

SANYO Component Europe GmbH
Panasonic Group

Stahlgruberring 4
81829 München
Germany

www.eu-solar.panasonic.net

Panasonic
ideas for life



Sunny times ahead!

HIT[®] solar modules: the 4 big benefits.

HIT[®]
Photovoltaic Module

The 4 big benefits at a glance

The **construction technology** of HIT[®] solar modules is innovative and different from conventional designs. They achieve a **higher cell efficiency**, which means: more energy per square meter. First-class materials result in an increased **durability** of HIT[®] solar modules. So they reach a **higher reliability**, assured by a **25 year performance guarantee**. HIT[®] solar modules are a profitable investment for the future.

Benefit 1: Unique technology

The construction technology of HIT[®] solar modules outclasses former PV-technologies:

- Hybrid-structure: Combination between ultra-thin amorphous silicon layers and high quality mono crystalline wafer leads to a reduction of power generation losses
- Three-tab-design minimizes losses between cell-fingers and tabs

➔ [Learn more on page 4](#)

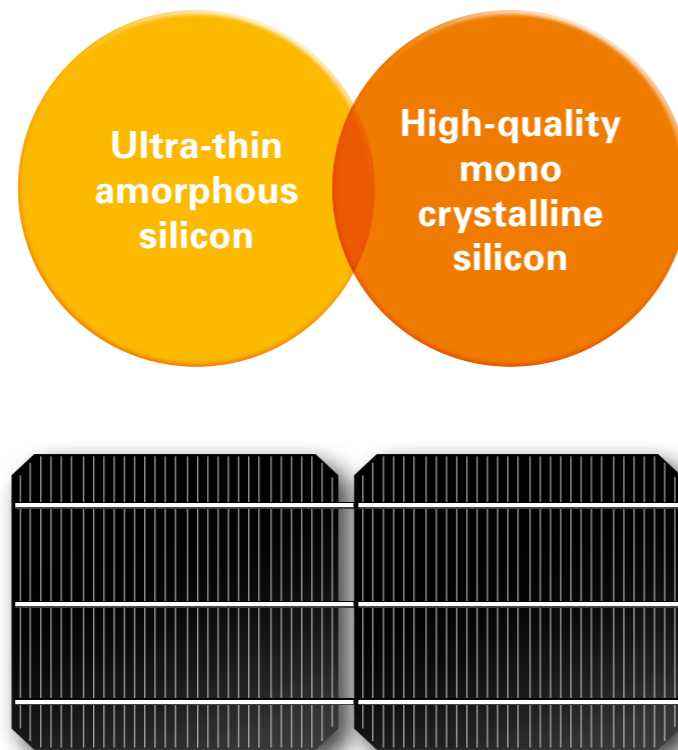
Benefit 2: Higher performance

HIT[®] solar modules are highly efficient:

- They achieve efficiencies at the world's highest level
- As temperature rises, they produce over 10% more electricity than conventional solar panels*
- Anti-reflection glass allows more sunlight to reach the cell through any incident angle, even specially diffused light gets to the cell
- HIT[®] cells are able to convert more light into electricity thanks to their extensive spectral sensitivity

* at a module temperature around 75°C

➔ [Learn more on page 4](#)



Benefit 3: Highest quality and reliability

Best selection of materials and a rigorous quality management ensure the high performance and durability of HIT[®] solar modules:

- Good isolation of the cell against humidity and chemical contamination
- Screwless, anodized and coated frame
- Output with positive tolerance
- Traceability: all modules are measured and tagged with an individual bar code
- Failure rate = 0.0021%*

* as of 30.11.2011

➔ [Learn more on pages 6 and 7](#)

Benefit 4: 25 year guarantee

Long lasting guarantee provides security for investing in HIT[®] solar modules:

