MANAGING UNWANTED OR BROKEN SOLAR PANELS IN FLORIDA

Solar panels are not considered electronic devices or universal waste in Florida. Therefore, a determination must be made for hazardous or non-hazardous designation before disposal.

Types of Solar Panels

There are numerous types of solar panels in circulation. The main types are the monocrystalline silicon, polycrystalline silicon and the cadmium telluride (CdTe) types and the newer thin film types such as copper indium gallium selenide (CIS/CIGS). It is difficult to determine the type just by looking. Most owners will have documentation regarding what they purchased and had installed. This documentation can help with these determinations.

Is it a Hazardous Waste?

A waste is any material that is discarded. A material is discarded if it is abandoned, recycled or considered inherently waste like. In general, a hazardous solar panel becomes hazardous waste when:

- For unused solar panels, when the generator decides to discard them.
- For used solar panels that will not be reused, when they are disconnected / removed from service.

Solar panel wastes include heavy metals such as silver, lead, arsenic, cadmium and selenium that at certain levels may be classified as hazardous wastes.

In general, data shows that older silicon panels can be hazardous due to lead solder. Some older silicon panels are hazardous for hexavalent chromium coatings. Cadmium tellurium (CdTe) panels are typically hazardous due to the cadmium. Gallium arsenide (GaAs) panels can be hazardous due to the arsenic. Thin film panels, such as copper indium gallium selenide (CIS/CIGS) panels, can be hazardous due to the selenium.

The electronic components associated with the solar panels (e.g., drivers, inverters, circuit boards) contain all of the common electronic device hazardous constituents such as lead, arsenic, cadmium, selenium and chromium.

Sampling and analysis are conducted when determining whether or not a waste is a hazardous waste. However, a generator can use its knowledge and can forego sampling and analytical testing, though documentation supporting the determination must be maintained and made available for review.

As for any waste, the generator must make the hazardous waste determination and manage the waste as hazardous waste if it is determined that the waste is hazardous. if the waste solar panel is hazardous waste, it needs to be managed according to appropriate regulations.

One can consult with the manufacturer to learn about the product. **You can consult a database that profiles solar manufacturers and solar products**.

Just like any manufactured article, the product should have a make and model number. Identification tags affixed to the solar panel provide specific information such as product name, trade name and part number. One can consult with the manufacturer to learn about the product. Even when you determine the type of solar panel, it is difficult to determine if it is hazardous or not without performing testing.

Is it a Universal Waste?

No. Solar panels are not considered electronic devices or universal wastes in Florida. A solar panel produces electricity to power devices such as TVs, computers and appliances. The solar panel itself is not an electronic device that performs specific tasks such as processing data or sending emails. A solar panel is more akin to a battery in a car.

If the generator determines that the solar panel is indeed hazardous waste, it must be managed according to hazardous waste regulations.

Are There any Exemptions?

Solar panels waste generated in Florida can be recycled using the **40 CFR 261.4(a)(24)** transfer-based exclusion as the State of Florida has the 2018 Definition of Solid Waste (DSW) Rule and the requirements found in 40 CFR 261.4(a)(24) are followed.

Accumulation

If the solar panel that is being disposed is determined to be hazardous waste, all applicable hazardous waste requirements apply. Accumulation time limits vary with generator status. Typically, a generator will be required to send the solar panels off-site within 90 or 180 days depending upon their monthly hazardous waste generation quantity.

Training Requirements

Training requirements for generators of hazardous waste depend on the generator's status.

Generators that produce no more than 2,200 lbs. of non-acute hazardous waste per month are required to comply with personnel training requirements described at **40 CFR section 262.16(b)(9)(iii)**. These requirements ensure that generators of less than 2,200 lbs. of non-acute hazardous waste per month are adequately prepared to properly handle the types of hazardous wastes generated at the site and to respond to any emergencies that may arise.

Generators that produce more than 2,200 lbs. of non-acute hazardous waste per month are required to comply with personnel training requirements described at **40 CFR 262.17(a)(7)**. These requirements ensure that generators of greater than 2,200 lbs. of non-acute hazardous waste per month receive instruction regarding personnel hazardous waste management procedures relevant to the employee's role.

Managing Broken Solar Panels

Whether broken or intact a waste determination must be done to determine whether the waste is a hazardous disposed waste. Solar panels determined to be a hazardous waste must be managed according to the appropriate regulations. Broken pieces must be cleaned up and properly packaged/containerized as to minimize the potential release. Containers shall be structurally sound and prevent releases under reasonably unforeseeable conditions. A release of hazardous waste to the environment could be considered hazardous waste disposal without a permit.

Disposal

Waste solar panels that are hazardous are fully regulated hazardous wastes. Hazardous waste solar panels must be managed according to all applicable hazardous waste laws and regulations.

Non-hazardous waste such as glass, copper wire and aluminum framing from the non-hazardous solar panels can be taken to a Class I landfill or to recycling centers to be disassembled and reclaimed through recycling activities.

HHW collection events are intended for hazardous waste generated at a residence. Qualifying residents should contact the HHW collection facility and verify that the hazardous waste solar panel wastes will be accepted.

Recycling

Most of the solar panel is made up of glass and aluminum. Solar panels also contain rare earth elements. Solar panel waste can include heavy metals such as silver, lead, arsenic and cadmium that – at certain levels – may be classified as hazardous waste.

There are currently no companies that recycle solar panels located in Florida. However, solar panel recycling options can be searched at the Department of Energy's Solar Technologies Office, U.S. Solar Photovoltaic Manufacturing Map.

The marketplace for recyclers of photovoltaic panels changes and continues to grow. Many materials associated with the installation have positive scrap value, including metal racks and structure supporting the panels, aluminum frames enclosing the panels, as well as copper wire and related electrical equipment associated with the connection to the electric grid. At the very least, the scrap value associated with these materials should help offset the cost of decommissioning.

For solar panels that have been determined to be non-hazardous, contact your local recyclers for glass and metal recycling opportunities.

Additional information on recycling solar panels can be found on the U.S. Environmental Protection Agency website.