Suntech Power

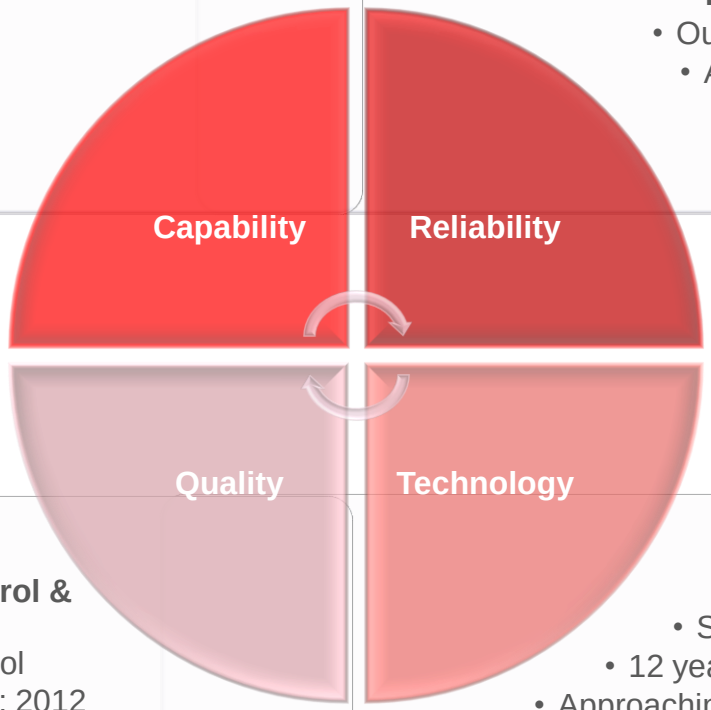
Suntech Bankability Book

Suntech Bankable Points

Supported by 3rd Party Warranty Insurance

- **Product quality test**
- PID resistant
- Sand Blowing
- Salty mist/ammonia

- **Product reliability test**
- Outdoor performance test
- Atlas 25+ long term test
- Double IEC test
- Combine cycle test



- **Product quality control & inspection process**
- Rigorous quality control
- ISO 9001&JIS Q8901: 2012

- **Proven technology**
- Screen printing technology
- 12 years production experience
- Approaching 8GW shipment globally

Contents

- Product Quality Additional Test
- Product Long-term Reliability Test
- Suntech’s Quality
- Proven technology & Track record
- 3rd Party Insurance for Suntech warranty
- Success Stories

PID(Potential Induced Degradation) Resistant Test

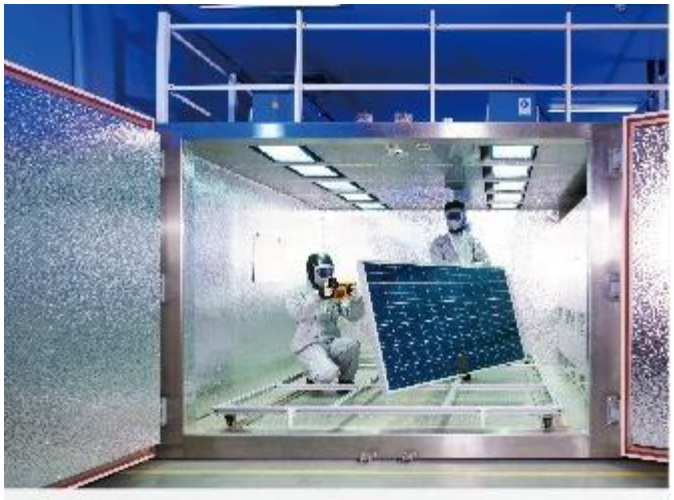
Proven products are highly resistant to PID (VDE certified)

- All production could correspond to the 25 ℃ ambient temperature, 75% rel. Humidity, 168 hours PID-resistant standard. (including all series of Suntech products)
- Customized product could correspond to the 85 ℃ ambient temperature, 85% rel. Humidity, 96 hours certified PID-free standard.(including poly and mono products)

PID Resistant

PID-resistant standard test

PID-free standard test



Cutting-edge Sand Blowing Test

Proven product durability for desert areas

- Test description: module front/back side; Test temperature: 63 ±2 ℃, Particle size: average 250μm, wind speed:9 ±2 m/s (Simulated environment in Saudi Arabia)

Sand Blowing Resistant

Resistant to Acidic Corrosion Environment

All Suntech modules are tested against sulfur dioxide by leading test institutes

- Sulfide and acid liquid are the biggest threat for landfill solar power plant
- Sulfur dioxide test tested according to DIN EN ISO 6988-1995 standards by CPVT

Solar system installed beside landfill

Solar system installed over landfill

Tested for Salt Mist Environment

All Suntech modules are tested against Salt Mist by leading Test Institutes

- tested according to IEC 61701 by VDE

Off-shore project In DongTai, China

Light Tower with Suntech Modules

Tested for Ammonia Environment

Suntech modules are tested against Ammonia by TUEV Rheinland

- Ammonia: tested according to relative strict standards in the industry, ammonia concentration 6667ppm, which Is the highest module anti-ammonia standard.

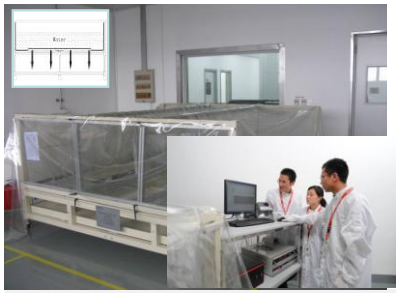
Conditions	Schott	Suntech
Institute/Standard	DLG focus test	TUV -IEC62716 Ed.1 Draft C
Test period	1500 hrs	480 hrs
Air Temperature	70ºC	60ºC
Relative air humidity	70%	**100%**
Ammonia concentration	750ppm	**6667ppm**
Performance stability	degradation≤0,4%	0,1%≤degradation(10 pcs) ≤1,5%
Visual examination	No damage, glass very slightly roughed	No significant disturbance of the functionality, only corrosion on the frame

Farm Building with Suntech Modules

Extended Wind & Snow Load Tests

Enhanced system safety:

- according to internal and VDE certified tests, Suntech increased the wind & snow loads capabilities
- Suntech offers high quality and high resistant modules performing under more demanding conditions



Mechanical loading tester for static or ice load testing

Normative requirements :

- Wind load :
  - IEC = 2400 Pa
  - **Suntech = 3800 Pa** (~ 162 km/h)
- Snow load:
  - IEC = 5400 Pa (optional)
  - **Suntech = 5400 Pa** (~ 550 kg/m²)

A layer of 2.5 m of wet snow weighs 890 kg.
Due to the great stability of Suntech W-type modules, this load can be placed on our modules without any damages.

Wind Tunnel Dynamic Loading Tests

Dynamic Loading Testing

Purpose of tests

- To determine the ability of module to withstand storm wind load

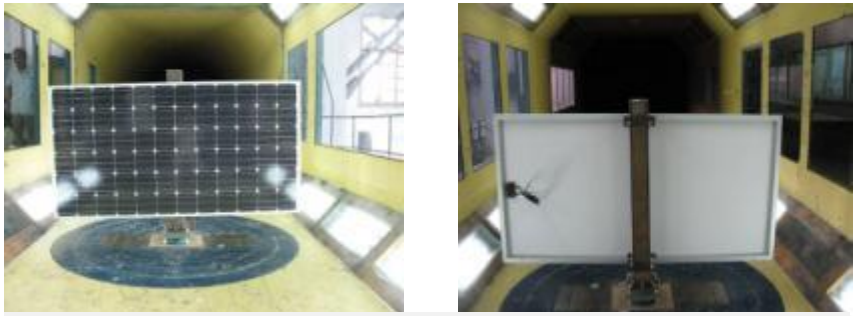
Test condition

- Wind speed=30m/s (storm wind), modules are installed with four clamps at the long frame-side or two clamps at long frame-side.

Test Result

- Modules with two different installation methods have almost no power loss after wind tunnel test, which means that modules are capable of withstanding storm wind speed of 30m/s.

Modules installed by four clamps at long frame



Modules installed by two clamps at long frame. Testing in National Lab of SJTU.

Certificate Report

TUV ammonia test report

VDE salt mist test report

CPVT sulfur dioxide test report

VDE extended loading test report

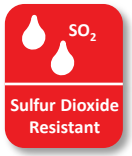
A quick Summary of Extended Quality Tests

PID resistant test by VDE

Salt mist resistant test by VDE

Sand blowing test by SGS

Extended wind and snow load test by VDE



Sulfur dioxide resistance test by CPVT

Double IEC testing/ combined cycle testing by VDE

Ammonia resistant strict test by TUEV Rheinland

Dynamic loading wind tunnel testing by SJTU National Lab

Third Party Long Term Outdoor Tests - Atlas 25+

Suntech is the first module manufacturer to pass this extremely harsh Test-to-Failure (TTF) testing based on one year outdoor test.

- Suntech (Oct, 2012) & Sunpower (Jun. 2013)
- Atlas is a well-known long term reliability R&D institute in US
- TTF reliability test means the test is scientific designed to cover the damage during the 25 year PV module life time

Measurements include visual inspections, IV curves, Infrared theromographs and digital photography

"*The report shows the performance degradation of Suntech modules (in the Lab test) is* ***only 3.9%*** *compared to its initial power , and less than the* ***Atlas evaluation standard of 8%, without visual defect****."*

The Atlas 25PLUS Testing Process

Module A

One PV module is run through the Atlas 25PLUS testing sequence over the course of 12 months.

