



☉ SUN EARTH by **SiG**
Energy - naturally with service **SOLAR**

**PHOTOVOLTAIC-
MODULES**

EVERY RAY OF SUNLIGHT IS A BUILDING BLOCK TO OUR FUTURE

Sun Earth Solar Power - one of the most
experienced photovoltaic producers in the world
takes responsibility towards the future seriously



Sun Earth Solar Power is one of the most experienced producers of PV-modules worldwide. The Sun Earth competence is based on more than 40 years of experience in the manufacturing of ingots, wafers, solar cells, and photovoltaic modules. Next to a complete vertical range of manufacture, optimized automation technology and dependable production capacity, Sun Earth quality is guaranteed by our high German quality standards.

German quality management "made by SiG Solar" combined with the advanced production facilities of Sun Earth Solar Power guarantee the manufacturing of a product which meets the highest demands in regard to quality.

CHINA. THE POWER OF THE CENTER.

Sun Earth Solar Power: company of the future

Sun Earth: High-tech from China teams up with technical engineering that meets European standards. On several levels of the production process, Sun Earth uses the best of both worlds to generate the power of the center.

Whether Europe or China, SiG Solar or Sun Earth Solar Power – we have the same goal: to preserve clear blue skies, green hills, and clear oceans for our descendants.

For this we have invested and extended our facilities to an area of more than 650.000 sqm:

- We currently have five manufacturing sites at the technology location of Ningbo, where approximately 1 GW PV-modules are produced annually. This makes us one of the ten leading PV-module producers in the world.
- The inhouse production depth is gapless. The production process is fully integrated.
- German quality management secures the complete chain of production.



Progress instead of standstill
Sun Earth production capacity on the increase

2006: 100 MW	2011: 1 GW
2008: 200 MW	2012/2013: 2 GW
2010: 600 MW	

History and Cornerstones

Sun Earth Solar Power & SiG Solar

1966 Foundation of the semi-conductor production at Ningbo

1978 Entry into the field of development & production of solar cells and PV-modules

1999 Foundation of the Ningbo Solar Electric Power Co. Ltd. and entry into the module distribution outside of government use

2004 SiG Solar becomes the primary distribution partner for the German and European PV market

2005 Certification of Sun Earth PV-modules by CE, TÜV, IEC, UL and Golden Solar

2005 - 2010 1 billion euro investment in development and production

2006 Start of construction of the extended high-tech production facility for PV-modules on a total area of more than 80.000 sqm

2007 Entry into the production of silicon

2010 Change of name into Sun Earth Solar Power Co. Ltd.

2011 Extension of annual production capacity to nearly 1 GW

2012 Start of construction of a new production facility with 1 GW additional capacity



HIMALAYA – 40 YEARS AGO

Sun Earth®: Tested on the roof of the world
– proven in space

Sun Earth PV-systems have been in operation for more than four decades. Since the 1970s, photovoltaic modules by Sun Earth have been supplying telecommunication satellites with the power to fulfill their missions in orbit. To keep up with the constantly increasing demands in regard to innovation and technology, every new technical feature has to withstand long-term tests in the harshest climatic conditions of the Himalayan Mountains – the roof of the world. These demanding practical tests in combination with the most advanced production techniques are the solid foundation for our guarantees which are based on proven dependability.

OUR TESTING SITE IN OVER 5.500 METERS
ELEVATION IN THE HIMALAYAN MOUNTAINS



COMPETENCE ON LOCATION

Silicon Production

Sun Earth's subsidiary Zhejiang Zhongning Silicon Production Co. Ltd. manufactures semi-conductors and the polycrystalline silicon raw materials for solar cell production. The purity of the material is the foundation for the sustainable efficiency of the modules.

Research & Development

At the research facility SIPV at Ningbo, highly qualified scientists and engineers work on the further development of polycrystalline silicon ingots and wafers.

Solar Cell Production

Heart of the module manufacturing process is the production of solar cells by Sun Earth Solar Power Co. Ltd. Here, in co-operation with an independent research department, the foundation of the outstanding quality of Sun Earth modules is laid.

