



# **SINOVOLTAICS PV MODULE MANUFACTURER RANKING**

**EDITION 3/2020**

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Welcome to this Edition 3 - 2020 version of the **SINOVOLTAICS PV Manufacturer Ranking Report.**

The Altman-Z Scores in this report have been calculated from June 2017 until July 2020, and provide detailed insight how the financial strength of PV manufacturers has evolved over the past 3 years.

## What's the value of Altman-Z Scores?

Altman-Z Scores are calculated to understand which **PV module manufacturers are financially stable**, and which players are **at risk of going bankrupt**.

For any stakeholder involved in solar projects, the financial stability of the manufacturer is of crucial importance.

Employing solar PV modules from financially stable manufacturers provides for a better hedge against the potential risks of collapsing return of investment (ROI) of any PV project.

## Why is financial stability important?

Ultimately, the **financial stability of a PV module manufacturer is geared to the validity and enforceability of the warranty policies** on its modules. Most people realize that today's PV module manufacturers will probably not be around in 25 years. However for the short to medium term, you want to be sure that warranties are in place.

In many years to come, lots of PV projects will likely face this tough question: whom to contact with performance complaints and replacement requests regarding a malfunctioning module after 2, 5 or even 15 years?

**2017 - 2020:  
rating of  
PV module  
manufacturers  
worldwide**



In this report we present you the **Altman Z-Scores of 70 solar PV module manufacturers**. This report can be used to see how one manufacturer matches up to the other, and can be an important indicator when selecting your PV module manufacturer.

The Altman Z-Scores show you which PV module manufacturers are **financially strong**, and which manufacturers are in the **risk zone of going bankrupt within the coming 2 years**.

On the following pages you find the full table showing the Altman Z-Scores of the major, publicly listed Asian, European and American manufacturers.

The scores have been calculated by team Sinovoltaics with the use of publicly available financial data.

MANUFACTURERS	RANKING	TREND	OCT17	JAN18	APR18	JUN18	OCT18	DEC18	MAR19	JUN19	SEP19	DEC19	MAR20	JUL20	LISTING
LINUO POWER (HONGFA TECHNOLOGY)	1	↑	5,55	5,77	5,55	7,86	5,07	5,71	6,29	5,12	4,93	5,55	4,99	6,46	SHSE:600885
DMEGC SOLAR (DMEGC MAGNETICS GROUP)	2	↓	10,39	8,71	6,90	5,87	4,96	5,15	5,6	5,37	4,29	4,69	5,74	5,37	SZSE:002056
EOPLLY (ZONGYI GROUP)	3	↑	2,69	2,34	2,28	3,57	2,81	3,35	4,73	4,79	4,03	4,01	3,63	4,89	SHSE:600770
LONGI SOLAR	4	↑	3,30	3,70	3,54	2,72	2,33	2,6	3,15	3,2	3,38	3,51	3,54	4,81	SHSE:601012
TEK SENG HOLDINGS	5	↑	1,82	3,39	3,31	2,99	2,71	2,75	1,88	2,31	1,96	2,28	1,83	3,8	XKLS:7200
BOVIET SOLAR	6	↑	4,58	4,38	4,05	3,62	2,97	3,32	3,8	3,67	3,22	3,06	3,3	3,56	SHSE:601137
FIRST SOLAR	7	↑	3,21	4,28	4,10	3,55	2,72	2,6	3,05	3,09	3,07	3,20	2,11	3,37	NAS:FSLR
KYOCERA	8	↓	3,78	3,87	3,56	1,59	3,42	3,28	3,56	3,68	3,86	4,1	3,42	3,28	TSE:6971
GLORIA SOLAR (INVENTEC)	9	↑				2,97		3,23	3,47	3,47	3,13	3,19	3,16	3,26	TPE: 2356
ETERBRIGHT	10	↑	3,51	3,9	4,45	4,03	2,7	3,3	3,47	3,27	2,95	3,02	2,75	3,25	TPE:2049
MITSUBISHI ELECTRIC	11	↑	2,74	2,97	2,84	2,73	3,16	3,1	3,4	3,32	3,27	3,31	3,02	3,19	TSE:6503
ALMADEN	12	↑	1,32	1,15	1,03	1,01	1,28	1,34	1,4	1,46	1,4	1,83	2,39	3,19	SZSE:002623
HANSOL	13	↑	2,08	2,20	2,71	2,46	2,12	1,99	1,9	1,99	2,08	2,34	2,17	2,55	XKRX:004710
HUAMUTONGTU NEW ENERGY (HENAN YICHENG NEW ENERGY)	14	↑				0,66		0,76	0,96	0,85	0,95	1,61	1,71	2,52	SZSE:300080
ASTRONERGY (CHINT GROUP)	15	↑	2,55	2,59	2,70	2,49	2,26	2,33	2,46	2,43	2,23	2,41	2,34	2,42	SHSE:601877
FENGFAN (CHINA SHIPBUILDING INDUSTRY GROUP)	16	↑				2,63		1,97	2,64	2,39	2,66	2,45	2,28	2,35	SHSE:600482
SUNOWE ( ZHEJIANG SUNFLOWER )	17	↑	2,39	1,99	1,80	2,06	1,2	1,22	1,66	-2,07	-1,44	-1,78	-1,7	2,28	SZSE:300111
PANASONIC	18	↑	2,21	2,27	2,22	2,23	2,24	2,15	2,22	2,18	2,04	2,12	2,04	2,26	TSE:6752
LG SOLAR	19	↑	1,89		2,17	1,61	1,53	1,53	1,57	1,55	1,5	2,19	2,1	2,25	XKRX:066570
GINTUNG	20	↓	4,56	3,68	4,22	4,81	3,58	3,65	3,84	2,65	2,57	2,59	2,42	2,2	ROCO:6113
KANEKA	21	↑	2,50	2,56	2,57	2,55	2,5	2,38	2,43	2,39	2,29	2,37	2,09	2,16	TSE:4118