ATLAS 25+ Comprehensive PV Durability Testing

1 UV Conditioning

2 Salt Spray Corrosion

3 Condensing Humidity

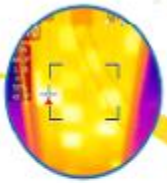
4 Solar/Thermal/ Humidity Cycle

5 Solar/Thermal/ Humidity/Freeze Cycle

6 Arizona Solar Tracking including peak summer

7 Initial, final and multiple interval measurements

Visual inspections, IV curves, infrared thermographs and digital photography included.



8 Results and data

Completion of the Atlas 25PLUS program provides test data that would be otherwise unattainable with current test methods.

A report details all data, images and analyses at the end of the one year test sequence.

Modules B & C

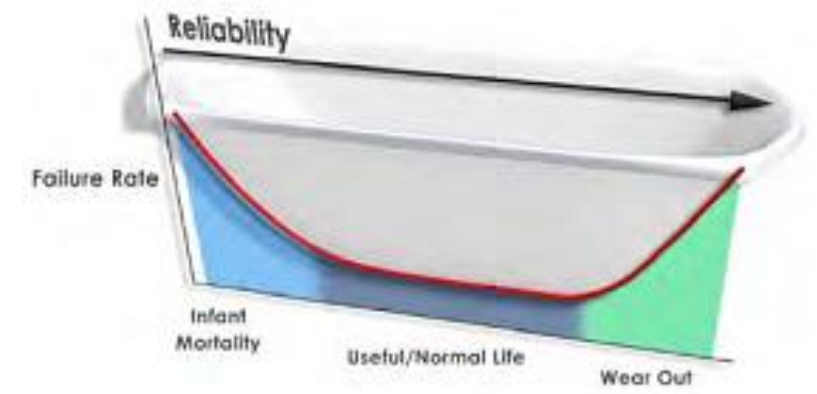
Two modules provide baseline data using outdoor solar tracking in subtropical South Florida and the arid Arizona Sonoran desert for one year.

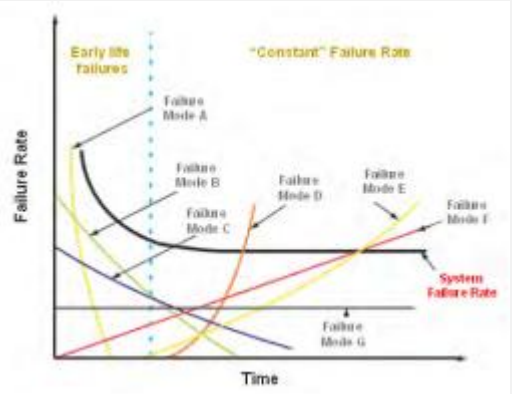
3 Modules of 12 months Lab & on-site testing.
Information from Atlas online at www.Solardurability.com

Third Party Long Term Outdoor Tests - Atlas 25+

Differentiation between IEC standard testing and Atlas TTF mode?

- Atlas reliability test covers two of the failure peaks within a module's lifetime,
  - the infant failure (IEC only covers this failure)
  - the wear-out failure
- Standard IEC tests only cover the infant failure party of the hypothetical life time bathtub curve of solar modules.
- For standard IEC test, no single module goes through all exposure tests, Atlas 25+ test mode applies one module for one year exposure tests and simulate harsh conditions considering solar irradiation, temperature and moisture etc, which is a well-designed accelerating test mode.





Double IEC - Testing Beyond IEC/UL

×N Testing

Double IEC test program (VDE Certified Lab)

- Damp Heat (DH) 2000 testing (vs. IEC 1000 h)
  - evaluate moisture resistance of encapsulation materials
  - evaluate anti-corrosion ability of metalized material

  → Less than 3% power loss (IEC < 5% allowed)
- Thermal cycling (-40°C / +85°C) TC 400 testing (vs. IEC 200 cycle)
  - evaluate the thermal stress matching properties of different materials

  →Less than 1% power loss (IEC < 5% allowed)
- Humidity Freeze test with 20 cycles (UV 15, TC 50)
  - evaluate the strength of the adhesive bonds

  → Less than 2% power loss (IEC < 5% allowed)

Rigid internal testing standards guarantee higher quality

Triple IEC – Randomly Chosen Sample Testing Beyond IEC/UL by TUEV Rheinland

Triple IEC testing

- Samples randomly purchased from the market by Exxergy GmbH on Nov. 2012
- Three samples were tested in parallel in each test program

TÜVRheinland®
Precisely Right.

Comparison(time, power loss)	Triple IEC_STP module	IEC testing
Damp Heat(DH)	DH 3000 hrs, **-3.4%/-3.3%/-2.0%**	DH 1000 hrs, loss < 5%
Thermal Cycling(TC)	TC 600 cycles, **-4.4%/-3.8%/-2.9%**	TC 200 cycles, loss < 5%
Humidity Freeze(HF) with UV15, TC50	HF 30 cycles, **-1.7%/-1.5%/-1.2%**	HF 10 cycles, loss <5%

Randomly purchased samples result indicates high quality of large-scale production.

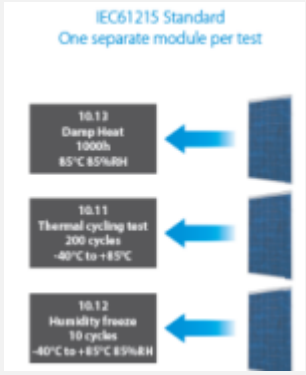
Combined Cycle- Testing Beyond IEC/UL

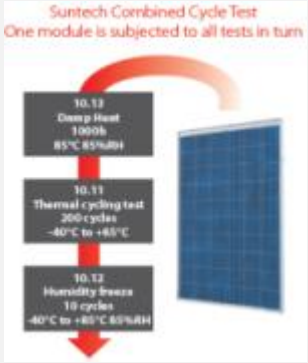
×N Testing

Combined Cycle Test (STP VDE Certified Lab)

- Instead of using three different modules for three different tests, Suntech only uses one for:
  - Damp Heat 1000 h 85°C 85% RH
  - Thermal cycling test 200 cycles -40°C to + 85°C
  - Humidity freeze 10 cycles -40°C to +85°C 85% RH

→Only 3.61% power loss vs. 15 % in IEC (5 % power loss per test are allowed)

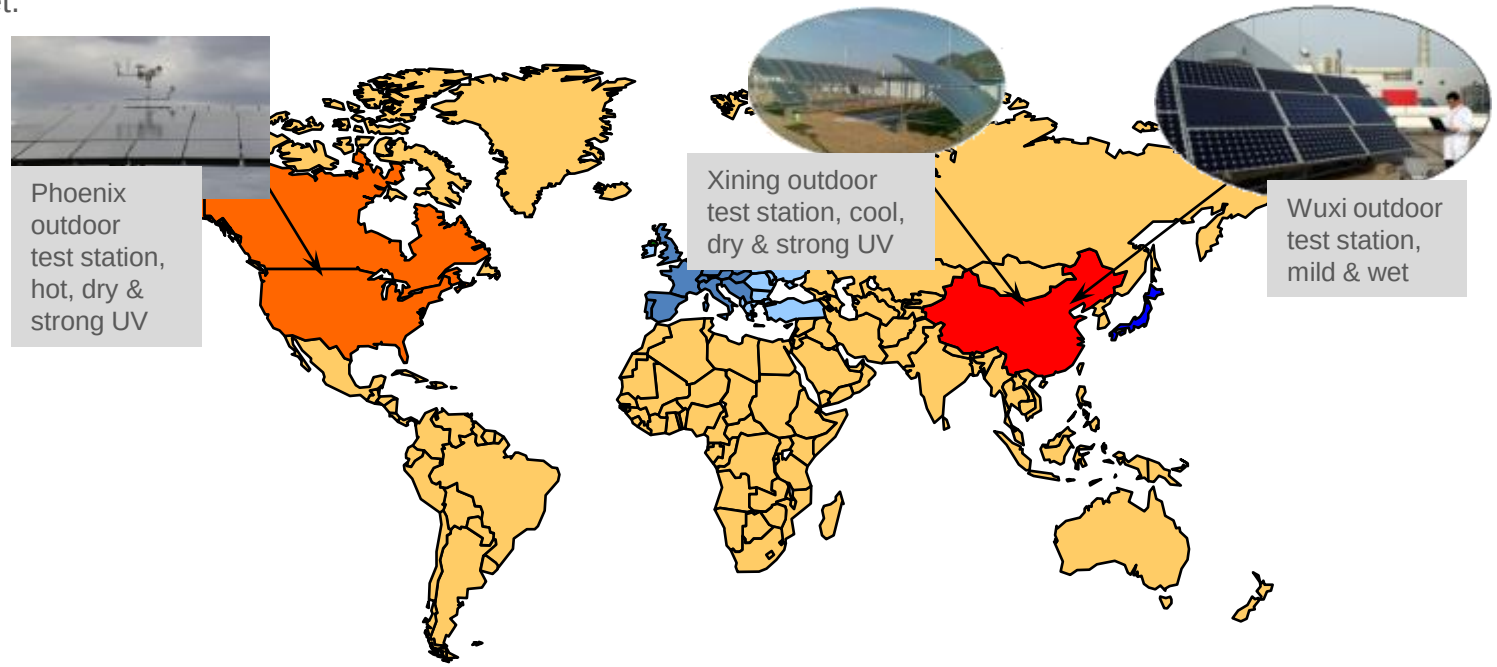




Did you know, that for example TUEV is using different modules for different tests? Thus the hurdles to pass the tests are not very high and the customer should check also other tests results.

