how projects are selected and ultimately funded.