MANUFACTURERS	RANKING	TREND	OCT17	JAN18	APR18	JUN18	OCT18	DEC18	MAR19	JUN19	SEP19	DEC19	MAR20	JUL20	LISTING
HUANSHENG PV (ZHONGHUAN SEMICONDUCTOR)	22	↑				1,22		0,86	1,11	1,07	1,27	1,32	1,67	2,09	SZSE:002129
PHONO SOLAR (CHANGLIN COMPANY)	23	↓	2,42	2,08	2,09	1,36	2,18	2,19	2,28	2,26	2,24	2,40	2,40	2,08	SHSE:600710
JA SOLAR	24	–												1,97	SZSE:002459
SHARP	25	↓	2,11	2,27	2,35	2,35	2,29	2,12	2,03	1,99	1,99	2,08	1,92	1,91	TSE:6753
DAQO NEW ENERGY	26	↑	1,24	2,08	2,25	1,85	1,77	1,9	1,72	1,65	0,96	0,88	1,1	1,9	NYSE:DQ
NEXPOWER (UNITED MICROELECTRONICS)	27	↑	1,37	1,35	1,42	1,64	1,46	1,54	1,53	1,51	1,41	1,62	1,58	1,89	NYSE:UMC
LINYANG PHOTOVOLTAIC (LINYANG ENERGY)	28	↑	2,62	2,67	2,35	1,51	1,43	1,58	1,67	1,69	1,74	1,67	1,81	1,89	SHSE:601222
VINA SOLAR (EAST GROUP)	29	↑	2,75	2,84	2,77	2,43	2,35	2,28	2,61	1,78	1,6	1,61	1,79	1,85	SZSE:300376
BYD	30	↑	2,23	2,25	1,58	1,35	1,37	1,51	1,53	1,52	1,51	1,53	1,6	1,85	OTCPK:BYDDF
SUNVIM GROUP	31	↓	2,24	2,03	1,81	1,76	1,83	1,8	2,07	2,05	2,13	2,24	2,52	1,81	SZSE:002083
ULICA SOLAR (SHANSHAN GROUP)	32	↑	2,72	1,92	1,94	2,05	1,59	1,85	1,92	1,51	1,56	1,68	1,6	1,76	SHSE:600884
CSG	33	↓	1,76	1,84	1,71	1,58	1,51	1,53	1,69	1,65	1,76	1,80	1,84	1,73	SZSE:000012
ALEO SOLAR (SINO-AMERICAN SILICON PRODUCTS)	34	↓	1,05	1,39	1,70	2,11	1,65	1,82	1,85	2,02	1,79	1,91	1,86	1,66	ROCO:5483
TRINA SOLAR	35	–												1,61	SHSE:688599
JOLYWOOD	36	↑	2,86	2,88	2,61	3,01	1,69	1,72	1,85	1,52	1,5	1,59	1,58	1,6	SZSE:300393
AIDE SOLAR (PAN JIT INTERNATIONAL)	37	↑	1,43	1,61	1,76	1,79	1,14	1,29	1,94	1,85	1,61	1,56	1,4	1,59	TPE:2481
TOPSOLA (HONGRUN)	38	↑				1,3		1,26	1,3	1,28	1,19	1,25	1,39	1,5	SZSE: 002062
CANADIAN SOLAR	39	↑	0,69	0,70	0,92	1,15	1,15	1,18	1,42	1,14	1,21	1,25	1,2	1,45	NAS:CSIQ
ANJI TECHNOLOGY	40	↑				1,2		1,38	1,48	1,46	1,42	1,39	1,24	1,45	TPE:6477
HYUNDAI HEAVY INDUSTRIES	41	↓	1,89	2,29	1,62	1,54	1,48	1,53	1,91	1,65	1,58	1,53	1,44	1,39	XKRX:267250