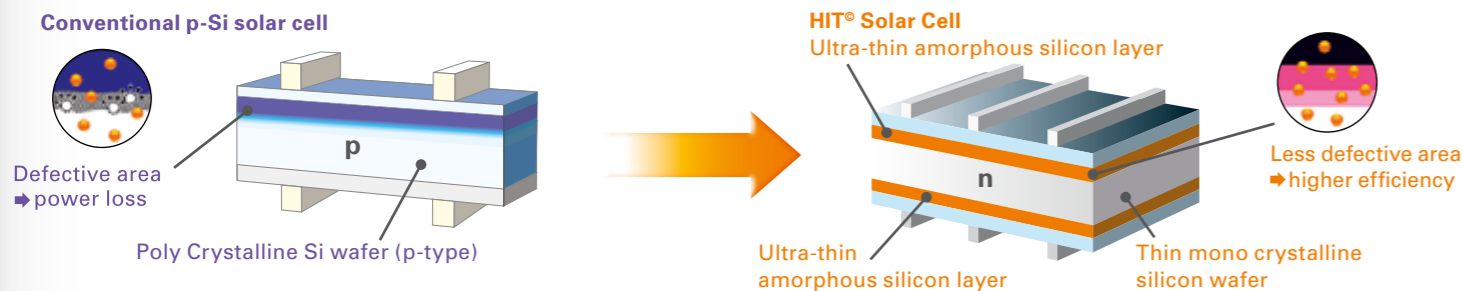
- 10 years on material defects and workmanship
- 25 years on performance (80% of P_{min})

➔ [Learn more on pages 6 and 7](#)



Benefits 1 and 2: Unique technology und higher performance

Unique technology - Hybrid solar cell

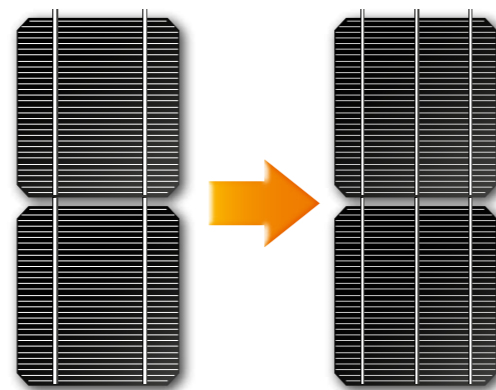


The HIT[®] solar cell is a hybrid solar cell that combines ultra-thin amorphous silicon and high-efficiency mono-crystalline silicon in a layered construction, which has been achieved by using Panasonic's proprietary technology. The i-type amorphous silicon layers are positioned in the HIT[®] solar cell between the crystalline silicon wafer and p- and n-type amorphous silicon layers. Compared to conventional crystalline silicon solar cells, the HIT[®] structure can minimize the defective area in solar cells and power loss is significantly reduced.

New cells design

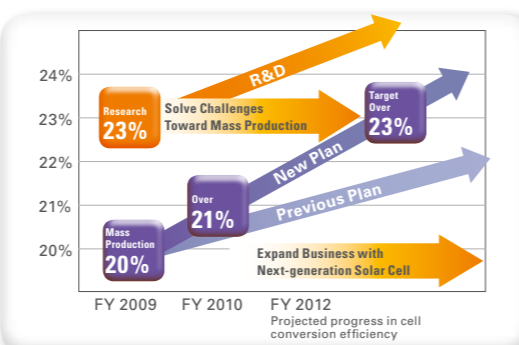
Our solar cells have one of the world's highest cell conversion efficiency of > 21.6%*. The N series features three instead of two tabs. With this new design the electrical losses in the cell fingers are reduced and the effective area is enlarged to capture more sunlight.

* as of 2011



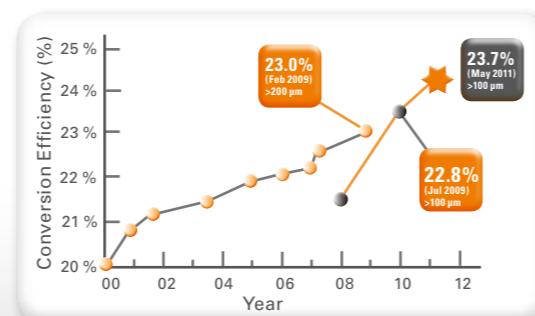
R&D technology adoption for mass-production

We strive every day for solving issues in order to transfer knowledge from R&D to mass production. Our high-efficiency solar sells are daily assembled in our product lines.



