

Solar Safety for Firefighters: The Myths and the Facts

Not too far back in the past, only wildland firefighters would ever expect to see solar electric panels on roofs and in yards during an incident. Such power systems were almost exclusively installed by folks living in remote, rural homes and cabins, and wildland firefighting doesn't usually include entering burning structures, ventilating roofs or saving homes already engulfed in flames. These systems were always used to charge banks of batteries in the home, and ran on 12, 24 or 48 volts DC.

Today the renewable energy landscape has changed significantly, and urban firefighters are just as likely to encounter solar power systems as their rural brethren. Indeed, most of the renewable energy market these days is geared towards "grid-tied" systems where the homeowner sells electricity to the utility when there's extra being produced. And, these new systems don't run at benign car battery voltage anymore, but are pumping power at up to 600 volts DC whenever the sun is shining!

It's extremely important for firefighters and their commanders to be able to identify homes with solar electric (photovoltaic or "PV") systems and understand how these systems work.

Much inaccurate information about PV and firefighter safety has been published on the Internet recently, even to the point of recommendations to "let it burn" if solar panels are spotted on a roof. As a firefighter and renewable energy consultant, I hope to set the record straight.

- Flat panels on roofs, poles and racks are not always electrical. They could be providing room lighting, hot air, hot water or electricity, and multiple types of panel could be combined in one installation.
- If there is a solar electric system involved, "pulling the meter" will only kill power coming in from the utility grid. Other circuits may remain live — household circuits if the system has battery backup or an auto-start gasoline generator, and PV circuits whenever the sun is shining. Multiple disconnects for various parts of the system are very common.
- A Hot Stick will not detect live DC voltage; these work only with AC.
- Roof access may be limited by solar panels of any type (see photo 1 below). While some areas have local ordinances requiring setbacks and pathways, others do not or the system may have been grandfathered in. The roof areas on which you can walk or cut into for ventilation may be very limited. Putting a foot or ventilation saw into a 600 volt DC solar array during daylight hours is dangerous!
- Roof-mounted systems of any type are fragile, and will not support the weight of firefighters or equipment. They are also very expensive, and damage should be avoided if possible during unknown or minor incidents, such as a possible chimney fire.
- Renewable energy system components and disconnects may not be properly labeled, or you may not be familiar with what the labels mean.
- Large backup battery banks (see photo 2 below) may or may not be included, and can pose chemical hazards (sulphuric acid), explosion hazards (hydrogen gas) and electrical hazards (powering household circuits even after you pulled the main meter)

Locate the central electrical system control panel if you need to disconnect circuits. All renewable energy systems are controlled from a central point. There may be other breakers that disconnect individual parts of the system, but these could be located outdoors or on the roof. Battery banks are always located near this control point, and may be the cause of smoke or a smoke smell in the first place. Assume every electrical circuit is live, even if you have pulled the main meter and shut off visible breakers. When the sun is shining, dangerous DC voltage is still being generated in the PV panels. The only way to eliminate this is to cover all panels with an opaque tarp. Note that scene lighting is not powerful enough to generate dangerous voltage from a PV array, but lightning may be. If the home has battery backup, household AC circuits may be live at any time.

- Do not step on or cut into PV panels during roof ventilation, especially during daylight — find another place to ventilate if possible, or change your attack strategy. After dark, only non-lethal battery voltage may still be present in wires leading to panels, and indeed anywhere in the system (if you did not locate the proper breakers to stop it).
- Watch for changing conditions — for example, during salvage operations after dark, wires damaged during an attic fire may become live as sun hits the PV panels in the morning, and their melted insulation could make metal conduit live too.
- Many renewable energy system installers now keep a 24/7/365 emergency contact number, so incident commanders can get a technician on scene ASAP to disconnect circuits if needed.