



SOLAR HEALTH AND SAFETY

**SOLAR PANELS ARE
PROVEN TO BE SAFE FOR
OUR HEALTH AND THE
ENVIRONMENT**



**GRANGE
S O L A R**

Contact Us

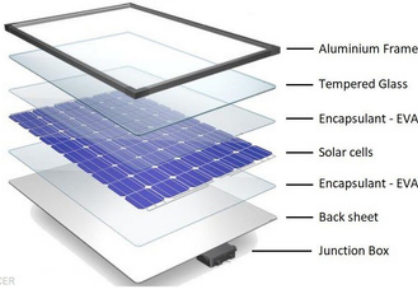
grange@openroadrenewables.com

www.grangesolarproject.com

SOLAR PANELS ARE SAFE



Solar panels are made almost entirely of tempered, shatter-resistant glass, metal, plastics and a semi-conducting material that is thinner than a sheet of paper and fully encapsulated to keep out air and moisture. They contain no liquids that can spill.



According to the Ohio Department of Health, there is no public health impact from solar panels used in solar facilities: solar panel design "ensures that the cells and solder are completely encapsulated and protected from rain and other elements that might corrode or damage them, and also means that the general public would not come into contact with any potential toxic elements contained in the panel unless...purposefully ground into a fine dust."



Solar panels are so safe that they are installed nationwide on millions of homes, schools, hospitals, barns, farms, churches, and businesses. There are even floating solar projects that are installed on drinking water reservoirs!

DID YOU KNOW?

Del-Co Water, a prominent central Ohio water utility, is installing a floating solar installation on its drinking water reservoir in Delaware, Ohio.



CADMIUM TELLURIDE IN THIN FILM SOLAR PANELS

The leading U.S. solar panel manufacturer uses Cadmium Telluride as the semi-conducting material in manufacturing its “thin film” solar panels in Perrysburg, Ohio. The semi-conducting material in these thin film solar panels is less than 1/25th the thickness of a human hair.



Cadmium Telluride (CdTe) is made from Cadmium and Terillium, but is a different chemical than Cadmium or Terillium, just like water is made from hydrogen and oxygen, but is neither of those chemicals.

Although Cadmium presents toxicity concerns, Cadmium Telluride is not toxic. For landfilling, the U.S. EPA classifies their solar panels the same as household trash: “non-hazardous.”

The solar panel model installed at the Grange Solar Project in Logan County will pass the EPA test referenced above and thus will not be hazardous.

“to draw a simple analogy, the properties of water (H₂O) are not similar to those of hydrogen gas (H₂) just because the two species both contain hydrogen (H). Just as it is improper to assume water can burn because hydrogen burns, it is invalid to treat CdTe as if it were as toxic as Cd.”

– The Virginia Center for Coal and Energy Research

Cadmium on Ohio’s Farm Fields

- Commercial phosphate fertilizers that are applied to farm fields every year contain elemental Cadmium, a known toxin.
- Additionally, burning coal deposits elemental Cadmium across farm fields all over Ohio each year.



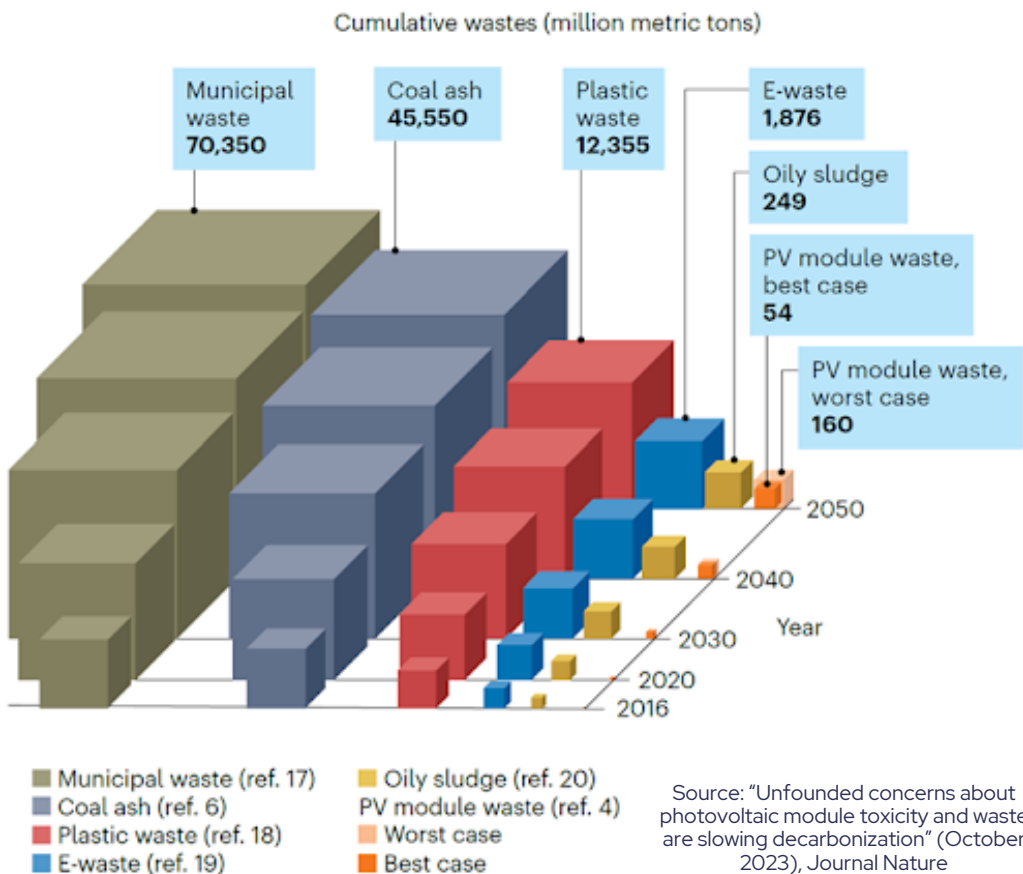
SOLAR PANEL WASTE & RECYCLING

Solar panels are made mostly of recyclable materials such as aluminum and glass, and even the semi-conducting material in them is recyclable. Additionally, solar panels no longer producing enough energy for optimal commercial power generation can still generate electricity for decades and may be used for years in other locations and applications.

