

正泰太阳能

THE POWER OF ASTRONERGY

Corporate Introduction



ASTRONERGY



Founded in **2006**



Capacity: **2.5GW** crystalline cells
and modules



Employees: **3000+**



2016 Revenue: **\$1.17 Billion**



5 Production Sites:

Hangzhou | Jiuquan | Haining

Germany | Thailand



Shanghai Stock Exchange Listed

601877

Bloomberg
NEW ENERGY FINANCE

Tier 1 Supplier



Top 20 PV Module suppliers by Bloomberg

ASTRONERGY

Bloomberg
NEW ENERGY FINANCE

Top bankable PV module brands in 2016

% share of respondents

Bloomberg New Energy Finance

Ranked by % share of respondents

Rank	PV Module Manufacturer	'Yes'	'No'	'Never Heard'
1	Trina	100%	0%	0%
2	Hanwha Q Cells	95%	5%	0%
3	SunPower	95%	5%	0%
4	First Solar	95%	5%	0%
5	Canadian Solar	95%	0%	5%
6	JA Solar	91%	5%	5%
7	Kyocera	91%	9%	0%
8	Jinko	88%	14%	0%
9	Mitsubishi	88%	9%	5%
10	Panasonic	77%	14%	9%
11	LG Electronics	73%	14%	14%
12	REC Solar	73%	23%	5%
13	Samsung	73%	9%	18%
14	Sharp	73%	27%	0%
15	Renesola	68%	32%	0%
16	Solar Frontier	68%	18%	14%
17	SolarWorld	64%	18%	18%
18	Chint/ Astronergy	59%	18%	23%
19	Hyundai Heavy	59%	18%	23%
20	SunEdison	59%	32%	9%

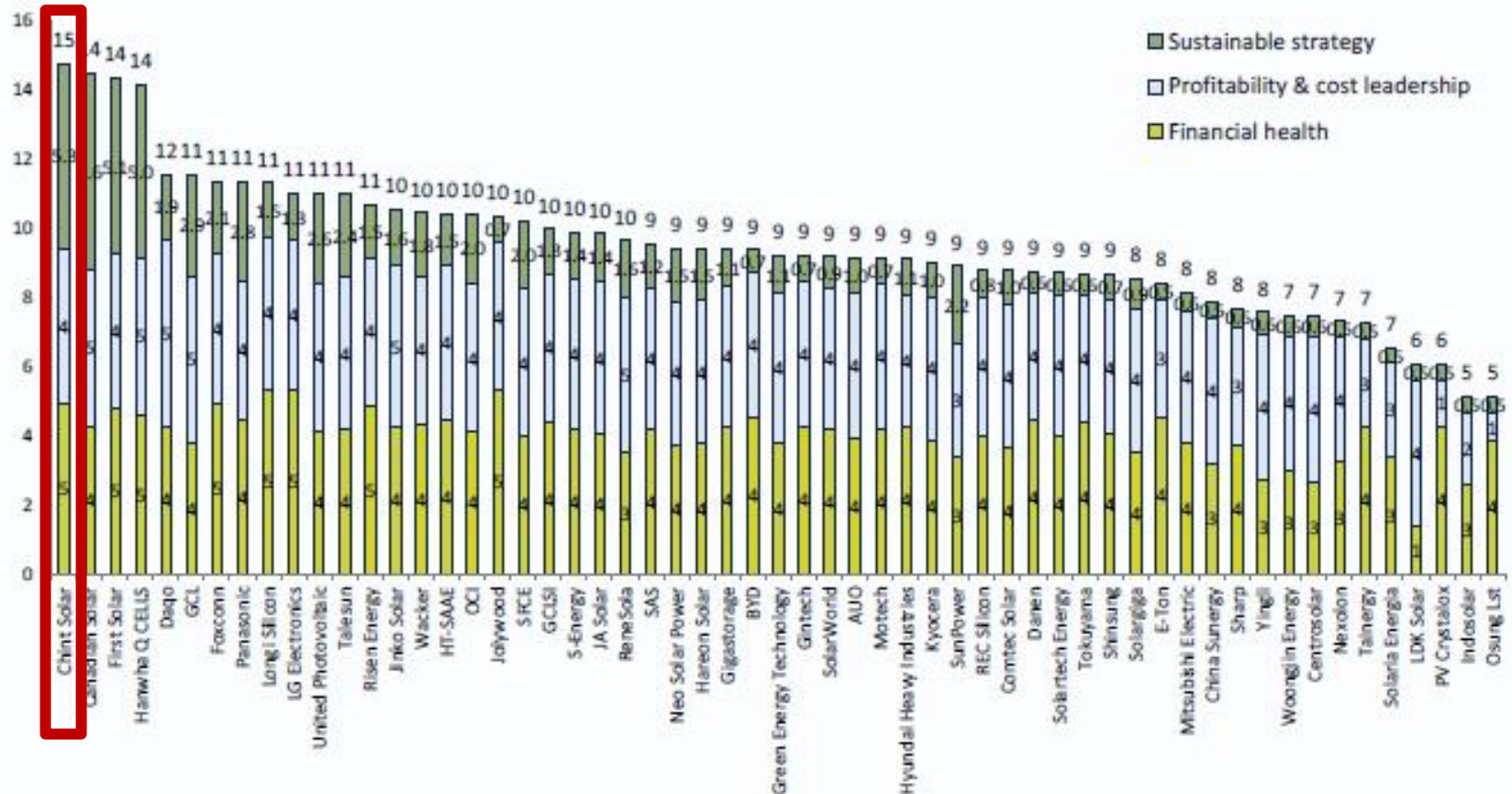
Note: We surveyed banks, technical consultants, EPCs, asset managers and independent power producers (IPPs) which PV module brands they considered 'bankable' out of a list of 50.

