

All flows listed in the Life Cycle Inventories (LCI) below are based on ecoinvent 3.3 database.

Table S1. DC-DC converter SimaPro modelling with EcoInvent 3.3 processes.

Inputs	Amount	Unit
Capacitor, for surface-mounting {GLO} market for Alloc Def, U*	0,24813	g
Tantalum, powder, capacitor-grade {GLO} market for Alloc Def, U*	0,012866	g
Capacitor, film type, for through-hole mounting {GLO} market for Alloc Def, U*	0,01838	g
Diode, glass-, for surface-mounting {GLO} market for Alloc Def, U*	12,2806889	g
Tin {GLO} market for Alloc Def, U*	48,13722	g
Polycarbonate {GLO} market for Alloc Def, U*	24,359014	g
Inductor, unspecified, at plant/GLO U*	0,141526	g
Resistor, surface-mounted {GLO} market for Alloc Def, U*	0,63169763	g
Printed wiring board, surface mounted, unspecified, Pb free {GLO} market for Alloc Def, U*	66,168	g
Integrated circuit, logic type {GLO} market for Alloc Def, U*	5,514	g
Converter, for electric passenger car {GLO} market for Alloc Def, U*	5,514	g
Transistor, unspecified, at plant/GLO U*	0,060654	g
market for printing wiring board, surface mounted, unspecified Alloc Def, U*	38,5	g
Output		
DC-DC converter	1	pc

Table S2. Two-axis tracker inventory modelled with EcoInvent 3.3 processes.

Inputs	Amount	Unit	Table
Energy			
Electricity, medium voltage, RER	176,430928	kWh	-
Materials			
Zinc coating, pieces/RER U	41,237	m2	-
Steel, unalloyed {GLO} market for Alloc Def, U	151,030928	kg	-
Polyvinylchloride, bulk polymerised {GLO} market for Alloc Def, U	70,9216495	kg	-
Road	159,83	m2	C3
Inverter	0,00206186	pc	C5
Transformer	0,00034364	pc	C6
Infrastructure	1	pc	C8
Copper {GLO} market for Alloc Def, U	43,9475732	kg	-

Aluminium, secondary, from new scrap, at plant/RER U	1,1814433	kg	-
Motor	1	pc	C4
Tracker foundation	1	pc	C7
Output			
Two-axis tracker	1	pc	

Table S3. 1 square meter of road in the CPV power plant in Catania, Sicily.

Inputs		
Resources	Amount	Unit
Occupation, traffic area, road network*	30	m ² a
Energy		
Electricity, medium voltage, RER	0,204	kWh
Materials		
Gravel, crushed, at mine/CH U	35,33	kg
Diesel, burned in building machine/GLO U	12,1	MJ
Excavation, hydraulic digger {RER} processing Alloc Def, U	0,06	m ³
Transport, freight, lorry 16-32 metric ton, EURO3 {RER}	1,29	tkm
Steel, low-alloyed {GLO} market for Alloc Def, U	0,03	kg
Emissions to air		
Particulates, > 10 um	0,000423	kg
Particulates, > 2.5 um, and < 10um	0,000108	kg
Heat, waste	0,74	MJ
Waste to treatment		
Disposal, inert waste, 5% water, to inert material landfill/CH U	3,22	kg
Output		
Road	1	m²

Table S4. Inventory of the motor used in the CPV power plant.

Inputs	Amount	Unit
Integrated circuit, IC, logic type, at plant/GLO U	3	kg
Cable, three-conductor cable, at plant/GLO U	15	m
Ferrite, at plant/GLO U	75	kg
Steel, low-alloyed, at plant/RER U	67,5	kg
Output		
Motor	1	pc

Table S5. Inventory of one piece of inverter for the two-axis tracking system.

Inputs	Amount	Unit
Aluminium, primary, ingot {GLO} market for Alloc Def, U	131	kg
Copper {GLO} market for Alloc Def, U	335	kg

Steel, low-alloyed {GLO} market for Alloc Def, U	1438	kg
Lubricating oil {GLO} market for Alloc Def, U	881	kg
Output		
Inverter	1	pc

Table S6. Inventory of one piece of transformer.