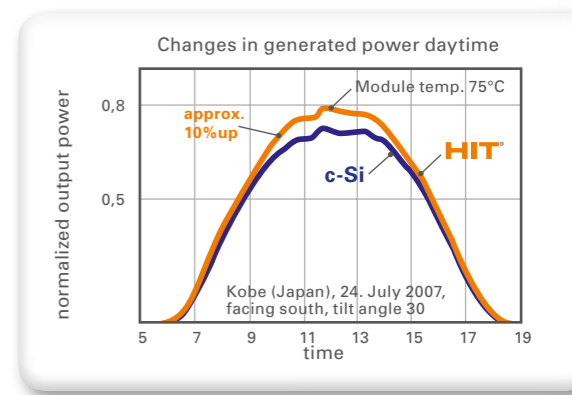
A world record at R&D stage targeting cost reduction

We are continuously improving the optical and electrical properties of each material such as the a-Si and TCO layers and the metal grid electrode to raise the conversion efficiency. As a result, we achieved one of the world's highest conversion efficiency at 23.7% with a 98- μ m wafer for a cell area of 100.7 cm². In addition, there are some possibilities for raising the conversion efficiency further, and we are aiming to achieve a conversion efficiency of 25% at the R&D stage in the future.



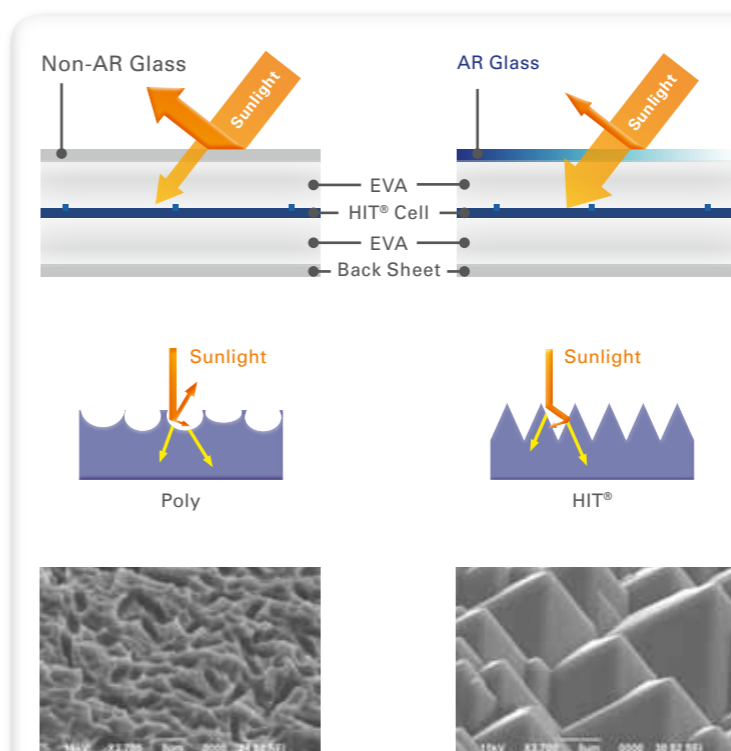
Hot temperature and low light performances

As temperatures rise, HIT[®] solar modules will produce up to 10% more electricity (kWh) than conventional solar modules at the same operating temperature. In addition, HIT[®] modules have high voltage as soon as irradiation arrives and this feature contributes to the annual power yield.



More light = more power Pyramid texture & anti-reflexion glass

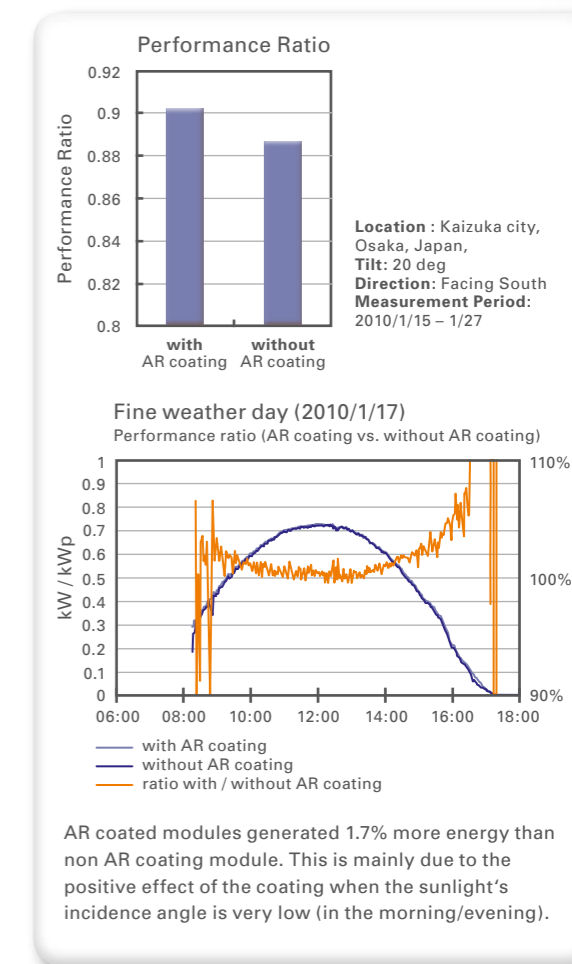
Thanks to the anti-reflection glass used for this module, more sunlight reaches the cells. This effect is especially noticeable in the morning and in the evening, when the sun is at a low position. As a result, the increased specific yield improves the conversion efficiency throughout the year.



