

# **Solar Thermal and Photovoltaic Collector Manufacturing Activities 2005**

**August 2006**

**Energy Information Administration**  
Office of Coal, Nuclear, Electric and Alternate Fuels  
U.S. Department of Energy  
Washington, DC 20585

This report is available on the Web at:  
<http://www.eia.doe.gov/fuelrenewable.html>

This report was prepared by the Energy Information Administration, the independent statistical and analytical agency within the U.S. Department of Energy. The information contained herein should be attributed to the Energy Information Administration and should not be construed as advocating or reflecting any policy of the Department of Energy or any other organization.

## Contacts

This report was prepared by the staff of the Renewable Information Team, Coal, Nuclear, and Renewables Division, Office of Coal, Nuclear, Electric and Alternate Fuels. Questions about the preparation and content of this report may be directed to Fred Mayes, Team Leader, Renewable Information Team at e-mail [fred.mayes@eia.doe.gov](mailto:fred.mayes@eia.doe.gov), (202) 287-1750 or Peter Wong at e-mail [peter.wong@eia.doe.gov](mailto:peter.wong@eia.doe.gov), (202) 287-1986.

## Preface

The Energy Information Administration (EIA) reports detailed historical data on solar manufacturing activities annually in its report, the *Renewable Energy Annual*. This report, *Solar Thermal and Photovoltaic Collector Manufacturing Activities 2005*, provides an overview and tables with historical data spanning 1996-2004, including revisions, and preliminary data for 2005. These tables correspond to similar tables to be presented in *Renewable Energy Annual 2005* and are numbered accordingly.

Data in this report is based upon manufacturers shipment information reported on Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Definitions for terms used in this report can be found in EIA's Energy Glossary:  
<http://www.eia.doe.gov/glossary/index.html>.

## Tables

Page

### Solar Thermal Collectors

29. Annual Solar Thermal Collector Domestic Shipments, 1996-2005.....	13
30. Annual Shipments of Solar Thermal Collectors, 1996-2005 .....	14
31. Annual Shipments of Solar Thermal Collectors by Type, 1996-2005 .....	15
32. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2005 .....	16
33. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2004 .....	17
34. Shipments of Solar Thermal Collectors by Destination, 2005.....	18
35. Distribution of U.S. Solar Thermal Collector Exports by Country, 2005 .....	19
36. Distribution of Solar Thermal Collector Shipments, 2004 and 2005 .....	20
37. Solar Thermal Collector Shipments by Type, Quantity, Value, and Average Price, 2004 and 2005 .....	21
38. Shipments of Solar Thermal Collectors by Market Sector, End Use, and Type, 2004 and 2005.....	22
39. Shipments of Complete Solar Thermal Collector Systems, 2004 and 2005.....	23
40. Number of Companies Expecting to Introduce New Solar Thermal Collector Products in 2006.....	24
41. Percent of Solar Thermal Collector Shipments by the 10 Largest Companies, 1996-2005 ...	25
42. Employment in the Solar Thermal Collector Industry, 1996-2005 .....	26
43. Companies Involved in Solar Thermal Collector Activities by Type, 2004 and 2005.....	27
44. Solar-Related Sales as a Percentage of Total Company Sales, 2004 and 2005.....	28

### Solar Photovoltaic Cells and Modules

45. Annual Photovoltaic Domestic Shipments, 1996-2005.....	29
46. Annual Shipments of Photovoltaic Cells and Modules, 2003-2005.....	30
47. Annual Shipments of Photovoltaic Cells and Modules, 1996-2005.....	31
48. Distribution of Photovoltaic Cells and Modules, 2003-2005 .....	32
49. Photovoltaic Cell and Module Shipments by Type, 2003-2005.....	33
50. Photovoltaic Cell and Module Shipment Values by Type, 2004 and 2005.....	34
51. Shipments of Photovoltaic Cells and Modules by Market Sector, End Use, and Type, 2004 and 2005 .....	35
52. Export Shipments of Photovoltaic Cells and Modules by Type, 2004 and 2005 .....	36
53. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2005.....	37
54. Shipments of Complete Photovoltaic Module Systems, 2003-2005 .....	39
55. Employment in the Photovoltaic Manufacturing Industry, 1996-2005 .....	40
56. Companies Expecting to Introduce New Photovoltaic Products in 2006.....	41
57. Number of Companies Involved in Photovoltaic-Related Activities, 2004 and 2005.....	42

## Figures

Page

### Solar Thermal Collectors

F1. Total Solar Thermal Collector Shipments, 1996-2005 .....	6
F2. APS Saguaro Solar Trough Power Plant .....	7
F3. Solar Thermal Collector Shipments Top Domestic Destinations, 2005 .....	7
F4. Solar Thermal Collector Average Price, 1996-2005 .....	7

### Solar Photovoltaic Cells and Modules

F5. Photovoltaic Domestic Shipments, 1996-2005 .....	8
F6. Photovoltaic Cell and Module Shipments, 1996-2005 .....	9
F7. Photovoltaic Import and Export Shipments, 2001-2005 .....	9
F8. Market Share of Crystalline Silicon Shipments, 1996-2005 .....	10
F9. Market Share of Thin-Film Shipments, 1996-2005.....	10
F10. Photovoltaic Cell and Module Average Prices, 2001-2005.....	11