MANUFACTURERS	RANKING	TREND	OCT17	JAN18	APR18	JUN18	OCT18	DEC18	MAR19	JUN19	SEP19	DEC19	MAR20	JUL20	LISTING
EGING PV	42	↓	2,20	2,36	2,20	1,91	1,67	1,57	1,8	2,27	2,13	1,82	1,83	1,39	SHSE:600537
RISEN ENERGY	43	↑	2,04	1,89	1,83	1,79	1,17	1,35	1,56	1,26	1,27	1,27	1,25	1,39	SZSE:300118
S-ENERGY	44	↑	1,29	0,91	1,47	1,48	1,37	1,4	1,07	0,99	0,96	0,98	0,93	1,34	XKRX:095910
ALEX SOLAR (SHANGHAI HUAYI GROUP)	45	↓	2,27	2,08	2,02	2,08	2	1,98	2,02	1,87	1,75	1,63	1,59	1,29	SHSE:600623
TOPRAYSOLAR	46	↑	1,97	1,94	1,61	1,14	0,88	0,91	1,06	1,02	0,97	1,03	1,11	1,21	SZSE:002218
HT SAAE	47	↓	1,24	1,21	1,07	0,85	0,86	0,83	1,07	1,55	1,53	1,43	1,42	1,2	SHSE:600151
TALESUN (ZHONGLI SCIENCE AND TECHNOLOGY)	48	↑	1,19	1,20	1,29	1,57	1,44	1,47	1,53	1,19	1,12	1,10	1,13	1,17	SZSE:002309
SHINSUNG E&G	49	↑	0,66	1,10	1,18	1,15	2,05	2,03	1,06	0,91	0,47	0,78	0,71	1,11	XKRX:011930
JINKOSOLAR	50	↑	1,28	1,17	1,19	1,16	0,88	0,89	0,97	1,01	0,84	0,93	0,9	1,07	NYSE:JKS
TAINERGY	51	↑	1,07	1,41	1,10	0,88	0,57	0,02	-0,02	-0,54	-0,28	-0,02	0,35	1,05	TPE:4934
AU OPTRONICS	52	↓	1,67	1,74	1,74	1,76	1,42	1,5	1,42	1,24	1,18	1,14	1,08	1	OTCPK:AUOTY
GCL SYSTEM INTEGRATION TECHNOLOGY	53	↓				1,6	1,69	1,5	1,54	1,68	1,7	1,56	1,48	0,94	SZSE:002506
JETION SOLAR (CNBM)	54	↑	0,33	0,41	0,42	0,42	0,36	0,38	0,68	0,68	0,69	0,70	0,71	0,86	HKSE:03323
CECEP	55	↑	0,92	0,90	0,91	0,82	0,74	0,74	0,83	0,73	0,73	0,80	0,79	0,8	SZSE:000591
ERA GROUP	56	↓	3,30	2,98	2,81	2,55	0,23	0,96	1,1	0,88	1,07	0,94	0,82	0,76	NYSE:ERA
AKCOME	57	↓	0,93	1,05	0,89	0,91	0,94	0,94	1,17	1,24	1,27	1,22	1,23	0,65	SZSE:002610
UNITED RENEWABLE ENERGY CO	58	↓				0,23		0,62	0,76	0,75	0,74	0,72	0,63	0,57	TPE:3576
TSEC	59	↑				0,26		-0,15	-0,06	-0,18	0,3	0,57	0,47	0,55	TPE:6443
MOTECH	60	↑	0,81	0,86	0,82	0,89	0,51	0,24	0,26	-0,69	0,1	0,29	0,18	0,5	ROCO:6244
NINGXIA YINXING ENERGY	61	↓	0,67	0,43	0,20	0,16	0,35	0,35	0,53	0,48	0,51	0,50	0,47	0,44	SZSE:000862
SUNPOWER	62	↑	-0,02	-0,10	-0,96	-0,77	-1,46	-1,43	-1,45	-1,47	-0,63	-0,51	-0,1	0,28	NAS:SPWR
RITEK	63	↓	0,56	0,46	0,50	1,42	0,65	1,29	1,23	0,93	0,85	0,74	0,51	0,22	TPE:2349