Worldwide Outdoor Long-Term Test Beds

3 Outdoor test station locations are located in Wuxi (eastern China), Xining (western China) and in Phoenix(western US). They occupy an area of 3000 square meters, which can be used to research material long-term aging and module actual power output in different climate. We successfully self-develop remote data acquisition system and an outdoor meteorological monitoring system. Test data can be real time monitored via Internet.



Outdoor Long-Term Test Bed in Wuxi Testing Site

Wuxi center compares the long-term degradation data

- test location: Wuxi
- annual avg. air temp: 15.3°C
- annual avg. daily solar radiation: 3.78 (kWh/m²)/day
- annual avg. wind speed: 3 m/s
- annual avg. relative humidity: 79.30%

Power Degradation:

Manufacturer	1st year	2nd year	2 years total
Suntech Power*	**0.88%**	**0.56%**	**1.44%**
Manufacturer A	1.70 %	0.40 %	2.10 %
Manufacturer B	1.00 %	1.30 %	2.30 %
Manufacturer C	2.60 %	1.30 %	3.90 %
Manufacturer D	3.50 %	0.50 %	4.00 %
Manufacturer E	1.50 %	0.30 %	1.80 %

= 2,82 % average

Suntech degrades 50% less

* This result just represents one tested type of module and is not valid or transferable to other Suntech modules.

Outdoor Long-Term Test Bed in Xining Testing Site

Xining center compares module with different technologies output data

- test location: Xining (Western China)
- Sep. avg. air temp: 15.1°C
- Sep. avg. daily solar radiation: 17.30 (kWh/m²)/day
- Sep. avg. wind speed: 1.4 m/s
- Sep. avg. relative humidity: 42.10%

Power Output (kWh)/KW/hour (eg. Data of Sep. 2012):

Module Type	Mono 1	Mono 2	Poly 1	Casting mono 2	Poly 3	Poly 4
Output	**0.77**	**0.73**	**0.66**	**0.64**	**0.54**	**0.52**
Technology Description	5' mono normal	5' mono Pluto	6' poly new texturing	6' casting mono	6' poly 4 busbar	6' poly 3 busbar

Output 4 busbar(poly) > 3 busbar product(poly)

* This result does not represent the comparison data according to different installing time and surface dust deposition condition.

Outdoor Long-Term Test Bed in Arizona Testing Site

Arizona center compares modules Output from different manufacturers

- test location: Arizona (Western US)
- Jan. avg. air temp: 15.0°C
- Jan. avg. daily solar radiation: 17,30 (kWh/m²)/day
- Jan. avg. wind speed: 2 m/s
- Jan. avg. relative humidity: 60.4%

Performance Ratio (eg. Data of Jan. 2013):

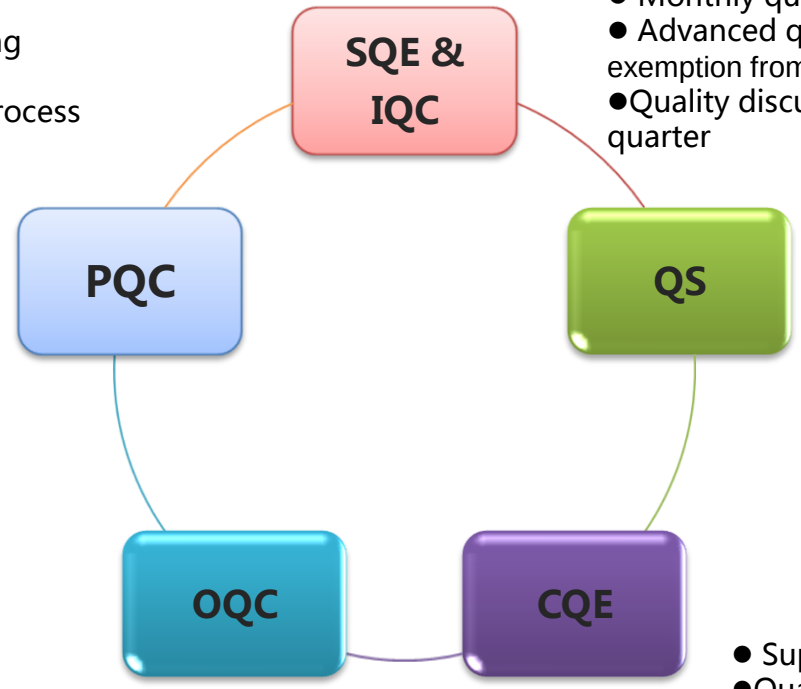
Manufacturer	Description	Average PR	Rating
Suntech Power*	**C-Silicon poly**	**95.6%**	**3**
Manufacturer A	C-Silicon poly	94.2%	4
Manufacturer B	C-Silicon WMT	89.5%	6
Manufacturer C	C-Silicon poly	96.7%	2
Manufacturer D	C-Silicon poly	98.0%	1
Manufacturer E	Thin film CdTe	93.8%	5

Suntech Top 3 PR >95%

3 Suntech’s Quality

- Specialized auditor in key process
- Audit in production line
- SPC control on key process
- Self-checking system
- Non-conforming Handling procedure
- Product change notice process
- FMEA and control plan

- Audit at suppliers site
- Quality control for new supplier and new material
- Monthly quality scoring assessment
- Advanced quality management to push exemption from inspection
- Quality discussion with suppliers each quarter



- Document review (1/quarter)
- Internal audit (twice/year)
- External audit (twice/year)
- management review (1/year)

- Open box audit
- QC Gate inspection for SLE modules
- Dock inspection including packaging inspection, data check and offer flash report

- Support in customer site
- Quarterly customer quality meeting
- customer audit and inspection
- VOC review and improvement
- Customer satisfaction analysis

Key Control Points in Cell Production Line

- **Wafer Control Points:**
  - Check wafer 's quality(each batch /pallet)
  - Check defects of wafer by PL tester
  - Monitor the carrier lifetime of wafer by WT-1000B
- **Texturing and Etching**
  - Check reflection and resistance (5 pcs/300pcs)
  - Monitor weight loss with SPC
- **Diffusion and PEVCD**
  - Monitor the resistance (5pcs/tube)
  - Monitor resistance and uniformity with SPC
- **Screen Printing**
  - Check its print quality by EL (5pcs/3h)
  - Check welding strength and soldering quality of busbar(1pcs/3h)
- **Cell Failure Analysis**
  - Use sorts of equipments to check the root cause of failure;
  - Quickly response to deal with quality issue

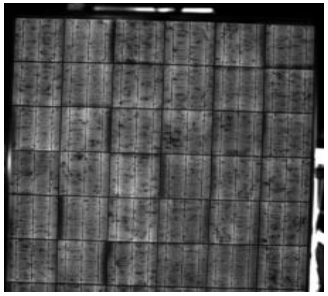
Key Control Points in Module Production line

- Soldering
  - Pick 5 pieces each 6 hours to test soldering temperature
  - Control soldering quality for manual soldering and automatic soldering each shift

- Cross-linking test in lamination
  - 7 days/time/set

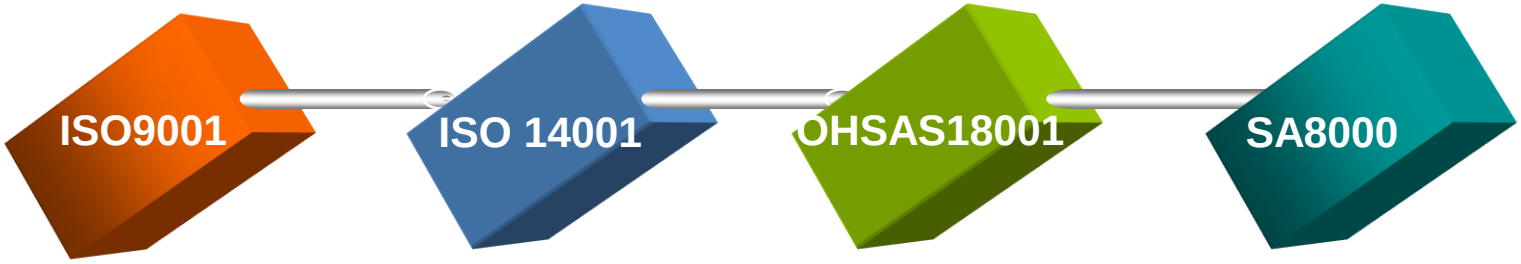
- HI-POT test & power test
  - 100% Hi-pot test
  - Validate final test each 4 hours and do MSA for final tester