Inputs	Amount	Unit
Energy		
Electricity, medium voltage {ES} market for Alloc Def, U	4578	kWh
Materials		
Steel, low-alloyed {GLO} market for Alloc Def, U	907,25	kg
Silicone product {GLO} market for Alloc Def, U	47,75	kg
Copper {GLO} market for Alloc Def, U	510	kg
Aluminium, primary, ingot {GLO} market for Alloc Def, U	356	kg
Steel, low-alloyed {GLO} market for Alloc Def, U	620	kg
Lubricating oil {GLO} market for Alloc Def, U	850	kg
Polyester-complexed starch biopolymer {GLO} market for Alloc Def, U	53	kg
Output		
Transformer	1	pc

Table S7. Inventory related to one piece of foundation for the tracker.

Inputs	Amount	Unit
Excavation, hydraulic digger {RER} processing Alloc Def, U	10,8982928	m3
Poor concrete, at plant/CH U	0,35964366	m3
Concrete, normal, at plant/CH U	10,4732594	m3
Steel, unalloyed {RER} steel production, converter, unalloyed Alloc Def, U	0,53401635	ton
Output		
Tracker foundation	1	pc

Table S8. Inventory of one piece of infrastructure for the two-axis tracker.

Inputs	Amount	Unit
Poor concrete, at plant/CH U	0,00921392	m3
Concrete, normal, at plant/CH U	0,26832045	m3
Steel, unalloyed {RER} steel production, converter, unalloyed Alloc Def, U	0,01368127	t
Poor concrete, at plant/CH U	0,00727191	m3
Concrete, normal, at plant/CH U	0,21176675	m3
Steel, unalloyed {RER} steel production, converter, unalloyed Alloc Def, U	0,01079768	t
Road {GLO} market for Alloc Def, U	0,00384197	my
Output		
Infrastructure	1	pc

Table S9. Modelling of one piece of CPV mirror module with EcoInvent 3.3 processes.

Inputs	Amount	Unit
Energy		
Electricity, medium voltage, RER	51,35154	kWh
Materials		
Glass fibre {RER} production Alloc Def, U	3024	g
Steel, unalloyed {GLO} market for Alloc Def, U	336	g
Aluminium, secondary, from new scrap, at plant/RER U	15420,40	g
Aluminium, primary, ingot {GLO} market for Alloc Def, U	811,60	g
Section bar extrusion, aluminium {GLO} market for Alloc Def, U*	16232	g
Cadmium {GLO} market for Alloc Def, U	0,092	g
Gold {GLO} market for Alloc Def, U	0,135	g
Flat glass, uncoated {GLO} market for Alloc Def, U	22	g
Epoxy resin, liquid {RER} production Alloc Def, U	45,508	g
Tetrachlorosilane, at plant/GLO U*	50	g
Polycarbonate {RER} production Alloc Def, U	5616,516	g
Sheet rolling, aluminium {RER} processing Alloc Def, U	2970	g
Solar glass, low-iron {GLO} market for Alloc Def, U	7800	g
Nylon 6-6 {GLO} market for Alloc Def, U	42,72	g
Silicone product {GLO} market for Alloc Def, U	5	g
Copper {GLO} market for Alloc Def, U	2179,609	g
Diode, glass-, for surface-mounting {GLO} market for Alloc Def, U*	15	g
Silver {GLO} market for Alloc Def, U	13,2594015	g
Bisphenol A, powder {GLO} market for Alloc Def, U	0,7425	g
Electronic component, passive, unspecified {GLO} market for Alloc Def, U*	5	g
Printed wiring board, surface mounted, unspec., solder mix, at plant/GLO U*	244,133477	g
Electronic component, passive, unspecified {GLO} market for Alloc Def, U*	0,135	g
Printed wiring board, surface mount, at plant/GLO U*	5,2744887	g
Butyl acrylate {GLO} market for Alloc Def, U	3	g
Wire drawing, copper {GLO} market for Alloc Def, U*	0,135	g
Laser machining, metal, with CO ₂ -laser, 2000W power {GLO} market for Alloc Def, U*	17	min
Laminating service, foil, with acrylic binder {GLO} market for Alloc Def, U*	1,02159635	m ²
Impact extrusion of aluminium, 1 stroke {GLO} market for Alloc Def, U*	5565	g
Photovoltaic panel factory {GLO} construction Alloc Def, U*	4,00E-06	pc
Outputs		
CPV mirror module	1	pc
Waste		
Heat, waste	36	kWh

Table S10. Modelling of one piece of CPV Achromalens module with EcoInvent 3.3 processes.