# Solar Thermal and Photovoltaic Collector Manufacturing Activities 2005

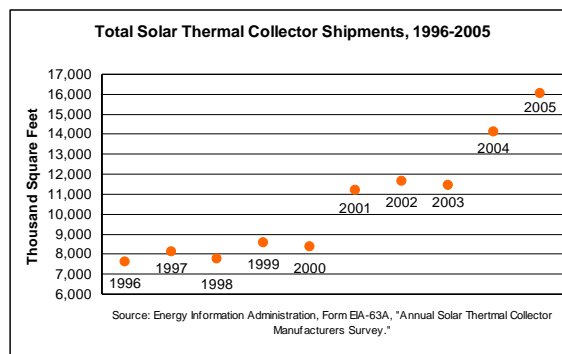
## Overview

Since the beginning of 2005, U.S. energy prices have been generally increasing, in part due to hurricanes Katrina and Rita, and demand pressure on oil supplies from the Far East. This has increased interest in alternate energy sources, which include renewable energy sources such as solar.

The U.S. manufacture of both solar thermal collector and photovoltaic (PV) cells and modules continued to grow at a strong pace in 2005. This occurred despite the fact that prices for solar panels and PV cells and modules rose due to material cost increases. The solar industry has been able to absorb most of the rising material costs because it has become more flexible in its production methods and supply arrangements over the past years. It has recovered from the nationwide economic downturn in 2003, showing significant growth in 2004 and 2005.

## Solar Thermal Collectors

Domestic shipments of solar thermal collectors rose 10.4 percent to 14.7 million square feet in 2005 (Table 29). There were 25 companies shipping solar collectors in 2005, one more than in 2004. Total shipments rose to 16 million square feet, a 13.7 percent increase over 2004 (Table 30 and Figure F1). Exports surged 67.4 percent, while imports increased 22.1 percent (Table 30).



**Figure F1**  
**Total Solar Thermal Collector Shipments, 1996-2005**

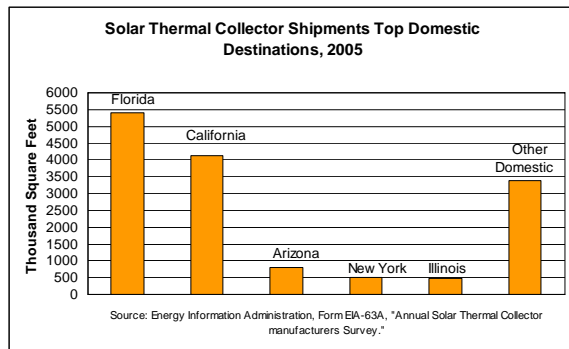
Low-temperature solar collectors represent 95 percent of total shipments. Medium-temperature collectors were responsible for more than 4 percent of total shipments (Table 31). High-temperature collectors represented less than 1 percent (0.7%). Included in the statistics are collectors shipped to Arizona Public Service's (APS) Saguaro Solar Trough Power Plant, the first concentrating solar power plant built in the U.S. since 1988.<sup>1</sup> The Saguaro Solar Trough Power Plant features more than 100,000 square feet of parabolic-trough shaped mirrors and stands more than 15 feet tall. It was built on a patch of desert in Red Rock, adjacent to APS' Saguaro Power Plant, about 30 miles north of Tucson. It has the capability of generating one megawatt of clean electrical power, enough electricity to meet the demands of about 200 homes (Figure F2).



**Figure F2**  
**APS Saguaro Solar Trough Power Plant**  
 Courtesy of Arizona Public Service (APS)

In 2005, 71 percent of all collectors were produced in five states: New Jersey, California, Florida, Tennessee, and Arizona (Table 32), with 63 percent of the total shipped from New Jersey and California alone. Twenty-eight percent of all collectors shipped were imported, mostly from Israel.

More than 70 percent of all collectors were shipped to the top five domestic destinations: Florida, California, Arizona, New York, and Illinois (Table 32 and Figure F3). Florida and California accounted for 60 percent of total shipments. (Table 33 shows these data for 2004.)

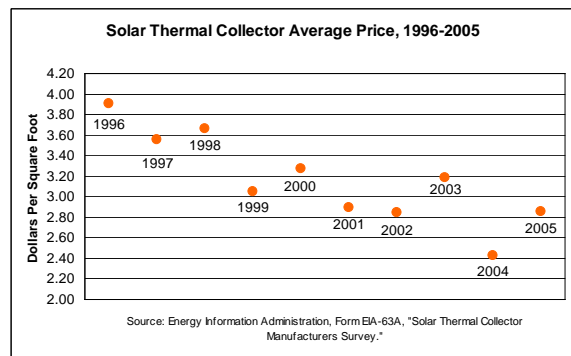


**Figure F3**  
**Solar Thermal Collector Shipments Top Domestic Destinations, 2005**

As indicated in Table 34, domestic shipments were sent to all 50 States within the U.S., plus the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands.

Exports experienced a record growth from 0.8 million square feet to 1.4 million square feet, mainly to Canada (36.37 percent), Brazil (20.97 percent), France (9.54 percent), and Mexico (8.14 percent) (Table 35). Fifty-eight percent of total shipments were sent directly to wholesale distributors, 33 percent to retail distributors, 4 percent to exporters, 4 percent to installers, and more than 1 percent to other end users (Table 36).

The value of total shipments increased to \$45.8 million in 2005 from \$34.3 million in 2004 (Table 37).



