Insights Into C&I Customer Motivations For Pursuing Energy Efficiency

Clay Hoover – Tennessee Valley Authority
Brittany Simmons, Amanda Pinion – TRC Companies Inc
Luke Gebhard, Matthew Cooke, Briauna Perryman – Milepost Consulting
Randy Ellison – Targoz Market Research
Barbara Patchen – Stoked

ABSTRACT

The Southeast United States of America has seen rapid electric demand growth from the commercial and industrial (C&I) sectors over the past several years, which has led to higher existing and projected energy demand and consumption. Additionally, these sectors have a growing need to navigate customer expectations around carbon emissions, budget constraints, and federal mandates. Demand for increased clean energy has motivated the Tennessee Valley Authority (TVA), a public generation and transmission utility, to reframe energy efficiency as an enterprise planning resource and as an integral part of its mission to provide equitable, community-focused offerings.

Spanning a diverse audience of schools, hospitals, large industrial manufactures, and small businesses, TVA has been effective in recruiting and engaging its C&I customers with a suite of energy efficiency programs. Much of our success is due to a unique approach that blends quantitative and qualitative market research, human-centered design, and community-based social marketing to achieve meaningful and persistent behavior change.

This paper will highlight behavior change at the customer level, which includes not only the individual motivators of key decision makers but also the business factors and barriers that influence C&I participation in energy service offerings. Leveraging insights from years of experience, we will define an approach for how other utilities and energy service professionals can tap into the motivational factors for a diverse set of non-residential customers in pursuing climate action, cost management, and energy efficiency in the building sector. These learnings will help reach, recruit, implement and evaluate impactful behavior-based energy efficiency offerings to maximize savings.

Introduction

The Tennessee Valley Authority (TVA) is the largest public power company in the United States. It stretches across the Tennessee Valley (Valley) supplying power in Tennessee and parts of the six surrounding states. TVA generates and transmits wholesale electricity to more than 10 million people and 750,000 businesses, including 58 direct-served large industrial customers and federal institutions. TVA partners with 153 Local Power Companies (LPCs),

comprised of both municipal utilities and regional cooperatives, that assist with the distribution and retail sale of electricity for end-use customers.

TVA's mission, created over nine decades ago with the agency's founding, is "To make life better for the people of the Valley (TVA EnergyRight & TVA Green Highlights Report). This mission continues today and takes many different forms. One form is the reinvestment into the Valley within our energy services group, known as the TVA EnergyRight® for Business and Industry team. This team carries out the mission by building and implementing customer programs to "help make life better for the people who live and work in our region[1]." This rephrasing of the mission has been used to target the energy burden and carbon reduction in underserved communities.

Founded in 2010, the TVA for EnergyRight Business and Industry (B&I) teams launched with a financial incentive program that assists commercial and industrial customers of the Valley to implement energy efficiency upgrades with a goal of 4,198 GWh in savings by 2034. These incentives have covered standard projects similar to other rebate programs across the county ranging from HVAC, indoor and outdoor lighting, electric forklifts, variable speed drives, refrigeration, thermal ice storage as well as custom projects for certain qualifying pieces of equipment and ultraviolet germicidal irradiation (UVGI). Over the years, the program has established a network of skilled commercial and trade contractors known as the Preferred Partners Network (PPN)to help customers achieve their energy goals. Additionally, the B&I team has developed and implemented equitable programs such as School Uplift (SUP), Small Business Uplift (SBU), Strategic Energy Management (SEM) for Industrial, Federal Energy Services (FESP), and Continued Commissioning (CCx) for Hospitals.