Inputs	Amount	Unit
Energy		
Electricity, medium voltage, RER	25,497331	kWh
Materials		
Diode, glass-, for surface-mounting {GLO} market for Alloc Def, U*	0,23	g
Aluminium, secondary, from new scrap, at plant/RER U	670,404	g
Aluminium, primary, ingot {GLO} market for Alloc Def, U	35,284	g
Section bar extrusion, aluminium {GLO} market for Alloc Def, U*	705,688	g
Gold {GLO} market for Alloc Def, U	0,188	g
Epoxy resin, liquid {GLO} market for Alloc Def, U	94,95	g
Electronic component, passive, unspecified {GLO} market for Alloc Def, U*	5	g
Steel, unalloyed {GLO} market for Alloc Def, U	12	g
Printed wiring board, surface mounted, unspec., solder mix, at plant/GLO U*	5,2744887	g
Flat glass, uncoated {GLO} market for Alloc Def, U	22	g
Copper {GLO} market for Alloc Def, U	64,4	g
Cadmium {GLO} market for Alloc Def, U	0,092	g
Silver {GLO} market for Alloc Def, U	0,37204562	g
Glass fibre {GLO} market for Alloc Def, U	4210,19	g
Cable, unspecified {GLO} market for Alloc Def, U*	671,163	g
Injection moulding {RER} processing Alloc Def, U	704,64	g
Laminating service, foil, with acrylic binder {RER} processing Alloc Def, U*	0,3208782	m ²
Transport, freight, sea, transoceanic ship {GLO} market for Alloc Def, U	15,433	tkm
Photovoltaic panel factory {GLO} construction Alloc Def, U*	4,00E-06	pc
Wire drawing, copper {GLO} market for Alloc Def, U*	3,18086252	g
Solar glass, low-iron {GLO} market for Alloc Def, U	2936	g
Polycarbonate {GLO} market for Alloc Def, U	704,64	g
Vinyl acetate {GLO} market for Alloc Def, U	140,93	g
Output		
CPV Achromalens module	1	pc

Table S11. Modelling of the CPV Fresnel lens module with EcoInvent 3.3 processes.

Inputs	Amount	Unit
Energy		
Electricity, medium voltage, RER	25,497331	kWh
Materials		
Diode, glass-, for surface-mounting {GLO} market for Alloc Def, U*	0,23	g
Aluminium, secondary, from new scrap, at plant/RER U	670,404	g
Aluminium, primary, ingot {GLO} market for Alloc Def, U	35,284	g
Section bar extrusion, aluminium {GLO} market for Alloc Def, U*	705,688	g

Gold {GLO} market for Alloc Def, U	0,188	g
Epoxy resin, liquid {GLO} market for Alloc Def, U	94,95	g
Electronic component, passive, unspecified {GLO} market for Alloc Def, U*	5	g
Steel, unalloyed {GLO} market for Alloc Def, U	12	g
Printed wiring board, surface mounted, unspec., solder mix, at plant/GLO U*	5,2744887	g
Flat glass, uncoated {GLO} market for Alloc Def, U	22	g
Copper {GLO} market for Alloc Def, U	64,4	g
Cadmium {GLO} market for Alloc Def, U	0,092	g
Silver {GLO} market for Alloc Def, U	0,37204562	g
Glass fibre {GLO} market for Alloc Def, U	4210,19	g
Cable, unspecified {GLO} market for Alloc Def, U*	671,163	g
Injection moulding {RER} processing Alloc Def, U	65,92	g
Laminating service, foil, with acrylic binder {RER} processing Alloc Def, U*	0,3208782	m ²
Transport, freight, sea, transoceanic ship {GLO} market for Alloc Def, U	15,433	tkm
Photovoltaic panel factory {GLO} construction Alloc Def, U	4,00E-06	pc
Wire drawing, copper {GLO} market for Alloc Def, U*	3,18086252	g
Solar glass, low-iron {GLO} market for Alloc Def, U	2140,8	g
Silicone product {GLO} market for Alloc Def, U	65,92	g
Output		
CPV Fresnel lens module	1	pc

Table S12. Solar cell inventory.

