



A PROJECT OF THE SILICON VALLEY TOXICS COALITION

Solar Scorecard 2011

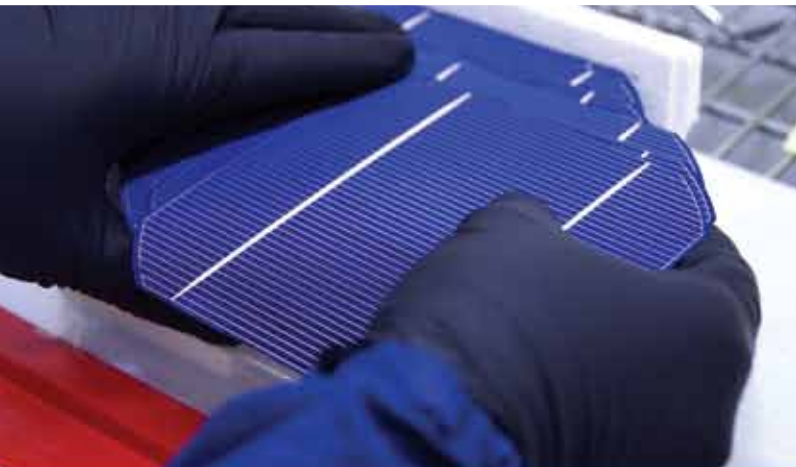
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The Vision

In 2010, the solar photovoltaic (PV) industry produced twice as many modules as it did in 2009. This growth is an encouraging step toward addressing the challenge of climate change through renewable energy. The generation of electricity from solar PV produces no greenhouse gas emissions while the modules are in use, and provides a sustainable alternative to non-renewable fossil fuels. However, there are potential negative environmental and health impacts from PV modules throughout their life cycles, ranging from raw materials extraction and procurement impacts, toxic and hazardous materials use in manufacturing, and the disposal and recycling of modules at the end of their useful lives.



The Silicon Valley Toxics Coalition (SVTC) believes that we still have time to ensure that the PV sector is safe for the environment, workers, and communities. We need to take action now to reduce the use of toxic chemicals in PV, develop responsible recycling systems, and protect workers throughout the global PV supply chain.

Many solar PV companies want to produce truly clean and green energy systems and are taking steps to implement more sustainable practices. SVTC is committed to helping these companies achieve that goal. At the same time, we need to create and enforce regulatory policies that ensure the safety and improved environmental performance of the entire sector.

SVTC envisions a safe and sustainable solar PV industry that:

1. Takes responsibility for the environmental and health impacts of its products throughout their lifecycles, including adherence to a mandatory policy for responsible recycling.
2. Implements and monitors equitable environmental and labor standards throughout product supply chains.
3. Pursues innovative approaches to reducing toxic chemicals in PV module manufacturing.

For over three decades, SVTC has been a leader in encouraging electronics manufacturers to take lifecycle responsibility for their products. This includes protecting workers from toxic exposure and preventing hazardous e-waste dumping in developing countries like India, Ghana, and China that lack adequate systems to protect worker health and safety. SVTC also seeks to stop the practice of sending e-waste to U.S. prisons for dismantling, which results in toxic exposure to inmates.

We now have a limited window of opportunity to ensure that solar PV does not follow the electronics industry's toxic and unsustainable path. The solar PV industry's rapid growth makes it critical to focus industry innovation on reducing toxic materials use and on developing products that are easier and safer to recycle. At the same time, the solar industry needs to build domestic recycling infrastructures that rely on the "proximity principle"; disposing of and recycling waste near where it is generated and/or reused will reduce the solar PV industry's carbon footprint, create jobs, and support local economies.

