Case study

Harnessing the Power of Island Solar

Terrasmart deploys PV software and racking solutions to Hawaii

Terrasmart is always seeking new horizons to bring its unique PV mounting portfolio to challenging sites. Hawaii is one of those places.

Over the past five years, our teams have completed solar projects across the gamut of ground-mount, carport, and rooftop systems in support of the island state's renewable energy leadership goal: **100% renewable energy by 2045**.

Today, **22 states plus the District of Columbia and Puerto Rico** have set 100% renewable targets. But by acting in 2015, Hawaii became the first to establish its clean energy vision. And for good reason. Electricity prices in Hawaii are the highest in the country because of the high cost of importing the oil that powers many of the islands' generators.

Sun-rich Hawaii is an ideal solar market: With **1.5 GWs installed across 100 projects**, solar generates 17% of the islands' electricity. Nearly 3,000 people are employed in the state's PV sector, which is expected to grow 736 MWs over the next five years.

What makes Hawaii unique?

The question is not “why solar” in Hawaii, but rather how best to make solar work. Terrasmart project managers with deep experience across the islands point to key challenges when working in the Aloha State:

- A lack of perfectly flat sites means that flexible mounting and racking systems with steep slope tolerances are required
- Environmental challenges like corrosion from the salt air and the danger of hurricane-force winds
- Logistical issues with material and equipment shipping and handling because of the islands’ geographic isolation

Nonetheless, Hawaii remains a prime location for PV. Here are three projects that illustrate how a creative approach to meeting the state’s challenges can yield big returns.

Project feasibility software optimizes for tough terrain

18-MW solar system in West Oahu

Hawaii’s dramatic coastlines feature steep slopes that complicate PV construction. That’s why developers turn to our Solar Instant Feasibility Tool (SIFT) to greenlight particularly challenging projects on the islands.

Although many developers appreciate the software's site layout function, SIFT offers multiple features for early-stage development such as system performance and financial modeling. The tool's powerful computations can quickly assess how to generate maximum capacity on a site. Users can run up to 500 spacing and DC:AC configurations, import accurate topography data from USGS and Google Earth, and conduct automated slope analyses. And when things inevitably change, developers return to SIFT to re-assess projects in just minutes, instead of waiting days for an engineering firm to rework the design.

When a leading US developer needed to identify the best tracking solution to optimize yield on a challenging site, it turned to SIFT for answers.

Located on an O'ahu hillside with terrain challenges, the 30-MW site appeared too steep in some areas to accommodate single-axis trackers. But SIFT untangled the topographic complexity, avoiding the myriad design iterations that would otherwise have made the site's development prohibitive.

SIFT allowed the developer to move forward with confidence. The economics would not have worked with just fixed-tilt structures, which are the traditional safe bet. Instead, the tool's topography feature confirmed that trackers with a 20% slope tolerance could be used to achieve the project's capacity goals. SIFT allowed the developer to look at north/south and east/west slopes in detail to identify exactly where different trackers could go and where building could be done without grading.

Without SIFT, the team faced speculating on upfront surveying and engineering costs while making land payments without a clear path to success.

Countering corrosion with novel solutions

As a national historic landmark, Pearl Harbor is one of the main tourist attractions in Hawaii with about two million visitors a year. But tourism is not the only bright sector on O'ahu. In 2022, the Navy announced its goal to reach 100% carbon-free electricity by 2030, with at least half of that from locally supplied clean energy. This has spurred a number of solar and renewable energy developments on Pearl Harbor's Waipi'o Peninsula.

In 2017, **Terrasmart completed the 11-MW Waipi'o solar project** for the Naval Facilities Engineering Command. Spanning 42 acres, the plant generates 33,400 megawatt hours of electricity per year, meeting roughly 14% of the region's energy needs. In addition to saving taxpayers $1.6 million in its first year, the project replaced 54,000 barrels of imported oil, reducing carbon dioxide emissions by 20,000 tons.

Located only 50 feet from the Pacific, the Waipi'o project faces unique corrosion issues. Salty sea spray pummels the system's piles and racks constantly. To counter this environmental challenge, Terrasmart designers armed its racking system to the teeth: the oversized piles are coated with epoxy for extra corrosion resistance; above grade the racking. Terrasmart utilized higher grade hot-dipped galvanization versus standard galvanization techniques.

Working hand-in-hand with the Navy, Terrasmart finished the project by painting the entire racking system battleship gray in true nautical fashion.

