

THE TOXIC TRUTH ABOUT SOLAR FARMS

www.StoptheSolarFarms.com

WHY?



HAZARDOUS WASTE CHEMICALS SITTING RIGHT ABOVE OUR WATER BASIN

Today's dominant thin-film technologies are cadmium telluride and a more recent competitor, copper indium gallium selenide (CIGS). In the former, one semiconductor layer is made of cadmium telluride; the second is cadmium sulfide. In the latter, the primary semiconductor material is CIGS, but the second layer is typically cadmium sulfide.

So [each of these technologies](#) uses compounds containing the heavy metal cadmium, which is both a carcinogen and a genotoxin, meaning that it can cause inheritable mutations.

The importance of chemicals. DO YOUR OWN RESEARCH!

Check out some of the most common chemicals used for solar power and how each plays a role.

Hydrochloric acid, copper, trichlorosilane gas and silicon waste. ...

Cadmium. ...

Nitrogen trifluoride and sulfur hexafluoride. ...

Copper indium selenide and copper indium gallium (di)selenide. ...

During manufacture and after the disposal of solar panels, they release hazardous chemicals including cadmium compounds, silicon tetrachloride, hexafluoroethane and lead.

Cadmium Telluride. ...

Copper Indium Selenide. ...

Cadmium Indium Gallium (Di)selenide. ...

Silicon Tetrachloride.

The Green New Deal being imposed on New Yorkers by Schumer and Cuomo will leave Long Island a Toxic Waste Dump with tens of thousands of acres of Solar Panels potentially short term and most definitely within the next couple decades leaking the most cancer causing chemicals and genotoxins into our precious water supply which sits right below these hazardous waste filled solar panels. Where is the outrage? Where are the people we voted for to represent our concerns and have an obligation to protect us from these international companies who are destroying our beautiful island with these cancerous solar farms.

Our representatives are choosing money over our health, they need to stop these solar farms now or be voted out of office if not impeached out of office for putting its citizens, kids, and grandkids at risk of serious health problems in the near future. Rise up people and stop these idiots from putting this potential hazardous waste problem in our water supply and on our crops because this same water is used to irrigate our crops, fruits, vegetables, grapes, and our animals. These chemicals do not go away, you thought roundup was bad, how about the plutonium we dumped into the peconic river, will you drink brookhaven water now? how about westhampton water?

They are recommending discussing the safety of these chemicals with brookhaven scientists who are in charge of allowing this to happen on long island. Riverhead board is counting on these people as their experts when discussing the safety of solar panel and your future family health issues. Do your own research, it is obvious your representatives have not done their due diligence when the hazardous chemicals which they say they were not aware of are being built faster than you can blink. Our Leaders are planning a ribbon cutting on monday in calverton celebrating another hazardous waste solar farm added to an already scary amount of cadmium, lead, gallium, amongst other cancer causing and genotoxins that can lead to deformities and mutated genes that are passed on from generation to generation.

These are bad chemicals and they are celebrating putting these above our water supply, God forbid a natural disaster, hurricane, hail, tornado, ice storm, fire, flying tree branches, meteorites, how about man caused disasters? plane crash, drone crash, car crash, vandals throwing rocks, how about nature? bird poop, birds crashing into panels thinking it was water or feathers burned off by the heat of solar array, birds losing their migratory senses and falling out of the sky, how about time? these solar panels corrode over time, who will monitor every single panel as each on corrodes at different times? Join the Fight to save our island from globalists who dont give a hoot about your health.

QUESTIONS YOU SHOULD BE ASKING YOUR REPRESENTATIVES

WHILE DEMANDING ACCOUNTABILITY FROM THOSE IGNORING THE ANSWERS

ALL THIS INFO CAN BE FOUND BY GOOGLING IT. IT IS NOT CONSPIRACY THEORY AS THEY WOULD LIKE TO CONVINCING YOU OF

Do solar panels contain hazardous materials?

Solar panels contain toxic metals like lead, which **can** damage the nervous system, as well as chromium and cadmium, known carcinogens. All three are known to leach out of existing e-waste dumps into drinking water supplies. ... "**Solar**" in this analysis exclusively refers to **solar photovoltaic**. Jun 21, 2017

Can you get cancer from solar panels?

Yes, UV radiation is a known carcinogen, but **solar panels do** not increase the amount of UV rays that hit a given area. ... **We** don't know enough about **solar panels** to say for sure that they don't cause **cancer**. The radiation that comes from **solar panels** seeps into your home and heightens the risk of **cancer**. Mar 4, 2016

Do solar panels create toxic waste?

Solar panels are manufactured using **hazardous** materials, such as sulfuric acid and phosphine gas, which **make** them difficult to recycle. ... According to an analysis by Environmental Progress, **solar panels create** about 300 times more **toxic waste** per unit of electricity **generated** than nuclear power plants. Aug 15, 2017

Do solar panels give off radiation?

All electrical and electronic device create electromagnetic fields or EMF around them when used and also **emit** electromagnetic **radiation** or EMR. This includes **solar panels** and **solar** inverters. So is it possible for the electromagnetic fields or **radiation** from your rooftop **solar** system to harm you or your family? Nov 27, 2017

Do solar panels kill birds?