In our market surveys[2], we have identified that bill savings are a primary motivator driving interest in energy efficiency programs, a trend consistent across both residential and non-residential markets. The latest Commercial and Industrial (C&I) program tracking study included 525 C&I customers out of 549,140. More than six in ten (63%) businesses reported undertaking energy efficiency improvements during 2020-2023 with the primary goal of cutting costs, highlighting the significant role of economic incentives plays in energy efficiency decisions. However, there are differences based on the size of the business. Small and medium-sized enterprises (SMEs), typically under single ownership or a partnership, exhibit a pronounced concern for their financial well-being, approaching energy efficiency with a mindset similar to individual consumers evaluating household investments. SMEs are found to be less driven by corporate sustainability commitments than large enterprises. Given that SMEs constitute the majority of business entities in our area—as is the case nationally—their decision-making processes are heavily influenced by the immediate financial implications of such investments, reflecting a cautious stance towards upfront costs. On the contrary, larger enterprises generally have more capital for investment in energy-efficient technologies and often employ specialized personnel, such as energy managers or sustainability officers, to focus on energy efficiency initiatives. The most prevalent energy efficiency measure adopted by commercial (53%) and industrial businesses (66%) in our area over the last three years has been lighting system

[1] https://energyright.com/business-industry/
[2] These market surveys are unpublished for proprietary purposes.

upgrades. This choice underscores a widespread recognition of the immediate benefits these upgrades offer, including their relatively low cost, high visibility, and rapid return on investment.

While commercial entities express intentions to continue prioritizing lighting improvements (28%), industrial firms indicate a growing inclination towards significant investments in HVAC systems and renewable energy solutions. Our research further reveals that industrial businesses have historically undertaken a broader array of energy efficiency measures than their SME counterparts. This trend is attributable to the higher energy demands and operational costs inherent to the industrial sector, which elevate energy efficiency to a strategic imperative.

However, our survey data suggest that the deterrent of initial costs and a general lack of information or available resources represent barriers hindering broader adoption of energy efficiency measures. To counter these obstacles, emphasizing direct benefits coupled with providing tailored, easily accessible information on available incentives and support was identified as a critical strategy for boosting participation in energy efficiency programs. Understanding and addressing sector-specific challenges and priorities can further refine these engagement efforts. Introducing financing solutions or facilitating more accessible access to incentives could serve as effective levers to lower the entry barriers to energy efficiency investments, making them more appealing to a broader spectrum of businesses. Our financing partners have indicated that large corporations are reluctant to take advantage of low interest energy efficiency loans due to debt reporting concerns. By adopting a nuanced approach that recognizes the unique characteristics and motivations of SMEs and industrial entities alike, utilities and energy service professionals can significantly enhance the reach and impact of their energy efficiency initiatives. With each program, these strategies have proven to effectively improve the program while creating new opportunities based on the Valley's needs. This paper will highlight several EnergyRight energy efficiency programs that have evolved due to customer motivators while continuing to meet energy efficiency and decarbonization goals.

Customer Motivators by Segment

School Uplift.[3] The School Uplift Program, which launched in 2020 in conjunction with the State of Tennessee's Energy Efficient Schools Initiative (EESI), focuses on providing Strategic Energy Management (SEM) training and capital improvement funding to schools in underserved areas of TVA's territory. Through behavioral and operational changes, SEM helps school staff make smart energy choices that save money through decreased energy use and improve facilities. Through SEM, students and their communities engage and learn about the capabilities and benefits of energy conservation and renewable energy. Over the first four cohorts, the program has engaged over 220 schools, impacting about 100,000 students and faculty, and will result in over $14 million in estimated lifetime energy savings across all schools. What makes the School Uplift program unique is the competitive energy efficiency improvement and learning environment funding incentive opportunities.

[3] 2022 Study with ACEEE: https://www.aceee.org/sites/default/files/summerstudy/2022/event-data/pdf/catalyst_activity_32570/catalyst_activity_paper_20220810191624601_34c59139_2be0_486c_8caf_07d163010f9a

