FIRE SAFETY:

PHOTOVOLTAIC SOLAR PANELS & FIRE SAFETY

INTRODUCTION

As energy costs rise, solar power is becoming a fast-growing energy source. Roof tops and walls of large industrial and commercial buildings are an ideal location for the installation of photovoltaic (PV) power generation. This not only makes economic sense but is also an ideal way to demonstrate your commitment to improving the environment.

If you are thinking of installing solar panels on your premises, then there are a number of Fire Safety issues to consider:

The Regulatory Reform (Fire Safety) Order 2005 requires a risk assessment to be reviewed any time there has been a significant change in the premises that has affected the fire precautions. The installation of a large photovoltaic array has a number of known fire safety hazards which should trigger a full review of the Fire Safety Risk Assessment.

Considerations

Upon arrival at a burning building one of the primary considerations for firefighters is to disconnect or isolate the utilities to the structure (including electrics). However, this is not possible with solar systems since the panels themselves will continue to produce power as long as the sun is shining. Isolating switches will be fitted to systems, but these only isolate from the switch onwards. Depending on the location of isolation switches all electric systems from the panel to the isolator will still be live. There are remote operated isolation switches which can be fitted on the roof close to the panels and be operated from the ground. Wherever possible these should be fitted. Even with these, panels will remain live along with any cabling before the isolator. There may also be capacitors and battery storage systems which will remain live even after operation of isolation switches.

Tests have shown that solar panels continue to produce electricity even when exposed to low light sources such as:

- Artificial light from scene lighting during a night time incident
- Artificial light from street lighting
- Light from exposure to fire
- Light from a low ambient source, such as a full moon.

The use of tarpaulins or fabric covers to block light has been considered but in reality, are not practical solutions. Whilst these can be effective at blocking light and therefore isolating panels from producing current there are a number of issues with their use:

- Dependent upon the size of the array there may be a significant number of covers required
- Storage of the covers - will there be space and a suitable facility to store them at roof level?
- Deployment of the covers – The main issues being weather conditions at the time and operating on the roof above a fire situation
- Flammability – Covers compromised by fire will assist with fire spread but also allows panels to start producing electric current

- Conductivity – Covers becoming wet either through weather or firefighting operations may conduct electricity

Many solar arrays operate at high Direct Current (DC) in many cases up to 1000 V DC. From a firefighting perspective DC current is a significant hazard over Alternating Current (AC) as DC causes muscles to contract sufficient to create a "lock-on" hazard. During a fire DC cable insulation may melt causing a DC flash arc. These DC arcs are an ignition source themselves but may also conduct electric current to any steel cladding on the roof or the building framework posing a further hazard to firefighters.

Solar arrays on sloping roofs also pose additional hazards:

- Damage to the mounting mechanism can lead to solar panels falling from a roof;
- The air gap between the panel and the roof can act as a flu. This accelerates the flame front and will promote rapid fire spread
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The additional weight of solar panels may also lead to earlier collapse of a roof if the integrity of the structure becomes compromised by a fire.

Solar panel arrays are exposed to all extremes of the climate so are required to be extremely durable. Certain types of material which traditionally perform well in this regard (certain types of plastics) do not necessarily have good fire resistance characteristics. Whilst the solar panels themselves contain limited amounts of plastics it is the frames, mounting systems, cabling and boxes that can add to the combustible loading of an installation. This should be taken into consideration as it can affect the combustibility of the whole roof.

Firefighters are unlikely to access a roof containing solar panels due to the inherent electric shock risks so are likely to employ stand-off methods of firefighting. This will often involve the application of water using "Fog" branches as water jets have been known to conduct electricity. These fog branches do not have the throw that a water jet would have so the use of aerial appliances will be required in order to apply water to the roof. The use of these aerial appliances brings with it access and water supply considerations. Solar panels will also act as a barrier, preventing water applied from above reaching the seat of the fire.

All of the above factors should be taken into consideration when reviewing the Fire Risk Assessment. It is strongly advised that you liaise with your local Fire Service at the planning stage in order to address any local operational issues. You should draw up Emergency Plans in conjunction with the Fire Service and include contact details of (24 Hour available) qualified electricians who are familiar with the installation and are able to disconnect the system.

Finally local crews should be familiarised with the installation and made aware of all isolating points. If you operate a premises information box or grab pack system to provide information to the fire service then details of the solar installation should be included within this.

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