Waipio Solar PV Station on Oahu

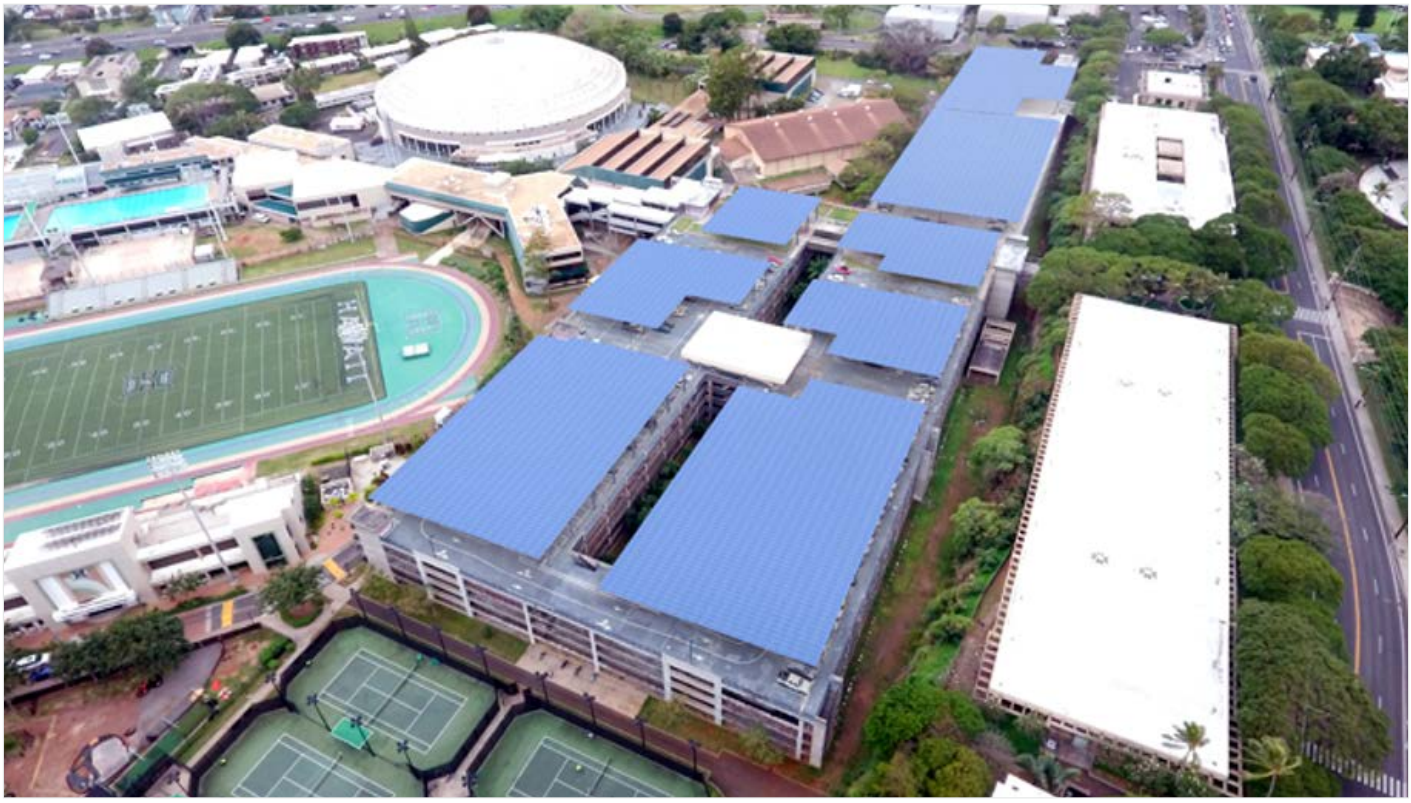
Shading cars and shaving costs

Even before the state legislature mandated that the University of Hawaii's 10 campuses achieve **net-zero status by 2035**, UH-Mānoa was aiming for clean energy. In 2019, the school topped off its largest parking structure with two solar canopy and rooftop systems totaling **2 MWs of capacity**.

Terrasmart brought its carport and rooftop expertise to Mānoa, designing and supplying the foundation and long span canopy systems. Terrasmart designers were able to maximize the structure's solar generating capacity without reducing the number of parking spaces.

In order to connect the co-located garages, Terrasmart had to take special design considerations. The structural capacities were different, requiring site-specific connection details that varied for each of the two parking garages, adding complexity in the design and engineering process.

Expected to save between $2 million and $8 million over the life of the projects, depending on fluctuating energy costs, these systems help to lower the campus' 10-MW base load—setting the foundation as the first renewable energy project in a series of PV systems to be constructed at Mānoa over the next decade.



Rooftop parking structure at the University of Hawaii, Mānoa campus

"Thought-partner" for tough island solar

Terrasmart has designed, fabricated, supplied material, and installed over 50 projects in Hawaii. With numerous projects in the pipeline in the Aloha State, our design, engineering, and construction teams are deeply experienced to support any PV project, no matter how complex. Wrap your project with our integrated software, mounting, and eBOS solutions and our full-scope mechanical installation to ensure your portfolio's success on every build. **Partner with us** to stay ahead of any issues that may arise—at any stage of development—with our team of dedicated project managers and engineers.