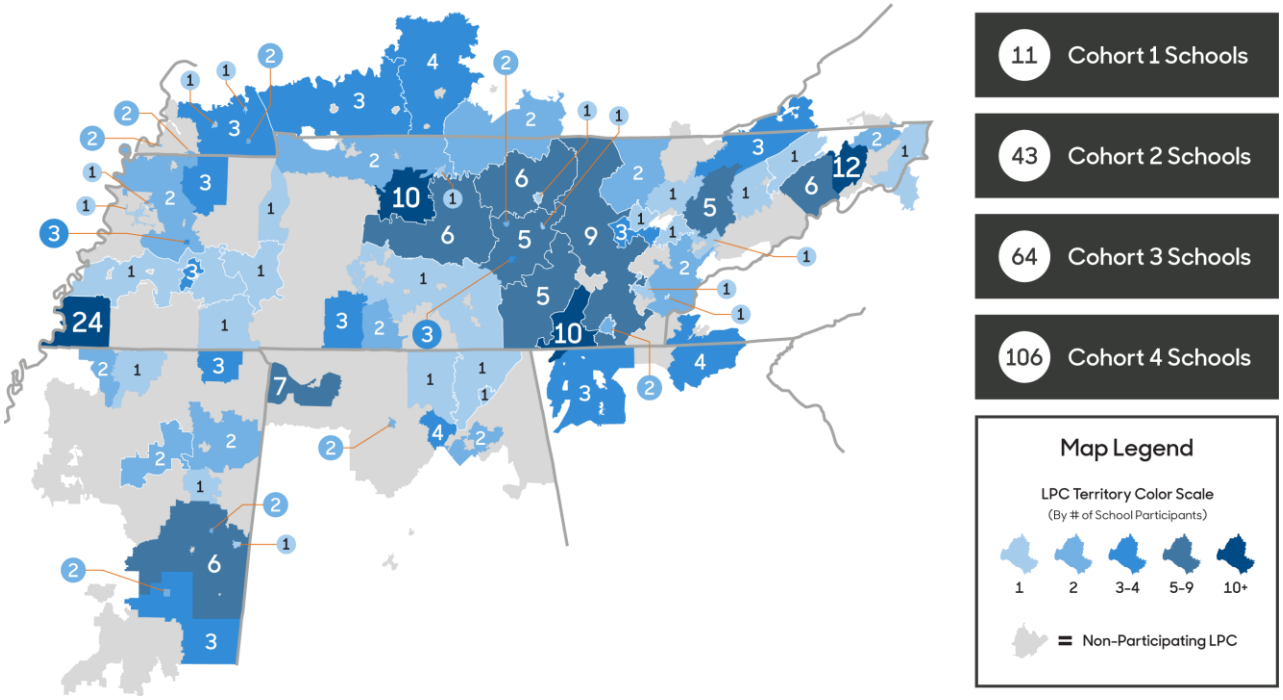

Figure 1: Participating LPCs and Schools Cohort 1-4

From the start, School Uplift identified the need for awards and incentives to engage busy teachers and staff. Throughout the pilot years of the program, it was identified that larger awards were necessary if we wanted produce energy savings through these new funding opportunities, which would benefit the ultimate goals of decarbonization and decreasing stress on the electric grid. This was the inception of the building energy upgrade grant (BEUG) and learning environment grant (LEG). The BEUG is awarded to six (6) schools per cohort and covers energy efficiency such as lighting, HVAC, controls, refrigeration, building envelope, and custom with many of measures also covering learning environment improvements like indoor air quality (IAQ). The LEG has two levels; however, the focus on this grant is to improve the student environment. The funds are not required to be spent on energy efficiency, and the students get to vote on three (3) scopes of which are available for all students. Furthermore, student engagement with the program was identified as a mark of program success leading to the addition of student incentives. Partnering with Stoked, a human-centered design firm, we conducted research into what students would want to get out of a financial reward for participating and making their SEM program successful.

Human-centered design is a problem-solving methodology that places real people at the focal point of the development process, facilitating the creation of products and services that are finely attuned to the needs of their intended audience. Over two months, our team undertook a comprehensive exploration, interviewing a diverse array of stakeholders, including 10 K-12 administrators, 12 teachers, 16 students, and 15 parents. This endeavor encompassed a multi-day design sprint, wherein representatives from all demographic groups participated in both prototype testing and collaborative solution crafting exercises.

During the prototype testing phase, participants were presented with three low-resolution prototypes devised by the cross-functional TVA + Stoked team, derived from initial research findings. This enabled recipients to offer valuable feedback on nascent ideas, thereby facilitating refinement prior to significant resource allocation. Subsequently, the co-design session provided a platform for the core audience to articulate their own ideas for incentivization, fostering an iterative learning process that profoundly influenced our strategic approach.