MANUFACTURERS	RANKING	TREND	OCT17	JAN18	APR18	JUN18	OCT18	DEC18	MAR19	JUN19	SEP19	DEC19	MAR20	JUL20	LISTING
SOLARGIGA ENERGY HOLDINGS	64	↓	0,14	0,16	0,12	1,01	0,99	0,99	1,01	0,24	0,23	0,23	0,22	0,11	HKSE:00757
REALFORCE POWER (DYNAVOLT RENEWABLE)	65	↑	1,69	1,44	1,26	0,64	0,01	0,03	0,07	-2,09	-2,1	-2,08	-2,1	-0,32	SZSE:002684
SUNLINK PV (IRICO GROUP NEW ENERGY)	66	↑	-0,67	-0,65	-0,53	-0,54	-0,55	-0,56	-0,52	-0,59	-0,61	-0,57	-0,6	-0,56	HKSE:00438
JIawei SOLAR	67	↓	3,04	2,66	2,30	2,33	1,46	1,17	1,31	-0,18	-0,23	-0,22	-0,37	-0,59	SZSE:300317
SOLARTRON	68	↑	0,23	1,82	0,31	0,16	0,37	0,24	-0,26	-0,47	-0,47	-0,66	-0,91	-0,88	BKK:SOLAR
SUNTECH (SHUNFENG INTERNATIONAL CLEAN ENERGY)	69	↓	-0,04	-0,04	0,22	0,04	0,05	0,08	0,06	-0,23	0,03	0,02	0,02	-0,91	HKSE:01165
RENESOLA	70	↓								-1,42	-1,26	-1,27	-1,33	-1,49	NYSE:SOL

\* The trend column in the table reflects a comparison of the current quarter score to the previous one.



# Graph overview

**Graph #1** - The latest PV manufacturers ranking, recorded July 2020

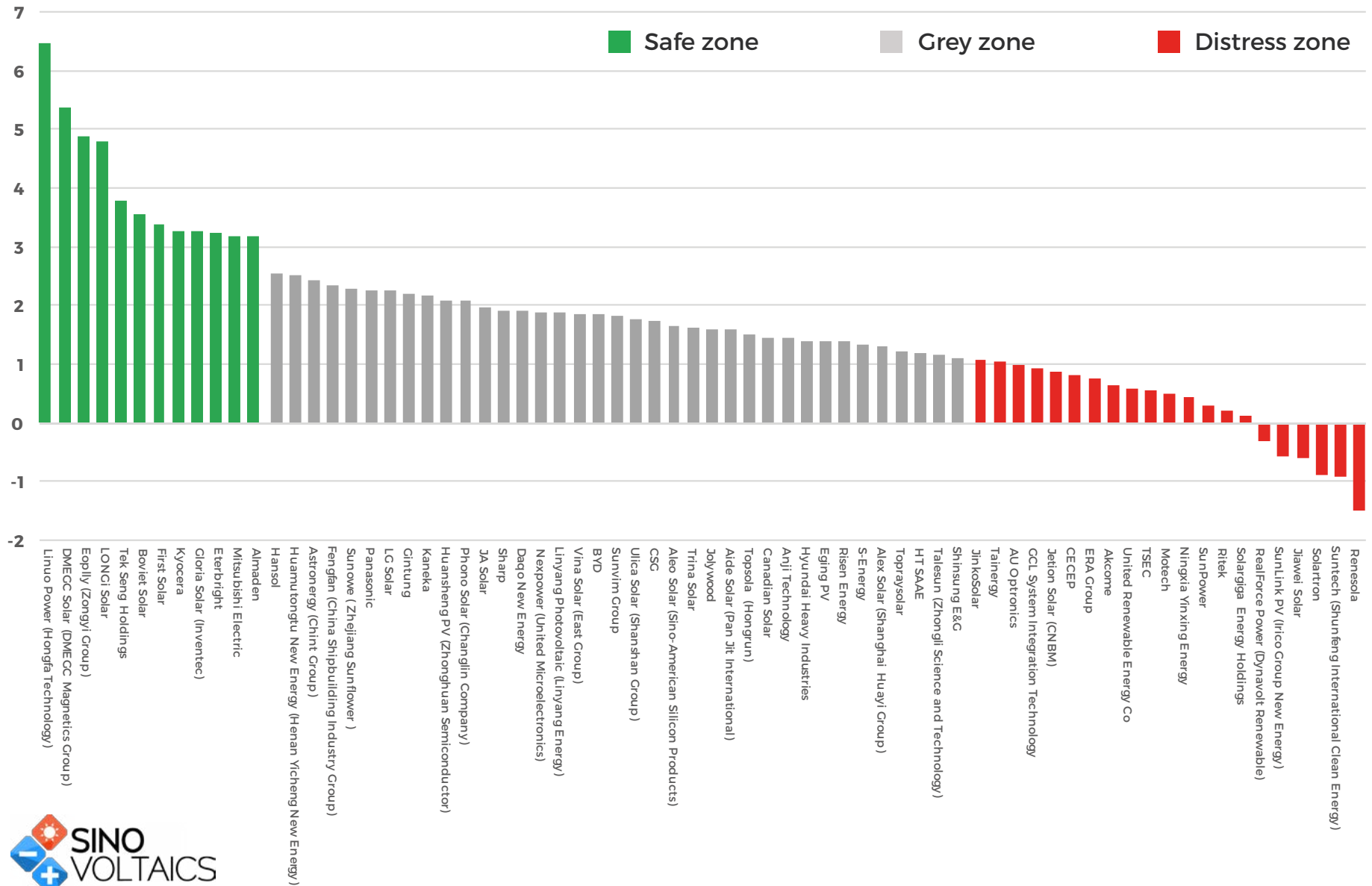
**Graph #2** - PV module manufacturers that are currently in the Safe Zone