Respondents could choose between three options for each brand: "Yes", "No", and "Never heard of the company"

Bloomberg surveyed banks, technical consultants, EPCs, asset managers and independent power producers (IPPs) which PV module brands they considered 'bankable' out of a list of 50. Respondents could choose between three options for each brand: "Yes", "No", and "Never heard of the company".

Chint/Astronergy was listed in the TOP20.

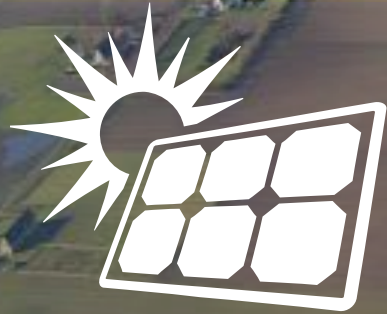
1. Physiological health: Current financial health (balance sheet-focused)
2. Exertion efficiency + Profitability + cost leadership (income statement-focused)
3. Versatility (a set of athletic skills)



Source: PHOTON Consulting, LLC, Bloomberg. Note: All data are rough estimates. Analysis includes public disclosure by companies as of March 30, 2017. Sustainable strategy is assigned twice the weight and is seen in the corresponding dark blue columns appearing twice as long as either of the two other columns.

Chint Solar, Canadian Solar, First Solar, Hanwha Q CELLS and Daqo leading the pack





**1.6 GW
Module Sales**



**2,200,000,000 kWh
Electricity Generated**



**3.2GW
Solar Power Plants
Connected**



**12,462 Houses
Commissioned**

Founded in **1984**

2016 Revenue: \$7.6 Billion

Assets: \$6.92 Billion

Employees: 30,000 +

- Chint Group has developed to be the leader in Chinese industrial electrical equipment production and clean energy fields.



Integration of CHINT Group

ASTRONERGY

- Biggest supplier of low-voltage products in Asia
- **40%** of Domestic Market Share in Low-Voltage Electronics and Components
- **2200** Distributors in China
- Sales in **100** Countries



Astronergy Value Chain Coverage

ASTRONERGY

Capacity Expansion (MW)



- Reach 2.5GW (300MW in Germany)
- Global production: Germany | Malaysia | Thailand
- Astronergy is also going downstream to provide clients with the total system solution from the Chint Group