One of their main complaints: The vast field of **solar panels** — which would generate enough electricity to **power** 230,000 average California homes, according to its developer — would **kill birds**. "We **do** know that (**solar**) **photovoltaic** projects **kill birds**, especially ones in these Colorado River flyways. Aug 17, 2016

Are there any negative effects of solar power?

The potential environmental **impacts** associated with **solar power** — land use and habitat loss, water use, and the use of hazardous materials in manufacturing — can vary greatly depending on the **technology**, which includes two broad categories: photovoltaic (PV) **solar cells** or concentrating **solar** thermal **plants** (CSP). Mar 5, 2013

Do solar panels deteriorate over time?

What Is the Lifespan of a **Solar Panel**? **Photovoltaic** (PV) **modules** typically come **with** 20 year warranties that guarantee that the **panels** will produce at least 80% of the rated power after 20 years of use. The general rule of thumb is that **panels will degrade by about 1% each year**. Apr 20, 2014

There are many more questions you should be demanding answers to including emergency cleanup plans and costs, costs of dismantling solar farms and who is responsible when solar company goes out of business which is highly likely to happen.

What is the cost of remediation and how long does the radioactive ground remain radioactive and useless after the panels are removed from land? There are many more questions that pertain to this.

TOXIC CHEMICALS IN SOLAR PANELS AND THEIR EFFECTS

Solar panels may be an appealing choice for clean energy, but they harbor their share of toxic chemicals.

The toxic chemicals are a problem at the beginning of a solar panel's life -- during its construction -- and at the end of its life when it is disposed of. These two intervals are times when the toxic chemicals can enter into the environment.

The toxic chemicals in solar panels include cadmium telluride, copper indium selenide, cadmium gallium (di)selenide, copper indium gallium (di)selenide, hexafluoroethane, lead, and polyvinyl fluoride. Additionally, silicon tetrachloride, a byproduct of producing crystalline silicon, is highly toxic.

Cadmium Telluride

Cadmium telluride (CT) is a highly toxic chemical that is part of solar panels. In the journal, "Progress in Photovoltaics," it reported that male and female rats that received CT through ingestion did not gain weight as they normally should have. This lack of weight gain occurred at low, moderate and high doses. When inhaled, CT also prevented normal weight gain and caused lung inflammation and lung fibrosis, a hardening of lung tissue. From low to high doses of inhaled CT, the weight of the lungs increased. Moderate to high doses of inhaled CT proved lethal.

Copper Indium Selenide

The study of rats in "Progress in Photovoltaics" showed that ingestion of moderate to high doses of copper indium selenide (CIS) prevented weight gain in females but not males. Moderate to high doses of inhaled CIS increased the weight of a rat's lungs and increased lung fibrosis. Lungs exposed to CIS produced high amounts of fluid. Another study of CIS on rats, reported in "Toxicology and Applied Pharmacology," revealed that inhaling CIS caused rats to develop abnormal growths in their lungs.

Cadmium Indium Gallium (Di)selenide

Cadmium indium gallium (di)selenide (CIGS) is another chemical in solar panels that is toxic to lungs. The "Journal of Occupational Health" reported a study in which rats received doses of CIGS injected into the airway. Rats received CIGS three times a week for one week, and then researchers examined lung tissue until three weeks after that. The scientists used a low, moderate and high dose of CIGS. All doses resulted in lungs that had spots that were inflamed, meaning they were damaged. Lungs also had spots that produced excessive fluid. These spots worsened as time went on after the one week of exposure.

Silicon Tetrachloride

One of the toxic chemicals involved with solar panels is not what's in the panels but is a byproduct of their production. Crystalline silicon is a key component of many solar panels. The production of crystalline silicon involves a byproduct called silicon tetrachloride. Silicon tetrachloride is highly toxic, killing plants and animals. Such environmental pollutants, which harm people, are a major problem for people in China and other countries. Those countries mass-produce "clean energy" solar panels but do not regulate how toxic waste is dumped into the environment. The country's inhabitants often pay the price.

The Trouble With Solar Waste

The International Renewable Energy Agency (IRENA) in 2016 estimated there was about **250,000 metric tons of solar panel waste** in the world at the end of that year. [IRENA projected](#) that this amount could reach **78 million metric tons** by 2050.

Solar panels often contain lead, cadmium, and other toxic chemicals that cannot be removed without breaking apart the entire panel. "Approximately 90% of most PV modules are made up of glass," [notes](#) San Jose State environmental studies professor Dustin Mulvaney. "However, this glass often cannot be recycled as float glass due to impurities. Common problematic impurities in glass include plastics, lead, cadmium and antimony."

Researchers with the Electric Power Research Institute (EPRI) [undertook a study](#) for U.S. solar-owning utilities to plan for end-of-life and concluded that solar panel "disposal in "regular landfills [is] not recommended in case modules break and toxic materials leach into the soil" and so "disposal is potentially a major issue."

California is in the process of [determining how to divert solar panels](#) from landfills, which is where they currently go, at the end of their life.

California's Department of Toxic Substances Control (DTSC), which is implementing the new regulations, [held a meeting last August](#) with solar and waste industry representatives to discuss how to deal with the issue of solar waste. At the meeting, the representatives from industry and DTSC all acknowledged how difficult it would be to test to determine whether a solar panel being removed would be classified as hazardous waste or not.