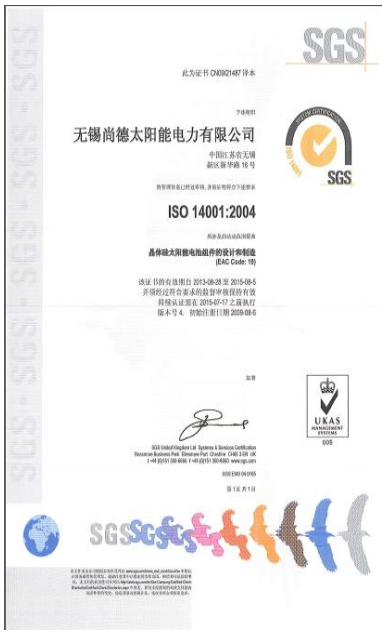
- Electroluminescence test
  - 100% EL test
  - SPC control on key process
  - Soldering temperature , ribbon pull test , size of module and so on

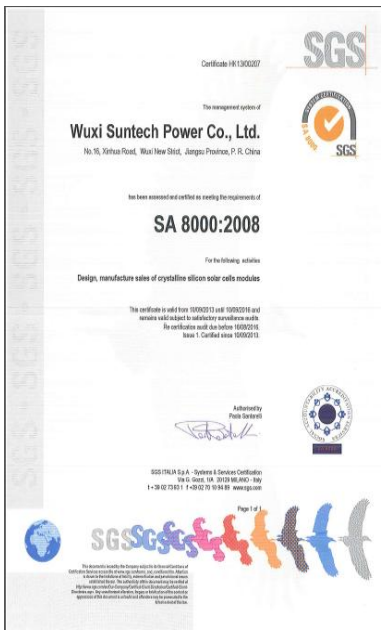


- Key control points on raw material
- Backsheet
  - width(volume) , thickness, length*width(chip), appearance
  - Performance: peel strength, weight, tensile strength, elongation, size stability and so on
- EVA
  - Width, thickness, appearance
  - Performance: peel strength, transmittance, cross-linking test, contractibility and so on
- Tempering glass
  - Length , width, diagonal, thickness, curvature, appearance
  - Performance: transmittance, status of fragment and so on
- Junction box
  - Size, appearance, pull test, wet leakage and so on
- Frame
  - Size, appearance
  - Performance, hardness of frame, thickness of oxidation film, hardness of jump ring (short frame), plat gap, curvature

We have passed several system certificates such as ISO9001 ,ISO 14001 ,OHSAS18001 and SA8000 which is very moment in Europe and America market to meet customer's requirement.



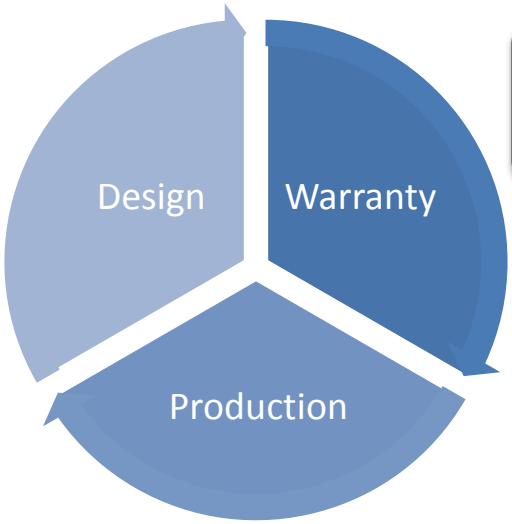




We have reliability assurance system based on special requirement from Japan market JIS Q8901: 2012.

The system focus on the reliability assurance of PV module by serial request of module design , production and warranty.

- Optimize the system of design and production to realize committed lifetime;
- Reliability guaranteed by :
  -- Raw material choice
  -- Design optimization
  -- Reliability assurance



- Warranty documentation
- The 3rd product warranty

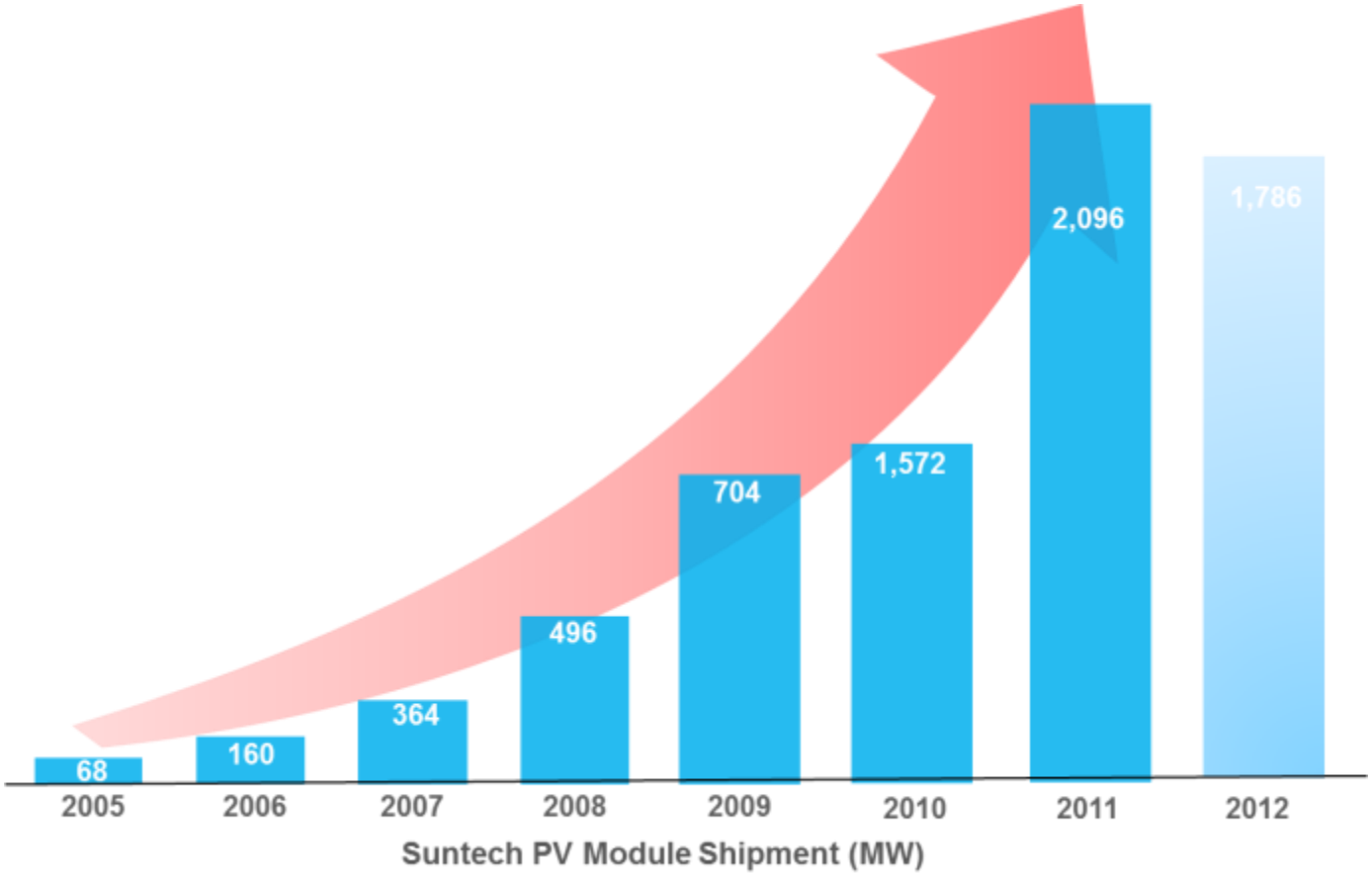
Based on ISO9001: 2008

First VDE Certified In-House Test Lab in Asia

Suntech is one of few module manufacturers with an own VDE, UL & CSA certified test lab

- 1.400 m² canopied test area (biggest in China)
- 7.000 m² outdoor test area
- own UV chamber for aging tests
- capable to do more than 50 different kinds of tests according to or even beyond the IEC 61215 / 61730 and UL 1703 standard
- spot testing of raw materials, new products and production modules
- yearly audits by certification institutes
- ISO/ IEC 17025 compliant (General Requirements for the Competence of Testing and Calibration Laboratories)

Suntech Shipped >7GW product by end of 2012

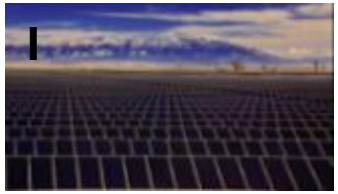


Approaching 8 GW Worldwide Installations

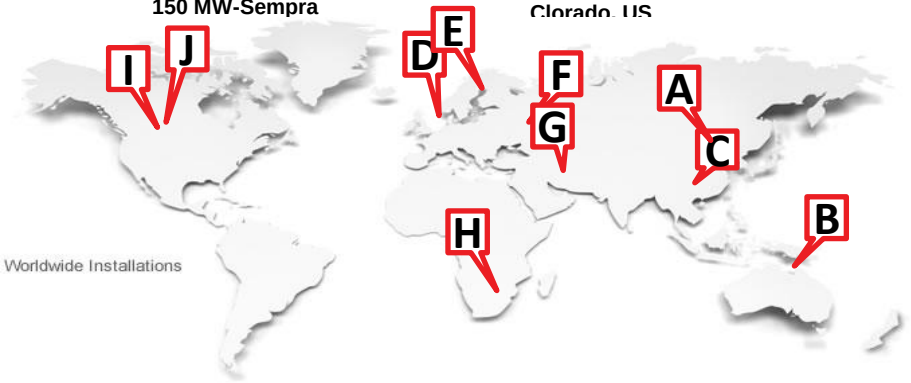
Shanghai Expo Project-5MW, China

Towl hall Project-48kW, Australia

Mesquite solar plant- phase 150 MW-Sempra



Alasoma solar plant- 8 MW-Clorado, US



De Aar solar plant- 100 MW-South Africa

Masdar solar plant- 5 MW-Masdar, UAE

BCP solar plant-52 MW-Thailand

Pozohondo solar park-5.15 MW-Spain

Weinbourg Farm Project-4.5 MW-France

Ktura solar plant-4.9 MW-Israel

Module Field Failures and Warranty Returns

Track Record for the field failures

- Suntech had approximately 0.055% returned modules shipped from 2003 to 2013 Q1, or roughly 17,842 modules out of 32,440,000 modules in total
- Suntech learned from these failures and incorporated the learning into the design and manufacturing process.