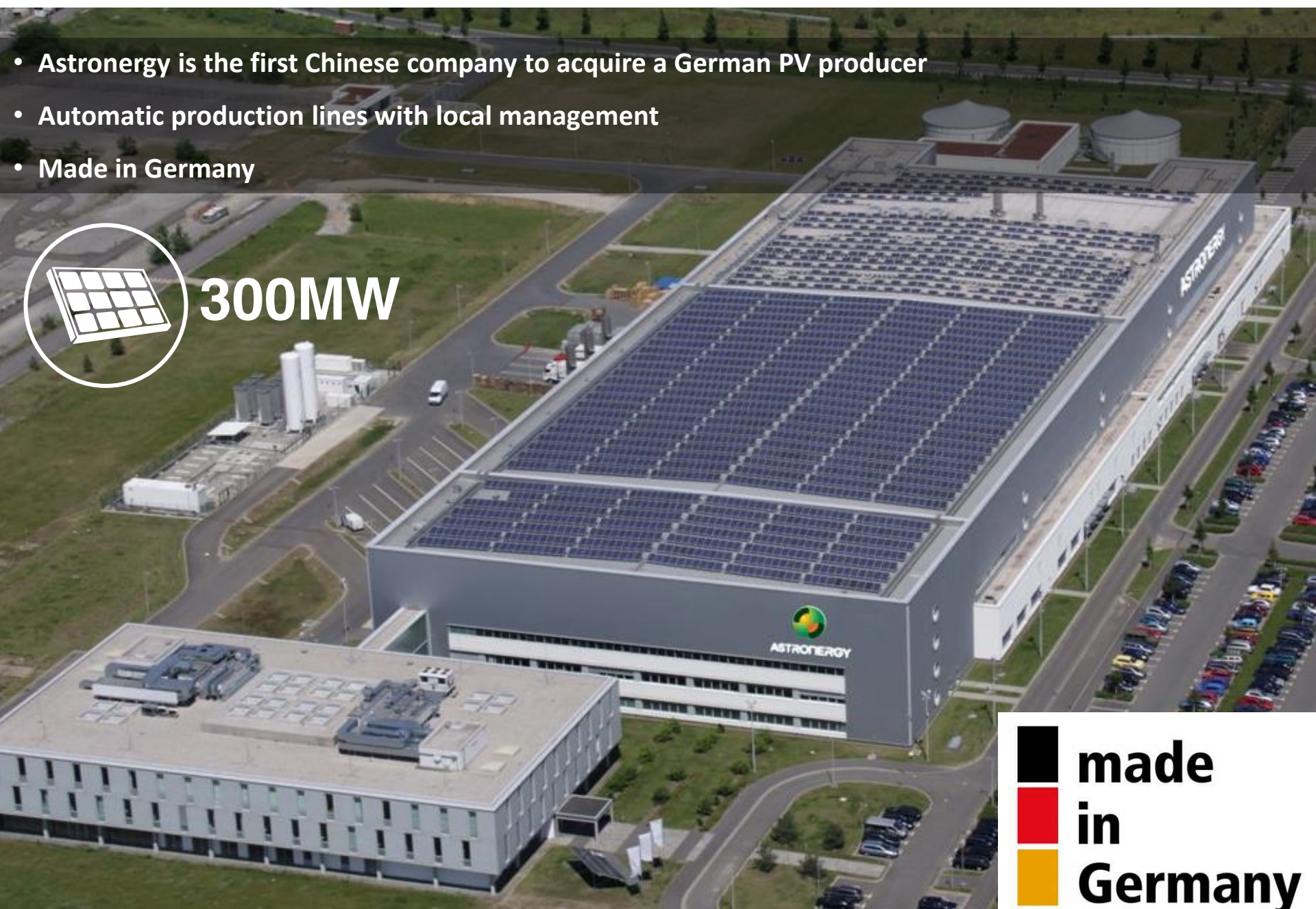
Made in Germany

ASTRONERGY

- Astronergy is the first Chinese company to acquire a German PV producer
- Automatic production lines with local management
- Made in Germany



300MW



 made
 in
 Germany

Made in Thailand

ASTRONERGY



600MW



200MW

New Production Site in Hai'ning

ASTRONERGY



1.6GW



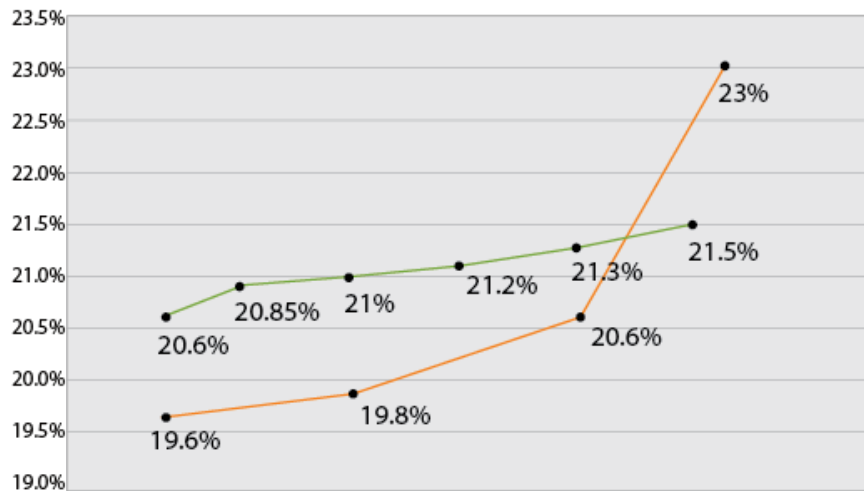
Poly Cell Technology Roadmap (R&D)

ASTRONERGY



Mono-Technology Roadmap 2015-2018 (from R&D)