The DTSC described building a database where solar panels and their toxicity could be tracked by their model numbers, but it's not clear DTSC will do this.

"The theory behind the regulations is to make [disposal] less burdensome," explained Rick Brausch of DTSC. "Putting it as universal waste eliminates the testing requirement."

The fact that cadmium can be washed out of solar modules by rainwater is increasingly a concern for local environmentalists like the Concerned Citizens of Fawn Lake in Virginia, where a [6,350 acre solar farm](#) to partly power [Microsoft data centers](#) is being proposed.

"We estimate there are 100,000 pounds of cadmium contained in the 1.8 million panels," Sean Fogarty of the group told me. "Leaching from broken panels damaged during natural events — **hail storms, tornadoes, hurricanes, earthquakes, etc.** — and at decommissioning is a big concern."

There is real-world precedent for this concern. A tornado in 2015 broke 200,000 solar modules at southern California solar farm Desert Sunlight.

"Any modules that were broken into small bits of glass had to be swept from the ground," Mulvaney explained, "so lots of rocks and dirt got mixed in that would not work in recycling plants that are designed to take modules. These were the cadmium-based modules that failed [hazardous] waste tests, so were treated at a [hazardous] waste facility. But about 70 percent of the modules were actually sent to recycling, and the recycled metals are in new panels today."

And when Hurricane Maria hit Puerto Rico last September, the nation's second largest solar farm, responsible for 40 percent of the island's solar energy, [lost a majority of its panels](#).

Can Solar Producers Take Responsibility?

In 2012, First Solar [stopped putting a share of its revenues](#) into a fund for long-term waste management.

"Customers have the option to use our services when the panels get to the end of life stage," a spokesperson told *Solar Power World*. "We'll do the recycling, and they'll pay the price at that time."

Or they won't. "Either it becomes economical or it gets mandated." [said EPRI's Cara Libby](#). "But I've heard that it will have to be mandated because it won't ever be economical."

Last July, Washington became the first U.S. state to require manufacturers selling solar panels to have a plan to recycle. But the legislature did not require manufacturers to pay a fee for disposal. "Washington-based solar panel manufacturer Itek Energy assisted with the bill's writing," [noted Solar Power World](#).

The problem with putting the responsibility for recycling or long-term storage of solar panels on manufacturers, says [the insurance actuary Milliman](#), is that it increases the risk of more financial failures like the kinds that afflicted the solar industry over the last decade.

Any mechanism that finances the cost of recycling PV modules with current revenues is not sustainable. This method raises the possibility of bankruptcy down the road by shifting today's greater burden of 'caused' costs into the future. When growth levels off then PV producers would face rapidly increasing recycling costs as a percentage of revenues.

[Since 2016](#), Sungevity, Beamreach, Verengo Solar, SunEdison, Yingli Green Energy, [Solar World](#), and [Suniva](#) have gone bankrupt.

The result of such bankruptcies is that the cost of managing or recycling PV waste will be born by the public. "In the event of company bankruptcies, PV module producers would no longer contribute to the recycling cost of their products," [notes](#) Milliman, "leaving governments to decide how to deal with cleanup."

Governments of poor and developing nations are often not equipped to deal with an influx of toxic solar waste, experts say. German researchers at the Stuttgart Institute for Photovoltaics [warned](#) that poor and developing nations are at higher risk of suffering the consequences.

Dangers and hazards of toxins in photovoltaic modules appear particularly large in countries where there are no orderly waste management systems... Especially in less developed countries in the so-called global south, which are particularly predestined for the use of photovoltaics because of the high solar radiation, it seems highly problematic to use modules that contain pollutants.

The attitude of some solar recyclers in China appears to feed this concern. "A sales manager of a solar power recycling company," the [South China Morning News](#) reported, "believes there could be a way to dispose of China's solar junk, nonetheless."

"We can [sell them to Middle East](#)... Our customers there make it very clear that they don't want perfect or brand new panels. They just want them cheap... There, there is lots of land to install a large amount of panels to make up for their low performance. Everyone is happy with the result."

In other words, [there are firms that may advertise themselves as "solar panel recyclers" but instead sell panels to a secondary market in nations with less developed waste disposal systems. In the past, communities living near electronic waste dumps in Ghana, Nigeria, Vietnam, Bangladesh, Pakistan, and India have been \[primary e-waste destinations\]\(#\).](#)

According to [a 2015 United Nations Environment Program \(UNEP\) report](#), somewhere between 60 and 90 percent of electronic waste is [illegally traded and dumped](#) in poor nations. Writes UNEP:

Thousands of tons of e-waste are falsely declared as second-hand goods and exported from developed to developing countries, including waste batteries falsely described as plastic or mixed metal scrap, and cathode ray tubes and computer monitors declared as metal scrap.

Unlike other forms of imported e-waste, used solar panels can enter nations legally before eventually entering e-waste streams. [As the United Nation Environment Program notes](#), "loopholes in the current Waste Electrical and Electronic Equipment (WEEE) Directives allow the export of e-waste from developed to developing countries (70% of the collected WEEE ends up in unreported and largely unknown destinations)."

All of that waste creates a large quantity of material to track,
which in turn requires

coordinated, overlapping, and different responses at the international, national, state, and local levels.