- MTBF(Mean-Time-Between-Failure)

$$MTBF-STP-PVm=\frac{\sum(Moudle\times Time\_after\_shipment)}{\sum Failure}=\frac{84{,}272{,}351}{17{,}842}=4{,}723 years/failure$$

$$Failure\_Rate=\frac{Total\_Module\_Failed}{Total\_Module\_Sold}=\frac{17{,}842}{32{,}314{,}443}=0.0552\%$$

Abov MTBF-STP and Failure-Rate record shows Suntech products' long-term reliability in the field.

3rd Party Module Manufacturing & Performance Evaluation by Black & Veatch

Black & Veatch(BV) evaluation report

- BV is the world-famous 3rd party engineering and auditing company
  - BV is entrusted to do the 3rd party evaluation on solar module performance models for project financing reference.

- BV inspection report shows
  - Black & Veatch has reviewed the suppliers of the module components and view the suppliers to be reputable and known to manufacture a quality product.
  - Additional strict raw material testing for cables & connectors, EVA, back sheet and etc.

Extended UV test is 60 kWh/m^{2,} 4 times of the IEC requirement

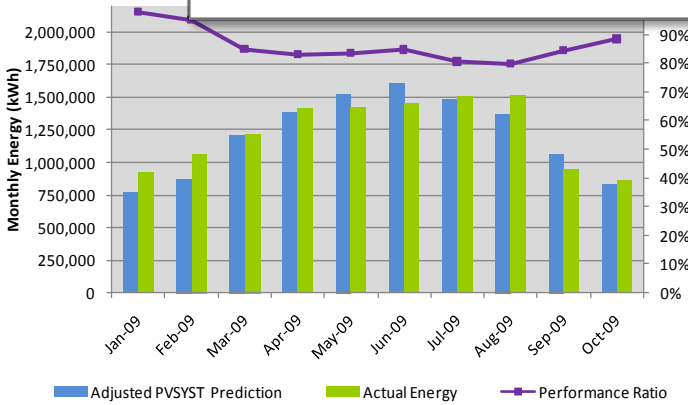
Mechanical strength at lower temperature

Test of water proof capability

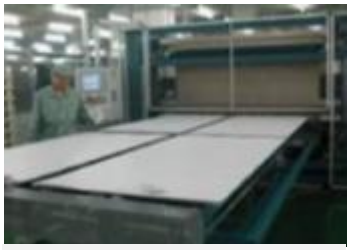
3rd Party Module Manufacturing & Performance Evaluation by Black & Veatch

- BV inspection report shows
  - A reputable German vendor supplies the laminators, which are a key piece of equipment. Durability and reliability
  - Suntech has stressed its modules well beyond the qualification testing requirements under IEC 61215. Black & Veatch viewed the equipment and is of the opinion that the testing equipment is among the industry leading

PVSYST Predicted Annual PR = 82.5%
Actual Annual PR = 86.9%



Suntech module in the field performs very well, and actual performance Ratio is higher than predicted.



1. High quality laminators

2. Very strict quality inspection process

3.Outdoor test bed with different conditions.

BLACK & VEATCH

Suntech provides two types 3rd party warranty / project performance insurance with strong insurance company

- Customized warranty insurance service for different target customers

Distributor/End customer: The product warranty insurance should cover all the promised warranty provided by Suntech.

Investor/Project owner: I care more about the total performance of the solar farm, the insurance covering system performance is better.

Suntech : Suntech is providing 2 types of warranty insurance depending on different requirements from target customers and regions.

Suntech provides two types 3rd party warranty / project performance insurance with strong insurance company

Preliminary version (Details still under discussion)

Munich RE

SOLAR INSURANCE & FINANCE

HDI GERLING

For Distributor/ End customers

- Backed up by credited insurance company
- Large coverage area
- Low deductible

EXXERGY Focusing on the flow of energy

SOLAR INSURANCE & FINANCE

Backed up by

Munich RE

HDI GERLING

For Project owner/ Investors

Customized project performance insurance

- Project (scale >1 MW) is supported by Exxergy
- Project is also supported by Solarif

Framework of 3rd party performance Insurance

HDI GERLING

Module Supplier

Consultant and executor of this performance assessment project

Insurer, providing the performance guarantee terms

SUNTECH UNLIMITED

EXXERGY Focusing on the flow of energy

HDI GERLING backed by Munich RE

The target customer can acquire the competitive insurance rate for their PV projects' performance guarantee from the HDI Gerling, only if the Suntech modules are chosen.

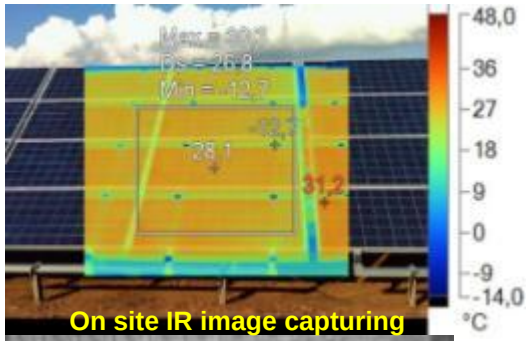
*** The insurance rate is based on the all-round quality assessment ratings for the Suntech product implemented by the Exxergy, and finally determined by HDI Gerling.**

3rd party PV plant performance insurance by HDI Gerling

- Suntech's customer can apply to HDI Gerling for insurance service to secure their project performance output.
- Suntech was audited by Exxergy as the 3rd party technical consulting company for better insurance premium (3rd party module reliability test, PV plant on-site inspection)
- It covers the loss of revenue, up to maximum 50% of the total value of the project excluding land cost.

Success case: On site inspection by exxergy, 2012
Location: Puertollano (Ciudad Real), Spain ,completed on 2008 with Suntech STP 270, STP280-24/Vb

HDI GERLING



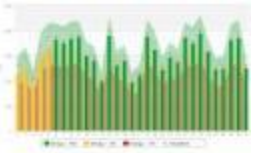
Show case Spain 48 MW Puertollano Project is insured by Exxergy

Framework of 3rd party Insurance

SOLAR INSURANCE

Module Supplier	SUNTECH UNLIMITED	Customer could acquire the competitive insurance rate for the module produced by Suntech from Solarif or HDI GERLING
Insurer, providing the performance guarantee terms	SOLAR INSURANCE	
Mandator of insurance	HDI GERLING	Suntech could offer the module with third party warranty at a premium price

Project Mercury



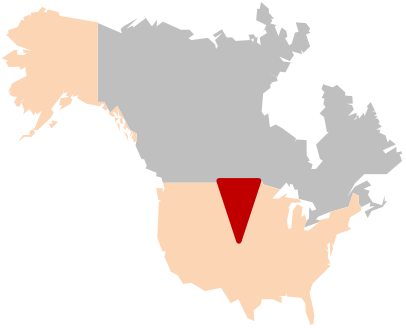
Aim to track Suntech globally installed modules

Project tracking	Performance Ratio(PR)	Details
Internal	Data calculation and comparison with the predicted output power	Project owners share the output data, STP does the calculation
External	System auditing, monitoring and observation	- Project owners share the system monitoring access or calculation data - 3rd party auditing company does the site performance monitoring

PROVES THAT SUNTECH OFFERS BANKABLE, TRUSTABLE, REALIABLE MODULES.