P : — N : —

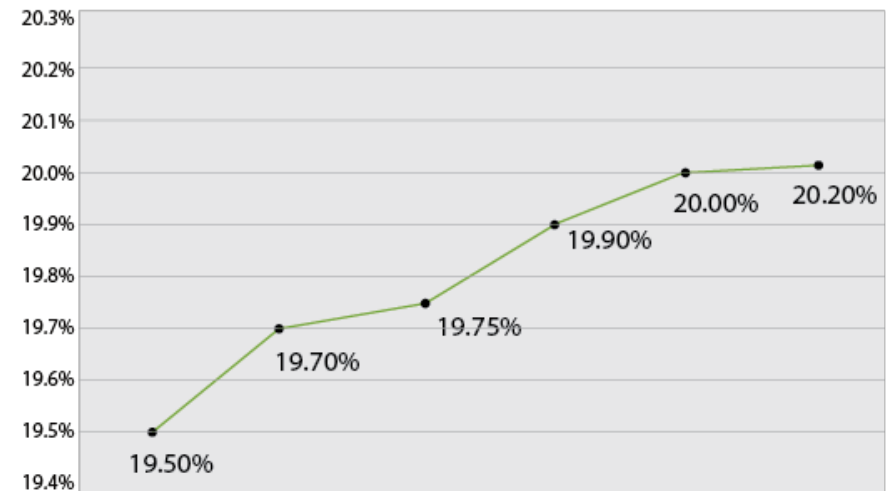


Q4	Q1	Q2	Q3	Q4	
2016			2017		2018	



Poly-Technology Roadmap 2015-2018 (from R&D)

P : —



Q4	Q1	Q2	Q3	Q4	
2016			2017		2018	



- High Power Output
- Excellent Performance at Low Irradiance
- More Credible and Precise PR Value Simulation



- Stringent Production Quality Control
- PID Free Ability
- More Cycles in-house Reliability Test



- Linear Power Output Warranty
- The 3rd party Insurance
- Independent Engineering Due Diligence Report

Monocrystalline



Black Series



Polycrystalline

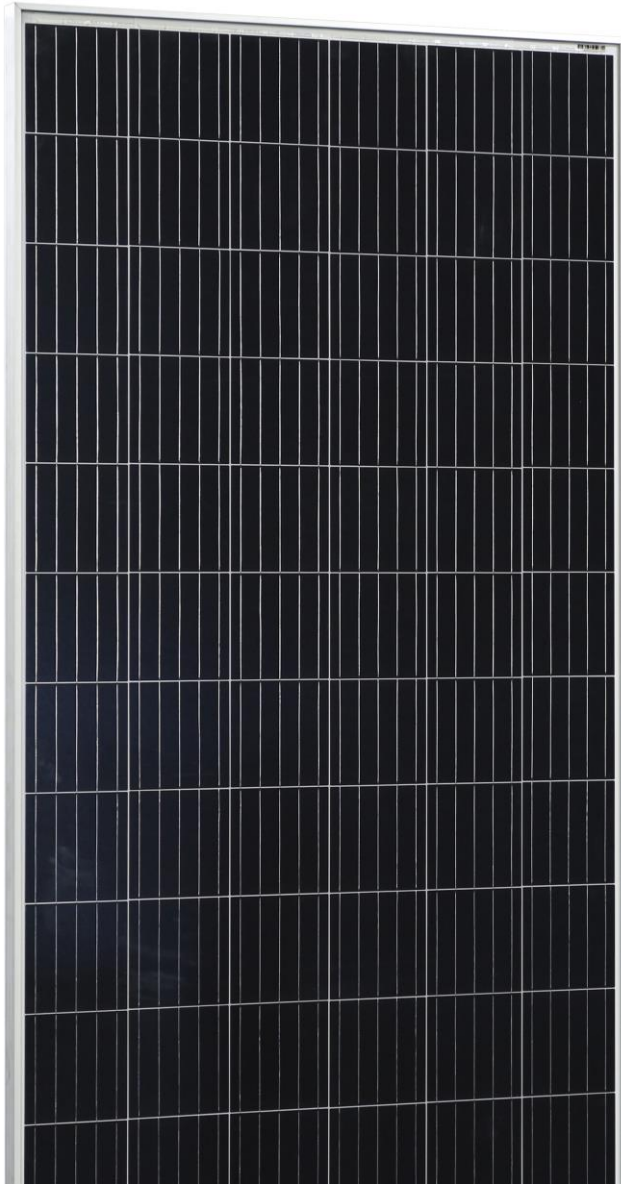


Cells	60 – 72
Output	270 - 365Wp
Module Efficiency	Up to 18.9%

Cells	60
Output	270 - 305Wp
Module Efficiency	Up to 18.7%

Cells	60 – 72
Output	260- 345Wp
Module Efficiency	Up to 17.8%





STAVETM

CHSM6612P/HV Series

- ▶ With innovational 5-busbar cells
- ▶ More power output
- ▶ Increasing cell efficiency
- ▶ Reducing cell series resistance

310W~330W



STAVETM II

CHSM6610P/HV Series

- ▶ With innovational 5-busbar cells
- ▶ Unique PERC technology with optimized module process

275W~290W



STARTM II

CHSM6610M/HV Series

- ▶ With innovational 5-busbar cells
- ▶ Unique PERC technology with optimized module process

290W~305W



STAVE™ II

CHSM6610P(DG) Series CHSM6610P(DGT) Series

- ▶ PID free and snail trail free
- ▶ Applicable for the extremely stringent environment
- ▶ 30-year linear performance warranty & 12-year product warranty
- ▶ Unique PERC technology with innovational 5-busbar cells

CHSM6610P (DG) is double glass module with white EVA material; CHSM6610P (DGT) is double glass module with transparent EVA material

260W~285W



STAVETM II

CHSM6612P(DG) Series

- ▶ PID free and snail trail free
- ▶ Innovative Back rail Installation
- ▶ 30-year linear performance warranty & 12-year product warranty
- ▶ Unique PERC technology with innovative 5-busbar cells

315W-340W

Astronergy aggressively pursues high quality in its products and production processes.