From this intensive design sprint, three key insights emerged:

- **Every school has diverse needs; there is no one-size-fits-all solution.** Customization is crucial in creating successful programs and incentives. Students, teachers, and administrators are very in tune with what these needs are and what could make a difference at their own schools.

- **Energy savings alone is not the key to unlock school community engagement.** Energy savings is not a top priority for schools. If we are looking for student and community engagement, we must learn what truly excites and motivates them.

- **Student autonomy empowers the entire community.** Everyone agrees that students come first for all schools. When students are given a voice to be heard and make decisions about what their school wants, adults at all levels of the education system will listen.

This input from pilot participants and ongoing research has and continues to shape program design, with participant motivations through ongoing engagement intentionally at the core of development, creating self-sustaining engagement channels for broader program engagement. Subsequently, the creation of program elements such as ongoing coaching and peer networking, along with funding, create motivation for program champions and key decision makers within the school. Gamification competition captures and engages students. Successes in these areas and others are then promoted among school families and the broader community, further enlarging the programs reach. And through ongoing assessment of the program objectives, the program continues to be refined to best support participation involvement.

Careful program development focused on motivating participants has resulted in tremendous engagement metrics. For example, a monthly program newsletter sent to participants sees consistently strong open rates from month-to-month - the current cohort has an average open rate of 75% with no signs of attrition. As each cohort ended, engagement and program activities completed have progressively improved, specifically those that take place in the latter half of the cohort. Participant motivations and engagement has also led to recruitment success, with interest and participation doubling from cohort to cohort. Furthermore, the program exceeds industry standard (5% savings) with an average of 10% savings per year per school through the School Uplift program. Savings are verified for SUP through ENERGY STAR Portfolio Manager (ESPM), a benchmarking tool that is free and provided by the Environmental Protection Agency (EPA). 24-36 months of historical data is entered at the beginning of each cohort and updated with monthly data throughout the program, which provides weather

normalized savings after the program is over. In Table 1, you can see the savings accumulated across the different cohorts with cohort 4 still to be determined.
Table 1: Cohort 1-4 detail

	# Participating Schools	Time (1 year)	*% Considered Distressed	Total est. SEM Savings $ (All schools)[1]	Total est. SEM Savings kBtu (All schools)[3]	Total Baseline kBtu (All Schools)
Cohort 1	11	2/1/2020 – 4/1/2021	100%	$122,527[2]	4,181,857[2]	31,791,235
Cohort 2	43	5/1/2021 – 4/30/2022	98%	$294,298	11,872,1453	137,492,744
Cohort 3	64	5/2/2022 – 4/30/2023	66%	$1,071,271	16,808,193	243,678,107
Cohort 4	106	5/1/2023 – 4/30/2024	82%	Data still in process of being analyzed		

**Sources*: USDA Poverty % in children 0-17, Justice40, and Opportunity Zones are considered for this section.
1 This is based off an average utility rate of $0.10/kWh. Gas costs are estimated at $1.00/therm.
2 Negative savings and gas savings were omitted from totals.
3 Cohort 2 & 3 includes gas savings. Schools with poor data quality were omitted from total.
Cohort 2: three. Cohort 3: none.

Small Business Uplift. TVA has focused its efforts in recent years on engaging a harder-to-reach customer group that has been disproportionately impacted by the COVID-19 pandemic: small businesses in traditionally underserved communities. Through initial discovery, TVA learned that many small businesses consider energy costs as a top three expense directly impacting profitability[4].

In response, TVA created a two-pronged approach in creating the Small Business Uplift (SBU) and Small Business Direct Install (SBDI) programs to bring transformative energy solutions for qualifying small businesses that are located within National Opportunity Zones or qualify as a disadvantaged community under the Justice40 initiative and lighting upgrade installations for other small businesses. With the goal of invigorating communities from the inside out, TVA and partnering LPCs designed the program to help business owners make smart energy improvements that enhance their facilities, reduce carbon emissions and save money through reductions in energy use.

