

WINTERGREEN RESEARCH, INC.

**Utility Scale Market Shares, Strategies, and Forecasts,
Worldwide, 2010 to 2016**

**Utility Scale Solar Large Farms and Concentrating Systems
with Thermal Storage Systems Provide Energy Efficiency**



Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

OPPORTUNITY ABOUNDS

**WinterGreen Research, Inc.
Lexington, Massachusetts
www.wintergreenresearch.com**

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CHECK OUT THESE KEY TOPICS

Utility Solar Farms
Concentrating Solar Systems
Solar Utility
Molten Salt
Thermal Solar Energy Storage
Concentrated Solar Power (CSP)
Solar Electricity
Utility Solar Market Shares
Utility Solar Market Forecasts
Solar Technology
CIGS
Photovoltaic, Solar
Thin film
Crystalline
Substrate
Solar Modules
Cadmium Telluride (CdTe)
Semiconductor Material
Flexible Glass
Parabolic Trough
Parabolic Dish
Solar Central Tower
Heliostats
Heliostat Control System
Commercial Solar Panels
Smart Grid
Solar Concentrated Power Technologies
Solar Thermal With Molten Salt Energy Storage

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Concentrated Solar Electricity Solutions

**Commercial Solar Panels
Multicrystalline Module
Solar Utility
Residential Solar
Consumer Solar
Smart Grid
Solar Panel Technologies
Thin Film Solar Cells
Amorphous Silicon
Thin Film Solar Cells Cadmium Telluride
Thin Film Solar Cells CIGS
(Copper Indium Gallium Selenide)
Copper-Indium-Gallium-Diselenide
Conversion Efficiency Confirmation From NREL
Thin-Film On Glass Substrate
Solar CIGS On A Polymeric
Plastic Substrate
Solar Monolithic Integration On Glass
Substrate
Solar Modules Cadmium Telluride (CdTe)
Semiconductor Material
CIGS Photovoltaic Effect
Crystalline Silicon Indirect Band-Gap Semiconductor
Solar Energy**

**Solar Steam Generator
Mirrors To Concentrate Solar Energy
Solar Energy Round-Trip Efficiency
Climate Change**

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Raise Global Sea Levels

Changing Water Supplies

Solar-Thermal Power Plant

Next-Generation Solar UVAC Receiver

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**Utility Scale Solar Market Shares,
Strategies, and Forecasts, Worldwide,
2010-2016**

LEXINGTON, Massachusetts (June 12, 2010) – WinterGreen Research announces that it has a new study on Utility Scale Solar Market Shares, Strategies, and Forecasts, Worldwide, 2010-2016. The 2010 study has 690 pages, 105 tables and figures.

Large solar farms are part of the answer to implementing energy generated from capture of heat from the sun. Utility scale systems are complex implementations of aggregated capture devices. The value of utility scale build out is the sheer size of the projects. It is easier to implement one large project in a controlled area than to implement multiple medium size projects to achieve the same level of power generation.

Solar energy market driving forces relate to the opportunity to harness a cheap, long lasting, powerful energy source. Solar energy can be used to create electricity in huge quantity. Solar panels are mounted in a weatherproof frame, are mounted in areas with direct exposure to the sun to generate electricity from sunlight.

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Solar power systems are comprised of solar modules, related power electronics, and other components. Solar panels are used in residential, commercial and industrial applications. Solar compositions of arrays that comprise electric utility grids appear to be the wave of the future. Other solar systems are concentrating systems that leverage thermal transport of heated fluids and utilize traditional steam generators.

The demand for solar energy is dependent on a lower prices for solar and higher prices for petroleum. A combination of economies of scale being realized in the manufacturing along with increases in the current prices for petroleum will drive solar energy adoption.

The overall solar market has attained enough critical mass to boost competitive technologies of thin film and monocrystalline, polycrystalline, and multicrystalline silicon based systems. Concentrating systems implemented in the desert use molten salt to store heat for use at night and when the sun is not shining.

SOLAR ENERGY MARKET DRIVING FORCES

Achievement of utility scale grid parity

Lower cost of solar energy than war to defend oil position

Government incentives for solar power

Grid parity of wind energy sources to supplement solar

Increasing cost of fossil fuels

Supply constraints

Desire for energy security

Growing awareness of the advantages of solar power

Solar peak energy generation advantage

Fuel risk advantage

Scalability

Reliability

Environmental friendliness

Thin film batteries to store energy when sun is down

Energy density increase of 40,000 with solid state thin film batteries

Advances in technologies making solar power more cost-efficient

Large market among underserved populations in rural areas of developing countries with little or no access to electricity

Source: WinterGreen Research, Inc.

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Large solar farms are more popular initially, but solar is anticipated to be built out on commercial roof tops in increased quantity. The electricity generated will be fed to local substations and distributed to homes from there.

There is growing global demand for cost-effective and reliable solar power. Molten salt storage and solar electricity generation by use of steam turbines are poised to achieve significant growth. The economies of scale have not yet kicked in and will do so after 100 projects have been built out. The technology promises to be significant because the projects generate so much electricity.