(1) Project in Central US- Internal calculation

Main System Data	
Installed Capacity	Utility(8MW)
Climate	Cool, Bright
Date of Commission	December 2007
Modules	STP 280 &STP 270
Inverter	Xantrex GT500E
Mounting	Wattsun Single-Axis

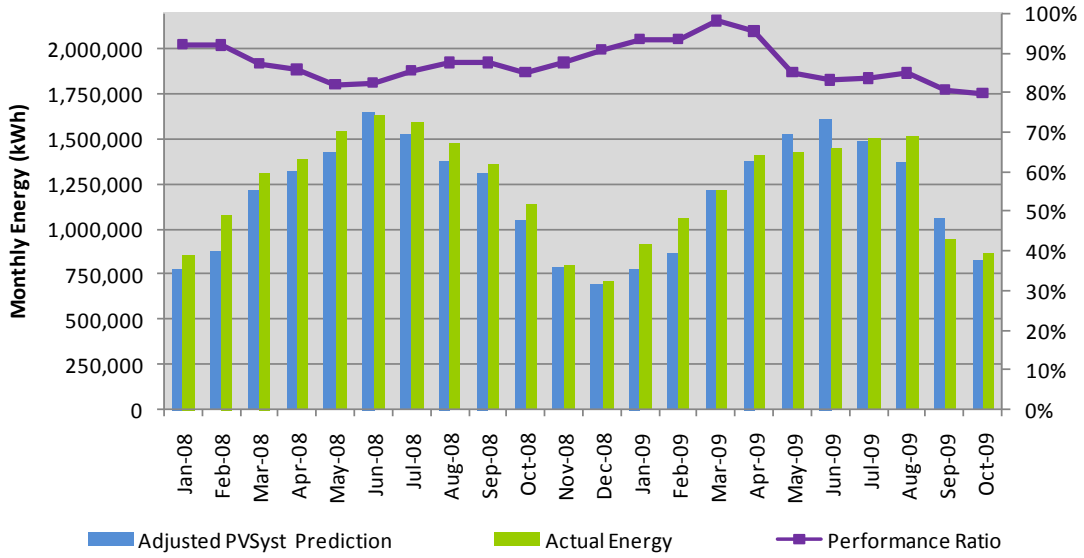


Sunedision
Alamosa Project
Colorado

(1) Project in Central US- Internal calculation

(1) Performance Ratio - internal calculation

PVSYST Predicted Annual PR = 82.1%
Actual Annual PR = 85.8%



Actual output exceeds PVSYST prediction (adjusted for actual insolation and system downtime) by 4%

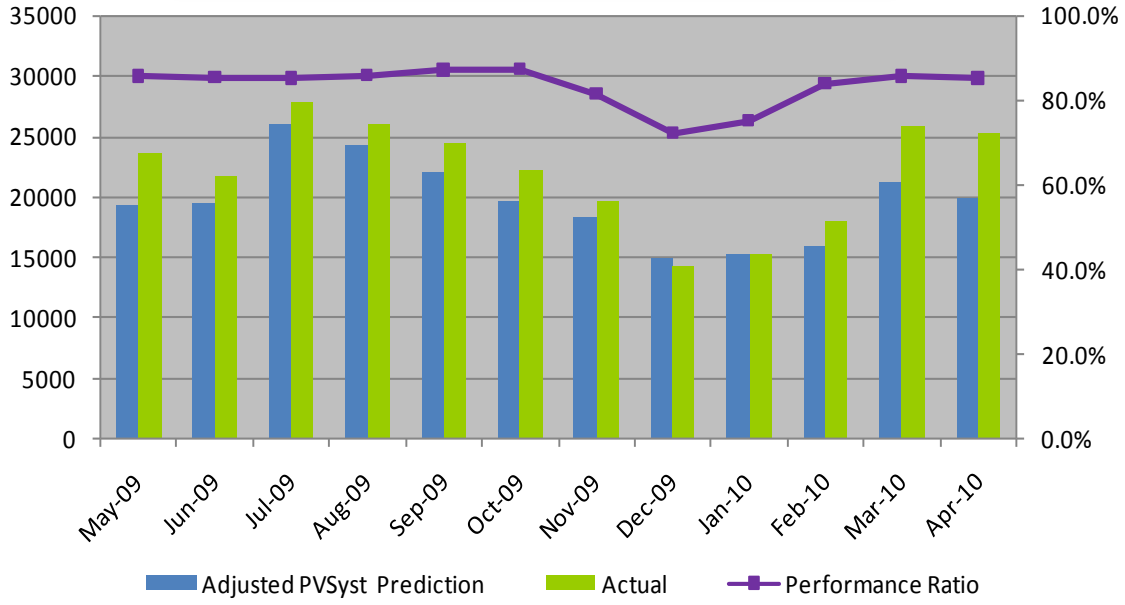
(2) Project in Westcoast US- Internal calculation

Main System Data	
Installed Capacity	Commercial (<500 kW)
Climate	Temperate, Diffuse
Date of Commission	Jan. 2009
Modules	STP 210W
Inverter	Satcon PVS135
Mounting	Rooftop Fixed Tilt

British Telecom , LA

(2) Project in Westcoast US- Internal calculation

PVSYST Predicted Annual PR= 75.4%
Actual Annual PR = 83.7%



Actual output exceeds PVSYST prediction (adjusted for actual insolation and system downtime) by 11%

(3) Finow Tower I in Germany – External monitoring

Main System Data	
Installed Capacity	24,24 MW
Annual energy yield	22,4 Mio. kwh
Reduction of CO2 emission	450.000 z / 20 years
Site size	77 ha
Location	Finow (Berlin) – 1010 kWh/m²
General Contractor	Solarhybrid

Planning: ENERPARC

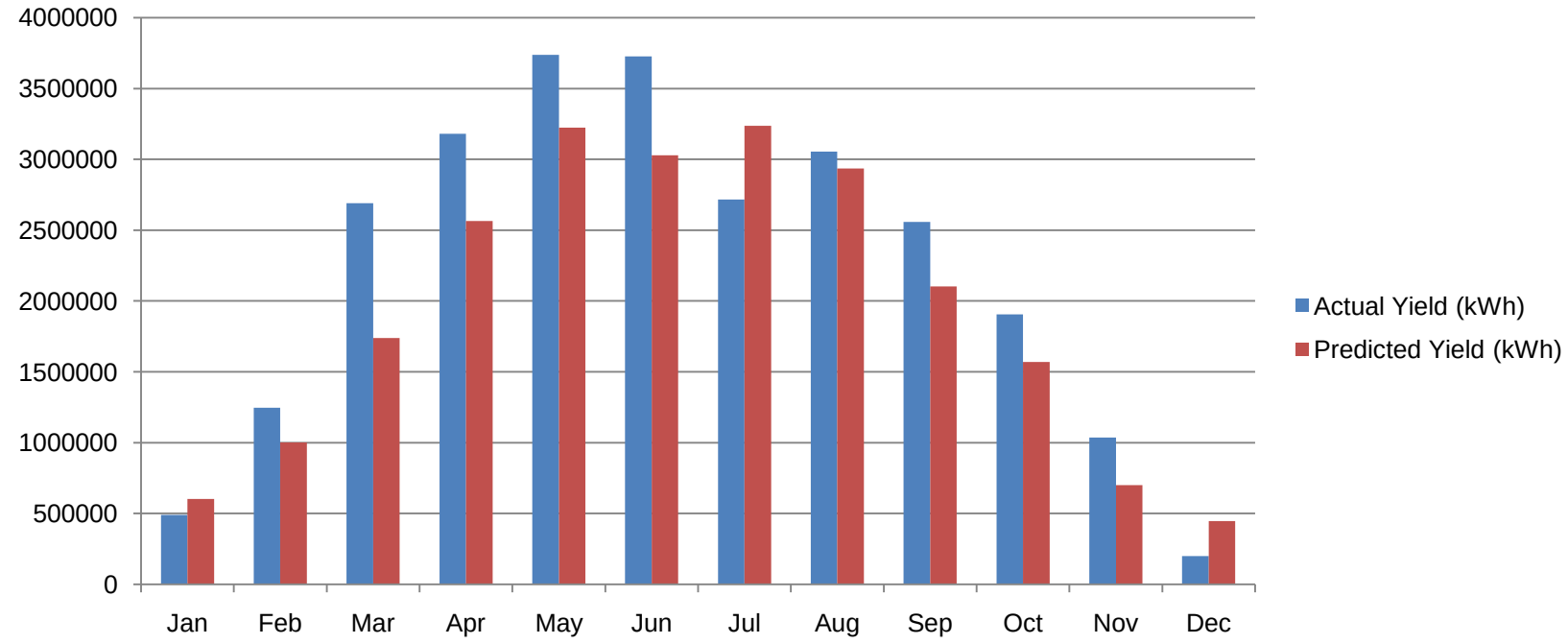
Installation: conecon

Financing: COMMERZBANK

Source: http://www.solarhybrid.ag/

(3) Finow Tower I Performance Ratio-External Monitoring

Suntech modules outperformed the forecast for the annual performance ratio



(3) Finow Tower I Performance Ratio External Monitoring

- Verified by “CH2 Treuhand GmbH” (Investor)
- Great technical availability of 99,85%
- 964.588 € more yield than predicted