Product Performance & Reliability

- The relative efficiency at 200W/m² VS 1000W/m² drops below than 5%
- Stringent Production Quality Control
- PID Free Ability has achieved a better Cpk value under the condition of 85°C, 85% @-1000V during 96h.

Qualifications & Certifications

- International labs and institutes regularly test conformance to strict international and national standards
- More Credible and Precise PR Value Simulation

In-House Testing & Analysis

- Double EL inspection
- Automated, statistical control and analysis of equipment, cells, and modules
- Quality assurance tests conducted both on incoming materials and on modules before and after packaging
- Perform 3 times of IEC aging standard for sampling

Third-Party Reviews

- **Munich Re**, as a condition of providing reinsurance, also conducts its own rigorous technical and financial assessments
- Product liability insured by **AIG**
- The 3rd party factory audit by **B&V**, **OST Energy** and **SolarBuyer**
- The 3rd party **PAN. FILE** created and test by **PVEL institute** for **PVSyst** simulation

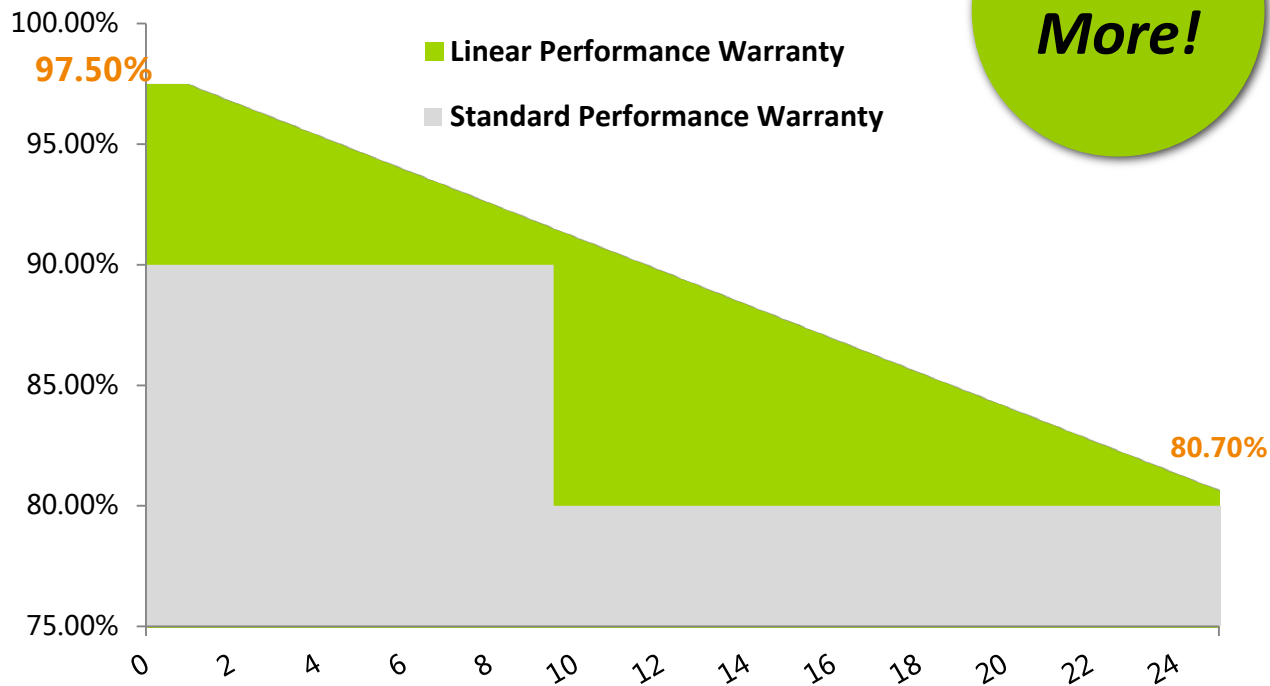
Product Insurance & Bankability

- **Linear Power Output Warranty**
Provide 10 years product warranty and 25 years linear power warranty
- **Independent Engineering Due Diligence Report**

Linear Warranty of Poly Modules

ASTRONERGY

- No less than **97.5%** within 1st year
- Decline rate **< 0.7%** per year from 2nd to 25th year
- **6.07%** more output in the whole lifespan

