

Annex 2. The CPV Companies

Company	Product	Specification	Web site (market note)
Angelatoni Industrie spa (Italy)	Household CPV The structure incorporates modules	Cells from CESI Area: 9 m ² Power: 2,25 kW _p Concentration: 400 Suns	www.angelantoni.it (Utility scale)
	Large CPV plants The structure incorporates modules	Cells from CESI Area: 22,5 m ² Power: 5,60 kW _p Concentration: 400 Suns	
Abengoa Solar SA (Spain)	CPV module	Area: Efficiency: 28 % III-V-based Concentration: 1000 x Acceptance angle: 1.2°	www.abengoasolar.com
	CPV system	Area: 140 m ² Power: 30kW Concentration: 1000 x Payload (kg): nd	(Utility scale)/ Installation:1 MW
Absolicon Solar Concentrator (Sweden)	CPV module X10-10 m (X10-6m also available) 10 X linear reflector PV Combined with heat production	Area: 10 m x 1.1m Efficiency: 9%- Si based Concentration: 10X Acceptance angle: nd	www.absolicon.com/ (Residential, Commercial)

Alitec S.r.l. (Italy)	Tracker 7.4	Area: 34 m ² Payload: 1000 kg Precision: 0,1° (@ v _{wind} = 30 km/h)	www.alitec.eu (Utility scale) Installations: Pisa, Catania
	Tracker 11.0	Area: 50 m ² Payload: 1500 kg Precision: 0,1° (@ v _{wind} = 30 km/h)	
	CPV module	Area: 1,7 m ² Efficiency: 28% @STC Concentration: 1100X Acceptance angle: +/-0,4° (>97% of the nominal efficiency)	
	CPV system Butterfly 7.4	Area: 34 m ² (accepting area: 28 m ²) Power: 7,4 kWp Concentration: 1100X Payload: 1000 kg	
	CPV system Butterfly 11.0	Area: 50 m ² (accepting area: 42 m ²) Power: 11 kWp Concentration: 1100X Payload: 1500 kg	Installations: 6 ENEA Portici - 1 WWLaboratories – 4 Castelgrande Observatory -1
Amonix (USA) Guascor Photon (Spain)	CPV system	Area: Power: 60 kW, Eff= 27% Concentration: 500 x Payload (kg):	www.amonix.com Installations :19 MW
	CPV module	Area: 0.2m ² Efficiency: 28.5% at sea level Concentration: 500 x Acceptance angle: 0.5°	
	CPV system	Area: 156 m ² Power: 44kW at sea level Concentration: 500 x Payload (kg): nd	(Utility scale) Installations: 6 Castelgrande Observatory Tito Scalo (PZ)

Arima Eco (Taiwan)	CPV module	Area: Efficiency: 23% @ 850 W/m ² Concentration: 500 x Acceptance angle: ±0.4°	www.arimaeco.com (Residential, commercial, Utility scale)
	Tracker	Area: nd Payload (kg): 1200 Precision: ± 0.3° (@ v _{wind} = 50 km/h)	
	CPV system	Power: 3 kW	
Azur Space (Germany)		Component type: Triple junction, InGaP/InGaAs/Ge bare; Cell size: from 5.5x5.5mm ² to 10x10mm ² . Custom sizes are possible. Polarity: N on P Concentration ratio: 500x Typical Efficiencies AM1.5D: 40%	www.azurspace.com
Boing-LPI XR array (USA, Spain)	CPV module	Area: Nd Efficiency: 27% @ 740 W/m ² Concentration: 800 x Acceptance angle: ±1.8°	www.lpi-llc.com/Solar.php (Utility scale)
Beghelli (Italy)	Albero d'oro (Life Tree):	Tracker: Area: 7670x5560	www.beghelli.com (Utility scale)
	HCPV system, including modules, high precision tracker, grid connected inverters and supervisory system	Payload: 1600kg Precision: 0.1° (@v _{wind} = 60 km/h) High reliability Brushless motors with custom electronic driver	
	CPV module	Peak power: 170W@ 900W/sqm, DNI AM1.5 Concentration: 1350X III-V triple junction cells Acceptance: +/-0.5° Size: 900x900x174mm, Active area: 0.732 sqm Efficiency: 25.8%	

	CPV System	HCPV Generator's peak power: 8160W @ 900W/sqm DNI 48 HCPV modules Modules lined up in the manuf. facility before installation 400V three phase output Spread spectrum radio controlled	
	Inverter:	Single module inverter Efficiency 95% No mismatching and partial shadowing problems	
CESI spa (Italy)	CPV solar cells	Component type: Triple junction, InGaP/InGaAs/Ge bare; Cell size: from 2x2mm ² to 20x20mm ² . Custom sizes are possible. Polarity: N on P Concentration ratio: Up to 1000x Typical Efficiencies AM1.5D: 36%-39%	www.cesi.it
Convert (Italy) Solaria (USA)	CPV MX1 CPV	Area: 63,5 m ² Power: 8.4 kW (with 265 Solaria CPV modules @ 850 W/m ²) Efficiency= 26% DC Concentration: approximately 2.3X Payload (kg): 1750 Acceptance angle: ±3° Accuracy (tracker): ±1°	www.convertitalia.com
CPower (Italy)	CPV module ("Rondine")	Area: 0.86m ² Efficiency: 16% Concentration: 20x Acceptance angle: ±4°	www.cpower.it (Utility scale)
Daido Steel (Japan)	CPV module	Area: 5.4 m ² Efficiency= 31.5% Concentration: 550 Acceptance angle: nd	www.daido.co.jp (Utility scale)