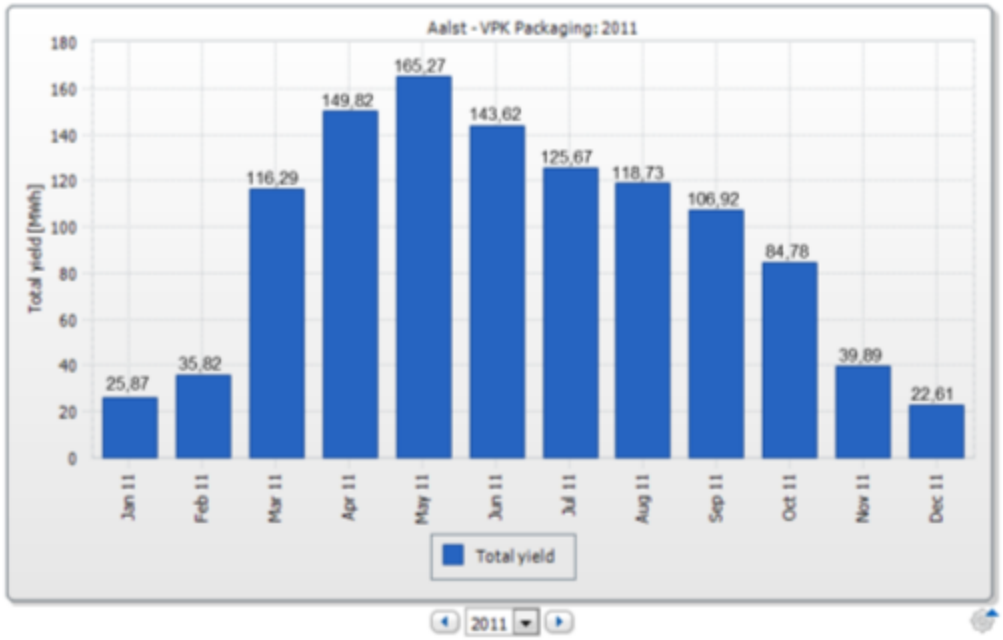
(4) VPK Packaging Performance Ratio External Monitoring

Main System Data	
Installed Capacity	1059,12 kWp
Type of module	STP Ud poly (200 – 210 Wp)
Location	Aalst (Belgium) – 894 kWh/m²
Installer	Oskomera

Source: http://www.solarhybrid.ag/

(4) VPK Packaging Performance Ratio External Monitoring

Suntech modules outperform the forecast from PV SOL



→ Outperformance by 20% in average

Annual Yield (2011): 1135,29 kwh / kwp

Predicted Yield (PV Sol – conservative*): **910,4 kwh/kwp**

Outperformance = 20%

* 0° Azimuth, 30° inclination, Wd 230 Wp, recommended Inverter combination (SMA)

(5) Project Puertollano in Spain - Performance Ratio 3rd Party Auditing

Main System Data	
Installed Capacity	Utility, 52 MW (18,1 MW SUNTECH modules)
Type of Module	STP 270, STP280-24/Vb
Location	Puertollano (Ciudad Real), Spain
Climate	Bright, hot
EPC	RENOVALIA

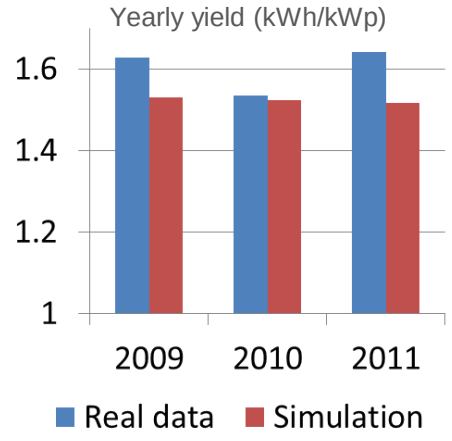
renovalia energy

EXXERGY

Data date collected	By Exxergy member	Data basis
Dec.,2012	Markus S Ansgar D	Audit results

(5) Project Puertollano in Spain - Performance Ratio 3rd Party Auditing

Yearly Yield(kWh/kWp)	Real data	Simulation
2009	1,627	1,531
2010	1,535	1,523
2011	1,642	1,516




EXXERGY

Excerpt
Auditing Report 2012
Technical Due Diligence
PV Power Plant Puertollano, Spain

SUNTECH

Average +5.1% higher than the simulated result

In Global Regions of Harsh Conditions…

Project I – BCP I Phase, Thailand

Main System Data	
Installed Capacity	44 MW
Reduction of CO2 emission	32,000 tons/ Annual
Location	Bang Pa-In (Ayutthaya) – 1892 kWh/m²
Consortium	Suntech & Solartron

SOLARTRON

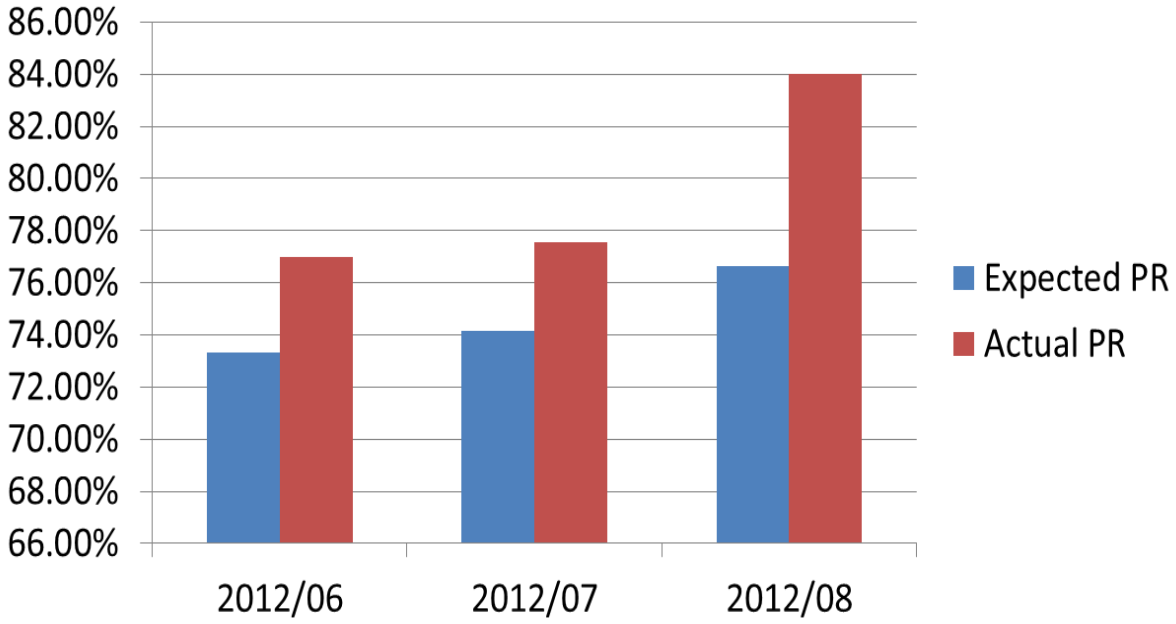
SUNTECH

Project I – BCP I Phase, Thailand

- **43,610** poly crsytalline STP285 solar panels
- **35,616** poly crsytalline STP290 solar panels
- **39,811** poly crsytalline STP295 solar panels
- **33,411** poly crsytalline STP300 solar panels

Project I – BCP I Phase, Thailand(9,48 MW)

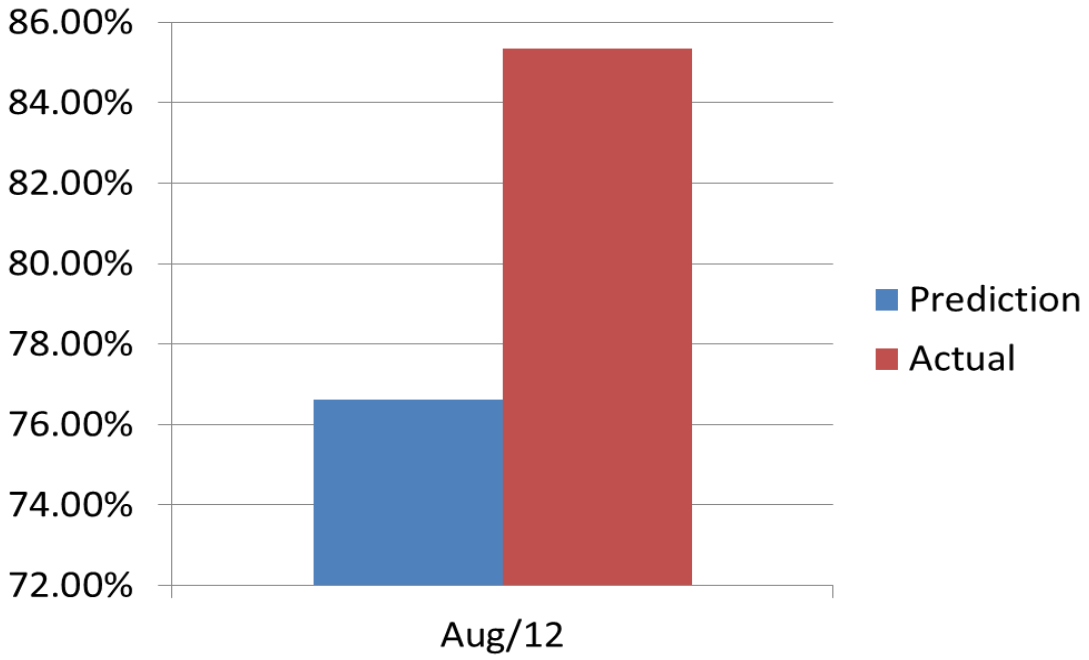
Suntech modules significantly outperform the forecast



Actual performance exceeds prediction by 3.66%in Jun,3.43% in Jul and 7.39% in Aug.

