Case study

Powering efficiency with smarter eBOS design

How to reduce costs and voltage drops in utility-scale solar

Background

Maximizing energy and returns for a landmark project

While solar energy is one of the most cost-effective renewable energy sources on the planet, site owners, developers, and EPCs can still unlock greater opportunities to contain costs and boost profitability with innovative yet efficient design improvements.

Among the various components of solar installations, eBOS can deliver utility-scale solar project savings, but it's often put on the back burner during the planning stage.

Working behind a 130-MW installation in Orange Grove, Texas that sits on 920 acres, the site EPC, Qcells, knew that their eBOS design could have a direct impact on material costs and maximizing energy output.

Challenge

Navigating voltage drop hurdles at a larger scale

In utility-scale sites like Orange Grove, voltage drops are a factor that affects energy production and profits.

A voltage drop is a decrease in voltage that occurs as current flows through different components in a solar system. This fundamental electrical principle becomes more critical as solar installations grow in size.

Here's how the challenges play out:

As projects scale to hundreds of megawatts across hundreds of acres, conductor runs become necessarily extensive, amplifying voltage drop concerns.

With every fraction of a percentage in voltage drop translating to lost energy production—and consequently, reduced revenue.

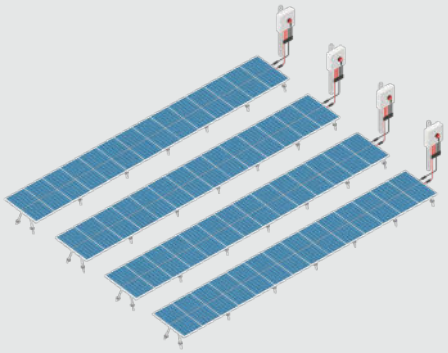
Voltage drops directly inform critical design decisions that impact financial returns throughout the project's lifecycle.

Solution

Delivering cost savings with a trusted partner

To address the risk of voltage drops in the Orange Grove site, Qcells found an innovative eBOS solution that would maximize production and cut costs. The team weighed the pros and cons between two trunk bus compatible box options—the disconnect enclosure and the recombiner.

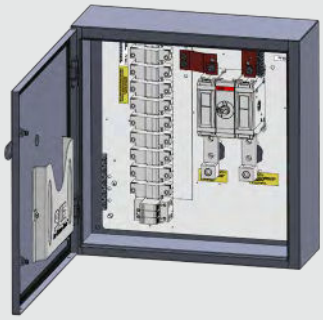
Disconnect Enclosure - One trunk in, one output

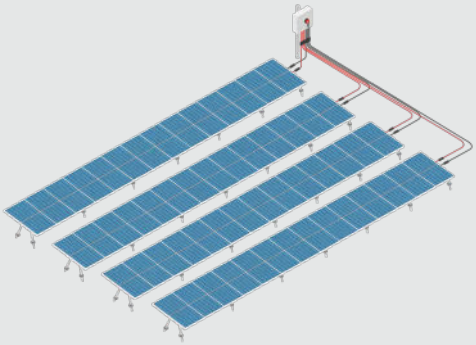


Pro:
During O&M or when servicing, you can turn off one individual trunk.

Con:
More boxes are required as there is one per trunk.

Recombiner - Multiple trunks in, one output





Pro:
Fewer boxes needed, cost savings, less maintenance. Fewer connection points so you can reduce voltage drops.

Con:
During O&M or when servicing, you must turn off all trunks feeding into the box.

After assessing the site, recombiners were chosen for the Orange Grove project as they helped reduce voltage drops with fewer boxes and therefore fewer connection points.

During the project, it was discovered that the incorrect lug was spec'd. While the issue was external, once discovered, Terrasmart jumped into action to find a new solution quickly, avoiding installation delays.

> **Problem to solution to delivery was quick and impressive"**
>
> ***— Chuck Pollard, Director of Projects at Qcells***

Orange Grove Project Highlights	
Size	130 MW
Location	Orange Grove, Texas
Land Area	920 acres
eBOS Solution	772 recombiner boxes (delivered in 4 shipments over 3 weeks)

> **We're about solving problems, not pointing fingers"**
>
> ***— Jason Coleman, Director of Business Development at Terrasmart***

Result

Unlocking value in utility-scale project execution

The Orange Grove project required a maximum voltage drop of 1.5%, meeting industry standards. With recombiners, the team successfully lowered the voltage drop to 0.5%—a substantial improvement that exceeded typical performance benchmarks.

> **With fewer boxes and connection points, the reduced voltage drop resulted in maximized energy production.**

With fewer electrical boxes on-site, maintenance is simplified and less time-consuming. Additionally, the Orange Grove site owner opted to trench and bury the wiring, making routine mowing far more efficient.

Terrasmart and Qcells' collective effort resulted in an efficient and clean installation process—keeping the project on track.

> **Terrasmart is a good partner”**
>
> ***— Albert Zabban, Project Engineering Manager at Qcells***

In another Qcells project, they decided to compare the cost for DC Disconnects vs. Recombiners. When using DC Disconnects, one box is utilized for each trunk bus. However, when using Recombiners, Qcells can connect two trunk bus cables to one box, significantly reducing the number of boxes required.

Qcells was able to design the project with half as many Recombiners vs. DC Disconnects. Given the large project size of 276 MW, this resulted in 18% cost savings. Although a single Recombiner is more expensive than a DC Disconnect, the substantial reduction in quantity needed saved the project almost $175K.

Product	Quantity	Total Cost
Recombiner	216	$ 782,497
DC Disconnects	432	$ 956,989
Savings	**216 fewer boxes**	**$ 174,492**

Conclusion

Improving project efficiency with reliable solar expertise

Delivering successful solar projects at any scale demands working with an experienced racking and eBOS partner. By addressing project complexity upfront and selecting the right customized solution for a project, site owners, developers, and EPCs can accelerate on-site installation, reduce costly voltage drops, and find cost savings.

With over 16 years of experience providing customized eBOS solutions, our track record of successful projects spans from community solar to utility-scale sites. Choose a reliable solar partner to optimize project efficiency and compress fabrication lead times—keeping projects on time and within budget.

Talk to our experts to help get your project started. Contact us today.