

Rooftop Solar: Pros and Cons

How a great solution could turn into your biggest nightmare



Jonathan Shick

Hawaii is one of the best places to live in the world, with amazing weather year-round, a wonderful spirit of aloha and an abundance of natural resources everywhere we turn. Hawaii enjoys 250- to 300-plus days of sunshine a year, making it the perfect environment for solar photovoltaics (PV).

And while it is important to protect our valuable natural resources and build a sustainable future with PV, we also need to focus on installing PV systems to the highest standards possible.

PV installation is typically seen in one of three ways: rooftop, canopy, ground-mount. Building-integrated solar photovoltaics (BIPV) is the technical term for rooftop solar.

Rooftop systems are the most prevalent installations in Hawaii for several reasons, including cost of installation and lack of available land for carports and ground-mount systems. They also provide the building owner with a valuable asset on their building and—when done correctly—can increase property values.

But a successful PV installation is one that properly integrates with, and preserves, the surface it's being installed on. If the PV system is not properly installed and compatible with the roof, it can lead to a multitude of problems down the road costing time, money and unnecessary headaches for building owners and operators.

The two main types of rooftop PV are ballasted and mechanically attached systems. Ballasted systems sit on top of the roof surface and rely on weight—"ballast"—to hold the system in place and prevent wind uplift. Mechanically attached systems are physically attached to the building structure, usually by means of mechanical fastening or connecting to the building's structural components.

While ballasted PV systems typical-



Ballasted PV System with slip sheets beneath ballast pans

ly are much easier to install and less impactful to building occupants, they have their drawbacks. Most ballasted systems sit relatively close to the roof surface, usually allowing no more than six inches between the bottom of the PV panel and the roof surface. These low clearance systems are not as exposed to wind loads, but do prevent access to the roof surface and can create additional heat loading on the roof membrane.

Additionally, the concentrated load from the ballasts can crush the roof at the ballast support areas if the roof materials are not strong enough. This can lead to ponding water and accelerated degradation of the roofing materials. If the roof structure is not strong enough, the added weight from the ballasted PV system can, in the most extreme case, cause significant structural degradation and even potential collapse.

If you are considering a ballasted PV

system, it is important to think about the following three questions:

- Can my roof system support the added concentrated loads from the ballast pans?
- Is my roof in good enough condition that I won't have to worry about maintaining or accessing it for the life of the PV system?
- Do the ballast supports provide sufficient protection to prevent cutting or damaging the roof?

The other typical rooftop PV installation is mechanically attached systems. These types of installations have several benefits over ballasted systems, including increased structural capacity, ability to provide clearance between the array and the roof surface, and easier maintenance of the roof and PV wiring. For long-term roof maintenance,

mechanically attached systems with high roof clearance (greater than 12 inches) allow for inspection and maintenance of the roof. They also allow for airflow between the roof and the PV system, which helps dissipate heat loading. But they also have several downsides. The installation is more impactful on building occupants, especially on concrete decks where the noise from the anchor installation can cause significant disruption to building operations.

Additionally, they involve opening up the roof system to attach the racking, which requires protection from leaks and proper flashing of the racking penetrations. Another issue with having to penetrate the roof membrane to install mechanically attached systems is loss of roof warranty if the flashing work is not done by a roofer certified by the manufacturer of the roof.

While each type of rooftop PV has its pros and cons, there is one common factor that applies to both types: It is important to have a roof system that has a life expectancy close to the PV system, which is typically more than 25 years nowadays.

Two common themes with rooftop PV are installation of old or failing roofs and improper integration of the PV system with the roof system. Improperly installed rooftop solar can lead to problems as simple as leaks to loss of warranty and even disastrous failures, in extreme cases.

When considering the installation of rooftop solar, be sure to ask lots of questions. Specifically ask whether your PV contractor has retained the services of a licensed, qualified roofer prior to starting a project. By paying attention to these key factors, you will be able to make an investment in renewable energy that provides years of headache-free benefits.

Jonathan Shick is the owner of Pono Consulting Group, a full-service construction management consulting firm in Honolulu. He has served as general contractor, consultant, designer, quality assurance manager, construction manager, project manager and expert witness for more than 13 years, with eight years specifically focused in roofing and solar. Reach him at jonathans@ponocg.com or 213-0533.



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