The local level is where action to dispose of electronic and toxic waste takes place, often under state mandates. In the past, differing state laws have motivated the U.S. Congress to put in place national regulations. Industry often prefers to comply with a single national standard rather than multiple different state standards. And as the problem of the secondary market for solar shows, ultimately there needs to be some kind of international regulation.

The first step is a fee on solar panel purchases to make sure that the cost of safely removing, recycling or storing solar panel waste is internalized into the price of solar panels and not externalized onto future taxpayers. An obvious solution would be to impose a new fee on solar panels that would go into a federal disposal and decommissioning fund. The funds would then, in the future, be dispensed to state and local governments to pay for the removal and recycling or long-term storage of solar panel waste. The advantage of this fund over extended producer responsibility is that it would insure that solar panels are safely decommissioned, recycled, or stored over the long-term, even after solar manufacturers go bankrupt.

Second, the federal government should encourage citizen enforcement of laws to decommission, store, or recycle solar panels so that they do not end up in landfills.

Currently, citizens have the right to file lawsuits against government agencies and corporations to force them to abide by various environmental laws, including ones that protect the public from toxic waste. Solar should be no different.

Given the decentralized nature of solar energy production, and lack of technical expertise at the local level, it is especially important that the whole society be involved in protecting itself from exposure to dangerous toxins.

Lack of technical expertise can be a problem when solar developers like Sustainable Power Group, or sPower, [incorrectly claim](#) that the cadmium in its panels is not water soluble. That claim has been contradicted by the previously-mentioned Stuttgart [research scientists](#) who found cadmium from solar panels “can be almost completely washed out...over a period of several months...by rainwater.”

THE TOXIC TRUTH ABOUT SOLAR FARMS

www.StoptheSolarFarms.com

THE GREEN NEW DEAL

The Democratic Socialist's Plan for Long Island

REDISTRIBUTION OF WEALTH

U.S. TAXPAYERS DOLLARS SENT ABROAD TO OTHER COUNTRIES

THESE ARE INTERNATIONAL OVERSEAS SOLAR COMPANIES USING U.S. FRONT COMPANIES TO STEAL OUR MONEY AND LAND USING THIS SOLAR FARM HOAX WHILE TRYING TO CONVINCING YOU THAT THIS WILL BENEFIT YOU AND STOP CLIMATE CHANGE

THE SAD TRUTH IS THEY WANT

- 1. To Impose "The Green New Deal" Policies and Taxes on Long Islanders**
- 2. To Confiscate Private Property using the Solar Farm Strategy.**
- 3. To Make Long Island the Country's Largest Hazardous Toxic Waste Dump**
- 4. To Force Rural Voters to move to Urban Zoned Areas in their effort to change their voting Habits**
- 5 To Secure the Progressive Democrat Vote into perpetuity.**
- 6. To Maintain a Taxpayer Slush Fund fueling the Solar Companies and Lobbyists.**

AS OF RIGHT NOW APPROX 90% OF ALL SOLAR PANELS ARE MANUFACTURED IN CHINA

THIS CRAZY AND INSANE GREEN NEW DEAL

PROMOTES THE MANUFACTURING OF THESE TOXIC PANELS IN THE USA

THE CHEMICAL BY- PRODUCTS USED IN THE MANUFACTURING ARE 4 TIMES THE WASTE AMOUNT AND ARE EVEN MORE TOXIC AND HARMFUL AS THOSE CONTAINED IN THE SOLAR PANEL ITSELF

THERE IS NO SAFE WAY AND PLACE TO DISPOSE OF THE TOXIC WASTE CHEMICALS THAT ARE USED IN THE CREATION OF THESE SOLAR PANELS

WHY WOULD WE WANT THESE TOXIC CHEMICALS IN OUR COUNTRY?

OUR NY DEMOCRATIC LEADERS WILL SOON BE PUSHING TO PLACE A MANUFACTURING PLANT HERE ON LONG ISLAND IN THE NEAR FUTURE

HAVE THEY LOST THEIR MINDS!

STOP THIS INSANITY NOW BEFORE IT IS TOO LATE TO UNDO THE DAMAGE

CADMIUM (Cd)

Cadmium Telluride (CdTe) is a commonly used material in thin film **solar modules**. **Cadmium** is a heavy metal and extremely dangerous. ... In relation to **solar panels**, the CdTe is safe while encapsulated in **the** module, but if **the panel** is damaged and exposed to water, **the cadmium** telluride could leach into **the** water. Apr 21, 2011

During manufacture and after the disposal of solar panels, they release hazardous chemicals including cadmium compounds, silicon tetrachloride, hexafluoroethane and lead.

Cadmium Telluride. ...

Copper Indium Selenide. ...

Cadmium Indium Gallium (Di)selenide. ...

Silicon Tetrachloride.

Apr 30, 2018

Cadmium and **cancer**. **Cadmium** is an established human and animal carcinogen. Most evidence is available for elevated risk for lung **cancer** after occupational exposure; however, associations between **cadmium** exposure and tumors at other locations including kidney, breast, and prostate may be relevant as well.

Cadmium has many uses, including in the production of batteries, pigments, metal coatings, and plastics. **Cadmium** and its compounds are highly toxic and exposure is known to **cause cancer**. It is primarily associated with human lung, prostate, and kidney **cancers**, and recently pancreatic **cancer**.