**Graph #3** - PV module manufacturers that are currently in the Grey Zone

**Graph #4** - PV module manufacturers that are currently in the Distress Zone

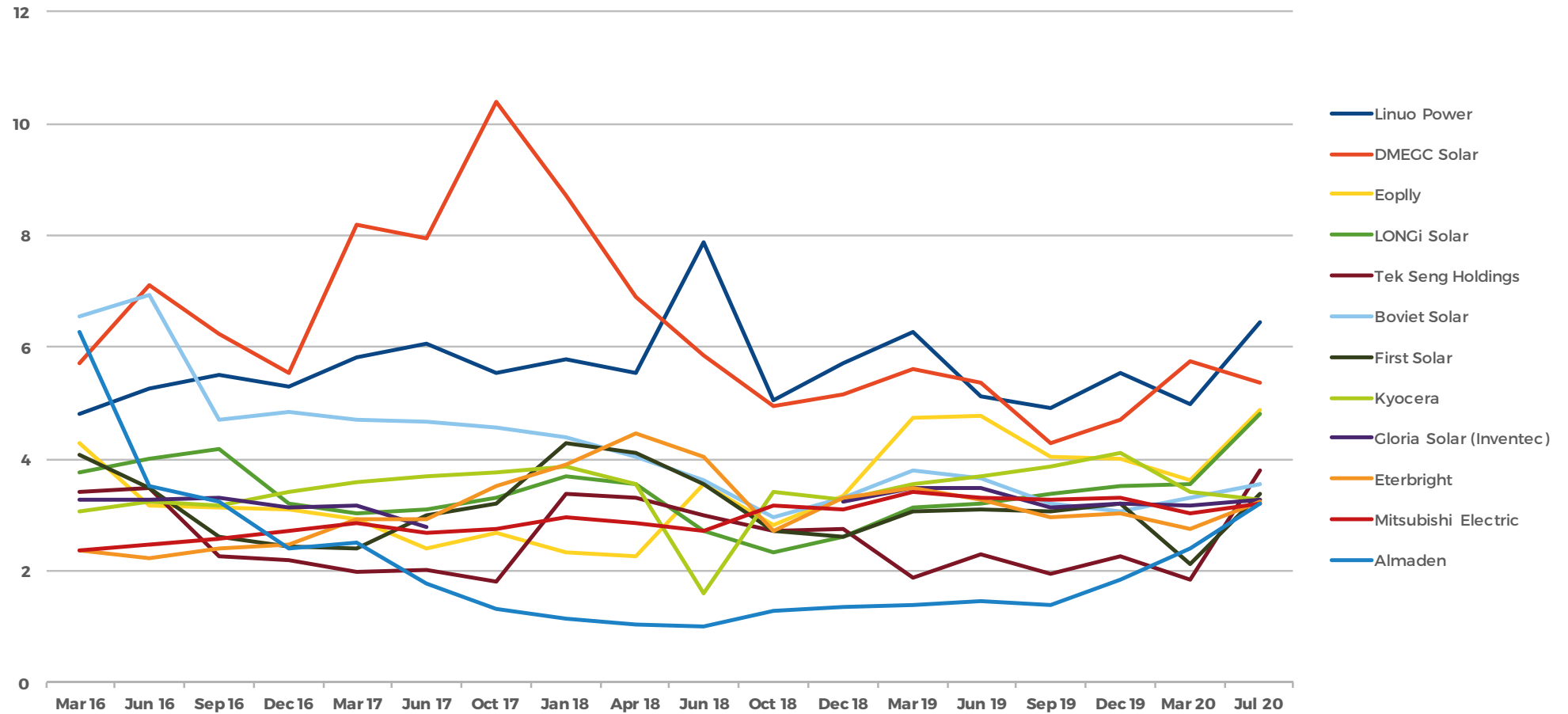
# Graph #1 - Full ranking overview of PV module manufacturers

