Onsite Energy Technical Assistance Partnerships
U.S. DEPARTMENT OF ENERGY
Western

Case Study

Belle Haven Community Campus
Menlo Park, CA

Background

The Belle Haven Community Campus (BHCC) is in Menlo Park, CA—a community of approximately 4,500 residents. The 37,000 square foot campus opened to the public on May 18, 2024. The BHCC includes a senior center, community center, youth center, recreational pool, and branch library. The City of Menlo Park, in partnership with Meta and ENGIE North America, built a microgrid for the BHCC to connect a solar PV, solar thermal, and battery energy storage system (BESS) to develop an all-electric and net-zero public building. The introduction of this large solar installation will help the city of Menlo Park work toward its carbon neutral goals.

Rationale

The BHCC solar-powered microgrid project aims to make the community center resilient and sustainable. The project provides environmental, economic, and community benefits for Menlo Park.

The City of Menlo Park has the goal of being carbon neutral by 2030 and is aiming to decrease greenhouse gas emissions by 90% from 2005 levels within the next eight years. The BHCC will have net-zero energy consumption and is expected to reduce CO_2 emissions by 277,000 lbs. annually.

The investment decisions for this project were driven by cost-effectiveness. There will be $6.9 million in total net savings over 30 years, excluding the Inflation Reduction Act (IRA) rebate. The project will pay for itself within the next 15 years. By integrating solar thermal energy, Menlo Park saves $35,000 from purchasing a heat pump for the new pool and avoids $20,000 annually in electricity costs. Total utility charges are expected to be reduced by about $268,000 per year. Menlo Park staff selected ENGIE to assist them with the microgrid design and construction, alongside operations and maintenance.

Project At-A-Glance

SITE

Location: Menlo Park, CA

Sector: Municipality

Facility Size: 37,000 sq. ft.

Generation Capacity: 900,000 kWh/year

TECHNOLOGY SOLUTIONS

Solar PV: 546 kW system

Solar Thermal: 360 kWt backplate heat collector

Battery Storage: 367 kW/1,468 kWh

IMPACT

Cost Savings: $35,000 in avoided pool heating equipment and $268,000/year reduction in utility charges

Emissions Reduction: 277,000 lbs. of CO_2 annually

Resilience: Battery storage system helps with demand reduction, energy price arbitrage, time shifting electricity from variable renewable resources, and instantaneous transitions for grid connection.

FINANCIAL

Total Cost: $3.4 million

Payback Period: 15 years

Incentives/Tax Credits:

- **$367,200** Self-Generation Incentive Program (SGIP) grant
- **$120,000** in Peninsula Clean Energy rebates for the EV charging infrastructure
- Inflation Reduction Act (IRA) projected rebate for **30%** of the cost of the entire project (approximately **$1 million**)

PARTNERSHIPS

Meta and ENGIE

The development decisions were driven by a need for resiliency. City leaders did not want to depend on diesel generators, and instead, wanted to build a microgrid. If an outage occurs, the batteries can provide power for the entire community center building for 24 hours.

Approach & Implementation

To minimize total costs of the project, different grants and incentives totaling $1.5 million were secured. These included:

- **$367,200** Self-Generation Incentive Program (SGIP) grant from the California Public Utilities Commission for the battery system
- **$120,000** in Peninsula Clean Energy (local community choice aggregator) rebates for the EV charging infrastructure
- Inflation Reduction Act (IRA) projected rebate for **30%** of the cost of the solar, battery, and microgrid portion of the project (**approximately $1 million**)
- Qualification for both the **10%** Low-Income bonus and **10%** Energy Communities bonus

Installation of the solar panels, batteries, and microgrid components was done by ENGIE, who will also oversee managing the operation and maintenance of these systems for the next 20 years. SunDrum Solar was the equipment provider and designer for the PV thermal backplate heat collectors.

- **Solar PV:** 546 kW solar PV system that has panels on the roof of the main community center building and carports in the parking lot
- **Battery Storage:** 367 kW/1,468 kWh battery energy storage system
- **PV Thermal:** 360 kWt backplate heat collectors

The BHCC was constructed without natural gas service. To provide heating to the building and pool, air-source heat pumps were installed to efficiently use electricity, rather than fossil fuels, to provide thermal energy.

To reduce the amount of electricity needed to provide heating, the city installed a PV thermal system on the carport PV system to heat pool water throughout most of the year. An air-source heat pump will provide any additional heat required in the winter months. Thermal backplates were installed onto the backs of the carport solar PV modules, allowing a glycol solution in the backplates to absorb heat from the PV. That heat transfers to the glycol solution, which is then pumped to the pool mechanical space to directly heat the pool through a heat exchanger; or if the temperature quality is low, a water-to-water heat pump raises its quality with less electricity than an air-to-water heat pump.

For three quarters of the year, the BHCC will receive most of or all its pool heating from the PV thermal system, significantly reducing the site's reliance on its air-source heat pumps. The PV thermal system has the added benefit of cooling the PV modules, enabling them to operate more efficiently and generate more electricity during hot months than they would otherwise be able to do.

The microgrid will connect the solar system to the battery energy storage system. It is expected that the microgrid will generate 900,000 kWh in solar power annually. It is also notable that the BHCC has 12 Level 2 dual charging stations and three single vehicle fast chargers built out by ENGIE, which are able to charge 27 electric vehicles. These chargers are also connected to the microgrid.

PV thermal heat collectors are placed beneath the solar PV arrays to provide thermal energy for the building and pool.

Results

The BHCC microgrid, which will provide the campus with reliable, cost-effective, and fossil fuel-free electricity, will accomplish the following outcomes:

- Generate electricity from the microgrid and have limited dependance on fossil fuels
- Realize $6.9 million in total net savings over the next 30 years (excluding IRA rebate)
- Generate uninterrupted power during a power outage

Solar rooftop (left) and carport (right) PV arrays located at the Belle Haven Community Campus.

Community Benefits

- **Reliability:** During expensive peak hours, the batteries will discharge to smooth spikes in demand and reduce the BHCC's electricity costs. The community center will serve as a Red Cross shelter in an emergency. This will provide local residents a place to shelter during extended grid outages or high-heat events. In the event of a grid outage, the batteries will be able to power the entire community center building for 24 hours, or for longer if non-essential systems are turned off. If an outage lasts multiple days, a mobile diesel generator can supplement the power if necessary.
- **Local Economy:** The development of the BHCC in Menlo Park's Belle Haven neighborhood is an effort to provide amenities in a historically underserved area that was lacking these community resources. The community center's needs are supported by 24 employees, providing additional local jobs for the city.
- **Environmental Benefits:** By generating clean onsite energy, the BHCC campus avoids 277,000 lbs. of CO_2 emissions annually, which the federal government estimates to be worth $2,000 to $11,000 in societal benefits. The campus will generate 900,000 kWh of solar power annually, most of which will be used immediately onsite or stored in onsite energy storage.

Lessons Learned

Menlo Park was the first city in the United States to target carbon neutrality by 2030, and its commitment to sustainable building design serves as an example to other cities to implement clean onsite energy at their public buildings.

Contact Information

The 10 U.S. Department of Energy Onsite Energy Technical Assistance Partnerships (TAPs) help industrial facilities and other large energy users integrate the latest onsite energy technologies. For more information on this project and/or the services of the Onsite Energy TAPs, use the QR code or contact us at OnsiteEnergy@ee.doe.gov.

Version: 10-2024