Sun Earth Solar Power Headquarters

On location at Ningbo is where threads converge: Integration of modules, quality management at the interface of Chinese know-how and European quality standards as well as the administrative management of Sun Earth Solar Power Co. Ltd. takes place here.



**Every grain of sand
holds a piece of our future**

The production of Sun Earth modules at the high-tech location at Ningbo, China, is characterized by a fully integrated vertical range of manufacture. This way Sun Earth can control, adjust and change module production at any time during the manufacturing process and is therefore in the position to give absolutely reliable guarantees.

THE SOLAR POWER COUNTDOWN: FROM GRAINS OF SAND TO MODULES

Use innovative technology. With Sun Earth, your photovoltaic solution will become a solar power plant characterized by strong performance, stability, and durability of its modules. It's all about Vertical Integration: Sun Earth-module production is fully integrated from the first grain of sand up to module manufacture.

Solar modules by Sun Earth not only meet the high demands on quality made by the SiG Solar distribution specialists, they are also certified by the TÜV Rheinland (German Association for Technical Inspection), UL, VDE, and MCS. Certificates verify internal audits and data in regard to durability, performance and stability of our modules.



QUARTZ SAND

Quartz sand and quartz gravel are the basic raw materials in the production of monocrystalline and polycrystalline solar cells.

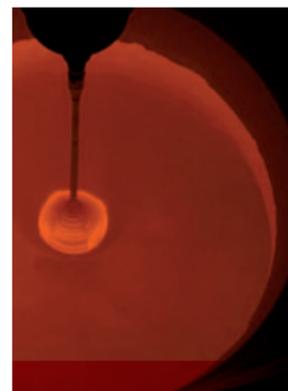
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SILICON

Silicon is produced by chemically purifying quartz sand and putting it through a melting process. The purer the raw material is, the better the performance of the end product. Sun Earth operates its own silicon-production with a capacity of 9,000 tons per year.

6



INGOT

During the production of these bars of material, the crystalline structure of the solar cells is determined. The highly advanced ingot-and wafer factory at QuZhou was taken over by Sun Earth in 2007 as a subsidiary firm and extensively modernized.

5



WAFER

Wafer is the term for a crystalline silicon disc which is cut off from a silicon block in a very complex procedure.

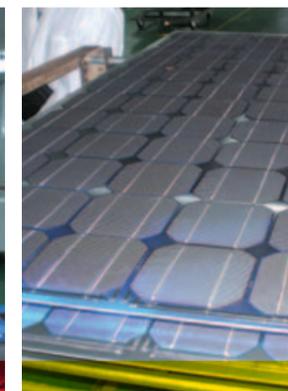
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SOLAR CELL

Solar cells are made from wafers. Light energy is turned into electricity in these cells.

3



PV-MODULE

For the production of a module, cell strings are electrically fused and fixed to a frame. The Sun Earth PV-modules are assembled at the new Sun Earth Solar Power headquarters at the high-tech park at Ningbo. The plant has had an output of 1 gigawatt per year since 2007.

2



SOLAR SYSTEM

A photovoltaic system combines the modules into a power plant. With the help of inverters, DC-voltage is converted to AC – an alternating current – and fed into the power grid.

1

OUR NO. 1 RESOURCE: CONTROL

THE SUN EARTH® PRODUCTION OUR PRODUCTS SHOW WHO WE ARE

From silicon production to manufacturing ingots, wafers, and solar cells on to the integration of all PV-modules: Sun Earth production is fully integrated. SiG Solar is able to monitor and influence product quality at all stages of the manufacturing process.

Our production facilities are highly advanced and equipped by European manufacturers. This way, the cost of production is greatly reduced – all to the end

consumer's benefit. At the same time, by using energy saving production technology, CO₂ emission - and therefore our ecological footprint - is minimized.

With electroluminescence measuring Sun Earth Solar Power tests the modules before and after they are laminated. Conspicuous solar cells are exchanged immediately – this process, based on innovative technical engineering, is probably unparalleled in the world.



