



PV Manufacturing – World Data and Florida Applications

**David Block
Florida Solar Energy Center**



World PV Manufacturing Output - Mw

Region/Country	2008	World Percent
Europe	1,906.6	27.5%
China	1,848.4	26.6%
Japan	1,224.0	17.6%
Taiwan	853.9	12.3%
U.S.	412.0	5.9%
India	157.0	2.3%
ROW	539.2	7.8%
Total	6,941.1	100.0%



World PV Installed in 2008 and Total Installed Capacity - Mw

Region/Country	Installed in 2008	%	Installed Capacity	%
Europe	4592	85.6%	9533	72.3%
Spain	2281		2973	
Germany	1500		5308	
France	105		175	
U.S.	342	6.4%	1200	9.1%
S. Korea	224	4.2%	352	2.7%
Japan	208	3.9%	2100	15.9%
Total	5366	100	13185	100

All values in Mw



Top 10 companies in PV production

Company	Location	2008
Q-Cells	Germany	570.4
First Solar	U.S., Germany, ML	504.0
Suntech Power	China	497.5
Sharp	Japan	473.0
Motech	Taiwan	384.0
Kyocera	Japan	290.0
Baoding Tiamwei Yingli	China	281.5
JA Solar	China	277.0
Sunpower	Philippines	236.9
SolarWorld	Germany	160.0
Trina Solar	China	210.0

Note that there is only one U.S. company, First Solar, and its production takes place in three regions – U.S. at 147 Mw, Germany at 196 Mw and Malaysia at 161 Mw for the total of 504 Mw.



Key U.S. Results

- U.S. accounted for 5.9% of world production
- U.S. installed 6.4% of world production
- U.S. accumulative world capacity is 9.1%
- 65% of U.S. production is thin film technologies from 2 companies.



U.S. PV Manufacturers and Output for 2008

Company	Location	Material	2008
First Solar	AZ	Cadmium Telluride	147.0
United Solar	MI	Amorphous Silicon	113.0
Solarworld	CA	Silicon	61.0
BP Solar	MD	Silicon	27.7
Evergreen Solar	MA	Silicon Ribbon	26.5
Schott Solar	NM	Silicon	11.0
Global Solar	AZ	CIGS	7.2
Other	--	--	18.7
Total	--	--	412.0

Two largest U.S. producers both use thin film technologies. Thin film accounts for 65% of the U.S.'s capacity.



Top 10 States of PV Installations

2008 Rank by State	2008 (MW _{DC})	2008 Market Share	2007 Rank
1. California	178.7	62%	1
2. New Jersey	22.5	8%	2
3. Colorado	21.7	7%	4
4. Nevada	14.9	5%	3
5. Hawaii	8.6	3%	6
6. New York	7.0	2%	5
7. Arizona	6.4	2%	7
8. Connecticut	5.3	2%	8
9. Oregon	4.8	2%	11
10. North Carolina	4.0	1%	16
All Other States	15.9	5%	
Total	289.8		



Recent Florida Installations

Location	Size	Status
FPL DeSoto County	25 Mw	Installation complete
FPL at Space Coast	10 Mw	Complete in December
FPL at NASA/KSC	1 Mw	Installation ongoing
Orange County Convention Center	1 Mw	Installation complete
Total in 2009	37 Mw	



Future Florida Installations

- Gainesville Regional Utilities will give producers \$0.32/kw-hour with limit of up to 4 megawatts per year.
- Florida Municipal Electric Agency has announced that it intends to install up to 100 Mw of PV over the next five years.
- The Governor's Energy Office through the solar in schools program has proposed 1.0 Mw on Florida schools in the next few years.
- Orlando Utilities Commission (OUC) has issued a qualifications for bid for 10 Mw.
- TECO is planning a purchase power agreement for 25 Mw in Polk County.



Future PV Manufacturers Locating in Florida



- Advanced Solar Photonics of Lake Mary, FL has announced that the company's monocrystalline solar panels are slated to come on the line in July 2009.
- Willard & Kelsey Solar Group is an Ohio-based solar company that may bring a new plant to Orlando.
- Mustang Vacuum Systems, LLC, of Manatee County, FL has received \$577,636 from the Florida Renewable Energy Grants Program which will allow expansion of its thin-film production.
- Blue Sky Solar, Inc. has made preliminary comments concerning the location of a PV manufacturing plant in Orlando.



Key Florida Results

- Four 2009 PV installations for a total of 37 Mw has moved Florida to second in U.S. PV installations.
- 140 Mw of Florida PV installations are now in planning for the next 5 years.
- Four PV manufacturers now have or have proposed Florida locations.



Projection for 2009

From PVNews:

- Projects a 13% increase in global installations in 2009 compared to 82% in 2008.
- 552 Mw proposed in U.S.
- 1800 Mw in China.

Solar Shakeout Prediction

- At present there are 250 companies. Will only be a couple of dozen in five years.
- Winners? - The ones with deep pockets, cutting-edge technology, and a rigorous focus on cutting costs.
- Who are winners? - Four names keep popping up: First Solar Inc. and SunPower Corp., both based in the US; Sharp Corp., headquartered in Japan; and SunTech Power Holdings in China.



Conclusions

Bad news

- U.S. losing PV market

Good news

- Florida opportunities large
- DOE RFI



DOE – RFI – PV Manufacturing Initiative DE-FOA-0000153

Three models:

- University-Led Consortia
- Collaborative Industry-Led Consortia
- Manufacturing Development Facilities

Awards – 30 million for 5 years

Gainesville meeting on September 21, 2009