The pyramid texture of the HIT[®] modules allows the sunlight once entered to be reflected several times inside the cell, leading to a higher absorption of sunlight and a higher power output.

Easy to install

Thanks to their efficiency, our modules are suitable for all types of installation. They can also be used with any type of inverters, also with transformerless.



AR coated modules generated 1.7% more energy than non AR coating module. This is mainly due to the positive effect of the coating when the sunlight's incidence angle is very low (in the morning/evening).

Benefits 3 and 4:

Highest quality as well as reliability and 25 year guarantee

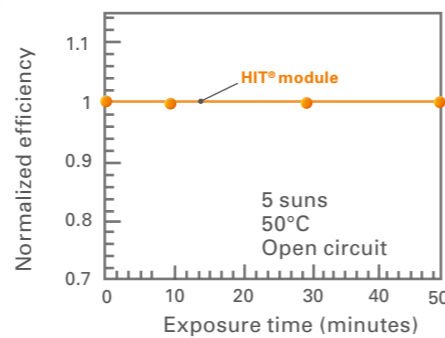
Our history

SANYO started the development of amorphous silicon solar cells in 1975, over 37 years ago. Since then, thanks to our constant efforts in Research and Development, many innovative products were developed and commercialized. We have achieved best quality and reliability levels through long experience and continuous improvement because our modules are designed to last for decades. SANYO became a full subsidiary of the Panasonic Group in 2011, adopting the Panasonic brand name in 2012.

Light soaking

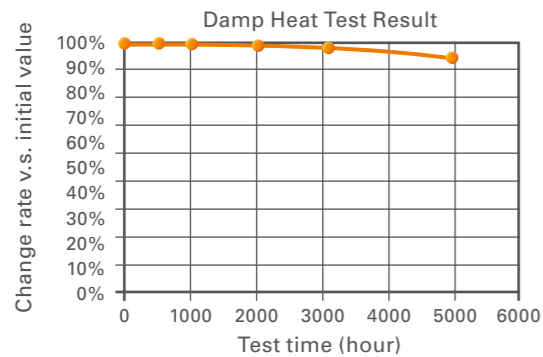
HIT® cells use only n-type silicon which has no light-soaking effect. Contrary to amorphous silicon solar cells that can lose up to 30% due to the LID*, our modules have **no degradation**. After 5 hours' soaking at 5 suns**, no degradation was observed in the **HIT® solar cell**. This is due to the fact that the amorphous silicon layers are very thin and do not contribute much to the power generation, but act instead as effective conductors.

* Light-Induced Degradation: efficiency loss in the first hundreds hours of light soak
** 5000W/m²

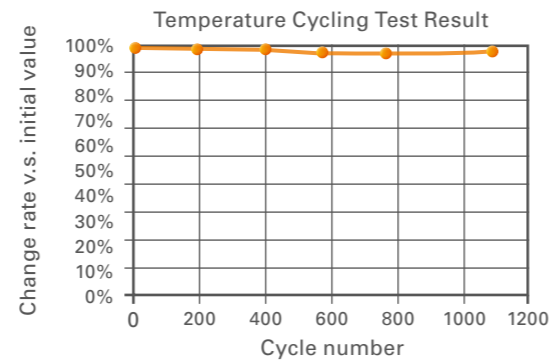


Damp heat and temperature

We have very good results regarding the output power degradation even after undergoing 5 times the IEC61215 standard test.