Cadmium is also an environmental hazard. Human exposure is primarily from fossil fuel combustion, phosphate fertilizers, natural sources, iron and steel production, cement production and related activities, nonferrous metals production, and municipal solid waste incineration.^[4] Bread, root crops, and vegetables also contribute to the cadmium in modern populations.^[65]

Solar panels contain lead, cadmium, and other **toxic** chemicals that cannot be removed without breaking apart the entire **panel**. ... China has more **solar** power plants than any other country, operating roughly twice as many **solar panels** as the United States and also has no plan for the disposal of the **old panels**. Dec 23, 2018

Can you get cancer from solar panels?

Yes, UV radiation is a known carcinogen, but **solar panels do** not increase the amount of UV rays that hit a given area. ... **We** don't know enough about **solar panels** to say for sure that they don't cause **cancer**. The radiation that comes from **solar panels** seeps into your home and heightens the risk of **cancer**. Mar 4, 2016

All electrical and electronic device create electromagnetic fields or EMF around them when used and also **emit** electromagnetic **radiation** or EMR. This includes **solar panels** and **solar** inverters. So is it possible for the electromagnetic fields or **radiation** from your rooftop **solar** system to harm you or your family? Nov 27, 2017

3. Toxicity of Cadmium

Cadmium is one of the top 6 deadliest and toxic materials known.

However, CdTe appears to be less toxic than elemental cadmium, at least in terms of acute exposure.

This is not to say it is harmless. Cadmium telluride is toxic if ingested, if its dust is inhaled, or if it is handled improperly (i.e. without appropriate gloves and other safety precautions). The toxicity is not solely due to the cadmium content. One study found that the highly reactive surface of cadmium telluride quantum dots triggers extensive reactive oxygen damage to the cell membrane, mitochondria, and cell nucleus. In addition, the cadmium telluride films are typically recrystallized in a toxic compound of cadmium chloride.

copper indium gallium selenide (CIGS) cells

The CIGS cells leached several metals, including molybdenum, zinc, aluminum, selenium, and cadmium. In particular, the team predicts that damaged CIGS cells would release amounts of cadmium leading to environmental concentrations that exceed World Health Organization safe drinking water limits in all the scenarios they tested, with concentrations more than 50 times higher than the limit set for acidic rainwater in arid climates.

Scale and Market for CIGS

While CIGS has good efficiencies for a thin film PV, it has been unable to overcome crystalline silicon PV. This is primarily due to an expensive manufacturing process and the economic downturn that significantly affected the photovoltaic sectors. With the recent capacity expansions and an increasing market for CIGS, investments are beginning to be made. NanoMarkets expects that CIGS produced for the PV market will grow from \$613.4 million in 2011 to \$5.41 billion in 2018. It is critical, however, for CIGS manufacturers to develop less expensive processes and cheaper substrates in order to compete with conventional crystalline silicon in the PV market. ^[5]

The following outlines the current production processes for the most prevalent CIGS producing companies:

[Solibro](#) - Co-evaporation CIGS process: Process which produces modules with a 17.4% power conversion efficiency^[6] ^[7]

[MiaSole](#) - CIGS is deposited on a flexible stainless steel substrate entirely by continuous sputtering in a vacuum^[8] to produce modules with an efficiency of 9-10%^[9]

[Solyndra](#) - Co-evaporation process in which Cu, In, Ga, Se are deposited straight onto glass tubes to produce modules with an efficiency of 7-10%^[10]

[Global Solar](#) - Co-evaporation CIGS process^[11]: Uses an inline three stage deposition process^[12] to produce modules with up to 19.9% efficiency in laboratory samples and 10.5%-11% average efficiency in production cells^[13]

[Soltecture](#) - Co-evaporation process^[14] to produce modules with an efficiency up to 13% and an average efficiency of 12%^[15]

[Nano Solar](#) - Nanoparticle ink is used to print the semiconductor onto a flexible substrate^[16] to produce modules with an efficiency of 8-9%^[17]

NanoMarkets has identified three markets in which CIGS will be able to make a strong standing: the conventional panel market, rigid and flexible building integrated photovoltaics (BIPV), and the mobile market.

Thin-film market share is stagnated at around 15 percent, leaving the rest of the PV market to conventional [solar cells](#) made of [crystalline silicon](#). In 2013, the market share of CIGS alone was about 2 percent and all thin-film technologies combined fell below 10 percent.^[2] CIGS cells continue being developed, as they promise to reach silicon-like efficiencies, while maintaining their low costs, as is typical for thin-film technology.^[3] Prominent [manufacturers of CIGS photovoltaics](#) were the now-bankrupt companies [Nanosolar](#) and [Solyndra](#).