**Figure F4**  
**Solar Thermal Collector Average Price, 1996-2005**

Average price per square foot for low-temperature collectors rose to \$2.00 from \$1.80 in 2004. In contrast, the average price for medium- and high-temperature collectors decreased from \$19.30 to \$18.77 per square foot. As a result, the overall average price for total shipments increased more than 17.7 percent, from \$2.43 per square foot in 2004 to \$2.86 per square foot in 2005, just one cent higher than the average price per square foot in 2002. Notably, there has been a pattern of the average price per square foot rising and falling every other year, which is primarily due to material costs growing slightly faster than efficiency and production economies of scale (Table 37 and Figure F4).

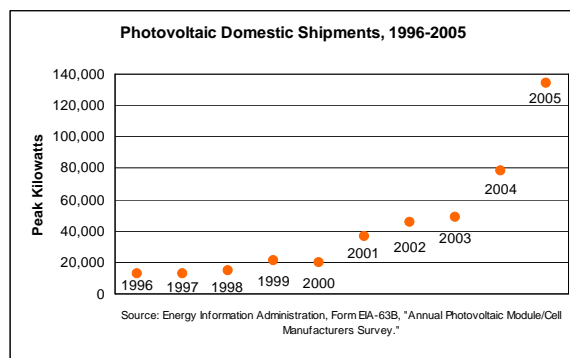
In general, the market was heavily dominated by low-temperature collectors for water heating applications (mainly swimming pool heating). Not surprisingly, the residential sector continued to be the largest market for solar thermal collectors in 2005. Solar thermal collectors shipped to the residential sector in 2005 totaled 14.7 million square feet, nearly 92 percent of total shipments. The distant second-largest market for solar thermal collectors was the commercial sector, which accounted for only 1.2 million square feet, or about 7 percent of total shipments. The largest end use for solar thermal collectors shipped in 2005 was for heating swimming pools, representing nearly 94 percent of the total shipments or 15 million square feet shipped. The distant second-largest end use for solar thermal collectors shipped in 2005 was domestic hot water systems, consuming 4 percent of the total shipments or 0.6 million square feet (Table 38).

The number of complete systems rose 72 percent to 51,265 systems in 2005. However, the value of complete systems increased 12 percent only (Table 39). This is mainly caused by more small systems being shipped in 2005 compared to fewer larger systems with almost the same value and total square feet in the prior year.

In 2005, almost 70 percent of the active companies indicated their intention to introduce new solar-related products in the near future (Table 40). As in the previous years, the industry remained highly concentrated, with 92 percent of sales made by the 5 largest companies (Table 41). Employment increased more than 11 percent in 2005 (Table 42) to its second highest level over the past 10 years. A total of 22 companies were involved in the design of collectors or systems, 11 were involved in prototype collector development, and 11 were active in prototype system development (Table 43). Sixteen companies had 90 percent or more of their total company-wide sales in solar collectors, while six companies had 50 to 89 percent, and three companies had less than 10 percent (Table 44).

## Photovoltaic Cells and Modules

The photovoltaic (PV) cell and module domestic shipments reached a record high of 134,465 peak kilowatts in 2005, a substantial 72 percent increase from the 2004 record of 78,346 peak kilowatts, and was an increase of more than 176 percent from the 2003 level (Table 45 and Figure F5). Rising electricity prices during the past 2 years have increased demand for PV products, which spawned new PV technology and business opportunities during 2005.

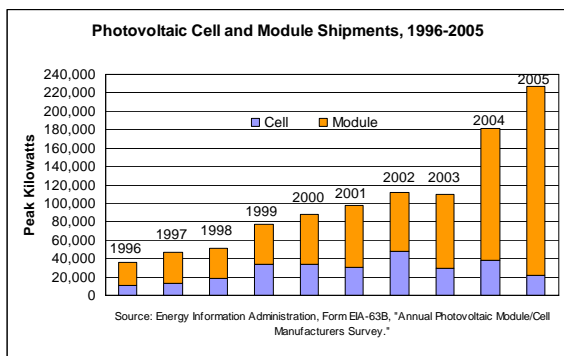


**Figure F5**  
**Photovoltaic Domestic Shipments,**  
**1996-2005**

Total shipments of PV cells and modules rose to 226,916 peak kilowatts in 2005, a 25 percent increase over the 2004. Module shipments increased 43 percent to 204,996 peak kilowatts, but cell shipments decreased to 21,920 peak kilowatts from 37,842 peak kilowatts in 2004 (Table 46 and Figure F6). This suggests a potential shift in manufacturer focus of offering unique PV modules to meet the strong demand of their customers, likely caused, in part, by higher energy prices. Among the indicators of the shift is the recent increase in module supply agreements by the PV manufacturers. This increased demand comes at a time of an industry-wide shortage of silicon, the principal feedstock of PV cells. The price of silicon wafers on the market has doubled in each of the past 2 years.<sup>2</sup> The tight silicon supply has also created back orders of several months. Demand is far greater than supply and PV manufacturers have simply not been able to keep up. Because of this, manufacturing costs have risen sharply,



