

F R O S T & S U L L I V A N

Excellence in Energy Resourcefulness Award:

*Sacramento Municipal District (SMUD),
California*

Introduction

Initiatives to effectively integrate clean energy without burdening consumer purse strings are essential for achieving climate adaptation and mitigation strategies. Cities and states nationwide have stepped up investments to curtail its carbon footprint and dampen the monetary and societal damage resulting from the same. In the US, there are nearly 180 cities on track to have 100% carbon-free energy, the earliest by 2045 and the latest by 2050. The City of Sacramento is hoping to achieve this goal by 2030.

The City of Sacramento has seen the worsening impact of climate change in the past few years in the form of the seventh-worst air pollution in the US, wildfires, and flooding. In 2020, the city's Board of Directors declared a climate emergency and adopted a resolution to take significant action to become carbon neutral by 2030. The municipal's 2030 Zero Carbon Plan (ZCP) calls for eliminating carbon emissions from its electricity production while maintaining a reliable and affordable service¹. The justification to adopt change became even furthermore evident in December 2022, as the city experienced unprecedented storms that resulted in flooding and downed power lines and trees due to water saturation.



1 [2030-Zero-Carbon-Plan-Executive-Summary.ashx](https://www.smud.org/2030-Zero-Carbon-Plan-Executive-Summary.ashx) (smud.org)

The ambitious target of carbon neutrality is dependent on collaborative approaches and economic prosperity for green jobs. Customer engagement, service reassurance, and job retraining are essential for achieving decarbonization targets. For instance, the municipality is committed to seeking resources that are available locally to fill future green jobs.

The municipal has a long history of serving its community, including its low-income customers. This has involved upgrading homes energy efficient electric appliances, installing solar rooftops, weatherization improvements, among other measures. The municipal launched Community Impact Plan (CIP) in 2022. Through this plan, it has completed more than 150 electrification and energy efficiency measures in residential homes². Its Solar Share program allows customers who cannot install solar at their location to participate in utility-scale solar.

Based on its planned energy mix, the utility is confident it will be able to reduce 90 percent of its carbon emissions without compromising grid reliability and raising rates. Already, it has achieved an impressive shift towards carbon-free power generation in terms of retail sales, as seen in the chart below.

SMUD Power Generation Mix	2018	2023	2030
Eligible Renewable	20%	48%	88%
Large Hydroelectric	23%	21%	20%
Natural gas & Renewable NG	56%	30%	0%
Other	0%	1%	0%
Unspecified Power	1%	0%	10%
Unidentified Carbon-Free Generation	0%	0%	11%
Total	100%	100%	119%³

2 [2030 Zero Carbon Plan Progress Report - March 2022 \(smud.org\)](https://www.smud.org/2030-zero-carbon-plan-progress-report-march-2022)

3 The generation above 100% will provide energy to charge energy storage and help balance the variability of renewable generation at high penetration in SMUD's portfolio.

To fill in the remaining 10 percent, the municipality will lean on new technologies and alternative business models. The municipal has long known the power of implementing a digital grid and was among the early adopters of advanced meter infrastructure as far back as in 2009. It has since recognized the importance of distributed intelligence (DI) that can allow the municipal to make real-time assessments and plan for effective integration of clean power and distributed power.

SMUD is currently piloting Itron's next generation AMI technology, including distributed intelligence, along with reviewing its distribution management system (DMS) and distributed energy resource management system (DERMS). The municipal's entire IT strategy is based upon covering and achieving ZCP. ZCP is not only focused on achieving decarbonization but also can prevent ongoing effects of climate change. Hence, the municipal's IT strategy is also focused on improving storm response time (such as real-time notification on when power is coming back on) as well as grid hardening.

Notable areas of outcomes for piloting include:⁴

- **Electrification of transportation and buildings.** This also includes construction of new smart homes and turnkey EV charging solutions.
- **Flexible demand programs and customer accountability.** This could be a form of ancillary services where customers are called upon to when the grid is experiencing the highest amount of stress. Direction and alerts can be offered through the customer's smart thermostats and electric vehicle.
- **Virtual power plants (VPP).** This technology forms a virtual power plant by balancing grid operations and customer needs by optimizing customer-owned equipment and distributed energy resources, especially during peak power periods. Currently, more than 49,000 customers in the district have installed rooftop solar⁵ and over 1,300 customers have installed battery storage. The utility is expected to launch many VPP pilot programs through 2024.
- **Vehicle to grid technology (V2G).** In this scenario EV batteries can be used to stabilize the grid during peak power periods or use available surplus renewable energy to charge the grid-connected vehicle. The municipal expects to have over 39,000 light-duty EVs in operation by the end of 2023 and expects this number to reach 288,000 by the end of 2030.
- **New grid-scale technologies** such as biofuel, long-duration energy storage, carbon capture and sequestration (CCUS), and pumped storage hydro.