4 In 2018, 35% of small businesses in the United States claimed energy costs as one of the top three business expenses that directly impacted profitability. (www.nfib.com/advocacy/energy/)

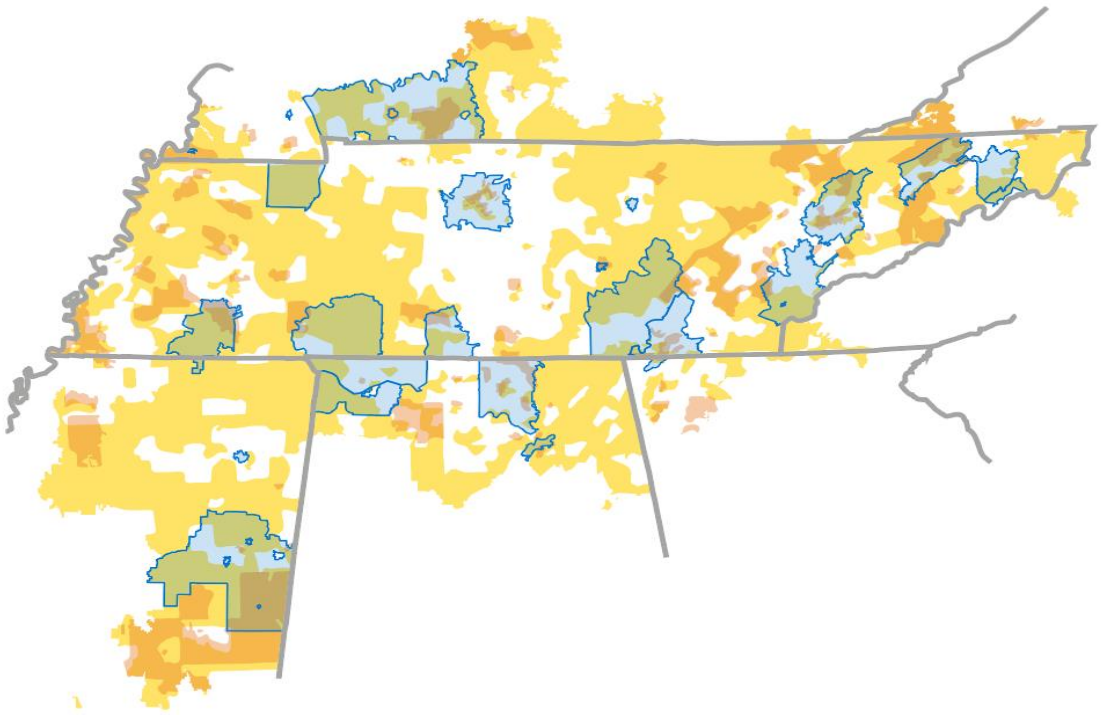

Figure 2: Justice40 and National Opportunity Zones in TVA Service Territory

Under the program, each SBU participant receives a no-cost investment-grade audit (IGA) and facility upgrades performed by local, TVA-certified trade allies. Eligible measures include replacing HVAC, lighting, water heating, kitchen equipment and refrigeration as identified by the IGA with higher efficiency or ENERGY STAR certified equipment As a result of the program, participating small businesses have become more sustainable, saved money on their monthly utility bills, and made their space healthier, safer, and more comfortable for employees and customers alike.

To ensure the biggest community impact, TVA has set eligibility requirements that include:

- Building Age – 10+ years old with no major renovations in last two years
- Occupancy – At least six months
- Size – Business cannot exceed 20,000 square feet,
- National chains and certain businesses are ineligible

After the first two years of the program, the measure eligibility was adjusted to focus on the three major contributors to energy efficiency in small businesses – lighting, HVAC (up to 10tons/unit), and refrigeration. This modification to the program will extend the ROI of the equipment being installed,

A unique program design component to SBU involves TVA's instrumental partnerships with its network LPC partners in selecting and recruiting businesses. Each program year, TVA works with approximately 10 LPC partners to identify and recruit potential program candidates. As the retail distributors of TVA wholesale power, LPCs are closely connected to the small business customers and have the best understanding of the building and operational needs for each small business. By rotating the participation of LPC communities each year, TVA helps ensure diversity, equity, inclusion, and program accessibility with respect to business geography and demographics. In the first three years of the program, for example, half of participants in SBU represent minority- or women-owned businesses.