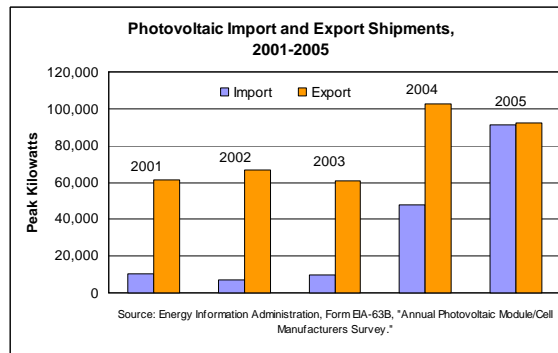
and manufacturers such as Evergreen Solar and SunPower have changed their business strategies to maintain profits and continue to finance their plans to expand their production and strengthen their distribution capabilities. For example, in November 2005, Evergreen Solar and PowerLight Corporation entered into a definitive agreement for a guaranteed contract, which called for Evergreen Solar to ship a minimum of \$70 million of PV modules to PowerLight over the next four years.<sup>3</sup> In December 2005, SunPower announced its largest ever product supply contract with PowerLight Corporation.<sup>4</sup> The supply agreement with PowerLight, called for the delivery of \$330 million of solar panels from 2005 through 2009.



**Figure F6**  
**Photovoltaic Cell and Module Shipments, 1996-2005**

Prior to 2005, the number of active companies shipping PV cells and modules had remained steady, averaging 20 over the past two decades. In 2005, however, the number of active companies surged to 29, compared to just 19 in 2004 (Table 47).

Imports jumped to 90,981 peak kilowatts in 2005 from 47,703 peak kilowatts in 2004, an increase of 91 percent (Table 47 and Figure F7). The main contributors to the increase are American subsidiaries of Japanese companies who are principally importing cells.



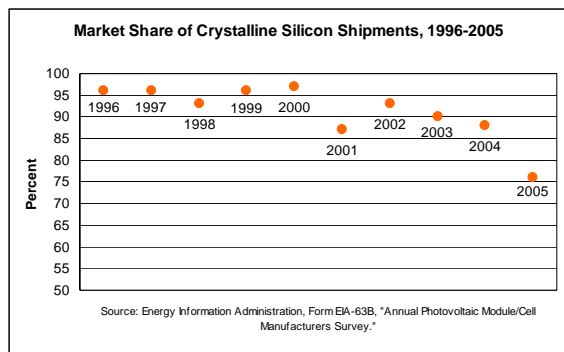
**Figure F7**  
**Photovoltaic Import and Export Shipments, 2001-2005**

In contrast, exports dropped to 92,451 peak kilowatts in 2005 from 102,770 peak kilowatts in the previous year, a decrease of 10 percent (Table 47 and Figure F7). This decrease is greatly influenced by the decline of shipments from a single company, due to silicon supply disruptions throughout 2005. In a major development that will affect the export market as well as the type of product sold, Shell Solar announced in February 2006 the sale of its crystalline silicon solar business to SolarWorld.<sup>5</sup> Shell Solar will focus on Copper, Indium and Selenium (CIS) thin film solar business instead.

Shipments to wholesale distributors, the largest business category, increased more than 22 percent from 106,400 peak kilowatts in 2004 to 130,086 peak kilowatts in 2005. Shipments to the second-largest business category, installers, surged 94 percent to 67,437 peak kilowatts in 2005 (Table 48).

Although the market share of crystalline silicon cells and modules has declined to 76 percent from 88 percent in 2004, it is still the dominant type of solar cell (Table 49 and Figure F8). Within that category, single-crystal shipments fell to 71,901 peak kilowatts, or slightly less than 32 percent of total shipments in 2005, compared to 94,899 peak kilowatts in 2004. In contrast, cast and ribbon silicon shipments rose to 101,065 peak kilowatts in 2005, or close to 45 percent of total shipments, compared to 64,239 peak kilowatts in 2004 (Table 49). Cast and ribbon is now the predominant PV technology.

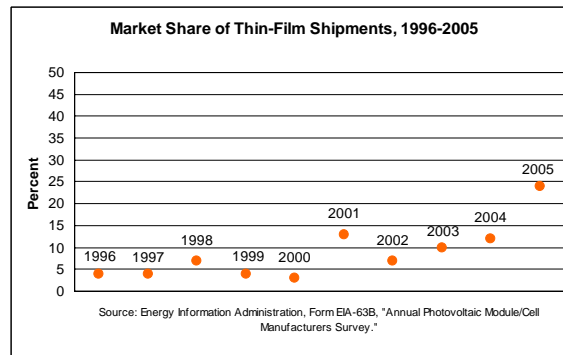
The increased cast and ribbon silicon shipments were largely attributable to three of the largest PV manufacturers.



**Figure F8**  
**Market Share of**  
**Crystalline Silicon Shipments,**  
**1996-2005**

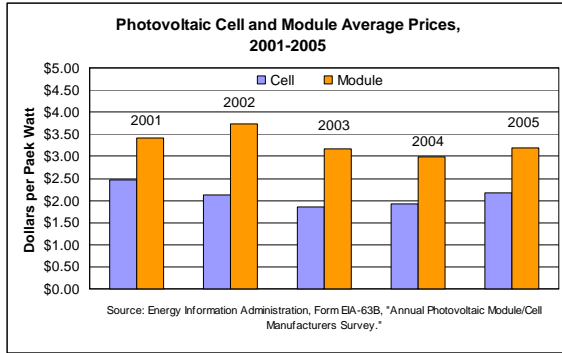
The theoretical potential of thin-film solar technology has been encouraging PV industry research in this area for many years. Now, companies promoting thin-film solar are rapidly attracting venture capital. In 2005, thin-film startups, companies such as Miasolé, Nanosolar, and HelioVolt, successfully raised venture funding to enter and explore the thin-film solar business. In February 2006, Konarka, which specializes in plastics that convert light into electricity, announced it had raised \$20 million in its latest round of venture funding. The financing is the company's fifth round and brings its total amount raised to \$60 million.