SOLAR COMPANY MANUFACTURERS & UN-SUSTAINABLE BANKRUPTCIES AND FAILING COMPANIES

This list of notable **companies manufacturing [copper indium gallium selenide solar cells \(CIGS\)](#)** includes a number of companies, some of which have significantly reduced or completely [closed down production](#):

[Ascent Solar Technologies](#) - Annual Revenue 215,000

[Flisom](#) (founded in 2005 as a spin-off company of [ETH Zürich](#), Switzerland)

[Global Solar Energy](#) (module producer, US-based subsidiary of Hanergy)

[Hanergy-Solibro](#) (former subsidiary of [Q-Cells](#))

[IBM](#)

[International Solar Electric Technology](#)

[Manz](#) (turnkey CIGS fab)

[Miasolé](#)

[Siva Power](#)

[Solar Frontier](#) (subsidiary of [Showa Shell Sekiyu](#))

[Veeco](#) Instruments Inc

Former companies

[HelioVolt](#) - BANKRUPT 2014 - 200 MILLION

[Nanosolar](#) - OUT OF BUSINESS

[Odersun](#) - BANKRUPT - OUT OF BUSINESS

[Soltecture](#) (previously [Sulfurcell](#)) - BANKRUPT 2012

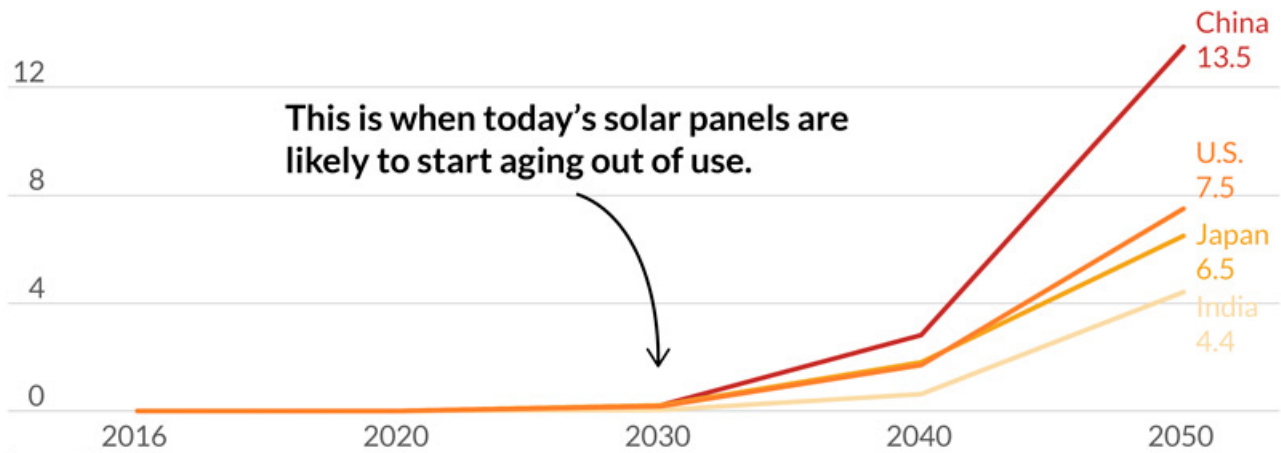
[Solyndra](#) - OUT OF BUSINESS - BANKRUPT STOLE 535 MILLION \$ LOAN GUARANTEE

TSMC Solar (module producer, wholly owned subsidiary of Taiwanese [TSMC](#))^{[1][2]} - BANKRUPT 2015

How China's Solar Panel Waste Stacks Up

Estimated cumulative volume of solar panel waste (millions of tons)

16



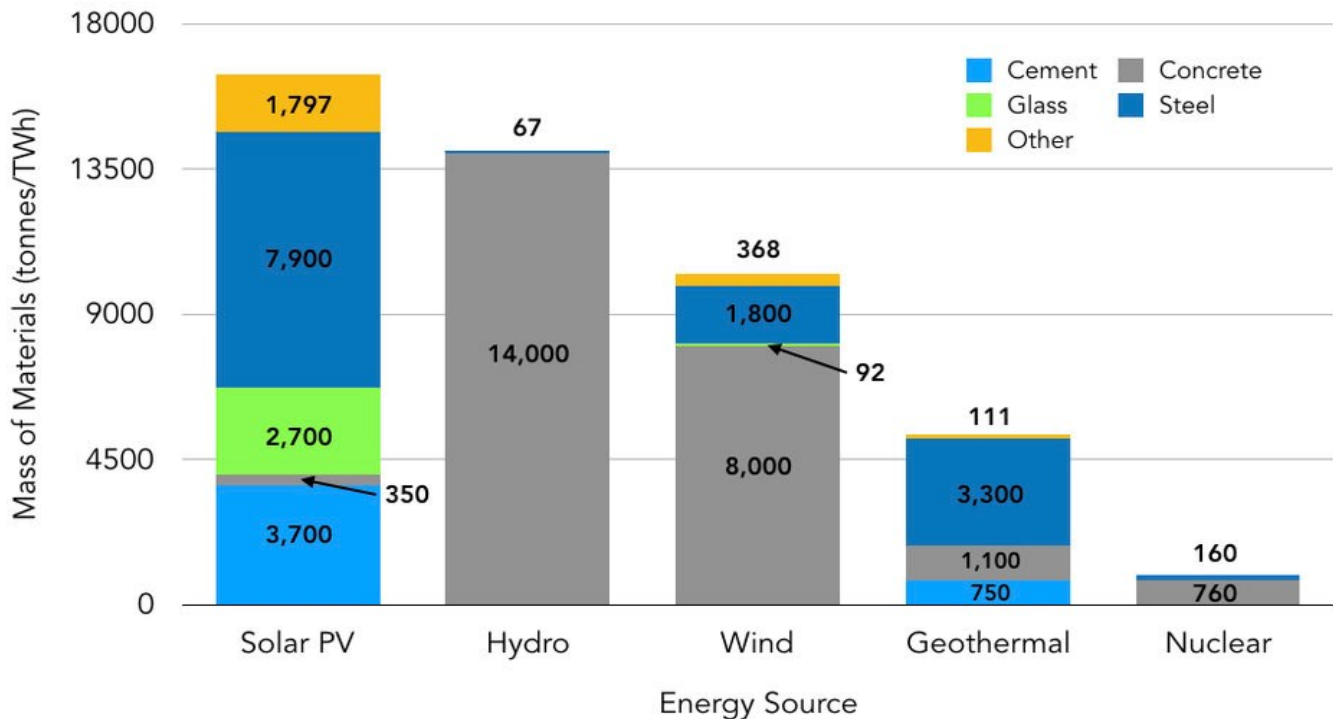
Note Assumes solar panels last for 30 years.