If and when solar panels ultimately become a waste product, it is important to understand the nature of future solar waste in context:

Globally, we produce and manage approximately the same mass of coal ash **per month** as the amount of solar module waste we expect to produce over the next 35 years. Compared another way, globally we will generate up to 440-1,300 times more mass of municipal waste than solar module waste by 2050.

By transitioning away from fossil fuels, a substantial reduction in waste mass and toxicity is possible



FREQUENTLY ASKED QUESTIONS



What happens when a solar farm is damaged by hail?

Solar panels are encased in shatter-resistant glass and are rated to withstand golf-ball-sized hail without breaking. Solar cells also are encapsulated between two layers of tough plastic to keep out air and moisture. This is the same material that has been used for decades to give car windshields their great strength and stability. Just like car windshields may crack but remain intact, solar panels generally remain intact despite powerful impacts. A solar panel damaged by hail or other flying objects generally will not shatter into small pieces of debris, but will remain in one piece. Any damaged solar panels will be removed, properly recycled, reconditioned, or appropriately landfilled.

What if a solar project is struck by a tornado?

Although solar farms are designed to withstand high winds, few structures can withstand a direct hit by a tornado. In 2015, a tornado struck a solar farm on public land in California, damaging tens of thousands of solar panels. Over 85% of the damaged solar panels were successfully recycled, however, and sampling of soil and panel pieces from the event showed no indication of soil contamination.

Don't solar panels contain lead?

Some solar panels use an extremely small amount of lead as a solder, but because solar panels are encapsulated, waterproof and suspended in the air, the lead does not make contact with the ground. In contrast, a single shotgun shell has twice the amount of lead as a typical solar panel.

What is the EPA's Toxic Characteristic Leaching Procedure (TCLP)?

The federal Environmental Protection Agency (EPA)'s TCLP test, is used to indicate whether waste products have the potential to leach any chemicals when subjected to the intense pressures of landfill disposal. For solar panels, such leach tests create conditions that are much more extreme than solar facility operating conditions and typically involve chopping up solar panels into tiny pieces, submerging them in an acidic solvent, then agitating the solvent for some period of time to see if any toxins leach out. Solar panels routinely pass the test and show no risk of leaching. Actual field conditions that involve a broken solar panel and rainfall are far less likely than the rigorous TCLP test to result in any leaching.

Will Grange Solar utilize solar panels that pass TCLP?

Yes. Grange Solar will use solar panels that are, for disposal purposes, classified as non-hazardous waste under applicable U.S. EPA tests (such as TCLP). This commitment means that the solar panels, if not recycled, are safe enough in the eyes of the U.S. EPA to be disposed of in a regular landfill along with household garbage.

How long do solar panels last? How long are their warranties?

The long-term durability and performance demonstrated over decades of solar panel deployment worldwide as well as the results of accelerated lifetime testing has helped lead to an industry standard 25-year power production warranty for solar panels. However, solar panels can last for decades longer than that, and some of the earliest solar panels commercially manufactured over 50 years ago are still in operation today.



“Solar Farm Photovoltaics Summary and Assessments” (April 2022), Ohio Department of Health, available at <https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms>.

“Assessment of the Risks Associated with Thin Film Solar Panel Technology”, Virginia Tech Center for Coal and Energy Research, March 8, 2019, available at: <https://vtechworks.lib.vt.edu/handle/10919/90197>.

North Carolina State University, “Health and Safety Impacts of Solar Photovoltaics” (May 2017), available at: <https://content.ces.ncsu.edu/health-and-safety-impacts-of-solar-photovoltaics>.

“Unfounded concerns about photovoltaic module toxicity and waste are slowing decarbonization” (October 2023), available at: <https://www.nature.com/articles/s41567-023-02230-0>

P. Sinha and A. Wade, “Assessment of Leaching Tests for Evaluating Potential Environmental Impacts of PV Module Field Breakage,” IEEE Journal of Photovoltaics, vol. 5, pp. 1710–1714, Nov 2015, Table I, available at: <https://ieeexplore.ieee.org/document/7356394>

“Heavy Metals and Pesticides Toxicity in Agricultural Soil and Plants: Ecological Risks and Human Health Implications” (March 2021), available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7996329/>

Del-Co Water partners on Ohio's first floating solar array
<https://www.poweronline.com/doc/d-energy-makes-waves-with-ohios-first-floating-solar-array-0001>

See <https://youtu.be/4T6VbzC889k> and <https://youtu.be/hR0dHI58zwE> for videos that demonstrate solar panels' ability to withstand impacts without shattering.



Contact Us

grange@openroadrenewables.com

www.grangesolarproject.com



QUESTIONS? WE WANT TO HEAR FROM YOU

- LEARN MORE ABOUT THE GRANGE SOLAR PROJECT
- REVIEW WELL-VETTED INFORMATION ABOUT SOLAR
- SCHEDULE A MEETING WITH OUR TEAM TO DISCUSS YOUR CONCERNS OR FEEDBACK
- DISCOVER HOW SOLAR CAN BENEFIT YOUR COMMUNITY
- GET INVOLVED!



GRANGE
SOLAR



Contact Us

grange@openroadrenewables.com

www.grangesolarproject.com