Fueled by the rapidly growing market, and the continuing tight silicon supply--thin film technology uses less silicon per unit of electrical output than does crystalline silicon technology--shipments of the small thin-film market more than doubled to 53,826 peak kilowatts in 2005, compared to 21,978 peak kilowatts in 2004 (Table 49 and Figure F9). Thin-film now accounts for nearly one-fourth of the PV market.



**Figure F9**  
**Market Share of**  
**Thin-Film Shipments,**  
**1996-2005**

The total value of PV cell and module shipments grew nearly 40 percent to \$701.7 million in 2005 (Table 50). The average price for modules (dollars per peak watt) increased more than 6 percent, from \$2.99 in 2004 to \$3.19 in 2005. For photovoltaic cells, the average price rose 13 percent, from \$1.92 in 2004 to \$2.17 in 2005. The rise in average prices was primarily due to an increase in material costs. Among the indicators of the rise in average price was the continuing shortage of refined silicon, which has driven up the price of photovoltaic cells and modules (Table 50 and Figure F10). Responding to the rapidly rising demand for silicon from the booming PV market, in November 2005, Hemlock Semiconductor - the world's largest producer of polycrystalline silicon, broke ground on an expansion at its existing facility in Hemlock, Michigan, that will increase its current annual capacity of 10,000 metric tons to 14,500 metric tons in 2008 and then to 19,000 metric tons by 2009.<sup>6</sup> Sharp Corporation and BP Solar also announced their latest developments of making thinner solar panels, which use less silicon.



**Figure F10**  
**Photovoltaic Cell and Module**  
**Average Prices,**  
**2001-2005**

Among the market sectors, the commercial sector remained the largest sector for PV shipments, followed by the residential and industrial sectors. Commercial sector shipments totaled 89,459 peak kilowatts and grew at a rate of 20 percent from 2004 to 2005. The residential sector totaled 75,040 peak kilowatts in 2005, increasing more than 39 percent over the previous year (Table 51). Electricity generation, which consists of both grid-interactive (those connected to electric power grid)<sup>7</sup> and remote applications (those not connected), continues to be the predominant end use for PV cells and modules. In 2005, electric generation was about 85 percent of the total shipments, and was 31 percent more than in 2004 (Table 51).

Nearly 78 percent of PV exports were modules during 2005 (Table 52). Shipments to Europe represented more than 72 percent of total U.S. exports, with Germany being responsible for slightly over 53 percent of the total. Although the Netherlands continued as the second-largest U.S. export market, exports to the Netherlands declined from 28,744 peak kilowatts in 2004 to 11,997 peak kilowatts in 2005 (Table 53).

Shipments of complete PV systems surged 118 percent from 16,990 systems in 2004 to 37,115 systems in 2005. While the total value of completed systems increased 9 percent to \$43.0 million, total peak kilowatts dropped from 8,110 in 2004 to 6,583 in 2005. These statistics reflect

the evolution of thin-film technology, as the systems shipped in 2005 were smaller, more flexible, and lighter-weight compared to conventional PV systems (Table 54).

Employment in the PV manufacturing industry increased more than 6 percent, from 2,916 person-years in 2004 to 3,108 person-years in 2005 (Table 55).

PV manufacturing companies continue to not only manufacture innovative products, but to keep pace with the rapidly changing environment. Aiming to penetrate into the existing marketplace, eighteen companies expect to introduce new crystalline silicon products, seven companies plan to introduce thin film products, and one company plans to introduce concentrator products (Table 56). Table 57 shows that of the companies involved in PV-related activities, twelve are involved in cell manufacturing and twenty-three in module or systems design. Eighteen are involved in prototype module development and nine in prototype systems development. Nineteen companies are active in wholesale distribution, seven in retail distribution, and seven are involved in installation.

#### References:

<sup>1</sup> [Arizona Public Service Company](#) (April 20, 2006) "APS Completes First Solar Trough Power Plant in Arizona."

<sup>2</sup> [EE Times](#) (May 20, 2005) "Polysilicon prices jump amid severe product shortages."

<sup>3</sup> [Evergreen Solar](#) (November 04, 2005) "Evergreen Solar Announces \$70 Million Sales Agreement with PowerLight Corporation."

<sup>4</sup> [SunPower Corporation](#) (December 15, 2005) "SunPower Announces \$330 Million Global Solar Supply Agreement With PowerLight."

<sup>5</sup> [SolarWorld AG](#) (February 02, 2006) "SolarWorld expands globally with addition of Shell Solar crystalline operations."

<sup>6</sup> [Hemlock Semiconductor Corporation](#)  
(November 15, 2005) “Demand in Solar Energy Industry Drives \$400 Million Hemlock Semiconductor Expansion.”

<sup>7</sup> See [EIA glossary](#) that defines electric power grid as a system of synchronized power providers and consumers connected by transmission and distribution lines and operated by one or more control centers.