Program impacts are rippling out across TVA's expansive 80,000 square mile service area. In the first three years, Small Business Uplift has helped 167 small businesses in 19 different rural communities across Alabama, Kentucky, Mississippi, and Tennessee. By supporting delivery of 167 IGAs and installation of 202 total project upgrades, the program has realized savings of 2,409,360 kWh and 1,243,141 pounds of carbon dioxide emissions. In 2024, TVA and its LPC partners project plans to serve 100 small businesses in 17 communities across 10 different LPC service territories.

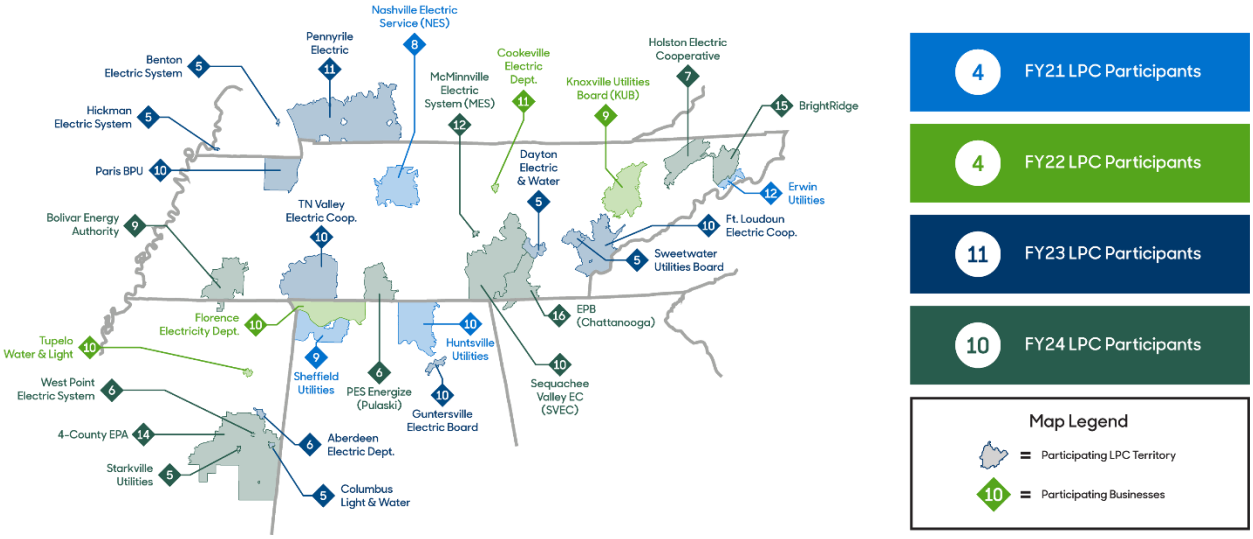

Figure 3: Participating LPCs and the number of small businesses in each

Small Business Direct Install. As a complement to Small Business Uplift, TVA last year launched the Small Business Direct Install Program, whose objective is to target and engage small businesses in converting their existing lighting to high-efficiency LEDs. SBDI supports no-cost walkthrough audits to identify lighting upgrade opportunities and provides direct installation services. In the first year, TVA paid 100% of the cost of these lighting upgrades to better serve these small businesses in economically distressed areas of Huntsville Utilities. By doing this, TVA reduced several key barriers to participation: time, lack of customer knowledge about LED lighting, and financial constraints.

Like its equity counterpart, SBU, project data shows early success of the SBDI program in driving energy and non-energy impacts to this customer group. To date, SBDI has helped 69 small businesses save approximately 6,800 kWh annually. The typical SBDI participant will experience a 73% return on investment with a payback of 1.57 years.

Similar to School Uplift and Small Business Uplift, customer motivation factored into the program design for Small Business Direct Install. Through SBDI, TVA and its LPC partners have been intentional about removing traditional barriers to participation for this hard-to-reach customer segment, such as time, complexity, and costs. Customers don't have to manage contractor relationships and schedules. Once they sign up, TVA handles installation through a turnkey process.