ELECTROLUMINESCENCE WE DO MORE THAN WHAT'S NECESSARY FOR A RELIABLE PERFORMANCE

With electroluminescence measuring (EL) the quality of the modules is monitored during the production process – invisible defects in solar cells are discovered by this method. Flaws such as short circuits or microscopic damages in the material, non-conductive contacts or faulty electrodes are discovered immediately. As opposed to the random sample EL-measuring of most other module producers, Sun Earth checks every single module twice with the EL-testing – before and after laminating. This way, Sun Earth exceeds increasing demands on product quality and excellence on the global PV-market.

EUROPEAN INSPECTION LEVELS

Quality protection starts at the production stage of Sun Earth PV-modules: Not just random samples are tested-100 percent of the Sun Earth PV-modules are examined by electroluminescence-testing. Even the slightest faults in the material are discovered and potential losses in performance prevented.

WE TEST THOROUGHLY

We have a modern testing facility certified according to German TÜV (German Association for Technical Inspection) standards. Here we are able to conduct tests in line with IEC and UL standards.

CERTIFIED SAFETY FOR PRODUCTIVE DECADES

„Sun Earth modules (TDB 125* 125-72-P) have exceeded IEC 61215 standards by far“. This is stated in the examination reports of the German Fraunhofer-Institute. Sun Earth quality modules by SiG Solar have once again not only met but significantly exceeded the long-term durability standards in testing solar energy systems according to ISE 2010.

Damp-Heat Test IEC 61215 10.13

Result: The modules exceed the requirements by the factor of three in regard to environments with intense damp/heat.

Thermal Cycling Test IEC 61215 10.11

Result: The modules exceed the requirements in regard to temperature fluctuation and three times extended performance time.

Mechanical Load Test IEC 61215 10.16

Result: Sun Earth PV-modules' structural engineering sustains above-average loads.

SUCCESSFULLY TESTED BY:



TestLab
PV Modules



WE LEAVE NOTHING TO CHANCE

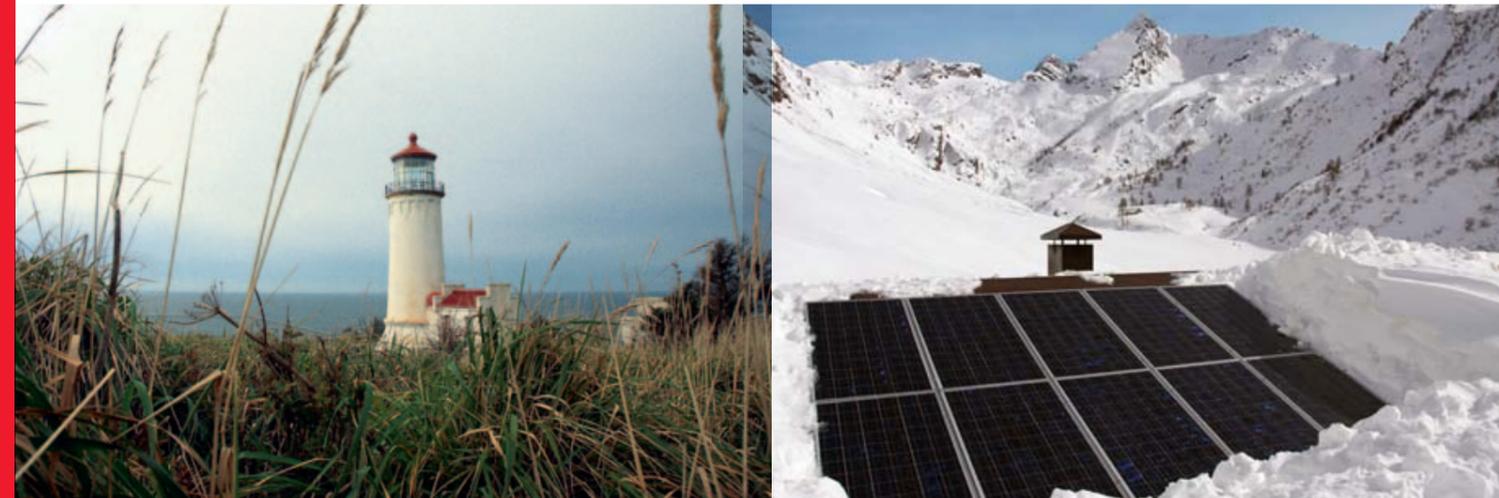
Quality and control
during the entire production process

SUN EARTH® OUR MODULE FAMILY

SOLAR POWER FOR EVERY REGION

With the great variety of Sun Earth PV-modules, SiG Solar offers high quality products for flexible applications with customized assembly concepts – even in regions with extreme weather conditions.