## Sinovoltaics PV manufacturer ranking - Edition #3 - 2020



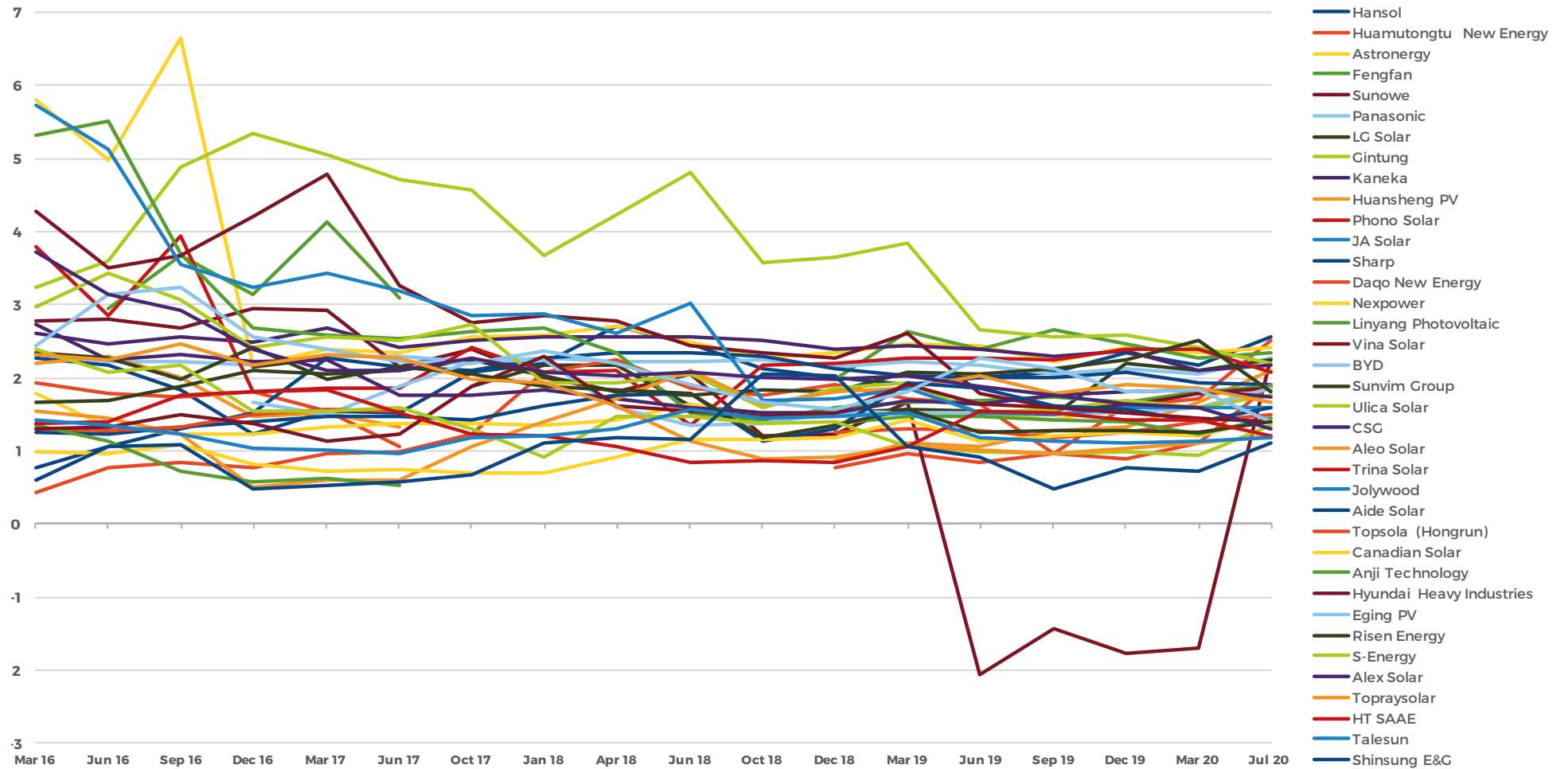
# Graph #2 - PV module manufacturers - Safety Zone