The Scorecard

SVTC's 2011 Solar Scorecard* is based on a survey of solar PV manufacturers around the globe. Responding companies are ranked on the following criteria:

- Product Takeback and Recycling
- Worker Health and Safety Issues at PV Facilities and in the Supply Chain
- Chemical Use and Lifecycle Analysis
- Company Disclosure Statements

The 2011 Solar Scorecard represents 46.6 percent of the industry market share, based on solar PV module shipment statistics for 2009.¹ This doubles industry participation over last year, and SVTC thanks the companies who chose to be transparent about their corporate and environmental practices. We hope that their example will encourage even greater participation in next year's survey.

Results of this year's survey include the following responses (out of fifteen responding companies):

- Eleven PV manufacturers reported that they would publicly support a law requiring mandatory takeback and recycling.
- Thirteen conduct audits and monitor their supply chain for environmental, health, and safety issues.
- Fourteen report that they do not use prison labor in production.
- Fourteen have a code of conduct to protect workers.
- Only two of the fifteen PV manufacturers report that their products contain no cadmium or lead.
- Five responding solar PV manufacturers have taken the U.S. EPA's Toxicity Characteristic Leaching Procedure (TCLP) test, and all have passed (meaning the PV modules are not characterized as hazardous waste according to the EPA).²
- Three PV manufacturers have taken similar tests administered by the State of California. The Total Threshold Limit Concentration (TTLC) test measures total hazardous materials by weight, and the Soluble Threshold Limit Concentration (STLC) test measures the amount of hazardous materials that can leach into the environment. One company failed both tests, while one company failed the TTLC and another failed the STLC. But it is important to note that the remaining twelve manufacturers have not yet taken the California tests; it is therefore still not clear which modules would be considered hazardous waste.

The Purpose

The scorecard is a resource and a guide for consumers, institutional purchasers, investors, and anyone who wants to be sure that PV modules are manufactured by companies that are responsible stewards through product lifecycles. The companies participating in the survey demonstrate their willingness to be transparent and show a commitment to improving the sustainability of the PV industry.

The scorecard provides the transparency necessary to determine industry progress in meeting SVTC's sustainability and social justice goals. It also lets companies see where they rank relative to their competitors. Our goal is to use SVTC's sustainability principles to drive the PV industry in a more sustainable direction that protects workers, communities, and the environment.

* The 2011 Solar Scorecard is based on SVTC's first annual scorecard, which was released in 2010. To view the 2010 Scorecard, go to: www.solarscorecard.com/2010.

1: The market share was determined from actual numbers of modules shipped reported by companies, estimates from various industry sources, and the 2009 PV industry output of 6,430 MW provided by solarbuzz.com (<http://www.solarbuzz.com/our-research/reports/marketbuzz>).

2: Whether or not a product is considered hazardous waste is based in part on a technical definition set by the EPA and tested by measuring how much hazardous material would leach from the product when it is discarded.

The Scorecard

The Key for Overall Score



Sunny
This company is an industry leader and is on the right track toward ensuring that solar PV is green and clean.



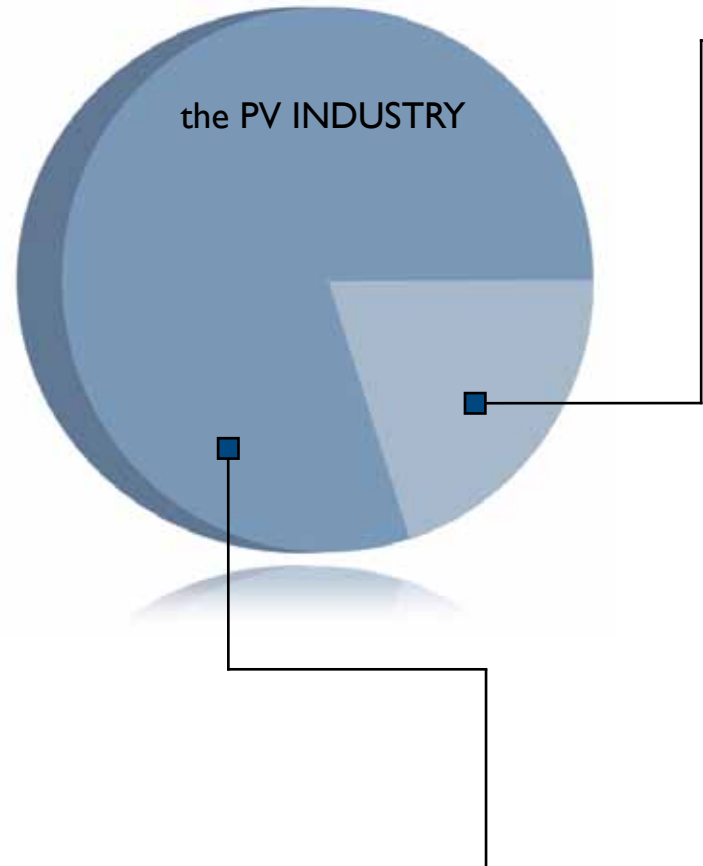
Partly Sunny
This company has taken some big steps toward creating a clean PV industry but does not address all of the issues effectively.