SIXTH TONE

Liu Chang

Source: International Renewable Energy Agency, "End-of-life Management: Solar Photovoltaic Panels."

Materials throughput by type of energy source

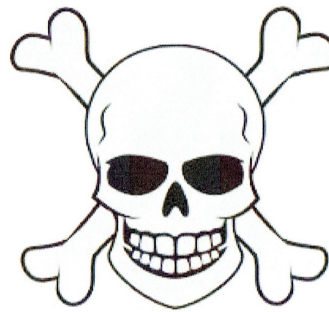


"Quadrennial Technology Review: An Assessment of Energy Technologies and Research Opportunities," Table 10. September 2015. United States Department of Energy. Nuclear and hydro require 10 tonnes/TWh and 1 tonne/TWh of other materials, respectively, but are unable to be labeled on the graph.

What can cause solar panels to catch fire? ... Incorrectly installed or defective DC/AC inverters have also been known to cause photovoltaic fires. Another possible, but rare, hazard is the voltage fluctuations created when excess electricity created by the solar panels is sent to the National Grid. Aug 24, 2017

Inhalation hazards (This is nasty smoke)

- You MUST use SCBA when dealing with fire involving PV arrays
 - Treat it like the Hazmat call it is
- PV cells can produce three main chemicals when burning:
- Cadmium Telluride (usually on commercial or utility scale installations)
 - Carcinogenic
- Gallium Arsenide
 - Highly toxic and carcinogenic
- Phosphorous
 - The worst of the three
 - Lethal dose is 50 mg



172

WHAT IS THE EMERGENCY EVACUATION PLAN IN CASE OF FIRE?

WHY WOULD THIS BE NECESSARY?

ACCORDING TO MANY FIRE SAFETY REQUIREMENT SOURCES A FIRE WOULD MELT OR DAMAGE THE ENCAPSULATION PART OF THE PANEL AND RELEASE THE HAZARDOUS TOXIC AND CANCER CAUSING CHEMICALS INTO THE ATMOSPHERE, WHICH IN THE FORM OF GASES AND VAPORS WOULD BE CARRIED BY THE WINDS OR BLOWING BREEZES SIGNIFICANT DISTANCES WHICH COULD AND WOULD HAVE SERIOUS CONSEQUENCES TO THOSE PEOPLE IN THE COMMUNITY WHO INHALE THE INVISIBLE GASES AND CHEMICAL FILLED SMOKE AS WELL AS THE FIRST RESPONDERS AND FIREFIGHTERS TRYING TO PUT THE FIRE OUT. CHEMICAL FIRES ARE DIFFICULT TO PUT OUT AND CANT BE PUT OUT BY WATER, IN MOST CASES IF NOT ALL, A CHEMICAL RETARDANT IS NECESSARY TO EXTINGUISH THE FIRE. THE SHUTTING OFF OF POWER TO THE PANELS IS NOT AN OPTION SINCE THE POWER IS CONTINUOUSLY POWERED ON WHICH PUTS FIRST RESPONDERS AND FIREMAN AT RISK OF ELECTROCUTION AND EXPOSURE TO THESE TOXINS.

LONG ISLAND CONTINGENCY PLAN FOR EMERGENCIES - NATURAL DISASTERS AND MAN CAUSED DISASTERS

HOW WILL YOU PROTECT OUR WATER SUPPLY, SOIL CROPS , AND PEOPLE FROM THESE HAZARDOUS TOXIC CHEMICALS?

CAN YOU 100% GUARANTEE


THAT NO CHEMICALS WILL EVER ENTER OUR SOIL, GROUNDWATER, RUNOFF INTO WETLANDS, OR CROPS?

IF YOU CANT GUARANTEE 100% SAFETY FROM THESE HAZARDS - WHY ARE WE STILL TALKING ABOUT THIS?