Energy		
Electricity, medium voltage, RER	0,16724138	kWh
Materials		
Acetone, liquid {GLO} market for Alloc Def, U	0,13525862	g
Ethanol, without water, in 99.7% solution state, from ethylene {GLO} market for Alloc Def, U*	0,46134828	g
Hydrogen peroxide, without water, in 50% solution state {GLO} market for Alloc Def, U	0,0542069	g
Isopropanol {GLO} market for Alloc Def, U*	0,47844828	g
N-methyl-2-pyrrolidone {GLO} market for Alloc Def, U*	1,50948276	g
Hydrogen fluoride {GLO} market for Alloc Def, U	0,01194828	g
Compressed air, 800 kPa gauge {GLO} market for Alloc Def, U	0,02586207	m ³
Nitrogen, liquid {RER} market for Alloc Def, U	0,04960862	kg
Natural gas, liquefied {GLO} market for Alloc Def, U	0,00051724	m ³
Tap water {Europe without Switzerland} market for Alloc Def, U	0,00077586	kg
Phenolic resin {GLO} market for Alloc Def, U	0,01896552	g
Silver {GLO} market for Alloc Def, U	0,00603448	g
Gold {GLO} market for Alloc Def, U	0,00051724	g
Nickel, 99.5% {GLO} market for Alloc Def, U	0,00034483	g
Arsine {GLO} market for Alloc Def, U	0,02586207	g
Phosphane {GLO} market for Alloc Def, U	0,00862069	g

Gallium, semiconductor-grade {GLO} market for Alloc Def, U*	0,00258621	g
Indium {RER} production Alloc Def, U*	0,00137931	g
Aluminium, cast alloy {GLO} market for Alloc Def, U*	3,4483E-05	g
Hydrogen, liquid {RER} market for Alloc Def, U	7,7483E-05	kg
Hydrochloric acid, without water, in 30% solution state {RER} market for Alloc Def, U	0,02051724	g
Nitric acid, without water, in 50% solution state {GLO} market for Alloc Def, U	0,01301724	g
Ammonia, liquid {RER} market for Alloc Def, U	0,00775862	g
Copper {GLO} market for Alloc Def, U	0,00769655	g
Copper oxide {GLO} market for Alloc Def, U	0,00273017	g
Gallium, semiconductor-grade {GLO} market for Alloc Def, U*	0,02080172	g
Arsenic rock, as P2O5, beneficiated, dry {MA} phosphate rock beneficiation, dry Alloc Def, U*	0,01366034	g
Germanium rock, as P2O5, beneficiated, dry {MA} phosphate rock beneficiation, dry Alloc Def, U*	0,04563448	g
Polypropylene, granulate {GLO} market for Alloc Def, U	1,58413793	g
Polycarbonate {GLO} market for Alloc Def, U	0,01420966	g
Polyethylene, high density, granulate {GLO} market for Alloc Def, U	0,65184138	g
Photovoltaic panel factory {GLO} construction Alloc Def, U	6,4E-09	pc
Transport, freight, lorry 3.5-7.5 metric ton, EURO6 {GLO} market for Alloc Def, U	0,00001412	tkm

Outputs		
Solar cell	1	pc
Emissions to air		
Hydrogen	0,07748276	g
Nitrogen, total	0,00647069	kg
Heat, waste	0,03793103	kWh
Waste to treatment		
Gallium, semiconductor-grade {GLO} market for Alloc Def, U*	0,01040086	g
Arsenic rock, as P2O5, beneficiated, dry {MA} phosphate rock beneficiation, dry Alloc Def, U*	0,00683017	g
Copper {GLO} market for Alloc Def, U	8,5894E-05	g
Copper oxide {GLO} market for Alloc Def, U	3,0469E-05	g
Germanium rock, as P2O5, beneficiated, dry {MA} phosphate rock beneficiation, dry Alloc Def, U*	0,02281724	g
Hazardous waste, for underground deposit {GLO} market for Alloc Def, U	0,00270999	g

Table S13. Wafer packaging.