4 [2030-Zero-Carbon-Plan-Executive-Summary.ashx \(smud.org\)](#)

5 [Emission and zero-carbon program information \(smud.org\)](#)

Implementation of these initiatives requires working with cutting-edge technology providers such as Itron to assess and prioritize technologies that will easily scale and help shape the future of decarbonization. Itron has many decades of grid modernization projects under its belt and holds the highest number of peer and customer-recognized IoT-enabled platforms. SMUD is currently piloting Itron's DI enabled smart meters and six DI apps from Itron, which will be expanded to 200,000 meters and 10 apps in 2024. The municipal expects it will take approximately three years for a potential complete meter upgrade implementation. The selection of DI was based on almost 200 identified use cases, which were scored and ranked in terms of importance. Customer involvement and reducing overall operational cost were among the key considerations for selecting the chosen technology.

Given its proactive initiative to decarbonize while maintaining a customer-centric approach, Frost & Sullivan recognizes SMUD as the recipient of the 2023 Excellence in Resourcefulness for Energy for 2023. The table below lists the criteria measuring SMUD's success for clean and carbon-free energy resourcefulness.

SOCIETAL IMPACT	POOR	FAIR	GOOD	EXCELLENT
Improving customer awareness and participation				✓
Enabling behavioral change for reducing waste through customer engagement and technology-driven programs				✓
BUSINESS IMPACT	POOR	FAIR	GOOD	EXCELLENT
Strengthening a utility's brand image as a leader in sustainability				✓
Achieving operational efficiency as a result of a successful sustainability strategy				✓



Social Impact

SMUD has a long-standing history for building customer-oriented programs. The municipality continues to maintain high customer satisfaction ratings. It has developed a trusted brand within their community that is in part based on maintaining low and affordable rates, safety, zero carbon emissions, and ensuring a cleaner environment. Customer engagement and programs are cornerstones for achieving SMUD's ZCP. The implementation of AMI 2.0 is considered instrumental for further refining customer engagement and enabling simpler processes and automation.

Pilot projects are segmented into three customer programs labeled: 1) Building Electrification and Energy Efficiency, 2) Transportation Electrification, and 3) Distributed Energy Resources. All three customer programs are currently ahead of plan and are making steady progress toward achieving their goals. It expects to have 100,000 customers show their support for Clean PowerCitySM initiative and take part in their Join the Charge program⁶. The program helps educate interested parties on how to help the overall community reach their decarbonization goals.

Earlier this year, the utility also rolled out a multi-channel campaign called Clean Power Savings⁷, which is heavily focused on providing customer rebates while saving the planet.



6 [Clean PowerCity \(smud.org\)](https://www.smud.org)

7 [2030 Zero Carbon Plan Progress Report - March 2022 \(smud.org\)](https://www.smud.org)

Business Impact

The municipality has prepared a methodical approach for implementing its IT strategy for achieving ZCP. Grid modernization and updated AMI infrastructure is focused on the following workstreams:

- Data and Data Analytics: Evaluating and implementing data analytics from existing and new data sets coming from a modernized AMI system. A representative from SMUD mentioned “there is a lot of data analytics from AMI that we haven’t fully realized value of.”
- Management of Higher Frequency of Data: the municipal projects having higher and more frequent influx of data. Data intervals are expected to drop down to 5-15 minutes versus one hour.
- Forming an Efficient and Effective Data Lake: this would allow different departments to access relevant data to make actionable and data-driven decisions.

Successful implementation will be measured in terms of:

- Improving safety and delivering reliable power
- Improve predictive analytics to help with outage management.
- Leverage DA devices more and have that automated approach.
- Develop more accurate customer load profiles for enhanced planning and customer experience.

Conclusion

SMUD clearly wants to lead by example by taking the charge to achieve zero carbon emissions by 2030. By modernizing its data pipeline across different grid operations, it is pushing the envelope to become more predictable and customer-intuitive. Through the success of this project SMUD will be able to demonstrate to other utilities how they can partner with their customers to help improve air quality, reduce carbon emissions, and improve the overall health of the community.

For its overall strong performance, SMUD deserves Frost & Sullivan’s 2023 Excellence in Resourcefulness for Energy.

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