**Table 29. Annual Solar Thermal Collector Domestic Shipments, 1996-2005**

<b>Year</b>	<b>Solar Thermal Collectors<sup>a</sup> (Thousand Square Feet)</b>
1996	7,162
1997	7,759
1998	7,396
1999	8,046
2000	7,857
2001	10,349
2002	11,004
2003	10,926
2004 <sup>p</sup>	13,301
2005 <sup>p</sup>	14,680
Total	98,481

<sup>a</sup> Total shipments minus export shipments.

P = Preliminary

Notes: Totals may not equal sum of components due to independent rounding. Total shipments include those made in or shipped to U.S. Territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 30. Annual Shipments of Solar Thermal Collectors, 1996-2005**

Year	Number of Companies	Collector Shipments <sup>a</sup> (Thousand Square Feet)		
		Total <sup>b</sup>	Imports	Export
1996	28	7,616	1,930	454
1997	29	8,138	2,102	379
1998	28	7,756	2,206	360
1999	29	8,583	2,352	537
2000	26	8,354	2,201	496
2001	26	11,189	3,502	840
2002	27	11,663	3,068	659
2003	26	11,444	2,986	518
2004	24	14,114	3,723	813
2005 <sup>P</sup>	25	16,041	4,546	1,361

<sup>a</sup> Includes imputation of shipment data to account for nonrespondents.

<sup>b</sup> Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

P = Preliminary.

Note: Total shipments as reported by respondents include all domestic and export shipments and may include imported collectors that subsequently were shipped to domestic or foreign customers.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 31. Annual Shipments of Solar Thermal Collectors by Type , 1996-2005  
(Thousand Square Feet)**

Year	Low-Temperature		Medium-Temperature		High-Temperature Total Shipments <sup>a, c</sup>
	Total Shipments <sup>a, b</sup>	Average per Manufacturer	Total Shipments <sup>a</sup>	Average per Manufacturer	
1996	6,821	487	785	41	10
1997	7,524	579	606	29	7
1998	7,292	607	443	23	21
1999	8,152	627	427	21	4
2000	7,948	723	400	25	5
2001	10,919	1,092	268	16	2
2002	11,126	856	535	31	2
2003	10,877	906	560	33	7
2004 <sup>p</sup>	13,608	1,512	506	30	0
2005 <sup>p</sup>	15,224	1,522	702	41	115

<sup>a</sup> Includes imputation of shipment data to account for nonrespondents.

<sup>b</sup> Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

<sup>c</sup> For high-temperature collectors, average annual shipments per manufacturer are not disclosed.

P = Preliminary.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 32. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2005**

Origin/Destination	2005 Shipments <sup>P</sup>	
	Thousand Square Feet	Percent of U.S. Total
Origin		
Top Five States	11,328	71
New Jersey	5,130	32
California	4,961	31
Florida	933	6
Tennessee	190	1
Arizona	114	1
Other Domestic	166	1
Imported	4,546	28
U.S. Total	16,041	100
Destination		
Top Five States	11,299	70
Florida	5,408	34
California	4,137	26
Arizona	794	5
New York	499	3
Illinois	461	3
Other Domestic	3,381	21
Exported	1,361	8
U.S. Total	16,041	100

\* = Less than 0.5 percent.

P = Preliminary.

Notes: Totals may not equal sum of components due to independent rounding. U.S. total includes territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."



**Table 33. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2004**

Origin/Destination	2004 Shipments	
	Thousand Square Feet	Percent of U.S.Total
Origin		
Top Five States	10,375	74
New Jersey	5,200	37
California	4,480	32
Florida	544	4
Puerto Rico	93	1
Hawaii	58	*
Other Domestic	16	*
Imported	3,723	26
U.S. Total	14,114	100
Destination		
Top Five States	10,960	78
Florida	4,955	35
California	4,306	31
Arizona	702	5
New Jersey	600	4
Illinois	396	3
Other Domestic	2,342	17
Exported	813	6
U.S. Total	14,114	100

Notes: Totals may not equal sum of components due to independent rounding. U.S. total includes territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 34. Shipments of Solar Thermal Collectors by Destination, 2005  
(Square Feet)**

Destination	Shipments <sup>P</sup>
Alabama	51,306
Alaska	324
Arizona	794,477
Arkansas	22,104
California	4,136,510
Colorado	62,931
Connecticut	327,876
Delaware	676
District of Columbia	350
Florida	5,407,966
Georgia	47,241
Guam	328
Hawaii	363,282
Idaho	15,782
Illinois	461,368
Indiana	50,341
Iowa	16,268
Kansas	18,437
Kentucky	15,961
Louisiana	23,401
Maine	28,005
Maryland	25,007
Massachusetts	73,253
Michigan	237,464
Minnesota	28,903
Mississippi	1,924
Missouri	16,939
Montana	530
Nebraska	16,351
Nevada	284,422
New Hampshire	23,420
New Jersey	424,670
New Mexico	15,804
New York	498,918
North Carolina	142,409
North Dakota	3,208
Ohio	34,663
Oklahoma	14,970
Oregon	269,251
Pennsylvania	233,797
Puerto Rico	116,737
Rhode Island	16,227
South Carolina	3,191
South Dakota	509
Tennessee	1,811
Texas	47,948
Utah	2,677
Vermont	12,938
Virgin Islands of the U.S.	4,086
Virginia	221,762
Washington	16,265
West Virginia	13,241
Wisconsin	31,148
Wyoming	485
Shipments to United States/Territories	14,679,862
Exports	1,361,116
Total Shipments	16,040,978

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 35. Distribution of U.S. Solar Thermal Collector Exports by Country, 2005**

