

EPEAT Disclosure Report 2021



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The following EPEAT disclosure report was prepared for conformance to the ANSI/NSF 457 Sustainability Leadership Standard.

1. Substances of Very High Concern (Criterion 5.2.1)

First Solar Series 6 and Series 6 *Plus* PV modules consist of four articles: glass module, junction box, cable, and frame. These articles do not contain substances on the Candidate List of Substances of Very High Concern (SVHC) as defined by EU REACH regulation (revision date: June 25, 2020) above 0.1% by weight per article.

2. Life Cycle Assessment (Criterion 7.1.2 and 7.2.1)

First Solar conducted a life cycle assessment (LCA) of its Series 6 PV modules, which was published in the IEEE Journal of Photovoltaics: <https://ieeexplore.ieee.org/document/8305539> (doi: [10.1109/JPHOTOV.2018.2802786](https://doi.org/10.1109/JPHOTOV.2018.2802786)), in accordance with the requirements of the European Union Product Environmental Footprint Guide. A copy of the conference paper is available on First Solar's website and includes an overview of identified life cycle hotspots: http://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/Sustainability-Studies/PVSC_44_Addressing-Hotspots-in-the-Product-Environmental-Footprint-of-CdTe-PV.ashx?dl=1.

The LCA quantifies the following mid-point indicators according to ILCD 2011 for First Solar Series 4 modules and First Solar Series 6 modules as follows:

3kWp installation, roof mounted (total all life stages, recycling benefits included)			
Impact category	Unit per kWh DC electricity	First Solar Series 4	First Solar Series 6
Climate change	kg CO2 eq	1.94E-02	1.66E-02
Ozone depletion	kg CFC-11 eq	8.78E-10	9.47E-10
Human toxicity, non-cancer effects	CTUh	4.95E-09	5.11E-09
Human toxicity, cancer effects	CTUh	5.97E-10	5.16E-10
Particulate matter	kg PM2.5 eq	9.95E-06	7.72E-06
Ionizing radiation HH	kBq U235 eq	9.06E-04	7.83E-04
Photochemical ozone formation	kg NMVOC eq	7.43E-05	5.62E-05
Acidification	molc H+ eq	1.46E-04	1.10E-04
Terrestrial eutrophication	molc N eq	2.76E-04	2.07E-04
Freshwater eutrophication	kg P eq	3.60E-06	3.51E-06
Marine eutrophication	kg N eq	2.54E-05	1.91E-05
Freshwater ecotoxicity	CTUe	7.63E-02	7.50E-02
Land use	kg C deficit	1.19E-02	8.61E-03
Water resource depletion	m3 water eq	7.83E-05	6.07E-05
Mineral, fossil & ren resource depletion	kg Sb eq	3.09E-06	2.58E-06
Cumulative energy demand non renewable	MJ	2.90E-01	2.47E-01
Cumulative energy demand renewable	MJ	3.63E+00	3.62E+00
Nuclear waste	m3 HAA eq	2.12E-11	1.84E-11

