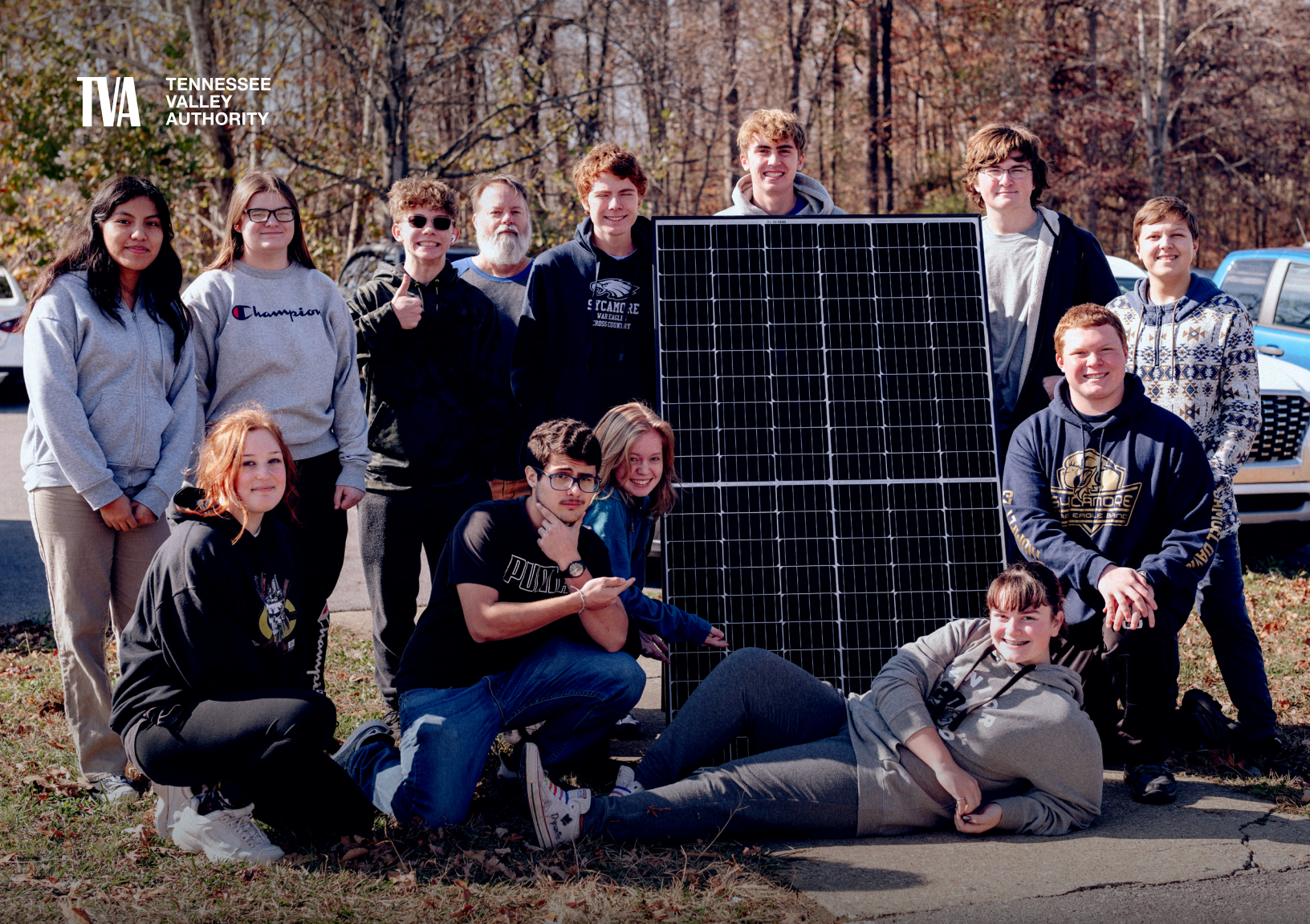




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CONNECTED COMMUNITIES

Economic Solutions Through Solar Innovation

Pilot Project Case Study

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LOCATION

Pleasant View, TN

PROJECT COSTS

\$383,020

Total Funding

\$187,543

TVA Connected Communities

\$195,477

Pilot Team Match

FOCUS AREAS



Economic Empowerment



Enhanced Community Resiliency

Project Summary

The Cheatham County School District (CCSD) constructed a 40 kilowatt (kW) solar array with a 60kW/100 kilowatt-hour (kWh) battery backup, creating energy cost savings and project-based learning opportunities for Career and Technical Education (CTE).

TOPICS

- ✓ Workforce Development
- ✓ STEM Education

TECHNOLOGY

- ✓ Solar power array with battery storage

KEY PARTNERS

- School District
- Solar Developer / Installer
- Economic & Community Development Organization
- Project Advisor





“ These jobs are not pie in the sky, out in the future things. They’re jobs that exist right now. In two to three years down the road, we’ll start putting our first kiddos into those solar battery jobs out in the market because there are a lot of them coming our way. We are providing that educational opportunity for our students right now, so they can see what their future can be.