Country	U.S. Export Shipments (Square Feet) <sup>P</sup>	Percent of U.S. Exports
Africa		
Reunion	1,584	0.12
Total	1,584	0.12
Europe		
Austria	14,950	1.10
Belgium	12,888	0.95
Czech Republic	11,775	0.87
Federal Republic of Germany	75,000	5.51
France	129,801	9.54
Italy	10,891	0.80
Spain	52,198	3.83
Sweden	49,172	3.61
Switzerland	2,880	0.21
Total	359,555	26.42
North & Central America		
Antigua and Barbuda	2,128	0.16
Bahamas	2,471	0.18
Bermuda	971	0.07
Canada	495,048	36.37
Cayman Islands	380	0.03
Costa Rica	4,305	0.32
Dominican Republic	1,426	0.10
Guatemala	6,598	0.48
Jamaica	125	0.01
Mexico	110,740	8.14
Netherlands Antilles	126	0.01
Trinidad and Tobago	1,200	0.09
Turks and Caicos Islands	2,950	0.22
Total	628,468	46.17
Oceania & Australia		
Australia	71,989	5.29
New Zealand	13,989	1.03
Total	85,978	6.32
South America		
Brazil	285,451	20.97
Ecuador	80	0.01
Total	285,531	20.98
Total	1,361,116	100.00

**P = Preliminary.**

**\* = Less than 0.01 percent.**

**Notes: Totals may not equal sum of components due to independent rounding.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 36. Distribution of Solar Thermal Collector Shipments, 2004 and 2005**

Recipient	Shipments (Thousand Square Feet)	
	2004	2005 <sup>P</sup>
Wholesale Distribution	8,248	9,248
Retail Distributors	5,092	5,342
Exporters	253	571
Installers	398	633
End Users and Other <sup>a</sup>	124	248
Total	14,114	16,041

<sup>a</sup> Other includes minimal shipments not explained on form EIA-63A.

P = Preliminary.

Notes: Totals may not equal sum of components due to independent rounding. Total includes U.S. territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 37. Solar Thermal Collector Shipments by Type, Quantity, Value, and Average Price, 2004 and 2005**

Type	2004			2005 <sup>P</sup>		
	Quantity (Thousand Square Feet)	Value (Thousand Dollars)	Average Price (Dollars per Square Foot)	Quantity (Thousand Square Feet)	Value (Thousand Dollars)	Average Price (Dollars per Square Foot)
Low-Temperature						
Liquid and Air	13,608	24,545	1.80	15,224	30,513	2.00
Medium/High Temperature	506	9,769	19.30	817	15,337	18.77
Medium						
Air	4	W	W	3	W	W
Liquid						
ICS/Thermosiphon	118	2,772	23.57	165	4,327	26.23
Flat Plate	383	6,802	17.75	530	8,161	15.38
Evacuated Tube	2	W	W	3	W	W
Concentrator				0	0	0
High						
Parabolic Dish and Trough				115	W	W
Total	14,114	34,313	2.43	16,041	45,850	2.86

ICS = Integral collector storage.

W = Data withheld to avoid disclosure of proprietary company data

P = Preliminary

Notes: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 38. Shipments of Solar Thermal Collectors by Market Sector, End Use, and Type, 2004 and 2005**  
(Thousand Square Feet)

Type	Low-Temperature	Medium-Temperature					High-Temperature	2005 <sup>P</sup> Total	2004 Total
	Liquid/Air	Air	Liquid			Parabolic Dish/Trough			
	Metallic and Nonmetallic		ICS/Thermo- siphon	Flat-Plate (Pumped)	Evacuated Tube		Concentrator		
Market Sector									
Residential	14,045	3	151	479	3	0	0	14,681	12,864
Commercial	1,099	0	12	46	*	0	2	1,160	1,178
Industrial	30	0	1	0	0	0	0	31	70
Utility	0	0	0	0	0	0	114	114	0
Other <sup>a</sup>	50	0	*	6	0	0	0	56	3
<b>Total</b>	<b>15,224</b>	<b>3</b>	<b>165</b>	<b>530</b>	<b>3</b>	<b>0</b>	<b>115</b>	<b>16,041</b>	<b>14,114</b>
End use									
Pool Heating	15,022	0	0	20	*	0	0	15,041	13,634
Hot Water	12	0	165	461	2	0	0	640	452
Space Heating	190	3	0	34	1	0	0	228	13
Space Cooling	0	0	0	0	0	0	2	2	0
Combined Space and Water Heating	0	0	0	16	0	0	0	16	16
Process Heating	0	0	0	0	0	0	0	0	0
Electricity Generation	0	0	0	0	0	0	114	114	0
Other <sup>b</sup>	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>15,224</b>	<b>3</b>	<b>165</b>	<b>530</b>	<b>3</b>	<b>0</b>	<b>115</b>	<b>16,041</b>	<b>14,114</b>

<sup>a</sup> Other market sector includes shipments of solar thermal collectors to sectors such as government, including the military but excluding space applications.

<sup>b</sup> Other end use includes shipments of solar thermal collectors for other uses such as cooking, water pumping, water purification, desalinization, distillation, etc.

\*=Less than 500 square feet.

ICS= Integral Collector Storage.

P = Preliminary.