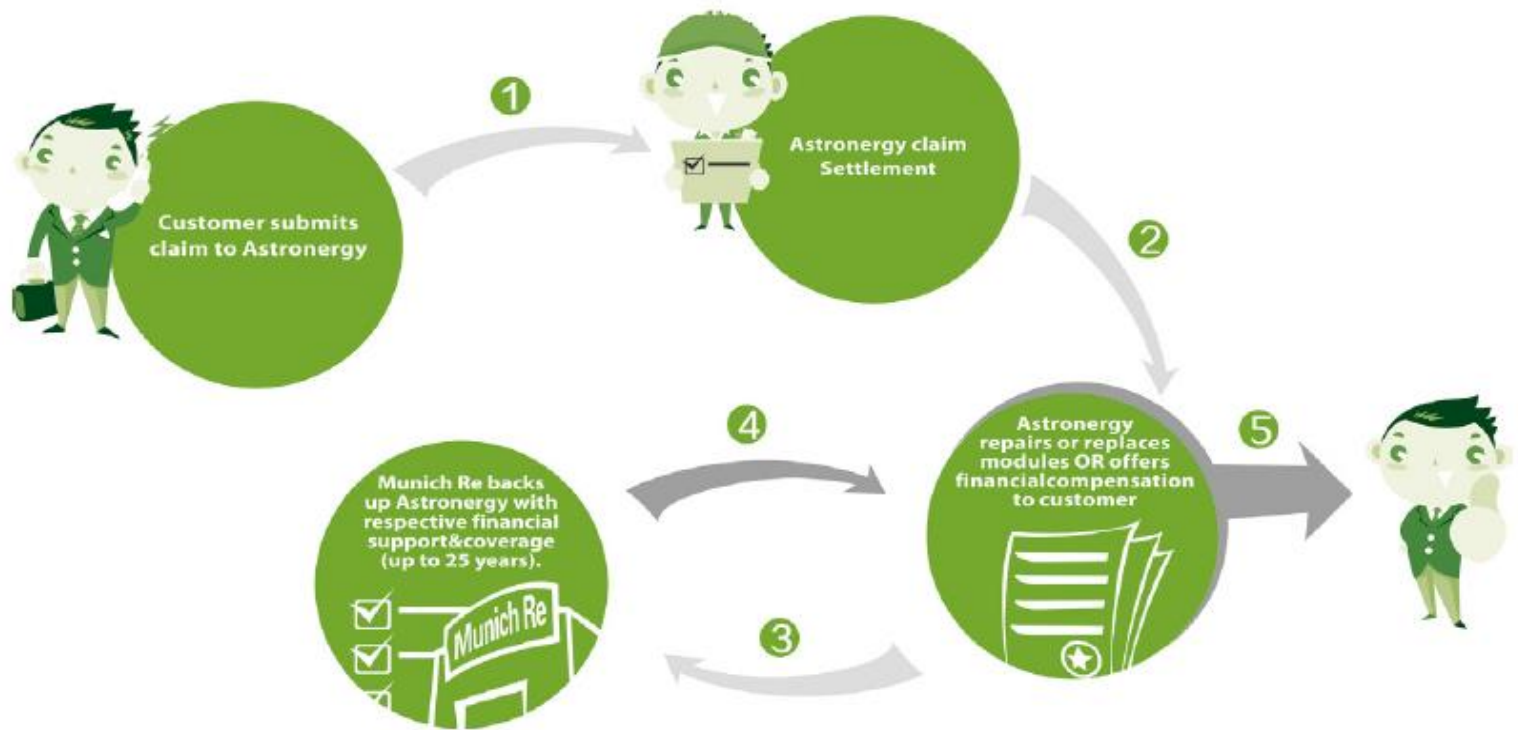


- Astronergy has gained its reputation in the excellent performance of PV modules that were applied to utility-scale PV projects and rooftop systems.

Month	Inverter	PR-Pro2	PR-Pro1	PR-Astronergy Mono	PR_PV Plant
Jan	Ingeteam	90.6%	102.4%	101.5%	82.1%
Feb	Ingeteam	88.6%	98.6%	98.4%	84.6%
Mar	Ingeteam	*	*	*	84.6%
Apr.	Ingeteam	86.0%	88.1%	88.0%	82.9%
May	Ingeteam	83.6%	85.7%	84.8%	80.7%
Jun	Ingeteam	82.5%	84.9%	83.8%	79.3%
Jul	Ingeteam	81.4%	84.0%	83.1%	78.3%
Aug	Ingeteam	80.0%	82.0%	81.1%	78.7%
Sep	Ingeteam	83.8%	85.8%	85.8%	79.8%
Oct	Ingeteam	86.7%	89.0%	89.3%	81.9%
Nov	Ingeteam	81.5%	84.4%	84.9%	81.4%

** Data in Mar. is missing.*

- In the 70MWp Rovigo Power Plant developed by SunEdison, a subsidiary of MEMC, Astronergy supplied 15MWp of PV modules to the project and the tracking record reveals that our modules' performance is quite outstanding.