Solar concentrators are efficient and leverage existing steam generation technology. The technology will succeed far faster and be far more wide spread that the vendor executives are now predicting. With rising prices of oil and the Gulf of Mexico oil well disaster, solar power begins to look good, because it is a sustainable energy source.

Aggregation of electricity generated from solar panels placed on commercial roofs is another aspect of utility scale electricity generation. The commercial roof electricity can be sold from electricity substations to the locality for use in data centers, powering electric vehicles, and general electricity usage.

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The overall solar market has attained enough critical mass to boost competitive technologies of thin film and monocrystalline, polycrystalline, and multicrystalline silicon based systems.

Utility solar storage units at a level below \$10.5 billion in 2009 are anticipated to reach \$84.6 billion by 2016. Existing solar products are tuned to the scale needed by utility companies and the cost structure demanded by grid parity. As second and third generation products are used to achieve more economies of scale markets will continue to grow rapidly.

Keywords: Molten Salt, Thermal Solar Energy Storage, Concentrated Solar Power (CSP), Parabolic Trough, Parabolic Dish, Solar Central Tower, Heliostats, Heliostat Control System, Commercial Solar Panels, Solar Utility, Smart Grid, Solar Concentrated Power Technologies, Solar Thermal With Molten Salt Energy Storage, Concentrated Solar Electricity Solutions, Solar Energy, Solar Steam Generator, Mirrors To Concentrate Suns Energy, Mirrors To Concentrate Solar Energy, Solar Energy Round-Trip Efficiency, Climate Change, Raise Global Sea Levels, Changing Water Supplies, Solar-Thermal Power Plant, Next-Generation Solar UVAC Receiver, www.wintergreenresearch.com, solar panel, solar electricity, solar market shares, solar market forecasts, solar technology, CIGS, Photovoltaic, Solar, thin film, crystalline, Substrate, Solar Modules Cadmium Telluride (CdTe) Semiconductor Material, Flexible Glass Solar Panels, Polysilicon Producers, Solar Inverter, Solar Micro Inverter, <http://wintergreenresearch.com/reports/molten-salt.htm>

YOU MUST HAVE THIS STUDY

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Companies Profiled

Market Leaders

Utility Scale Solar Generated Electricity Storage Company Profiles

Sharp
First Solar
SunTech
Ascent Solar Technologies
SolarWorld
BP Solar
Q Cells
LDK Solar
Yingli Green Energy
Trina Solar
Canadian Solar
Solarfun-Power
Sunpower
Evergreen
ET Solar
China Sunergy
Energy Conversion Devices / United Solar Ovonic
Shenzhen Sunshine Electronics
Kyocera
Sanyo
Mitsubishi
Abengoa
Acciona Solar Power
Areva / Ausra
BrightSource Energy
GE Energy
Siemens

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United Technologies
Schott Solar
Hitachi

Utility Scale Solar Market Participants

Selected Company Profiles

Asahi Glass
Battelle
Corning
Directed Vapor Technology
DuPont
Applied Materials
SEIA
United Technologies / SolarReserve
United Technologies / Hamilton Sundstrand
A-Power
Abengoa Solar
Anwell Technologies
Areva / Ausra
TATA BP Solar
BYD 5-14
China Sunergy
China Guangdong Nuclear Wind Power Company
Conergy AG -
Conergy and MEMC Agreement
Corning
Developers Diversified Realty (DDR)
Daqo New Energy
Dow Chemical
Dow Chemical / NuvoSun
Dyesol
Energy Conversion Devices / United Solar Ovonic
ET Solar
Evergreen Solar
G24
GreenWing
HelioVolt
Hoku Scientific

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**Honda
JinkoSolar
Juwi
Kyocera
LDK Solar
Masdar PV
MEMC
MEMC / SunEdison and Developers Diversified
Realty National Rooftop Solar Program.
MiaSolé
Mitsubishi Solar Panels
Oerlikon Solar
Petra Solar
PNM 5-106
Ranking Solar
Samsung
Sanyo
Scatec Solar
Schott
Sharp LCD
Shell Oil
Solar Energy Initiatives
Shenzhen Sunshine Electronics
Singulus Technologies
SMA Solar Technology AG
SMA Solar
Solyndra
Staples (SPLS)
Solarfun
Solar Fusion Power
SolarWorld
Sun Fields Europe
SolFocus
Stirling Solar
Suniva Inc.
SunTech
SunPower
SunPower Acquires SunRay
Telio Solar / Telconord - Agencia de Energías Renovables
Tianwei**

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Xinjiang Goldwind

Utility Scale Solar Market Shares, Strategies, And Forecasts, Worldwide, 2010 to 2016

Report Methodology

This is the 445th report in a series of primary market research reports that provide forecasts in solar energy, robots, communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and batteries to store energy. Automated process and significant growth potential are a priorities in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. Forecasts are based on primary research and proprietary data bases.

The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors,

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distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards. Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications, trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2009. With 2009 and several years prior to that as a baseline, market projections were developed for 2010 through 2016. These projections are based on a combination of a consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective. The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes referencde to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

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The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models have lists of servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world. This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.

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Utility Scale Solar Storage Technology

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