Sun Earth PV-modules by SiG Solar are available in different sizes and power levels and are highly versatile in application. And they are perfect for individual solutions. Sun Earth technology works to your advantage: With our high-performance solar cells and our premium module construction you can rely on high harvests.



SUN EARTH®-SPECIFICATION

MONO

POLY

TECHNICAL DATA

NOCT:	46°C
Temperature coefficients	
Power:	- 0,45%/°C
Open circuit voltage:	- 0,35%/°C
Short circuit current:	+ 0,05%/°C
Max. system voltage (IEC):	1000 VDC
Weight	
(125*125-72-P) 190-195 Wp Mono:	16 kg
(125*125-96-P) 250 Wp Mono:	20,5 kg
(156*156-60-P) 235-240 Wp Poly:	20 kg
(156*156-72-P) 285 Wp Poly:	23,5 kg
Frame:	anodized aluminium
Front side:	highly transparent, anti-reflective solar-safety-glass
Glass thickness:	3,2 mm
Encapsulant:	EVA
Back side:	TPT
Junction box:	IP65
Bypass diodes:	3 pcs 4 pcs (250 Wp Mono)
Plug:	MC-T4 compatible
Output cable:	4 mm ² , cable length 90 cm (190/195), 1 m (235/240/250) and 1,2 m (285)

MAXIMUM RATINGS

Operation temperature (environment):	-40°C~+85°C
Max. load capacity:	5400 Pa
Max. hail resistance:	25 mm at 23 m/s

PERFORMANCE

Standard test conditions:	Radiation: 1000 Wm ² AM: 1,5 TC: 25°C
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• Qualified, IEC 61215
• Safety tested, IEC 61730
• Periodic inspection



Modules 190, 195, 235, 240, 285 UL Listed and TÜV certified. Modules 250 VDE certified.
All modules to IEC-Standard (61215, 61730-1, 61730-2).

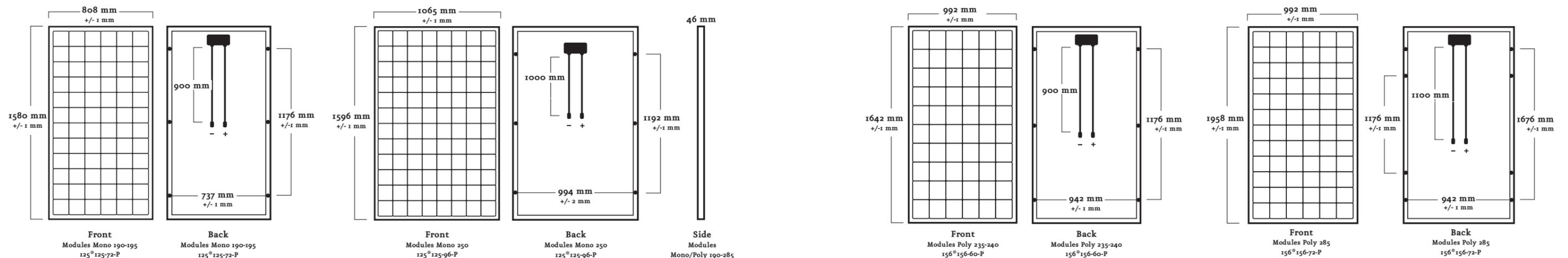
MODULES MONOCRYSTALLINE

Power Class	190	195	250
Max. power (P _{mpp})	190	195	250
Module efficiency (%)	14,9	15,3	14,7
Power tolerance (Δ P _{mpp})	0/+5W	0/+5W	0/+5W
Max. power voltage (U _{mpp})	36,6	36,8	48,6
Open circuit voltage (U _{oc})	45	45,2	59,8
Max. power current (I _{mpp})	5,2	5,3	5,15
Short circuit current (I _{sc})	4,39	4,45	4,36
Max. over current rating (I _R)	10	10	10