- The clients will get additional guarantee from the 3rd party in the future 25 years.
- Astronergy guarantees a linear warranty with actual power output of the first year no less than 97.5% of the nominal power output and with annual decline no more than 0.70% from year 2 to year 25.

Total Solution Provider

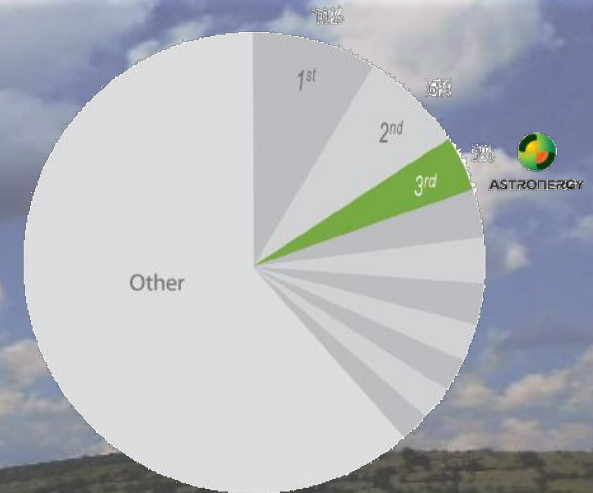
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Astronergy's easy access to the entire Chint Group product portfolio allows us to provide and support total system solutions to our clients with warranty from the same group.



Value-added Service: Project Financing

- Astronergy has over 3200MW PV power plants around the world.
- Cooperate with strategic partners to develop more projects.



* *Solarbuzz*: Astronergy is one of the biggest project developers in China.

Consulting

Planning

Development

Financing

Construction

Management

Customer Portfolio

ASTRONERGY

Astronergy and its solid, worldwide customer base are committed to helping each other succeed



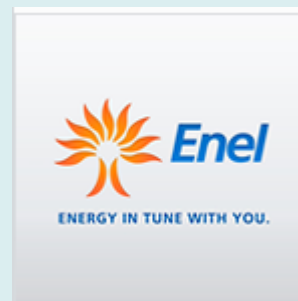
Morgan Stanley



WIRSOL
EINE MARKE DER WIRCON GRUPPE



brightergy



TATA POWER SOLAR



SCHIELE



ITEC
solar





2016 Exhibition: Intersolar EU



Sponsorship: Dutch Open Solar Boat Challenge



2016 PV EXPO Japan

- Press Releases
- Global Trade Shows
- Customer Activities
- Print Ads Campaign
- Web Advertisement
- Sponsorship Programs
- The United Nations assistance programs



India Central Hospital PV System Donation



Baja California Hospital
PV System Donation, Mexico



Hwa Chong International School
PV System Donation, Singapore



As one of the fastest growing solar companies in China, Astronergy has strong support from our central and provincial government.

