15.30 Scope

Photovoltaic panels, commonly known as solar panels, are an alternative electrical generation system which converts solar energy to electricity. These systems are known as photovoltaic systems, or simply PV. This system consists of photovoltaic solar panels and other electrical components used to capture solar energy and convert it to electrical power. Many systems are roof mounted, and present hazards to firefighting operations. Strings of photovoltaic modules are wired together to form an array, which can produce up to 600 volts commonly in a residential system. Photovoltaic modules are commonly mounted above existing roof surfaces. These modules and arrays can be powered by sunlight and by artificial light that could be produced from street lights and fire department scene lighting. These modules/arrays are then wired to an inverter that is used to convert the power generated by the PV modules from direct current to alternating current.

15.301 Guideline

Operating at incidents that involved PV systems may require adjustments to standard firefighting tactics to mitigate the situation in the safest and most effective manner.

The primary hazard to firefighters working around a PV system is an electrical shock. It is important that a thorough scene size-up is complete that identifies the presence of a PV system. After detecting the presence of a PV system it shall be important to note of the system itself is involved in the fire and if it is able to be de-energized. A risk-benefit analysis should be conducted. Incidents involving a PV system are unique in that components may remain energized within the structure or on the roof even after all utility supplied power has been de-energized.

It is important to note, that when controlling utilities, controlling the power at the electrical box and also at the inverter only controls the flow of electric from that point forward. All wiring leading from the PV modules and arrays to the inverter will still be energized if the module is receiving sufficient light to produce power. A qualified PV technician or electrician should be called to the incident to de-energize any system that has been compromised or creates a hazard.

After a size-up is complete the incident commander shall select a strategy and assess the fires impact on the structure and change strategy if a delay in attack caused by the PV system results in excessive time loss. The IC should also consider the presence of sunlight and artificial lighting. The IC should also consider the additional of the weight added to the roof by the PV system, especially in light weight truss or wooden I-beam construction could result in collapse if the fire has sufficiently degraded the roof's structural components.

Utility companies should be notified in the event of a working fire to control the utilities, but the utility company may not be able to control electric generated from a PV module and/or array. A contractor specializing in PV may be needed to control the PV system.

When personnel are performing roof operations and overhaul in a structure that has a PV system extreme care should be taken.

At fires that involved the PV module or an array, water streams can be directed onto the PV module or array as long as the hose stream originates at least 25 feet away from the module and/or array and is applied with a fog pattern set at 30 degrees or greater. Straight streams and foam will not be used as both are conductors and increase the risk to firefighters.

If roof operations are employed, roof crews should determine if the PV system components themselves are on fire, or are the PV components being impinged upon by fire. When working around a PV system that is on fire, firefighters should use respiratory protection. Roof objectives should be accomplished quickly and firefighters should then exit the roof, limiting their exposure to the PV system. Any vertical ventilation required will not be conducted in areas where PV modules or arrays are present. At no time shall personnel walk on a PV module.

PV system conduit containing energized conductors on the roof deck and in attic spaces poses a serious shock hazard to firefighters performing ventilation and overhaul. These PV systems may also be located in any portion inside the building and present a shock hazard. If PV system conduit is identified it should be communicated, including the location of the PV system conduit, with the Incident Commander and all personnel operating at the fire ground.

It is important to remember that the PV modules and arrays will still produce electricity to the inverter during the daylight hours and at night when artificial light is absorbed by the module. Traditional “Hot Sticks” are not recommended for use to detect the presence of electricity in PV systems.

Transferring the scene post incident, the Incident Commander should ensure that the property is safe. If hazards exist, they should be appropriately marked or barricaded.