CHRIS COOPER | CCSD coordinator for CTE and Science, Technology, Engineering, Arts, and Math (STEAM) Education

Challenge and Solution



Challenge

The TVA service region has higher poverty rates compared to other regions across the country, with significant income inequality and limited access to economic opportunities for marginalized communities. Economic disparities in the area are worsened by limited access to quality jobs and financial stability. To attract more businesses to our region, we must ensure a skilled workforce to fill and excel at those jobs. Clean energy installations, like battery energy storage, electric vehicles (EVs), solar and microgrids, provide educational opportunities for students to learn about science, technology, engineering and mathematics (STEM) careers, create demand for clean energy technology in the region and help provide communities with backup power during emergencies.



Solution

The Cheatham County School District (CCSD) constructed a 40 kilowatt (kW) solar array with a 60kW/100 kilowatt-hour (kWh) Lion Energy battery backup, creating energy cost savings and project-based learning opportunities for Career and Technical Education (CTE).

40kW

solar array

constructed with a Lion Energy battery.

Focus Areas Supported



Economic Empowerment

By providing an opportunity for students to learn about solar technology, this project ensures an enhanced understanding of career opportunities in the clean energy industry. Enhancing skills and knowledge of clean technologies and advanced manufacturing across the region can help attract higher-paying jobs and help boost the average income in the region, which is currently \$15,000 less than the national median.



Enhanced Community Resiliency

When a solar energy system is installed, the energy produced by the system directly feeds into the building, providing as much energy as it can to meet the building's needs. Once immediate power needs are met, any surplus energy can either go to the grid or in this case a battery. The onsite battery unit stores this excess energy, enabling the school to function as a resiliency hub during crises. In adverse weather events, the stored power can maintain essential functions such as refrigeration, power outlets and kitchen operations for multiple days. If the stored power depletes, the resiliency center can continue operating on solar power alone during daytime hours, provided the solar panels remain undamaged.

Goals, Approach and Results

Project Goals

The goal of CCSD is to connect their facilities and students to the environmental, scientific and fast-paced economic growth aligned with renewable energy futures — specifically solar power. Through the Connected Communities grant from the Tennessee Valley Authority (TVA), CCSD constructed a 40kW solar array with a 60kW/100kWh Lion Energy battery backup that will help the school district save approximately \$3,500 in annual energy costs and enable the critical functions of the connected facilities to operate for up to 48 hours.

The pilot project's goal is to create a model for all of Tennessee's 147 school districts and schools in other regions served by TVA. The solar canopy will also serve as a covered outdoor classroom for CTE/STEM curriculum designed to help educate students about solar power and storage to prepare students for a future career in solar energy and technology. CCSD has identified solar curricular components for the CTE and STEM programs for its Sycamore High/Middle Schools complex, starting with the 2024-25 school year.

- Ensure project/facility would have both community and educational value
- Produce broad-reaching educational value
- Serve as a valuable model for other projects and as a resiliency hub for the community



PILOT PROJECT GOAL

Create a model for all of Tennessee's 147 school districts as well as schools in other regional TVA service areas.

Goals, Approach and Results

Project Approach

Cheatham County’s strategic plan calls for future growth with a focus on preserving natural resources through the introduction of alternative, renewable energy solutions. The addition of battery technology and storage solutions also provides additional capabilities and resiliency for the communities.

The CCSD Board of Education conducted a feasibility study for all CCSD schools in 2020 and approved the CTE programming and solar array. Employees and teachers supported the project by a 10:1 ratio, and citizens created a Facebook page to advocate for its approval. This widespread support has driven the success of the solar and battery storage initiative.

Once the CCSD sustainability plan was approved and underway, key stakeholders on the committee championed the solar innovation initiative, identifying and applying for the Connected Communities funding opportunity. These community influencers also identified and engaged a single, individual donor who provided \$82,000 in matching funds needed to launch the project.

Lightwave Solar came onto the project for construction and assembly, helping the team

explore and refine the array site location to accommodate the needs of the school. After being brought onto the project, these expert stakeholders identified site considerations such as access to sunlight, student and faculty safety, traffic flow and building regulations and best practices.

After final approval of the construction site, a groundbreaking ceremony was held to engage the community and encourage support for the project. Once construction was complete on the solar array, educators were consulted on the necessary features that would make the environment conducive to learning and provide the best experience for students. Initial plans included a temporary structure to house educational experiences, but this consultation resulted in design changes that included a permanent structure, allowing for a more comprehensive, comfortable environment for lessons.

Construction was completed toward the end of 2023, with the public unveiling—officially called the “Flip the Switch” event—held in March 2024.

Goals, Approach and Results

Project Results

The system has a maximum capacity of 40kW of solar power, with an average of 32-35 kilowatts on sunny days.

