



Incidents from Solar Panels - Photovoltaic (PV) See what's new today

ICHEME SAFETY CENTRE

Solar electricity panels, also known as photovoltaics (PV), capture the sun's energy and convert it into electricity that you can use in many applications including process plants and home use. Solar panels allow individuals or organisations to generate their own renewable energy.

A solar PV panel consists of many cells made from layers of semi-conducting material, most commonly silicon. When light shines on this material, a flow of electricity is created. The cells don't need direct sunlight to work and can even work on cloudy days. However, the stronger the sunshine, the more electricity generated.

Solar PV systems are made up of several panels, with each panel generating around 355W of energy in strong sunlight. Typical systems contain around 10 panels and generate direct current (DC) electricity.

Depending on the electricity's application an inverter may be installed to convert DC electricity to alternating current (AC), appliances throughout your home are predominantly operating on AC.

Case 1 – Warehouse Roof Fires

On 14 April 2020 the roof of an 880,000 square-foot warehouse caught fire in Fresno, California. Approximately 220 solar panels and other equipment at the facility were damaged. The cause – 'an undetermined electrical event within the solar system mounted on top of the roof'. A year later the same incident occurred to an even larger warehouse and the following intervening months another four warehouses caught fire or experienced electrical explosions due to failures with their solar energy generating systems.

Internal documents highlight that critical fire or arc flash events occurred in at least 6 out of 47 of the organisation's facilities, impacting 12.7% of their business at a cost of \$16.2m. Although all solar panels were turned off as a precaution resulting in costs of approximately \$940k per month.

Key Findings – The organisation took steps to develop an internal solar PV team that would promote more robust controls to be put in place regarding the installation and maintenance of solar PV on their sites. This step was taken due to the lack of legislation and regulation around the industry. In addition to these steps there was an increase on auditing of systems across their sites.

The organisation has not publicly shared the lessons learned which is a step that should be considered going forward to support the mitigations of hazards from emerging technologies. The organisation provided a statement highlighting of the past five years solar malfunction have been caused by improper installation techniques, improper commissioning, inadequate system maintenance and equipment malfunctions.

Case 2 Breaking news

An individual was fatally electrocuted while modifying solar panels on an off-grid solar PV system in a remote area in April 2023, Queensland. The individual was found with significant burns to their hands and fingers.

The solar PV system had been operating at around 100 VDC which is classified as extra-low voltage, resulting in the individual performing the work was not required to be a licensed electrical worker.

However, anyone working on solar PV systems requires specific skills and knowledge to understand electrical safety and installation requirements. Should the voltage have been greater than 120VDC the individual would have been required to hold a license.

The effect from extra-low voltages depends on the size of the voltage, regardless of the voltage individuals work with, safety standards for equipment and installations should be followed to reduce risks associated with such systems such as electric arcing, electric shock, and fire risks.

Key Findings – Even at extra-low voltage there can be significant electrical current in solar PV systems that can cause arcs and burns to the body. Consider the environment that individuals in your team are working within such as high humidity or wet seasons along with heavy rain.

Lone working and remote locations bring challenges with regards to controlling worksites, safe systems of work and emergency response. It is critical that adequate supervision is in place for all tasks and an effective safe systems of work is implemented, including safe means of isolation. An effective management of change process should be in place for all modifications.





The IChemE Safety Centre believes that leadership across six key functional elements is vital to achieve good process safety outcomes.

These elements are;

- Knowledge and Competence
- Engineering and Design
- Systems and Procedures
- Assurance
- Human Factors
- Culture

