

WINTERGREEN RESEARCH, INC.

**Green Machines: Worldwide Solar Manufacturing
Capacity, Production, and Capacity Utilization Market Shares,
Forecasts, and Strategies, 2008-2014**

Solar Manufacturing Capacity Lends Energy Independence



Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

**WinterGreen Research, Inc.
Lexington, Massachusetts**

www.wintergreenresearch.com

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CHECK OUT THESE KEY TOPICS

SOLAR MANUFACTURING CAPACITY
PHOTOVOLTAICS MANUFACTURING
SOLAR ELECTRIC MANUFACTURING
POLYSILICON
STAND ALONE PV SYSTEMS
BACKUP POWER SOLAR
THIN FILM MANUFACTURING CAPACITY
PV CELLS
PV MODULES
BIPV
ON-GRID SOLAR APPLICATIONS
ON-GRID MANUFACTURING CAPACITY SOLAR
OFF-GRID MANUFACTURING CAPACITY SOLAR

Global Warming Drives Solar Energy Adoption

**Solar Capacity Market Forecasts
Solar Production Market Shares
Solar Manufacturing Capacity Percent Utilization
Forecasts**

OPPORTUNITY ABOUNDS

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Solar Manufacturing Capacity, Production and Percent Utilization: Market Shares, Forecasts, and Strategies, 2008-2014

The single most significant economic factor driving adoption of solar utility initiatives is the prospect of carbon use surcharges. As coal, gas, and oil usage are taxed to help prevent pollution and stimulate use of renewable energy sources, solar energy becomes more attractive to the utility grid electricity providers and ordinary households. The environmental impact of energy use choices promises to be an ongoing factor in energy grid supply.

Hybrid energy solutions are anticipated to evolve. The combinations of wind and solar energy are compelling. These systems only work if the energy storage systems are reliable and available.

Total global capacity in 2010 for solar manufacturing is anticipated to reach 26.5 gigawatt (GWp). Solar is emerging as the renewable energy electricity generation of choice. Storage is the biggest difficulty, and a combination of the grid, batteries, and hydrogen are anticipated to provide energy storage means.

Some of the very large enterprises in the solar manufacturing markets do not have very much manufacturing capacity. They have been waiting to see what technologies are the most efficient. As market trials begin to be successful, it is certain that there will be a significant number of acquisition and merger activities as companies move to achieve strategic advantage in the growing solar markets.

Adoption of solar energy has a simple market driving force. If people do not adopt solar energy, the planet will become unfit for human habitation. The fossil fuels are warming the planet at an increasing rate that makes life unsustainable if something does not change.

Global warming drives solar markets. Solar is perceived as the best, perhaps the only widespread solution to global warming. Every large enterprise has adopted a social responsibility strategy that makes a nod toward solving the issues of global warming and embraces renewable

energy. Every person in the world is aware of the problems that global warming is bringing.

High growth is forecast for Manufacturing Capacity solar markets as solar moves to take on a measurable supply of world energy. As penetration from .3% of the world energy supply raises to over 15% in five years, Manufacturing Capacity uses of solar energy will represent a significant part of the growth.

Manufacturing Capacity solar energy represents a measure of energy independence for every household, used as hybrid systems independently of, but not completely in place of traditional grid electricity.

Demand for energy is accelerating as more of the world becomes developed. Developing countries are anticipated to double the worlds demand for energy in the next thirty years. Energy creation is becoming a central environmental issue with air quality, water quality, and flooding because of global warming having implications for the entire world.

Solar energy is a clean, reusable and affordable solution that is increasingly being recognized as the leading alternative energy source for the 21st century. While hybrid solutions are anticipated to evolve with wind, geothermal, and nuclear solutions, evolving as well, solar looks to be a dominant technology. The solar panel size is a trade-off between the amount of money wanted to invest and the amount of electricity needed to produce. A typical US home uses 13,000kWh per year or 5kWp.

On average, the sun radiates 2.6 gigawatts (GW) of energy onto a square mile of the earth's surface, and the most suitable way to harvest that light depends on two factors: cost and the available real estate. It does not matter that thin film solar panels are not more than 10% efficient initially, the roof of the home is not doing anything else except sit there. The sides of the home, the back fence can be used to collect solar energy and that energy can be stored for later use in vehicles and lighting.

World solar cell production reached 3,623 MW in 2007, up from 2,204 MW a year earlier in 2006. A German company Q-Cells is the market leader in productions, but Sharp is the leader by far in manufacturing capacity. Japanese producers account for 26% of global solar equipment

production. Chinese manufacturers raised their share from 20% in 2006 to 35% in 2007.

By 2009, Sharp continues to be a market leader in production, based on its low cost manufacturing capacity and broad distribution reach to commercial and consumer markets which are expected to develop rapidly now that thin film batteries and electric vehicles make solar energy attractive.

Companies Profiled

Market Leaders

Q-Cells
Kyocera
Sharp Solar
Schott
BP Solar
First Solar
Isotoner
Sanyo
SolarWorld
SunPower
Suntech
Yingli Green Energy

Market Participants

AES
Akvo Energy
Colorado Instruments / SolarWorld
Concentrix
Cypress Semiconductor / Sunpower

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Dyesol Limited
Evergreen Solar
Flisom
GE
Global Solar Energy
Hitachi America Ltd.
Hoku Scientific
Isofoton
Kyocera
LDK Solar Co LTD
Mitsubishi
Nanosolar
PrimeStar Solar
Q-Cells AG
Sanyo
SatCon
Signet Solar
Siemens
Solaire Direct
Solarfun Power Holdings Co, Ltd.
Solar Integrated
SolarWorld AG
Solartech
Solon
Spectra Watt / Intel
Tenesol
Urbasolar
Yingli Green Energy

Solar Manufacturing Capacity Market Strategies, Shares, and Forecasts 2008-2014

REPORT METHODOLOGY

THIS IS THE 392ND REPORT IN A SERIES OF MARKET RESEARCH REPORTS THAT PROVIDE FORECASTS IN COMMUNICATIONS, TELECOMMUNICATIONS, THE INTERNET, COMPUTER, SOFTWARE, TELEPHONE EQUIPMENT, HEALTH EQUIPMENT, AND ENERGY. 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. FORECASTS REFLECT ANALYSIS OF THE MARKET TRENDS IN THE SEGMENT

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AND RELATED SEGMENTS. UNIT AND DOLLAR SHIPMENTS ARE ANALYZED THROUGH CONSIDERATION OF DOLLAR VOLUME OF EACH MARKET PARTICIPATION 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, 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. OUR RESEARCH INCLUDES ACCESS TO LARGE PROPRIETARY DATABASES. LITERATURE SEARCH INCLUDES ANALYSIS OF TRADE PUBLICATIONS, GOVERNMENT REPORTS, AND CORPORATE LITERATURE.

YOU MUST HAVE THIS STUDY

Solar Manufacturing Capacity Market Opportunities, Strategies, and Forecasts, 2008 to 2014

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