Supporting Equitable Healthcare Through Solar Energy Assessment Tools

Bren School of Environmental Science and Management | Spring 2025 University of California, Santa Barbara

Faculty advisor: Christopher Costello, Distinguised Professor **Client:** Collective Energy Henry Strecker Ivette Castañeda Reeves Erickson Sabrina Molina Temesgen Gebereyesus

Federally Qualified Health Centers provide care to 32.5 million patients across the United States, including 30% of the population living in poverty (HRSA, 2024). However, health centers are particularly vulnerable to power outages interrupting their services. This affects their patients, who are often marginalized and underserved populations. By providing these centers with tools to implement solar and battery systems, we can increase their energy resilience to keep serving their communities.

Project scope

This project built models to analyze solar and battery storage system feasibility, costs, and benefits for over 11,000 sites in the U.S. by compiling and building over 14 datasets. We presented the results of these models through web applications to streamline the energy assessment process, supporting our client, Collective Energy, in its mission to provide equal and reliable health services to all.

Our Solution

We designed and built two web applications translating the data into energy assessments tailored for each site:

Clinic Solar & Battery Assessment Tool

The preliminary screening tool assesses the costs and benefits of installing solar and battery systems for clinics, including information on investment costs, solar production capacity, power outage risk, and health equity demographic data.

Collective Energy Prioritization Tool

The prioritization tool ranks clinics based on userdefined weighting of financial, environmental, and social equity factors. It assists our client in identifying and prioritizing health centers for consultancy based on the selected criteria.

Collective Energy Solar	
Clinic Information	ull Summary Results
HIV Prevention Center Address: 4040 30th St, San Diego, CA, 92104-2684 Site ID: 1	\$5,949 Annual Savings \$36,530 Battery NPV (15 years) 52nd Percentile for Community Health Vulnerability
1. Building square footage	
3248	54th
2. Monthly energy use (kWh)	FEMA Natural Disaster Risk Percentile
3248	
3. Peak Power Use (kW)	
14	\$ Assessment Details
4. Utility Rate (\$ per kWh):	Solar Battery Risk Social
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1	With solar, you will save \$5,949 per year on your utility bill
5. Dollar Value of Refrigerated Vaccines 64960	Installation of a standard-size solar array for your building (18.4 kW) would cost \$22,080.
6. Number of patients seen per hour	The present value of lifetime solar savings is estimated to be \$83,845 .
9	The present value of lifetime solar costs for maintenance is estimated to be \$12,966 .
	The net present value of a colar array on a 25 year time horizon is \$48.799



Impact

We are supporting healthcare equity by enabling health centers to adopt solar energy systems that will allow them to keep providing services to millions. Each of these sites is crucial for their communities' well-being. Through tools like these, they can enhance their energy resilience.

Next steps

There are potential applications for this project beyond its current scope. Assessment tools like ours can help guide effective investment in modernizing the US electrical grid by deploying on-site renewables and battery systems.