MODULES POLYCRYSTALLINE

Power Class	235	240	285
Max. power (P _{mpp})	235	240	285
Module efficiency (%)	14,4	14,7	14,7
Power tolerance (Δ P _{mpp})	0/+5W	0/+5W	0/+5W
Max. power voltage (U _{mpp})	29,2	29,3	35,1
Open circuit voltage (U _{oc})	36,7	36,8	44,1
Max. power current (I _{mpp})	8,05	8,19	8,12
Short circuit current (I _{sc})	6,86	6,95	6,89
Max. over current rating (I _R)	16	16	16

DIMENSIONS



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SUN EARTH® GUARANTEE

We are completely confident when it comes to guarantees because we have proven the premium performance and quality of our Sun Earth PV-module family. We do not simply rely on the results of our lab-tests: Sun Earth PV-modules absolve maximum testing under the extreme weather conditions in the mountains of Tibet – with outstanding results: Even after a quarter of a century, Sun Earth PV-modules still have more than 90 percent of their nominal power. This is globally unique.

SUN EARTH® PV-MODULE GUARANTEES TDB125*125-72-P / TDB125*125-96-P and TPB156*156-60-P / TPB156*156-72-P

- » **CONTRACTUAL PARTNER FOR CLAIM UNDER GUARANTEE IS THE SIG SOLAR GMBH IN THE NAME OF SUN EARTH SOLAR POWER CO. LTD.**
- » **PRODUCT GUARANTEE: 10 YEARS**
THIS GUARANTEE INCLUDES ALL TECHNICAL MALFUNCTIONS WHICH MIGHT OCCUR WITHIN 10 YEARS. EXCLUDED ARE MALFUNCTIONS DUE TO MISUSE AND FAILURE OF INSTALLATION.
- » **POWER GUARANTEE: 10 YEARS FOR 90% OF NOMINAL POWER**
WE HEREWITH GUARANTEE THAT SUN EARTH® MODULES WILL HAVE AT LEAST NINETY PERCENT OF THEIR NOMINAL POWER AFTER 10 YEARS.
- » **25 YEARS FOR 80% OF NOMINAL POWER**
WE HEREWITH GUARANTEE THAT SUN EARTH® MODULES WILL HAVE AT LEAST EIGHTY PERCENT OF THEIR NOMINAL POWER AFTER 25 YEARS.

Excluded of the guarantee are malfunctions due to misuse of the modules, failure of installation, technical changes outside of the place of production or other effects, which are not in responsibility of the supplier. For all guarantee matters, all complaints or all questions about the modules the SIG Solar GmbH is available for the customer at any time. All guarantee matters are settled with the manufacturer through the SIG Solar.



LASTS FOR GENERATIONS



SUN EARTH[®] AND SIG SOLAR AT HOME ALL OVER THE WORLD

Sun Earth by SiG Solar Solar has a steadily growing client base: An increasing number of installers, wholesalers, investors, and end-consumers appreciate and make use of renewable energy sources. Whether large-scale solar power plants, roof-systems, or individual PV-systems – photovoltaic energy is a statement for a clean and emission-free future.

REFERENCES

Location 2011 **Chiangali, Italy**
Peak power 5 x 498,96 kWp = 2,449 MWp
Modules 180 Wp
 Sun Earth® Mono

Location **Tito, Italy**
Peak power 4 x 495,72 kWp = 1,982 MWp
Modules 180 Wp
 Sun Earth® Mono

Location **Satriano, Italy**
Peak power 5 x 495,72 kWp = 2,478 MWp
Modules 180 Wp
 Sun Earth® Mono

Location **Filiano, Italy**
Peak power 2 x 498,20 kWp = 0,996 MWp
Modules 235 Wp
 Sun Earth® Poly

Location **Atella, Italy**
Peak power 2 x 498,20 kWp = 0,996 MWp
Modules 235 Wp
 Sun Earth® Poly

Location **Anzi, Italy**
Peak power 3 x 495,72 kWp = 1,487 MWp
Modules 235 Wp
 Sun Earth® Poly