3. Material Recovery Targets (Criterion 9.1.3)

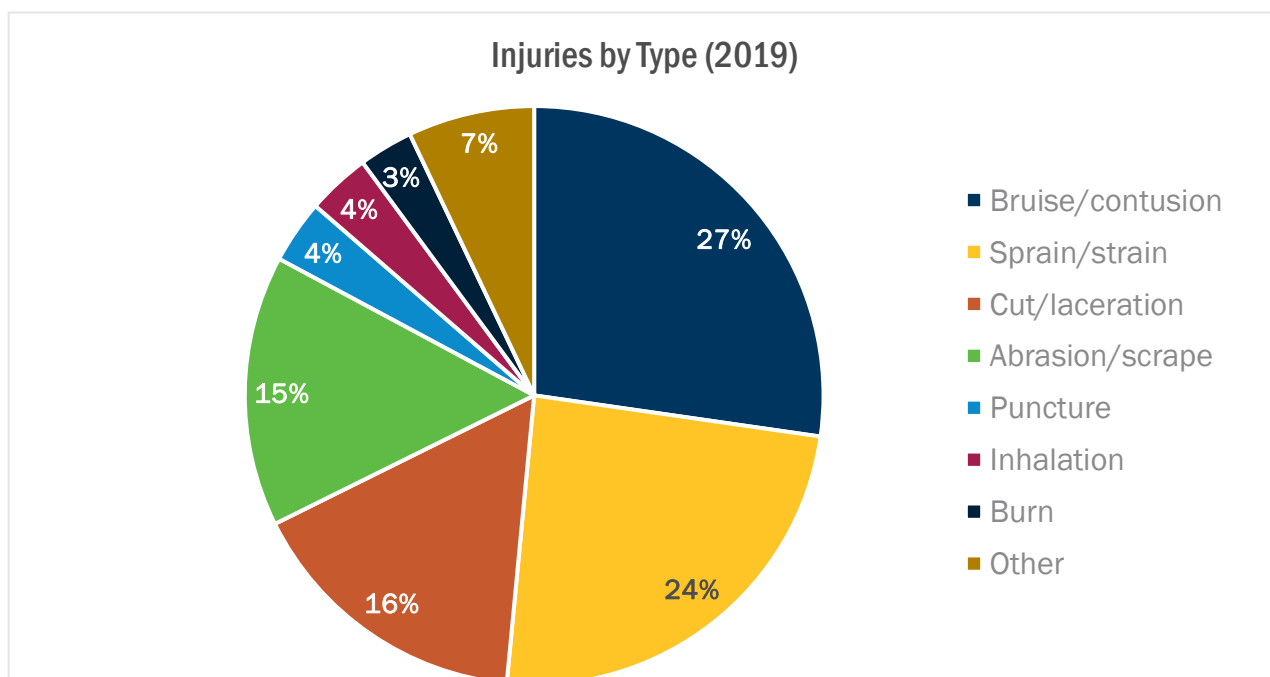
First Solar’s high-value PV recycling process recovers more than 90% of a First Solar module for reuse in new First Solar modules, glass products and rubber products. Approximately 90% of the glass and more than 90% of the semiconductor material and more than 90% of other metals are recovered at end-of-life.

First Solar PV Module Recycling Material Recovery Achievements	
Glass	= 90 mass-%
Metals (not including semiconductor materials)	≥ 90 mass-%
Semiconductor Materials	≥ 90 mass-%

4. Corporate Reporting (Criterion 11.2.1)

Key Performance Indicators	Reference Source of Key Performance Indicator			First Solar		
	GRI Standards ¹ 4	SASB solar energy sustainability accounting standard ³⁰	SEIA Commitment ²⁸	2019	2020	Boundary
PV modules produced in MW AC in reporting period		RR-ST-000.A	Included	5,662	6,124	Manufacturing (Global)
Recycled input materials used (%)	301-2	RR0102-10		2.5-8%	4-10.5%	Semiconductor material (Global)
Energy consumption within the organization (MWh)	302-1	RR-ST-130a.1	Included	1,045,931	868,060	Global (equity share)
Grid electricity consumed (%)		RR-ST-130a.1		91%	96%	Global (equity share)
Renewable energy consumed- onsite solar (%)		RR-ST-130a.1		1%	1%	Global (equity share)
Energy consumption in manufacturing (MWh)		RR0102-01.01		926,947	795,915	Manufacturing (Global)
Energy intensity (kWh/Watt)	302-3			0.16	0.13	Manufacturing (Global)

Total water withdrawal from all sources (m3)	303-1	RR-ST-140a.1	Included	3,846,213	3,655,065	Manufacturing, Recycling and R&D (Global)
Direct GHG emissions (Scope 1)	305-1		Included	26,520	7,037	Global (equity share)
Energy indirect GHG emissions (Scope 2)	305-2		Included	441,692	344,697	Global (equity share)
Waste by type and disposal method	306-2		Included	Sustainability Report (pg.27)	Sustainability Report (pg.27)	Manufacturing (Global)
Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work related fatalities	403-2		Included	Sustainability Report (pg. 64)	Sustainability Report (pg. 43 and 64)	Global (manufacturing and offices)



Safety data includes all global manufacturing and offices.

First Solar’s manufacturing data covers all processes (from the beginning of the manufacturing process to the finished module) and includes all of the company’s manufacturing facilities in the U.S., Malaysia and Vietnam. First Solar’s advanced thin film modules are manufactured in a high-throughput, automated environment that integrates all manufacturing steps into a continuous flow operation under one roof.