Sinovoltaics PV manufacturer ranking - Edition #3 - 2020 - Safety Zone



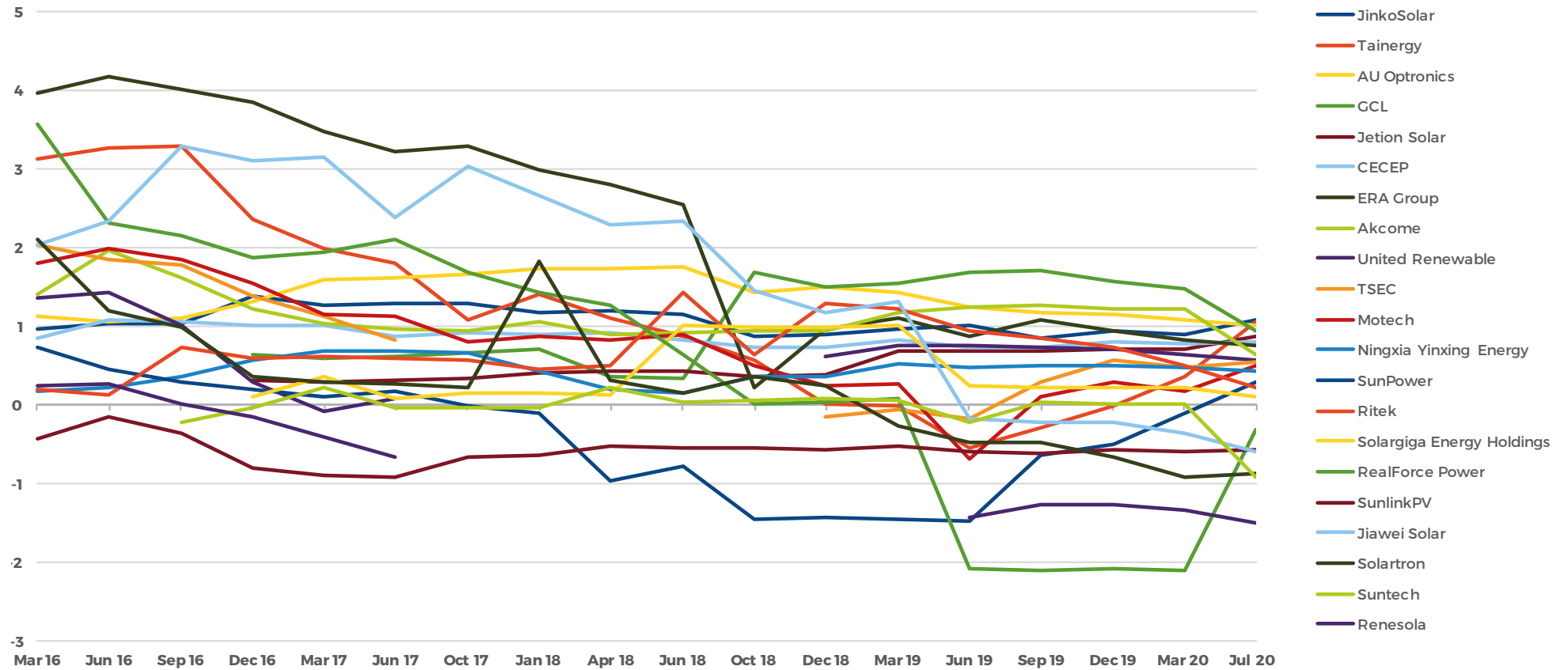
# Graph #3 - PV module manufacturers - Grey Zone

Sinovoltaics PV manufacturer ranking - Edition #3 - 2020 - Grey Zone



# Graph #4 - PV module manufacturers - Distress Zone

Sinovoltaics PV manufacturer ranking - Edition #3 - 2020 - Distress Zone



## How is the Sinovoltaics Ranking Score calculated?

The Sinovoltaics PV Manufacturer Ranking Score is based on the Altman Z-Score

$$\text{Altman Z-Score} = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$$

The original formula is broken down as following:

<b>A</b>	Working Capital/Total Assets: measures liquid assets in relation to the size of the company.
<b>B</b>	Retained Earnings/Total Assets: measures profitability that reflects the company's age and earning power
<b>C</b>	Earnings Before Interest & Tax/Total Assets: measures operating efficiency apart from tax and leveraging factors. It recognizes operative earnings as being important to long-term viability.
<b>D</b>	Market Value of Equity/Total Liabilities: adds market dimension that can show up security price fluctuation as a possible red flag
<b>E</b>	Sales/Total Assets: a standard measure for total asset turnover

## How are the Altman Z-Scores interpreted?

The scores are categorized into 3 zones called the Safe Zone, Grey Zone and Distress Zone:

$Z > 2.6$	Safe Zone
$1.1 < Z < 2.6$	Grey Zone
$Z < 1.1$	Distress Zone

## How to interpret companies in the 'GREY ZONE'?

With a large number of companies in the 'Grey Zone', how to interpret these scores when selecting a manufacturer?

While ideally a manufacturer is in the 'Green Zone', some companies have been consistently in the Grey Zone for years.

Take for instance **Hansol**. Here a number of Altman Z-Scores over the years:

**1.55 on Q1-2017**

**1.99 on Q4-2018**

**2.34 on Q4 2019**

**2.55 on Q2 2020**

### Currently stands at 2.55 (July '20)

These numbers show that **Hansol** has been stable for years. Add the fact that **Hansol** AZ score has seen a gradual improvement since early 2018 and they may just as well be one of the most solid companies on the list.

You could argue the same for known players such as **BYD**, **CSG** and **Nexpower**. As you can see each of these companies show a rather stable score since early 2017:

BYD	CSG	Nexpower
1.85 (Q2 2020)	1.73(Q2 2020)	1.89 (Q2 2020)
1.53 (Q4 2019)	1.8 (Q4 2019)	1.62 (Q4 2019)
1.51 (Q4 2018)	1.53 (Q4 2018)	1.54 (Q4 2018)
1.88 (Q2 2017)	1.76 (Q2 2017)	1.37 (Q2 2017)
1.49 (Q1 2017)	2.25 (Q1 2017)	1.32 (Q1 2017)





# SINOVOLTAICS PV MODULE MANUFACTURER RANKING



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# Discover our ZERO RISK SOLAR™ SERVICES

## QUALITY ASSURANCE



### PV QUALITY INSPECTIONS

Hire our **PV specialized quality engineers** to inspect your PV components on-site at the factories in Asia.

#### TEST ALL PV COMPONENTS, INCLUDING:

- Solar modules
- Inverters
- BOS components
- Solar cells
- Storage



### FACTORY AUDITS

Make a **fully informed decision** on the factories you're procuring from. Our accredited auditors provide you with **full insights** in the manufacturing capabilities of any PV factory worldwide. Use our **audit scoring card** system to manage and compare your factory selection.

#### FACTORY AUDITS INCLUDE:

- Pre-manufacturing audit
- General qualification audit
- Factory benchmark
- Factory background check
- Financial audit



### LABORATORY TESTING

**Thoroughly test** your solar PV components at our **accredited PV lab**. Inform about country and climate specific test procedures for your region.

#### A SELECTION OF LAB TESTS:

- Potential Induced Degradation (PID) test
- Light Induced Degradation (LID) test
- EVA gel content test
- Damp heat testing
- Thermal cycling testing



### SOLAR FARM INSPECTIONS

On-site solar farm **inspections** and **troubleshooting** worldwide. Assess your existing solar farms and optimize performance.

#### SOLAR FARM INSPECTIONS INCLUDE:

- Drone infrared thermography
- I-V measurement
- Electroluminescence imaging
- Electrical safety tests
- Commissioning checks

## PV INSURANCE



Have your solar farm projects insured by the **leading insurance companies** in the solar energy industry. Solar farm developers that have their solar modules inspected by Sinovoltaics can become eligible to have their new and existing solar energy project insured.

#### INSURANCE PRODUCTS INCLUDE:

- Construction all risk
- Operational all risk
- Inherent defect coverage
- PV Performance Warranty insurance
- PV Performance Guarantee insurance

## CUSTOM SOLAR MODULES



Sinovoltaics offers a **worldwide service** of Custom Engineering and Manufacturing of Solar Modules.

#### CUSTOM SOLAR MODULES INCLUDE:

- Solar tiles / Roof slates
- Building Integrated Photovoltaics (BIPV)
- Custom materials, including 100% polymer solar modules to achieve semi-flexible and light weight properties.
- Latest cell technologies, including N-type, NWT and Mono PERC.
- Any size, any shape.



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**10+ YEARS**  
at the PV  
factories in Asia

**6.4 GW+**  
Zero Risk  
Solar projects

**12,000+**  
Community

**150+**  
Factories  
audited