

Case study



Integration and partnership lead to canopy success

Experience, teamwork, and process efficiencies save time and money



Carpports just make sense. Of the 21.4 GWs of solar installed in the U.S. to date, between 10% and 15% has been built on top of carpports, according to Wood Mackenzie.

Demand for this efficient use of space continues to surge — generating clean energy while shielding our cars from the elements. A 2012 study from the U.S. Geological Survey shows that parking lots cover nearly half-a-percent of America's total land area — some 13,778 square miles. If we were to add PV atop that entire area, the U.S. would enjoy nearly 500 GW of additional capacity without impinging on land already dedicated to wildlife, agriculture, or housing.

More than 15 years ago, Terrasmart was among the first to begin installing large-scale solar canopy carpport systems. So far, we have partnered on more than 270 MWs of canopy projects throughout the U.S. Our expert designers, architectural engineers, and knowledgeable project managers can help customers navigate the complex variables that go into building solar canopies on garage structures and surface parking lots.

The following two recently completed projects illuminate Terrasmart's unique approach to creating cost and design efficiencies that streamline execution and value-engineer canopy projects.


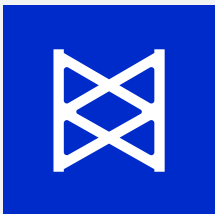

1 Fresh Plant

Background **Beating the schedule with material savings and no change orders**

When one of the largest independently owned food retailers in the country explored its solar options, its parking lots turned out to be an ideal solution. Placing solar canopies on surface lot structures to produce clean energy aligned with the grocer’s commitment to public service, environmental sustainability, and its employees — all in one go.

Energy services company Centrica Business Solutions led the development and EPC responsibilities for the Fresh Plant project, and partnered with Terrasmart for its end-to-end canopy racking solution.

Recognized for its vertical integration, Terrasmart brought a complete scope to the Fresh Plant project, including:

-  Design and engineering of the parking canopy
-  Fabrication of the racking system using 90% domestic steel
-  Mechanical installation of the foundation, racks, and solar panels



Fresh Plant Project Highlights

Size	2.67 MW
Location	San Antonio, Texas
Array	Fixed tilt, 7° array tilt
Canopy	T-structure, 17 canopies
Modules	5,496 qty, Qcells PEAK 485Wp

Challenges

Layers of local permitting approvals threatened to bog down the project. Also, Fresh Plant’s aggressive schedule and multiple subcontractors required exact sequencing and coordination among the entire team: from site grading, drilling, and pouring the concrete foundations to paving the entire parking lot and ultimately installing the racking structures and modules.

Solutions

The complexity of such coordination required Terrasmart's years of experience to smooth the way. Terrasmart's project managers anticipated every move and kept the project ahead of schedule. While the details of this intricate project may have perplexed a less-experienced competitor, Terrasmart showed its strengths as the team successfully fabricated the racks exactly to specs and ensured on-time material delivery.

“ I think that’s where we shine. We were under a lot of pressure to perform and make sure we didn’t delay any teams behind us. So we poured our foundations three weeks ahead of time.”

— Saul Mendez, Terrasmart’s on-site project manager

Results



Material savings

While the geotechnical report called for 24- to 36-inch diameter concrete foundations at depths between 18 and 20 feet, Terrasmart's designers were able to value-engineer the system using a 24-inch diameter and an 18-foot depth. This design required only two yards of concrete per foundation instead of five yards — a 60% materials reduction that provided a consequential savings across the project.



Zero change orders

Solar canopy projects are rarely completed with zero change orders. In fact, 95% of these systems experience on average 2% in change orders. In this case, though, the Terrasmart team delivered with no additional costs to the customer.



Consistently ahead of schedule

Not only did Terrasmart meet Fresh Plant’s demanding three-month schedule, they beat it. The team delivered the mechanical scope a full month ahead of schedule — a 30% gain on the schedule and a big win for all parties involved.

“We know what the pitfalls can be in canopy projects, so we spent a lot of time up front to understand soil conditions, map out underground utility locations, and take into account all of the different metrics and loading cases for garages,” said Canopy Project Operations Manager Brad Fey. “Our experience and foreknowledge of everything involved helps us mitigate risks once we actually start construction.”

2 Turnbridge

Background **Gaining efficiencies through tight execution and flexibility**

The 2.9-MW garage canopy system atop the Bronx Logistics Center (BLC) is one of New York City’s largest private sources of renewable energy.

At 1.3 million square feet, the BLC is the city’s largest industrial development. Covering 14.2 acres, the facility offers two 250,000 — square-foot warehouse floors. Its 730,000 square feet of parking make it the single largest garage in the city. The thoughtfully designed distribution warehouse is the first of its kind on the East Coast to receive the prestigious LEED v4 Platinum rating — the highest LEED rating available from the U.S. Green Building Council.

Turnbridge Equities developed and owns the facility and has partnered with Accord Power as the solar system's EPC. During its development, Terrasart worked hand-in-hand with the project's partners to deliver a complete, end-to-end structural scope, including the racking system's design, engineering, manufacturing, logistics, installation, and water management system.



Turnbridge (or BLC) Project Highlights

Size	2.94 MW
Location	New York City
Array	Fixed tilt, 2° array tilt
Canopy	2 long-Span structures
Modules	6,624 qty, Longi 445 Wp
Estimated annual production	3,444,841 kWh/year

Challenges

From the start, the Turnbridge project required extraordinary collaboration. Terrasmart designed and manufactured the racking system, but then was tasked with installing it at the same time the warehouse itself was under construction.

To meet New York City's stringent permitting requirements, Terrasmart worked closely with Accord Solar to ensure that every piece of equipment met height, weight, and structural requirements. From cranes and manlifts to skid steers and telehandlers, every piece of man-moving equipment required building department certification of a full set of drawings and specs before it could be used.

With multiple construction projects taking place simultaneously, the city required an approved staging plan with detailed weight considerations taken into account. And because the garage construction was staffed by union crane operators, Terrasmart's non-unionized workers were scheduled at separate times. This was a result of positive collaboration with the union to ensure both teams worked to build the garage efficiently while remaining on schedule.

Solutions



Precise coordination

1

Terrasmart project and construction managers had to constantly juggle schedules to ensure that the work was on schedule in parallel with the garage builders. It was not unusual for the situation to require coordination of deliveries and crane lifts over the weekend to stay on track.



Complete scope delivered through single point of contact

2

With so much coordination, Terrasmart ultimately acted as a single point of contact on the PV canopy, streamlining all of the permitting requirements through Accord while keeping the peace between union and non-union workers. Being able to offer a wide scope allowed Terrasmart to reduce risks throughout the entire project.



Results

Value-engineering and flexibility

Terrasmart value-engineered the system with in-house designers and engineers, resulting in tighter, more rapid feedback between its canopy experts and the city's permitting officials. Because Terrasmart's team brought laser-sharp focus on optimizing canopy systems, they were able to ensure that the project was done in a way that is feasible while offering alternative solutions to create value for the client. This resulted in a system that met Turnbridge's needs cost-effectively.

While today's solar carport systems offer comparable design and performance features, what really makes a racking partner stand out is its ability to plan and execute the project efficiently. This also means forecasting and troubleshooting any issues before they arise. When deciding on a solar carport, our customers trust Terrasmart to contain costs, [save time, and limit disruption.](#)

Terrasmart did just that on the Fresh Plant and the Turnbridge projects.



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