Cloudy
This company responded to the survey but has not taken the necessary steps toward creating a clean PV industry.



Rainy
This company did not respond to our survey and is not transparent; it's not clear if they are committed to sustainability and social justice.



Top 10 Manufacturers

COMPANY	OVERALL SCORE	RECYCLING	GREEN JOBS	TOXICS	DISCLOSURE
Canadian Solar	0				
First Solar	87				
Hanwa SolarOne	0				
REC	87				
Sharp *	0				
SolarWorld	91				
SunPower	85				
Suntech *	0				
Trina Solar	89				
Yingli Solar	72				

*Sharp and Suntech contacted SVTC and worked to have a constructive dialogue, but did not complete the survey.



The companies participating in the survey and show a commitment to improving the

Other PV Manufacturers

COMPANY	OVERALL SCORE		RECYCLING	GREEN JOBS	TOXICS	DISCLOSURE
Abound Solar		87				
AXITEC		64				
BP Solar		0				
Calyxo		82				
China Sunergy		0				
Eurener		60				
Evergreen Solar		0				
Fluitemik Group		61				
Hyundai		0				
JA Solar		0				
Jinko Solar		0				
Kyocera		0				
LDK Solar		0				
Miasole		0				
Mitsubishi		0				
Motech Industries		70				
Nanosolar		0				
Ningbo		0				
Renesola		0				
Samsung		0				
Sanyo		0				
SCHOTT Solar PV **		0				
Solar Frontier		0				
Solon		84				
SoloPower		71				
Solyndra *		0				
Sovello		83				
Suniva **		0				
Uni-Solar		0				
Westinghouse Solar		0				

*Solyndra contacted SVTC and worked to have a constructive dialogue but did not complete the survey.
 **Schott and Suniva declined to participate in this survey.

demonstrate their willingness to be transparent sustainability of the PV industry.

The Standards



Extended Producer Responsibility (EPR) and Takeback

EPR requires that manufacturers be responsible for the impacts of their products on the environment and on communities throughout the product lifecycles.

Range of Points (0-40)

Partly Sunny: 25 - 39

Cloudy: 1 - 24

Rainy: Did not respond

Requirements for a “Sunny” Score – 40 points

Companies with a “Sunny” score have made a solid commitment to a recycling program, including a commitment not to export end-of-life PV modules to inadequate recycling facilities in developing countries. They support a mandatory takeback law and plan to finance a recycling program in the near future.



Supply Chain Monitoring and Green Jobs

Green jobs protect workers from exposure to toxic chemicals and ensure a living wage. There is no guarantee that companies are providing green jobs if they do not monitor their supply chains.

Range of Points (0-20)

Partly Sunny: 14 - 19

Cloudy: 1 - 13

Rainy: Did not respond

Requirements for a “Sunny” Score – 20 points

Companies with a “Sunny” score require suppliers and sub-suppliers to follow a code of conduct. They conduct audits and monitor supply chains for environmental and health and safety issues, and they do not use prison labor.