Project Data – BCP I Site Two(34.5MW)

First month of COD performance exceeds prediction by 8.72%



PVSYST Predicted PR = 76.62%
Actual PR = 85.34%

Project II – Masdar, UAE

System data:

- System Size: **4.937MW**
- EPC: **Enviromena (Masdar City)**
- Start Time: **Sep-2009**

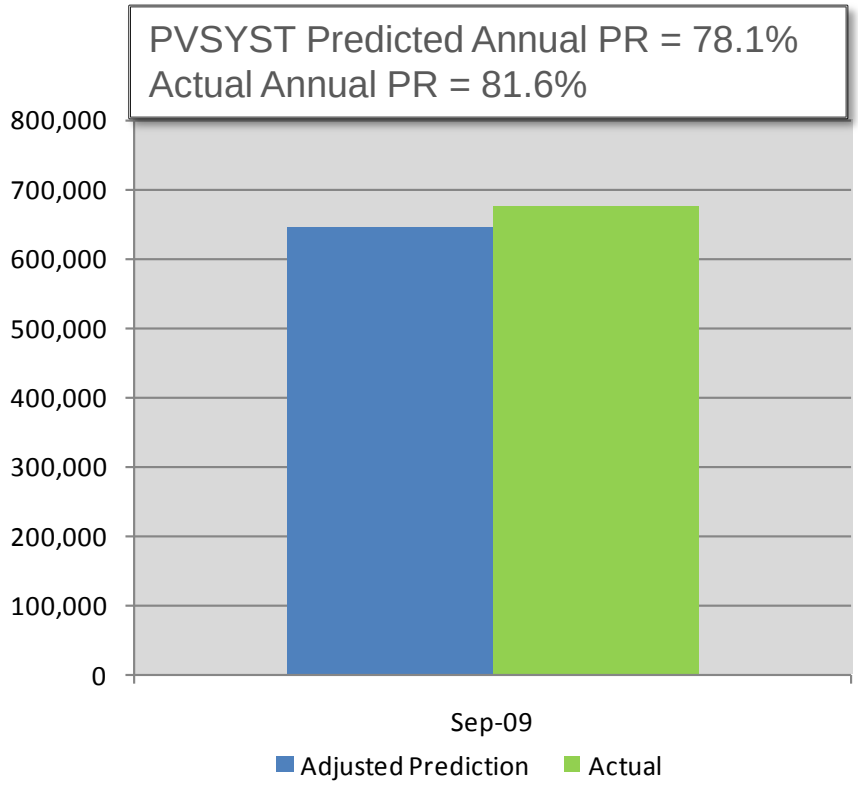
Climate	Hot, Sandy and Bright
Irradiation	2218 kWh / m²
Fixed Til	15°
Type of installation	Ground Mount

Project II – Masdar, UAE

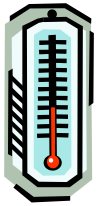
18288 poly crsytalline STP 270 solar panels

8 SMA SC 630CP inverters

Project II – Masdar, UAE



September 2009
Average Daily High
41 ° C (106° F)



Max. temp.
45 ° C (113° F)

Actual September performance exceeds prediction by 3.5%

Project III – Ketura, Israel

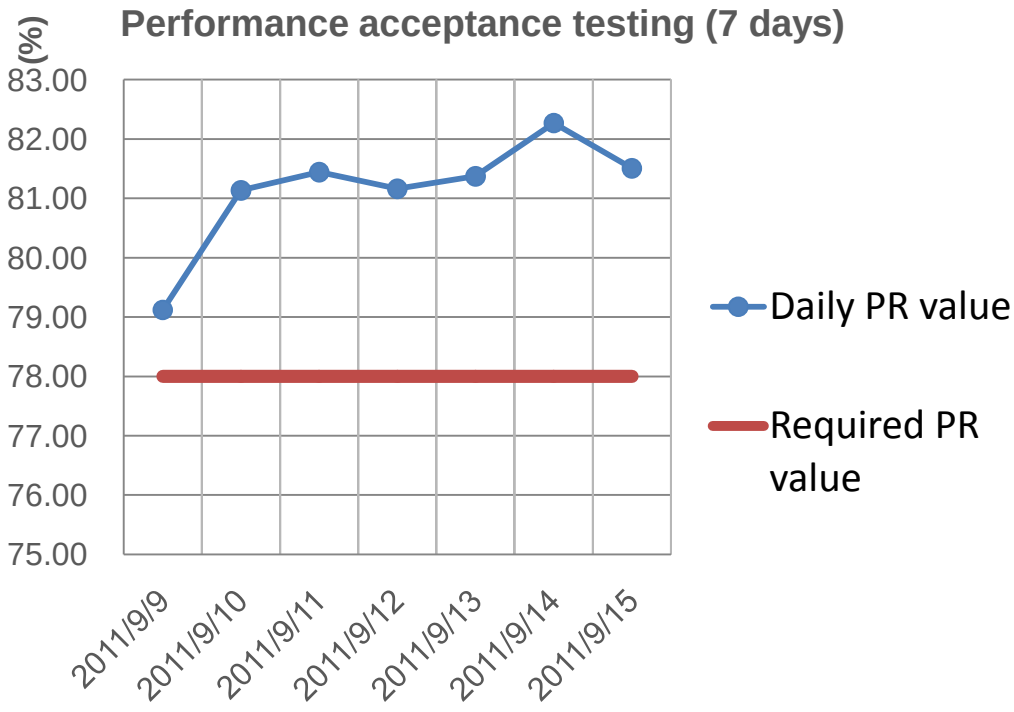
Main System Data	
Installed Capacity	4914 kWp
Carbon dioxide saving	125,000 tones during 20 years
Location	Kibbutz Ketura (Israel) – 2046.8 kWh/m²
Installer	Siemens

Project III – Ketura, Israel

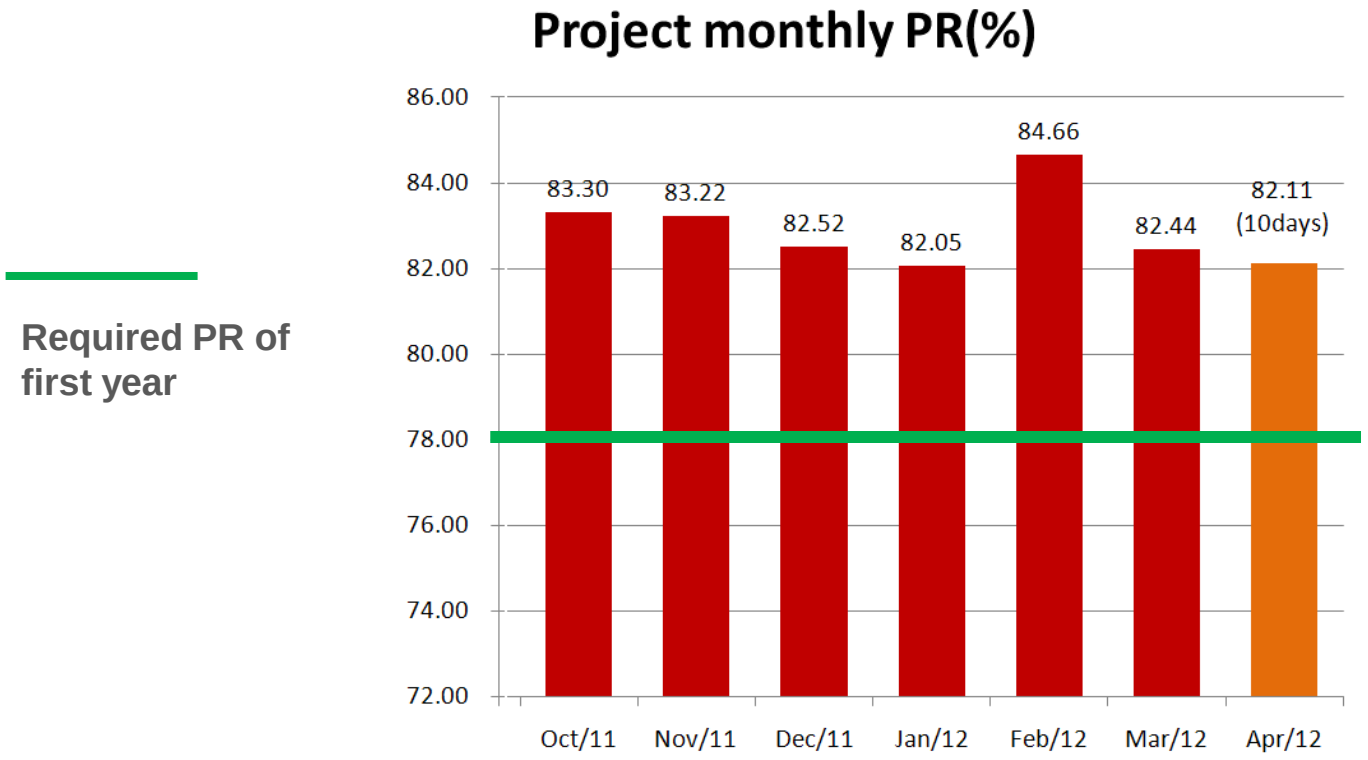
18200 poly crsytalline STP 270 solar panels

2 Sinvert 2000 MS TL & **1** Sinvert 1000 MS TL inverters.

Project III – Ketura, Israel



Project III – Ketura, Israel



Ketura project's actual data shows higher performance over expected.

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Thank you