REFERENCE PROJECTS



Projects in EU



Location: Bulgaria
Modules Used: CHSM 6610P
System Size: 4.5 MW

Projects in China



Yongchang Solar Power Station

Location: Yongchang, Gansu, China

Modules Used: CHSM 6610P

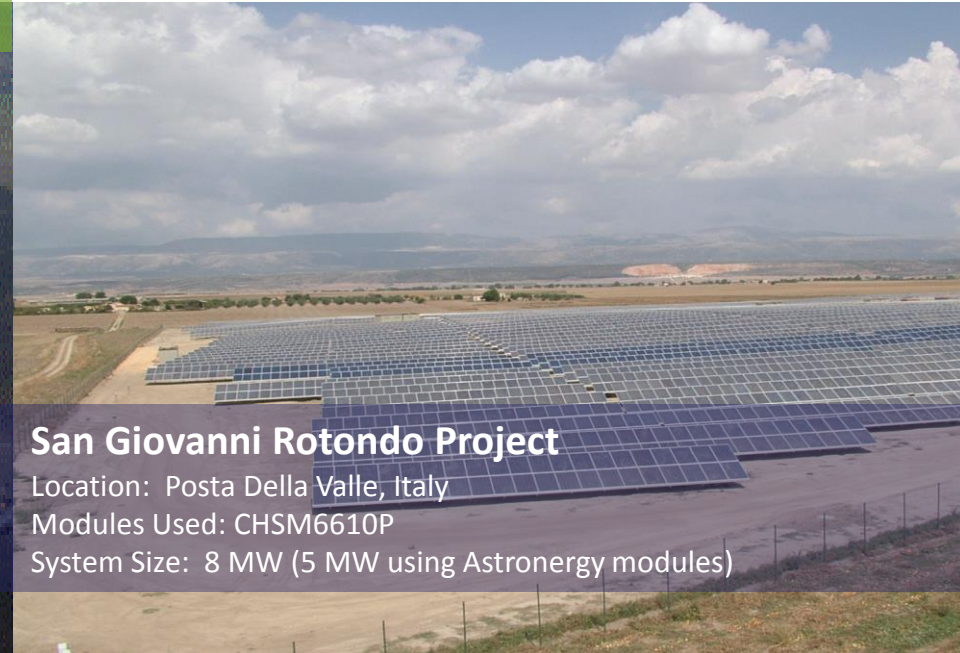
System Size: 200MW

Projects in EU



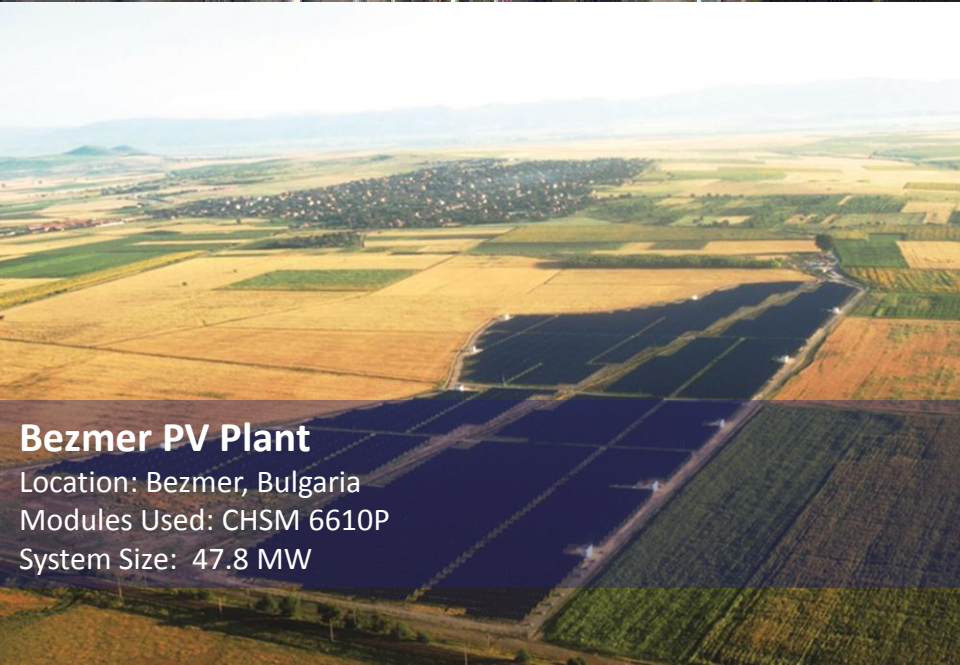
Rovigo Project

Location: Rovigo, Italy
 Modules Used: CHSM 6610M | CHSM 6610P
 System Size: 70 MW (15 MW using Astronergy modules)



San Giovanni Rotondo Project

Location: Posta Della Valle, Italy
 Modules Used: CHSM6610P
 System Size: 8 MW (5 MW using Astronergy modules)



Bezmer PV Plant

Location: Bezmer, Bulgaria
 Modules Used: CHSM 6610P
 System Size: 47.8 MW



Hendai Project

Location: UK
 Modules Used: CHSM6610P/6612P
 System Size: 12MW

Projects in North America



Lincoln Country Project

Location: Fayetteville, TN, USA
Modules Used: CHSM 6610P
System Size: 3MW



Clean Harbors Environmental Services Project

Location: Bridgeport, NJ, USA
Modules Used: CHSM CHSM6610P
System Size: 1.5MW



KingsMountain Solar Plant

Location: North Carolina, USA
System Size: 5 MW



Depot Park Project

Location: Sacramento, CA, USA
Modules Used: CHSM 6610P
System Size: 3 MW

Projects in Asia



Saraburi Project

Location: Saraburi, Thailand
Modules Used: CHSM 6610P
System Size: 5.8 MW



Nasu PV Plant

Location: Tochigi, Japan
Modules Used: CHSM6612P
System Size: 1.56 MW



Boogeo-seom PV Plant

Location: Songam-dong, Chuncheon city, Korea
Modules Used: CHSM6610M
System Size: 6 MW



NVVN PV Plant

Location: Jodhpur, Rajasthan, India
Modules Used: CHSM6612P
System Size: 24 MW

Projects in China



Yongchang Solar Power Station

Location: Yongchang, Gansu, China
Modules Used: CHSM 6610P
System Size: 200MW



Minqin Solar Park

Location: Minqin, Gansu, China
Module Used: CHSM6610P
System Size: 50MW



Dunhuang Solar Park

Location: Dunhuang, Gansu, China
Modules Used: CHSM6610M
System Size: 50 MW



Hangzhou East Railway Station PV System

Location: Hangzhou, Zhejiang, China
Modules Used: CHSM6610P
System Size: 10 MW

Thank You



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