The following severities are applied:
Test temperature: 86°C ± 2°C
Relative humidity: 85% ± 5%

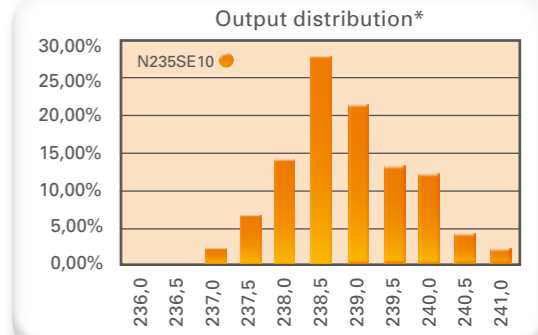


The following severities are applied:
Test temperature: -40°C / +85°C

Power guarantee

Each module is measured at our production site before delivery. We guarantee that our customers will receive 100% of the rated power (or more) at the time of purchase, enabling owners to generate more electricity (kWh) per rated Watt and quicken their return on investment. In addition, every module is marked with a unique serial number which can track the module all along its lifetime.

* Exemplary shipment in January 2012



Strength

Our modules are 100% designed and manufactured by Panasonic only in our own facilities certified for ISO 9001. HIT® solar modules are checked and controlled at each production step with severe Panasonic quality standards. As additional proof of their excellent quality, our modules have been certified against salt mist corrosion and ammonia resistance.

Certifications

As a leading company, we are certified by the most prestigious bodies. Thus our factories are audited every year by TÜV Rheinland.



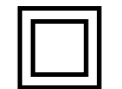
- Quality tested, IEC 61215
- Safety tested, IEC 61730
- Periodic inspection



- Ammonia resistance tested
- Salt mist corrosion tested
- Periodic inspection



Certificate No. MCS PV0034
Photovoltaic System



Electrical Protection
Class II

Reliable

Our Quality Figures:

- **2,885,689** Modules sold in Europe
- Failure rate Appr.: **0,0021%**
- Guarantee cases* **62 pcs**

* 30/11/2011

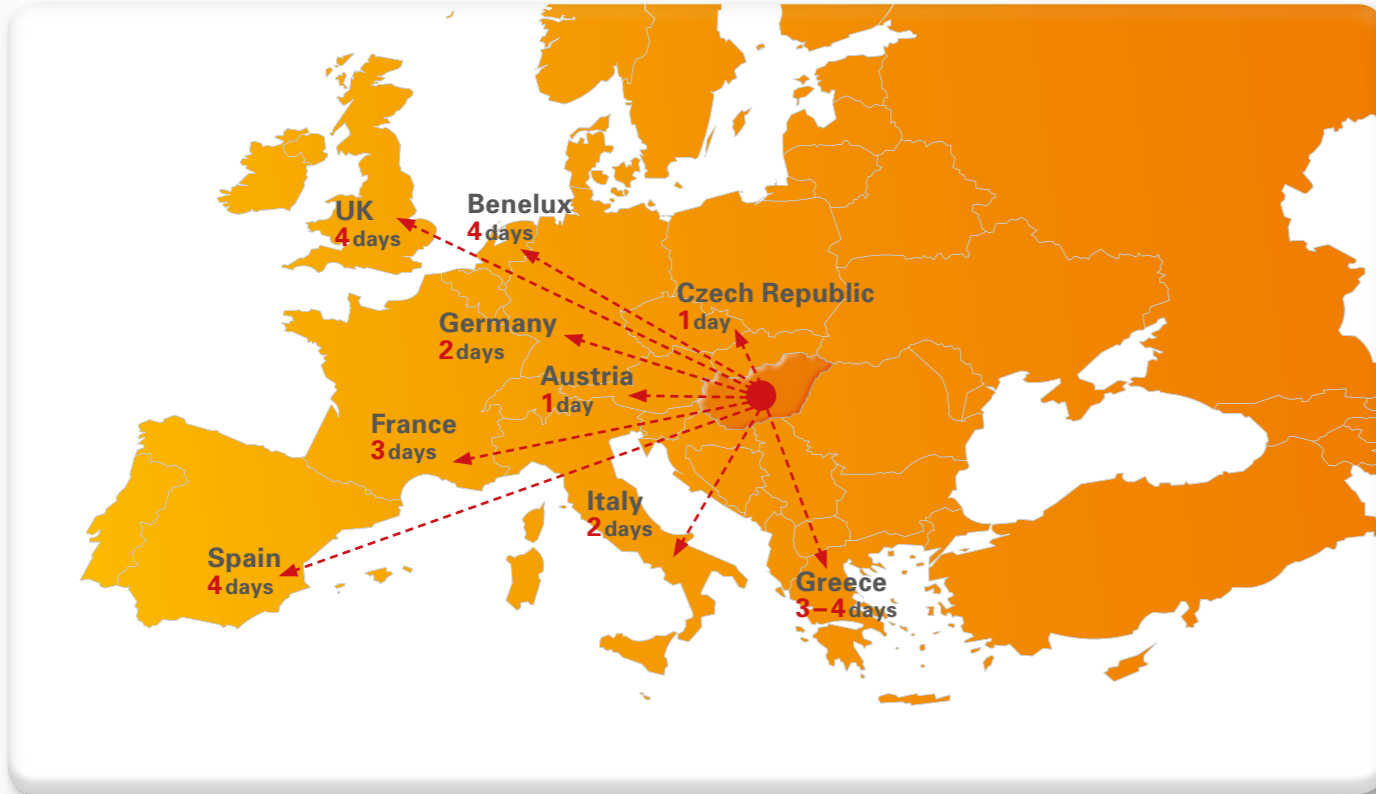
Internal reliability tests for stable performances