EcoInvent 3.3 Name	Amount	Unit
market for polypropylene, granulate*	918,8	g
market for polycarbonate*	8,24	g
market for polyethylene, high density, granulate*	378,07	g
market for isopropanol*	31.452	g
Output		
Wafer package Bow	1	pc

Table S14. EOL processes summary for one piece of mirror-based module.

End-Of-Life Process (EcoInvent 3.3 Name)	Output process (EcoInvent 3.3 Name)	Total Amount	Unit
	Steel, low-alloyed {GLO} market for Alloc Def, U	336,00	g
	Copper {GLO} market for Alloc Def, U	871,84	g
	Silver {GLO} market for Alloc Def, U	13,26	g
	Steam, in chemical industry {GLO} market for Alloc Def, U	5659,24	g
	Gold {GLO} market for Alloc Def, U	0,14	g
Steel and iron (waste treatment) {GLO} recycling of steel and iron Alloc Def, U		336,00	g
Inert waste, for final disposal {GLO} market for Alloc Def, U		7800,00	g
Disposal, municipal solid waste, 22.9% water, to sanitary landfill/CH U		4745,97	g
Disposal, plastics, mixture, 15.3% water, to municipal incineration/CH U		5659,24	g
Disposal, treatment of printed wiring boards/GLO U		294,86	g
Disposal glass 0% water to inert material landfill/CH		22,00	g
Hazardous waste, for underground deposit {GLO} market for Alloc Def, U		7,95	g
Transport, freight, lorry 3.5-7.5 metric ton, EURO6 {GLO} market for Alloc Def, U		7,51	tkm
Diesel, burned in building machine {GLO} market for Alloc Def, U		22,31	MJ
Electricity, medium voltage, RER		8,05	kWh

Table S15. EOL processes summary for one piece of Fresnel lens-based module.

End-Of-Life Process (EcoInvent 3.3 Name)	Output process (EcoInvent 3.3 Name)	Total Amount	Unit
	Gold {GLO} market for Alloc Def, U	0,19	g
	Steam, in chemical industry {GLO} market for Alloc Def, U	1516,73	g
	Steel, low-alloyed {GLO} market for Alloc Def, U	857,57	g
Disposal, municipal solid waste, 22.9% water, to sanitary landfill/CH U		4433,38	g
Disposal, plastics, mixture, 15.3% water, to municipal incineration/CH U		1516,73	g
Disposal, treatment of printed wiring boards/GLO U		23,36	g
Disposal, glass, 0% water, to inert material landfill/CH U		2958,00	g
Hazardous waste, for underground deposit {GLO} market for Alloc Def, U		2,824	g
			k
			W
Electricity, medium voltage, RER		1,11	h
			tk
Transport, freight, lorry 3.5-7.5 metric ton, EURO6 {GLO} market for Alloc Def, U		1,84	m
			M
Diesel, burned in building machine {GLO} market for Alloc Def, U		3,26	J

Table S16. EOL processes summary for one piece of Achromatic lens-based module.

End-Of-Life Process (EcoInvent 3.3 Name)	Output process (EcoInvent 3.3 Name)	Total Amount	Unit
	Gold {GLO} market for Alloc Def, U	0,19	g
	Steam, in chemical industry {GLO} market for Alloc Def, U	671,16	g

	Steel, low-alloyed {GLO} market for Alloc Def, U	12,00	g
Disposal, municipal solid waste, 22.9% water, to sanitary landfill/CH U		4423,01	g
Disposal, plastics, mixture, 15.3% water, to municipal incineration/CH U		671,16	g
Disposal, treatment of printed wiring boards/GLO U		23,36	g
Hazardous waste, for underground deposit {GLO} market for Alloc Def, U		2.82	g
Disposal, glass, 0% water, to inert material landfill/CH U		2162,80	g
Electricity, medium voltage, RER		0.93	kWh
Transport, freight, lorry 3.5-7.5 metric ton, EURO6 {GLO} market for Alloc Def, U		1,69	tkm
Diesel, burned in building machine {GLO} market for Alloc Def, U		2,72	MJ