The solar array currently produces enough energy during the middle of the day to run the kitchen and cafeteria facilities at full capacity with any surplus energy redirected to the remainder of the building's energy needs.



40kW

system size

32-25kW

**on an average
sunny day**

Key Partners

- **Cheatham County School District (CCSD)**
 - **Dr. Cathy Beck**, director of schools
 - **Chris Cooper**, coordinator, CTE and STEAM Education
 - **John Patrick**, vice-chair of the school board
 - **Dr. Tara Watson**, COO and CTE director
- **Lightwave Solar**
 - **Evan Fitzgerald**, solar project manager
 - **JP Plumlee**, solar sales consultant
- **Tennessee Valley Authority (TVA)**
 - **Lisa Akins**, senior program manager
 - **Georgia Caruthers**, senior project lead
- **Wilmot, Inc.**
 - **David Adams**, project engineer
 - **Tiffany Wilmot**, president

Lessons Learned

1

Consider Including Multiple Partners Throughout the Process

The team credits the project's success to the various stakeholders involved from idea to inception. Each step of the process included ideas, input and funding from experts and partners that helped bring the plan to fruition. In this project, the site plan changed and evolved throughout the planning process, which created unnecessary delays that could have been avoided had construction and regulation stakeholders been involved in the siting decision earlier in the process. Additionally, educators should have been brought into the process earlier to ensure a comprehensive design; they provided valuable feedback on the design for the outdoor education classroom that streamlined the design of the space but required revisions to the existing plan.

2

Explore All Vendor Options

When ideating this project, there was an automatic choice for the vendor providing the battery component, as the brand recognition added value and validity to the project when communicating with the public. However, there were issues with sourcing those materials from that vendor, which ultimately delayed the construction by months and resulted in the project team consulting with Lightwave to choose a different provider for the battery. This vendor was very customer service-oriented and ended up being the right choice for the project; had the project team explored other vendor options earlier in the planning process, this delay could have been avoided.

“ We finalized the vendor decision early in the process. It was in the spec for the grant application, and this is what we're using. Asking questions of Lightwave and those stakeholders deep in the business if they have any other suggestions would have been good in that process. If I was going to give someone doing this advice, I would ask as many questions as possible about what this is, what the process is, and who providers are, so you get a bigger scope to choose from and better understand your needs.

CHRIS COOPER | coordinator for CTE and STEAM Education, CCSD

Lessons Learned

3

Identify and Activate Champions Early

As with any new technology, adoption can be intimidating for some. Identifying community influencers that champion the benefits of a project can make a huge impact. In the case of this project, a key member of the school board involved in sustainability planning is an advocate for solar energy, even having solar panels at his residence. This individual led the exploration of what that technology could do for the school district and how to utilize government grant money to benefit the community, even sourcing the matching funds from his network. The superintendent of schools became a huge spokesperson for the project, using their platform to communicate the benefits and highlight how it can bring value to the community.

4

Plan for Delays in Your Timeline

The team has learned that, as with any construction project, supply chain and construction delays can impact the timeline. For example, there were delays in getting battery shipped, and the first set of steel platforms arrived from the manufacturer flawed, so they had to get a second set of steel sent. General shipping was slow, and the team ended up moving to a different source of backup power—which ended up being more efficient for this particular product. A lot of patience is required, but the team stayed steadfast and committed to progress.

5

Continual Communication is Key

Engagement is important to maintain for a construction project. The team took quite a few pictures and kept people up to date with plans, such as when the school district added a sustainability element to their programming. Now, students will take sustainability and renewable energy with them as they grow up.

Looking Ahead

CCSD is developing project-based learning opportunities for classroom experiences and work-based learning solutions for individual students to participate in all phases of the proposed project, from inception to long-term maintenance. The project team is currently collaborating with engineering and technical educators on developing a career path lesson plan associated with the solar program that aims to help students visualize and explore careers in battery and solar technology. Working closely with knowledgeable industry partners, students will receive critical, real-time, specific science and math skills and competencies that can be implemented in micro or macro applications in CTE programs.

This project team and site will serve as a demonstration point for other communities to come and explore the project, better understand the sustainability of the building and ask questions relevant to their pain points and concerns in their communities. Once the tours are up and running, benefits will become clear to community members. The resiliency center concept has yet to be proven, as there hasn't been a critical need to date, but CCSD is exploring the potential for demonstrations to help community members experience the benefits, further engaging them in sustainable solutions and encouraging their support for future initiatives.



NEXT STEPS

- Develop and launch CTE program for Sycamore High School students
- Pursue possible community demonstrations of the resiliency hub
- Host tours for other communities to explore the solar array



“ This array is massive, which means for a little kid, that it’s all about curiosity and wonder. When you’re in that moment and there’s this phenomenon of a magical thing they don’t see, and all of a sudden, they have lights. That’s a great start to talking to them about why this works and why it’s important.

CHRIS COOPER | CCSD coordinator for CTE and STEAM Education

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