Ecoware (Italy)	Tracker	Elianto	www.ecoware.eu
Emcore (USA)	CPV module G3-1090 X	Area: 1.7 m ² Efficiency: 28 % Concentration: 1090 X Acceptance angle: ± 0.7°	www.emcore.com (Utility scale)
	CPV system	Area: nd m ² Power: 16.4 kW (@ 1000 W/m ²) Efficiency= 26% DC Concentration: 1090 X Payload (kg): nd	
Green and Gold Energy (Australia)	CPV module “Sun cube”	Area: nd m ² Efficiency= 31.% @ 1000W/m ² Concentration: >1000 Acceptance angle: nd	www.greenandgoldenergy.com.au
ENEA (Italy)	CPV module	Area: nd Efficiency= 23% @1000 W/m ² Concentration: 250x Acceptance angle: nd	www.enea.it (utility scale)
Energy Innovation (USA)	CPV module	Area: nd Efficiency= 30% @1000 W/m ² Concentration: 1200 X Acceptance angle: nd	www.energyinnovations.com/ (Solar carport, commercial roof mount, Utility scale)
Guascor Photon (Spain)	HCPV System SIFAC	Area: 215 m ² Power: 25 kW (@ 1000 W/m ²) Efficiency= 27% DC Concentration: 400 X Payload (kg): nd	www.guascorfoton.com (Utility scale)

INER (Taiwan)	CPV module	Area: nd Efficiency= 26,1% @850 W/m ² Concentration: 476X Acceptance angle: nd	www.iner.gov.tw (Utility scale)
Integra Renewable Energies – Centro Ricerche Plast-optica (Italy)	CPV module	Area: Modular Efficiency: 14.7 % Concentration: 15X Acceptance angle: 2.5°	www.orion-project.eu (Residential scale)
JX Crystal (USA)	CPV module: New CPV generator	Area: nd Efficiency= nd (adopting 35% efficient solar cells), power = 50 W Concentration: nd Acceptance angle: (module for single axis tracker)	www.jxcrystals.com/
Isofoton (Spain)	CPV system	Area: 62 m ² Power: 13.37 kW (@ 1000 W/m ²) Efficiency= nd DC Concentration: 500 X Payload (kg): nd	www.isofoton.it/ (Utility scale)
Maneova Energy (Canada)	CPV module	Area: 6 m ² Efficiency: 28.7% CSTC Concentration: 700X Acceptance angle: 0.8°	
	CPV module	Area: 72 m ² Power: 11.4 kWp CSTC (@ DNI 850 W/m ²) Concentration: 700X	
Opel Solar (Canada)	CPV module	Area: 4.39 m ² Efficiency= (adopting 36.7 efficient solar cells), power = 90W Concentration= 500 X Acceptance angle: nd	www.opelinc.com (Utility scale)

Pirelli Labs	CPV system	Prototype	www.pirelli.com
Sharp (Japan)		Nd	www.sharp.co.jp
Silicon CPV (United Kingdom)	CPV module MCPV-48	Area: 1,36 m ² Efficiency= (adopting Si solar cells), power = 150 W Concentration= 120 X Acceptance angle: nd	www.siliconcpv.com/ (Utility scale, Commercial scale)
Skyline Solar (USA)	LCPV	Area: nd Efficiency= nd Concentration= 14 X Acceptance angle: ±1.3°	www.skyline-solar.com/ (Utility scale)
Soitec (France)	CPV module	Area: 0.24 m ² Efficiency: .28% Concentration: 500 x Acceptance angle: nd	www.soitec.com (Utility scale) Installations: 150 MW (2015)
	CPV system	Area: 28.8 m ² Power: 5.4-6.4 kW (@ 850 W/m ²) Efficiency= 26% DC Concentration: 500 x Payload (kg): nd	
Solar System Pty (Australia)	CPV system	Area: (mirror diameter ≈15 m) Power: 40 kW (@ 1000 W/m ²) Efficiency= 30 DC Concentration: 500 X Payload (kg): 6 ton	www.solarsystems.com.au (Utility scale)

Solfocus (USA)	CPV module Mod1100 S	Area: nd Efficiency= 25% Concentration= 850 X Acceptance angle: $\pm 0.85^\circ$	www.solfocus.com (Utility scale)
Soliant's Concentrating Photovoltaic (USA)		N.d	Commercial roof top BETA SITES AND TEST FACILITIES Cal Tech: Pasadena, CA, Chevron: San Ramon, CA, So CA Theme Park: Anaheim, CA, Grupo Turiprojecto Alverca, Portugal , MBK Enterprises Chatsworth, CA
Sol3G (Spain)	CPV module	Area: nd Efficiency= 23% (adopting III-V solar cells) Concentration= 476 X Acceptance angle: nd	www.sol3g.com
Sun POWER (USA)	<i>The Alpha-2 LCPV system</i>	Area: nd Efficiency= 15.6% Concentration= 7 X Acceptance angle: $\pm 1.25^\circ$	www.sunpowercorp.com
Suntrix (Cina)	CPV module SCPV 500	Area: 1m^2 Efficiency= 28 % (adopting III-V solar cells) Concentration= nd Acceptance angle: nd	www.suntrix.cn/home-it
	CPV system T48-SCPV-500	Area: 8.5 m x 6.6 m Power: 12.7 kW (@ 1000 W/m^2) Efficiency = 28% (?) Concentration: nd Payload (kg): 3.5 ton	

Thesan (Italy)	CPV module for facade	Prototype	www.thesan.com/solarnova.html
Zenith Solar (Israel)	CPV system Z20 (PV and thermal)	Area: 2x 11 m ² Power= 4.5 KW (@ 1000 W/m ²); 15.5 kW combined Combined Efficiency= 72%, Power = Concentration: 500 X Payload (kg): 1500	www.zenithsolar.com

Note: Data have been collected from the websites of the companies or from literature. The annex 2, for reason of space, does not report of all the CPV Companies.