5. Corporate Reporting (Criterion 11.2.2)

Key Performance Indicators	Reference Source of Key Performance Indicator			First Solar		
	GRI Standards ¹⁴	SASB solar energy sustainability accounting standard ³⁰	SEIA Commitment ²⁸	2019	2020	Boundary
Reduction of energy consumption	302-4			3,262 MWh (11,746 GJ)	2,948 MWh (10,613 GJ)	Global Manufacturing (electricity)
Standards, methodologies, assumptions, and/or calculation tools used				Engineering measurements of lighting and HVAC electricity conservation projects using previous year as a baseline, in order to show annual progress. Scope 2 WRI/WBCSD GHG Protocol.		
Water withdrawn in water stressed areas	303-3	RR-ST-140a.1 (or WBCSD Global Water Tool ⁴⁰)		0.292 megaliters (0.01%)	0.170 megaliters (0.005%)	Manufacturing, Recycling and R&D (Global)
Standards, methodologies, assumptions, and/or calculation tools used				In 2020, 0.005% of our water withdrawals came from water stressed areas, compared to 0.01% in 2019. We used the WWF Risk Filter Tool and defined stressed areas as having baseline water stress that is equal to/greater than 'High': 40-80%. In 2020, our Mesa, Arizona test site was the only one classed as water stressed and water withdrawals there decreased by more than 40% compared to 2019, from 0.292 megaliters in 2019 to 0.170 megaliters in 2020. 100% of our withdrawals come from local municipal suppliers (third-party/ freshwater), including 100% third-party water from surface water for our Mesa, Arizona test site.		
Water recycled and reused (m3)	303-3			299,969	290,011	Manufacturing, Recycling and R&D (Global)
Standards, methodologies, assumptions, and/or calculation tools used				We measure the amount of water recycled at our manufacturing and recycling facilities in Malaysia, Ohio, Vietnam and Germany, which represented 99.9% of our water withdrawals in 2020. We recycled approximately 300 megaliters in 2019 and 290 megaliters in 2020 (or approximately 8% of our total water withdrawals) across our operations.		
GHG emissions intensity (metric tons of CO ₂ -eq / MW produced)	305-4			83	57	Global (equity share)
Standards, methodologies, assumptions, and/or calculation tools used				In 2019 and 2020, our GHG emissions intensity includes direct (scope 1) and indirect (scope 2) emissions of all manufacturing and recycling plants, R&D and testing facilities, EPC-owned		

				construction equipment, company-owned operational solar projects, and company-owned vehicle fleet on a carbon intensity basis measured per megawatt (MW) of PV modules produced. All GHGs are included in the calculations.		
Reduction of GHG emissions (metric tons CO2-eq)	305-5			Scope 1: 0 Scope 2: 1,205	Scope 1: 0 Scope 2: 1,233	Global Manufacturing (electricity)
Standards, methodologies, assumptions, and/or calculation tools used				Scope 1 and 2 WRI/WBCSD GHG Protocol using previous year as baseline, in order to show annual progress. In 2019, we implemented a lighting project at its manufacturing facility in Malaysia, and a lighting and HVAC projects at its manufacturing facility in Vietnam. These measures resulted in savings of 1,205 metric tons CO2-eq from avoided electricity consumption in 2019. Our scope 1 and 2 emissions in the previous year (2018) amounted to 356,288 metric tons CO2-eq. This amounted to a 0.34% decrease in our gross global emissions in 2019. All GHGs are included in the calculations. In 2020, we implemented a re-lighting and chiller optimization project at its manufacturing facility in Malaysia, and various lighting, HVAC, and chiller optimization projects at its manufacturing facility in Vietnam. These measures resulted in savings of 1,233 metric tons CO2-eq in 2020 from avoided electricity consumption in 2020. Our scope 1 and 2 emissions in the previous year (2019) amounted to 468,212 metric tons CO2-eq. This amounted to a 0.26% decrease in our gross global emissions in 2020. All GHGs are included in the calculations.		
Product Recycling Program in Place			Included	Yes	Yes	Global

First Solar’s manufacturing data covers all processes (from the beginning of the manufacturing process to finished module) and includes all of the company’s manufacturing facilities in the U.S., Malaysia and Vietnam. First Solar’s advanced thin film modules are manufactured in a high-throughput, automated environment that integrates all manufacturing steps into a continuous flow operation under one roof.

6. Public Disclosure of Use of Conflict Minerals in Products (Criterion 11.4.1)

First Solar is committed to responsible sourcing and operating a supply chain free of conflict minerals. First Solar’s [Specialized Disclosure and Conflict Minerals reports](#) are available on our public website (see “Specialized Disclosure” tab in SEC Filings).