Strategic Energy Management for Industrial. Industrial Strategic Energy Management (SEM) program, originally launched in 2016, provides training and energy efficiency opportunities to industrial facilities. SEM programs provide customers with a behavioral change process of continuous improvement for saving energy, typically achieving both electric and natural gas savings of 6-10% in the first year of program engagement (Rogers, Whitlock, and Rohrer 2019). As the largest public power provider in the country, TVA can significantly impact the people, environment, and economy of the Tennessee Valley region. The SEM Industrial program started as a two-year cohort structure that focused on recruiting customers with a minimum contract demand of 3.5 MW with ten participants per cohort. The success of this program was proven with an average participant annual savings of 2.5 million kilowatt hours over the two years, resulting in an average of $192,000 reduced energy costs.

With the COVID-19 pandemic, the program took a hiatus, but over time, TVA developed a strategy to make a bigger impact than the previous SEM program, which led to the development of the Save It Forward pilot. Through behavioral and operational changes, the pilot leverages the traditional SEM approach to help industrial customers make smart energy improvements. The pilot differs from a traditional SEM program where the savings remain with the customer by creating an opportunity for a portion of energy savings to be reinvested into the customer's local community. Utilizing carefully determined energy consumption baselines and regression modeling, energy cost savings are measured by an independent third-party and confirmed as the amount of savings created by the program. Industrial participants then pay it forward by reinvesting a set percentage of their avoided energy cost savings, verified through regression modeling, into a tax-deductible charitable contribution, funding an energy savings project at a local K-12 school. The program aims to create a scenario where industrial participants are rewarded with numerous benefits: energy savings, community stewardship, tax benefits, and positive brand exposure. The theory is that employees are more motivated to support an energy savings project at their place of employment if they know that a portion of the savings was going to be donated into a community resource like a school their family and friends could benefit from.

During recruitment of Save It Forward, it was discovered that potential participants found it difficult for corporate offices to support the "forward" aspect of the program but were still interested in implementing the SEM portion of the program into their facilities. This led to slow recruitment proving the traditional cohort structure of the program to be difficult. With this insight on what

motivates customers to participate, TVA offered flexibility and previously recruited participants to continue with the program without having a full cohort by removing the requirement to “give forward” and the rolling cohort model was implemented. Without a traditional cohort structure, it is difficult to forecast yearly goals; however, each participant holds a minimum 5% energy reduction goal, some have set higher individual goals. The participants will still hold cohort activities together such as workshops and progress reports, but they were able to begin on their own schedule. Our desire to increase participation also led to a change allowing any large facility with at least 3.5 megawatts annual usage to participate without committing to providing a contribution of savings to a school. Although this was no longer a requirement, each participant can still contribute if they are interested. This change proved to increase recruitment rates.

Federal Energy Services. TVA’s Federal Energy Service Program (FESP) has been successfully supporting its federal clients in achieving their energy goals since 1998. FESP is responsible for delivering technical and financial solutions through Utility Energy Service Contract (UESC) allowing federal customers to utilize energy savings to pay for capital upgrades with no capital funding. Under The White House’s Executive Order 14057: Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, "Through a coordinated whole-of-government approach, the Federal Government shall use its scale and procurement power to achieve: ...(iii) a net-zero emissions building portfolio by 2045, including a 50 percent emissions reduction by 2032.” A part of this directive is to transition Federal Government building inventory to resilient, energy-efficient, and sustainable facilities. Aligning with TVA’s mission critical approach, FESP performed nearly 40 projects and saves the Federal Government more than $200M, 1,393 GWh and 985,439 MTCO2 annually.

Continuous Commissioning© for Hospitals. TVA has launched a targeted technical assistance and incentive initiative for hospitals that undertake Continuous Commissioning© of their facilities. This approach utilizes data to determine savings opportunities, such as repairing malfunctioning or poorly calibrated equipment, operational changes, equipment setting adjustments, and low-cost corrective actions. Through this initiative, TVA’s offers its trained and certified trade ally partners to conduct a free initial opportunity assessment and identify recommended continuing commissioning measures and their attending savings. The trade ally partner implements the optimization measures and enrolls the hospital for the $.07 per kilowatt hour incentive, which are paid or credited to a hospital's electricity bill upon verification of modeled savings.

Implemented in over 141 healthcare facilities (over 23 million square feet), Continuous Commissioning© for healthcare facilities had $9.9 million of annual savings and on average, annual energy cost savings of approximately $215,000 per healthcare facility. The average cost savings for the healthcare facilities was $0.64/ft2.