We carry out internal tests in order to guarantee the products performance under the strongest conditions.

Service and oriented eco-friendly

Close to you

HIT® solar modules are being produced in Hungary since 2005. This makes it possible for our customers anywhere in Europe to take delivery of our modules within four days or less: We are committed to satisfying our customers' demand for our high-quality/high-performance products with a rapid delivery.



Premium Installer Programme

We would like to make sure that your Panasonic HIT® installation is done by an experienced installer. On our website you can find one of our recommended Premium Installers in your area. Just enter your postal code or town and get directly in contact with them.

www.eu-solar.panasonic.net/en/service/how-to-find-an-installer/



We help the environment

All HIT® factories are certified for ISO 14001. HIT® cell production is made at low temperature and requires less energy than needed for conventional cells. HIT® modules are assembled in Hungary in order to reduce as much as possible the CO₂ emissions due to transportation. Unique eco-packaging minimizes cardboard waste at the installation site and the high pallet density reduces transportation fuel and storage costs.



PV Cycle

We joined PV Cycle at its creation in 2007 and one of our executives is president of the association. This voluntary agreement commits us to a take-back and recycling programme for end-of-life-modules and to take responsibility for solar modules throughout their entire value chain.



RoHS compliant

Even though not mandatory for solar panels, our products comply with the directive restricting the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC. This directive restricts the use of hazardous materials, such as lead, cadmium and mercury, used in the manufacture of electronic and electrical equipment.



Health and safety management (OHSAS 18001)

Our factory in Hungary is proud to be certified OHSAS 18001: 2007 (MZS 28001:2008) by Eurocert. It is an international occupational health and safety management system specification. It helps to minimize risk to employees, to demonstrate diligence and to gain assurance.

Panasonic eco ideas and philosophy

Panasonic will celebrate its 100th anniversary in 2018. As it heads towards that landmark year, we aim to become the No. 1 Green Innovation Company in the Electronics Industry.

Panasonic was founded based on the philosophy of contributing to progress in society and to enriching people's lives through business activities. By offering products that help people lead better, greener lives, we have made close ties with people worldwide.

We believe we can integrate contribution to the environment with business growth, by driving green innovation in all aspects of our business practices such as product development firmly rooted in people's everyday lives and production activities. Our efforts include the reduction of CO₂, a recycling-oriented manufacturing, water conservation, minimizing the environmental impact of chemical substances, the conservation of biodiversity and a lively dialogue with our stakeholders. And because every region has different circumstances and characteristics, Panasonic expands its Global Eco Project, which promotes products, production activities, and citizenship activities as specific initiatives tailored to each region.

The 'eco ideas' mark symbolizes Panasonic's strong commitment to continuous environmental sustainability management.

To learn more about Panasonic's services and comprehensive energy management solutions, visit www.panasonic.net.

Solar Ark:

In 2001 the world's largest solar power plant on the site of the SANYO facility in Gifu was completed.



Deutsche Bank



Solarleben GmbH



Solarcentury