Chemical Use and Life-Cycle Analysis

PV manufacturers currently rely on a number of hazardous or toxic chemicals. By using lifecycle analysis, alternatives assessment, and other tools, the PV industry can move away from the most toxic and hazardous inputs. In the E.U., the Restriction of Hazardous Substances (RoHS) directive prohibit the use of several toxic chemicals (including cadmium and lead) by the PV industry. While PV is currently exempt from this directive, the exemption will be up for renewal in several years.

Range of Points (0-10)

Partly Sunny: 2 - 9

Cloudy: 1

Rainy: Did not respond

Requirements for a “Sunny” Score – 10 points

Companies with a “Sunny” score avoid using hazardous materials such as lead and cadmium throughout the product lifecycle. They use tools such as lifecycle analysis to characterize environmental and worker impacts.



Disclosure

Claims about being “green” are increasingly common—but there are relatively few ways for the public to confirm or contradict those assertions. Transparency is important to verify whether companies are implementing EHS standards, takeback programs, and responsible recycling. By providing information on their practices, companies can demonstrate their performance, establish a reputation for being a reliable operation, and be held accountable by the communities where they manufacture and market their products.

Range of Points (0-30)

Partly Sunny: 25 - 29

Cloudy: 1 - 24

Rainy: Did not respond

Requirements for a “Sunny” Score – 30 points

Companies with a “Sunny” score responded to the survey and will provide a list of all chemicals used in production. They will share information related to labor standards, manufacturing hazards, and sustainability.



For over three decades, SVTC has been a leader in manufacturers to take lifecycle responsibility for

The Recommended Actions

Commercial, government, or residential purchasers of PV modules are making a long-term financial and environmental commitment, and PV module manufacturers should make the same long-term commitment to purchasers and to the environment. If you plan to own your home for 20–25 years, or to pass it down to your children, the PV modules will become your burden to recycle if they are not covered by a manufacturer takeback program. In addition, those modules could contribute to a global e-waste crisis unless the manufacturer has agreed not to export solar waste overseas or use prison recycling labor. PV modules also contain a number of rare and valuable materials that would otherwise be lost as waste. Using recycled materials can reduce the solar modules' carbon footprint because the use of recovered materials is typically more energy efficient than using virgin materials. Similarly, recovering materials can lower the ecological impacts associated with raw material extraction.

What do I do? I already have PV modules...

If your manufacturer is not listed in this scorecard or does not have a good score for recycling, contact them and encourage them to start a takeback and responsible recycling program for their modules. This will help not only you, but also the planet!

If I have not yet purchased PV modules...

Use this scorecard to help choose a manufacturer that exhibits high standards for PV module manufacturing, transparency to the public, and a true commitment to the environment.

encouraging electronics
their products. ”



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• Silicon Valley Toxics Coalition (SVTC) is a U.S.-based non-profit organization engaged in research, advocacy, and grassroots organizing to promote human health and environmental justice in the high-tech industry. SVTC was founded in 1982 as a response to groundwater contamination caused by leaking underground chemical storage tanks belonging to electronics companies. Since then, SVTC has worked to reduce the burden that the electronics and high-tech industries place on workers, communities, and the environment.

• Henderson Global Investors, Boston Common Asset Management, AVIVA Investors, PaxWorld Management LLC, Rathbone Greenbank Investments, and Walden Asset Management, a division of Boston Trust & Investment Management Company are investment companies committed to the long-term sustainability of the solar industry. As investors we believe strongly that solar PV technologies offer a critical set of solutions in the development of cleaner energy sources that don't contribute to climate change or other environmental issues. SVTC has undertaken this work independently, and as investors we take no credit for it. We have nonetheless supported the project because we believe it is essential that the solar industry develops systems and processes to manage environmental, health, safety, and labor issues effectively. We see this scorecard as an important step in this development.