NATURAL DISASTERS - POTENTIAL DAMAGE TO PANELS

1. HURRICANES (HIGH WINDS, BROKEN BRANCHES, FLYING DEBRIS)
2. HAIL (ANY SIZE CAN DAMAGE PANELS)
3. TORNADOS (RARE BUT POSSIBLE)
4. FLOODING (FLOATING DEBRIS, SALT AIR AND WATER CORROSION)
5. FIRE (PINE BARRENS, BRUSH FIRE, POWER OVERLOAD, SPARKS CAUSED BY BIRD WINGS TOUCHING TWO CABLES)
6. LIGHTNING STRIKES CAN CAUSE FIRES AND/OR PUNCTURE THE PANELS (CAUSING CHEMICAL LEAKAGE) AS IT STRIKES AND PASSES THROUGH
7. SNOW AND ICE STORMS - MELTING SNOW - SALT AND SAND SPRAY FROM PLOWING SNOW.
8. FREEZING TEMPS MAY CRACK PANELS CAUSING CHEMICAL LEAK
9. BIRD DROPPINGS (ACIDIC AND CORROSIVE) AND BIRD STRIKES AS FEATHERS ARE SYNGED BY INTENCE HEAT OF SOLAR ARRAY
10. MIGRATORY BIRDS CRASHING INTO PANELS THINKING IT IS A POND OR LAKE AS IT LOOKS LIKE WATER FROM ABOVE.
11. TIME - CORROSION BY SALT AIR, ACID RAIN, RUST, DUST AND DIRT, DECOMPOSITION, WEAR AND TEAR ON MECHANICAL (MOVABLE) PARTS

MAN –MADE CAUSES - POTENTIAL DAMAGE TO PANELS

1. FIRES (ARSON, TERRORIST ACTIVITIES, ACCIDENTS, CIGARETTES, ENEMY ATTACK FROM THE AIR TO TAKE OUT GRID, ETC)
2. ACCIDENTS - PLANE CRASHES, CAR CRASHES, DRONE CRASHES, SATELLITE OR SPACE DEBRIS
3. VANDALISM - ROCK THROWING AND OTHER FORMS OR PHYSICAL DAMAGE TO PANELS
4. OPEN TO POSSIBLE RANSOM / BLACKMAIL THREATS TO DAMAGE OUR WATER SUPPLY / SOIL UNLESS A RANSOM IS PAID BY TOWN
5. MAINTENANCE, REPAIRS , AND/OR REPLACEMENT OR PANELS OR SYSTEM ITSELF THAT MAY LEAD TO ACCIDENTS
6. DISMANTLING AND DISPOSAL OF PANELS - HAZARDOUS TOXIC WASTE REMOVAL AND CLEANUP
7. DAMAGE CAUSED BY CLEANING PANELS WITH SOLVENTS AND WATER PRESSURE 
8. RUNOFF OF WASH WATER SEAPING INTO ANY CRACKS OR OPENINGS THAT MAY FREEZE AND EXPAND IN WINTER TIME
9. WEAR AND TEAR ON MECHANICAL (MOVEABLE) PARTS INCLUDING PETROLEUM PRODUCTS USED FOR LUBRICATION
10. PETROLEUM AND CLEANING SOLVENTS RUNOFF OF WASHED MATERIAL INTO SOIL AND EVENTUALLY INTO GROUND WATER.
11. PLUS ANY UNTHINKABLE OR UNIMAGINABLE CAUSES NOT STATED ABOVE INCLUDING NEGLIGENCE DUE TO BANKRUPCY .
12. WHO WILL BE RESPONSIBLE FOR CLEANUP, DISMANTLING, AND DISPOSAL OF PANELS IF NO LONGER IN BUSINESS AT TIME.

humans and the environment must be avoided. The most serious type of disaster that could occur at a photovoltaic systems is fire, because the semiconductor material could release into the environment and also could cause chemical reactions to take place, producing additional toxic chemicals. Decentralized photovoltaic systems mounted on buildings are potentially exposed to fire. Burning buildings can provide temperatures necessary for oxidation reactions to take place. These, may cause evaporation of certain components contained in the solar cells. These chemical vapors will eventually condense and settle in the surrounding area, generating a source of continued exposure to humans and the environment. However, with regard to cadmium telluride and CIS thin-film solar cells critical amounts of cadmium (Cd), tellurium (Te) and selenium (Se) may be released. For centralized solar farms, fire is not so dangerous because the structures for PV modules can be protected from fire. There are structural materials that are nonflammable or can be treated with fire retardants. As a result, the high temperatures necessary for the chemical reactions to take place can be avoided (Slusarczuk, 1982).

Furthermore, experience has shown that in case of extreme, hardly realistic, elutriation (e.g. due to rain or modules being submerged into brooks or rivers) the limits of the potable water prescription act are not exceeded.

Injury hazards due to falling solar modules, improperly mounted onto roof panels or facades, or in consequence of electrical voltages between electrical connections, may be largely excluded by adhering to the applicable standards in terms of construction and operation of electro-technical plants.

All in all, photovoltaic power generation has a very low propensity towards malfunctions, and malfunctions are always limited to a certain location. Provided that the modules are appropriately installed and operated, hardly any significant environmental impacts are expected.

In conclusion, we consider that the analysis of the environmental impacts of the photovoltaic technology has not to be limited only to production and operational phase of the PV system. It has to take into account the whole life cycle including the decommissioning of the PV panels and also recycling. The analysis indicates that the main environmental impact of the production of PV modules is generated by silicon wafer which is high energy intensive. Due to the growth of photovoltaic facilities will increase the PV waste in the coming decades. In order to reduce the environmental impact of photovoltaic systems