Location **Laurenzana, Italy**
Peak power 997,50 kWp
Modules 250 Wp
 Sun Earth® Mono

Abriola, Italy
 991,44 kWp
 180 Wp
 Sun Earth® Mono

Tufaroli, Italy
 2 x 498,20 kWp = 0,996 MWp
 235 Wp
 Sun Earth® Poly

Pietragalla, Italy
 2 x 497,00 kWp = 0,994 MWp
 250 Wp
 Sun Earth® Mono

2010 **Possidente, Italy**
 8 x 495,72 kWp = 3,965 MWp
 235 Wp
 Sun Earth® Poly

Revello, Italy
 1,23 MWp
 175 Wp / 180 Wp
 Sun Earth® Mono

Murello, Italy
 1,14 MWp
 185 Wp
 Sun Earth® Mono

Cuneo, Italy
 1,28 MWp
 185 Wp
 Sun Earth® Mono

2009 **Mottolà, Italy**
 3 x 999,18 kWp = 2,997 MWp
 175 Wp / 180 Wp
 Sun Earth® Mono

2008 **Almería, Spain**
 7,7 MWp
 165 Wp / 175 Wp
 Sun Earth® Mono

Passau, Germany
 444,22 kWp
 165 Wp / 175 Wp
 Sun Earth® Mono

2007 **Soria, Spain**
 2,2 MWp
 160 Wp / 170 Wp
 Sun Earth® Mono

Burghausen, Germany
 1,066 MWp
 160 Wp / 170 Wp
 Sun Earth® Mono

Malgersdorf, Germany
 331 kWp
 160 Wp / 170 Wp
 Sun Earth® Mono

2006 **Platting, Italy**
 500 kWp
 150 Wp / 160 Wp
 Sun Earth® Mono



Almería, Spain



Gaienhofen, Germany



Potsdam, Germany



Soria, Spain



Possidente, Italy

Solar power plant with Sun Earth® - photovoltaics

WE ARE WHERE THE SUN IS SHINING



Satriano di Luciana, Italy



Hohenweststedt, Germany

PARTNERSHIP SUSTAINABILITY FUTURE-ORIENTATION

The SiG Solar GmbH is one of the leading German distribution specialists for PV-modules and has a solid Hanseatic business approach based on more than 20 years of experience. In Europe, SiG Solar stands for the successful distribution of the Sun Earth brand. Since 2004, the company based in Northern Germany has been cooperating with the Chinese PV-module manufacturer Sun Earth Solar Power.

Sun Earth Solar Power and SiG Solar – teamed up for the future because we feel responsible and are determined to do our share to change global energy supplies to renewable and clean energy.

WE ARE CONVINCED
THAT ENERGY FROM
THE SUN WILL REPLACE
ENERGY GENERATION
BY FOSSIL FUELS.



Join us and the **sun** on
our path of partnership
into a successful and
clean future.

JÜRGEN AND JAN-CHRISTIAN SCHRÖDER
with official government representatives from China



SUN EARTH® AND WERDER BREMEN

We want to minimize the ecological footprint – and we are starting with the Weserstadion in Bremen, where the German national soccer league team Werder Bremen is at home. With our joint sponsoring, Sun Earth Solar Power and SiG Solar express our definition of partnership. Photovoltaic is the deciding factor on the path to a clean and emission-free future. And we must walk this path as a team with our selected partners – with the leading international companies of the industry, as well as with social commitment. Our sponsoring presence in the sports business at the SV Werder Bremen stadium is a first step to sensitizing the public to our cause.

A STRONG TEAM

Traditional and dependable: Werder Bremen Football stands for sustainability teamed with continuity, straightforwardness and responsibility - key attributes which perfectly embody the Sun Earth and SiG Solar company philosophies.



**OFFICIAL PARTNER
OF WERDER BREMEN**

**THOSE WHO ONLY GRUB
INTO THE EARTH
WILL NEVER SEE THE SKY**

Chinese saying

Build on the eternal power
of the sun with Sun Earth



02.2012

 **SUN EARTH** by 
Energy - naturally with service

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