To develop this offering for hospitals, TVA again undertook a design-thinking approach by interviewing and testing prototypes with the three pillars of healthcare: patient care, administrative leadership, and facilities professionals. During this empathy research, we learned that an engagement driven behavior change program would be overwhelmingly difficult in hospitals with so many competing and complicated priorities. From listening to healthcare

leadership, we determined that significant and cost-effective savings can be achieved through optimizations of building controls systems, which will also improve the environment of care. Research also unearthed some surprising benefits; for instance, hospitals who adopt sustainability practices and share this news experience improved staff hiring and retention. TVA is currently piloting an incentive of $.07/kWh for savings resulting from control system optimization if the contractor follows the Continuous Commissioning© process as defined by Texas A&M Energy Systems Laboratory. To model savings the program is going to use the Texas A&M WinAM tool.

Lessons for Energy Service Providers

Amongst all current and potential future programs, motivational factors vary depending on the customer segment and who within the facility programs are intending to influence. Within the traditional C&I business customers, energy cost savings and profitability are the most common and strongest motivating factors. Although decarbonization and energy cost savings are important, K-12 schools required a unique approach for behavior change programs like SEM and School Uplift to ensure success is achieved by influencing energy efficiency behaviors with people who do not recognize energy cost savings or carbon reduction as a personal benefit to themselves. Teachers and students are heavily motivated to pursue energy efficiency through competition-based incentive structures providing nontraditional grants for improvements to the overall educational experience. On the contrary, industrial customers are heavily motivated by cost savings and decarbonization. Unlike schools, the industrial customers find our cost-free assistance with identifying cost savings opportunities, capital investment projects, and knowledge on best practices as a large incentive to implement an SEM program. Unlike any of our other energy efficiency programs, our federal customers energy cost savings is heavily driven by emission reduction mandates put in place to hit the nation's net-zero goal by 2045. As the team identifies additional customer segments that have a niche requiring a more unique approach to energy cost savings, similar to CCx, our team will continue to design the program to work efficiently with the needs of the target customers.

Conclusion

Since the inception of EnergyRight for Business and Industry, we have observed a recurring need to evolve energy efficiency programs that adapt to what motivates each customer segment to save energy, especially for those that are not directly impacted by financial savings. Although some programs and customers follow traditional motivational factors to save energy and money, dedicated working sessions brought together prospective participants in each respective program, which gave the TVA program design team insights to articulate what motivates each customer segment to complete the requirements of the program that still allows the program to meet its goal Recognizing diverse types of customers and their needs can determine the desired outcomes and the need for specific types of programs: Performance based vs Rebates vs Mandated can be selected and combined with specific motivators to achieve maximum results.

This research has led TVA to motivate energy efficient behaviors through several nontraditional approaches. In schools we motivate students and teachers by providing grants that are non-energy related. In the industrial sector several participants are motivating SEM related

change by choosing to reinvest 50% of SEM savings into a school in their local community. Healthcare employees were found to be motivated by corporate commitments to sustainability and initiatives that provide additional support to nurses and other patient care providers.

References

Alaina Ruffin, David E. Claridge & Juan-Carlos Baltazar. 2021. “The energy savings impact of the existing building commissioning process by building type.” *Science and Technology for the Built Environment*.

Clay Hoover et al. 2022. “School Uplift: An Inspiring Program to Save Energy in School of Disadvantaged Communities.” https://www.aceee.org/sites/default/files/summerstudy/2022/event-data/pdf/catalyst_activity_32570/catalyst_activity_paper_20220810191624601_34c59139_2be0_486c_8caf_07d163010f9a

Feygin, M. 2018. “How Some Small-Business Owners Can Now Save on Energy Costs.” *Forbes*, May 23. www.nfib.com/advocacy/energy/

Rogers, E., A. Whitlock, and K. Rohrer. 2019. *Features and Performance of Energy Management Programs.* Washington, DC: ACEEE.

TVA EnergyRight & TVA Green Highlights Report. 2022. https://highlights.energyright.com/

TVA EnergyRight. N/d. https://energyright.com/business-industry/