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

**Table 39. Shipments of Complete Solar Thermal Collector Systems, 2004 and 2005**

<b>Shipment Information</b>	<b>2004</b>	<b>2005<sup>P</sup></b>
Complete Collector Systems		
Shipped	29,769	51,265
Thousand Square Feet	5,560	5,748
Percent of Total Shipments	39	36
Number of Companies	18	18
Value of Systems (Thousand Dollars)	18,293	20,402

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 40. Number of Companies Expecting to Introduce New Solar Thermal Collector Products in 2006**

New Product Type	Number of Companies
Low-Temperature Collectors	6
Medium-Temperature Collectors	9
High-Temperature Collectors	2
Noncollector Components	4

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**



**Table 41. Percent of Solar Thermal Collectors Shipments by 10 Largest Companies, 1996-2005**

Year	Company Rank	Shipments (Thousand Square Feet)	Percent of Total Shipments
1996	1-5	6,452	85
	6-10	910	12
1997	1-5	7,183	88
	6-10	731	9
1998	1-5	6,938	89
	6-10	613	8
1999	1-5	7,813	91
	6-10	563	7
2000	1-5	7,521	90
	6-10	567	7
2001	1-5	10,732	96
	6-10	325	3
2002	1-5	10,755	92
	6-10	670	6
2003	1-5	10,485	92
	6-10	700	6
2004	1-5	13,291	94
	6-10	664	5
2005 <sup>P</sup>	1-5	14,801	92
	6-10	934	6

**P = Preliminary.**

**Note: Totals may not equal sum of components due to independent rounding.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 42. Employment in the Solar Thermal Collector Industry, 1996-2005**

<b>Year</b>	<b>Person Years</b>
1996	239
1997	184
1998	207
1999	289
2000	284
2001	256
2002	356
2003	287
2004 <sup>p</sup>	317
2005 <sup>p</sup>	353

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 43. Companies Involved in Solar Thermal Collector Activities by Type, 2004 and 2005**

Type of Activity	2004	2005 <sup>P</sup>
Collector or System Design	19	22
Prototype Collector Development	10	11
Prototype System Development	8	11
Wholesale Distribution	22	23
Retail Distribution	11	11
Installation	8	9
Noncollector System Component Manufacture	11	10

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 44. Solar-Related Sales as a Percentage of Total Company Sales, 2004 and 2005**

Percent of Total Sales	Number of Companies	
	2004	2005 <sup>P</sup>
90-100	15	16
50-89	6	6
10-49	0	0
Less than 10	3	3
Total	24	25

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."**

**Table 45. Annual Photovoltaic Domestic Shipments, 1996-2005**

<b>Year</b>	<b>Photovoltaic Cells and Modules<sup>a</sup> (Peak Kilowatts)</b>
1996	13,016
1997	12,561
1998	15,069
1999	21,225
2000	19,838
2001	36,310
2002	45,313
2003	48,664
2004	78,346
2005 <sup>p</sup>	134,465
Total	424,807

<sup>a</sup> Total shipments minus export shipments.

P = Preliminary.

Notes: Totals may not equal sum of components due to independent rounding. Total shipments include those made in or shipped to U.S. Territories.

Sources: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 46. Annual Shipments of Photovoltaic Cells and Modules, 2003-2005  
(Peak Kilowatts)**

<b>Item</b>	<b>2003</b>	<b>2004</b>	<b>2005<sup>P</sup></b>
Cells	29,295	37,842	21,920
Modules	80,062	143,274	204,996
Total	109,357	181,116	226,916

**P = Preliminary.**

**Sources: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**

**Table 47. Annual Shipments of Photovoltaic Cells and Modules, 1996-2005**

Year	Number of Companies	Photovoltaic Cell and Modules Shipments <sup>a</sup> (Peak Kilowatts)		
		Total	Imports	Exports
1996	25	35,464	1,864	22,448
1997	21	46,354	1,853	33,793
1998	21	50,562	1,931	35,493
1999	19	76,787	4,784	55,562
2000	21	88,221	8,821	68,382
2001	19	97,666	10,204	61,356
2002	19	112,090	7,297	66,778
2003	20	109,357	9,731	60,693
2004	19	181,116	47,703	102,770
2005 <sup>p</sup>	29	226,916	90,981	92,451

<sup>a</sup> Does not include shipments of cells and modules for space/satellite applications.

<sup>p</sup> = Preliminary.

Note: Total shipments as reported by respondents include all domestic and export shipments and may include imported cells and modules that subsequently were shipped to domestic or foreign customers.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 48. Distribution of Photovoltaic Cells and Modules, 2003-2005**

Recipient	Shipments (Peak Kilowatts)		
	2003	2004	2005 <sup>P</sup>
Wholesale Distributers	65,477	106,400	130,086
Retail Distributers	6,624	5,140	2,362
Exporters	7,600	2,354	1,088
Installers	11,733	34,779	67,437
End-Users	8,286	1,029	3,142
Module Manufacturers	8,738	11,868	15,347
Other <sup>a</sup>	899	19,546	7,455
Total	109,357	181,116	226,916

<sup>a</sup> Other includes categories not identified by reporting companies.

P = Preliminary.

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."



**Table 49. Photovoltaic Cell and Module Shipments by Type, 2003-2005**

Type	Shipments (Peak kilowatts)			Percent of Total		
	2003	2004	2005 <sup>P</sup>	2003	2004	2005 <sup>P</sup>
Crystalline Silicon						
Single-Crystal	59,379	94,899	71,901	54	52	32
Cast and Ribbon	38,561	64,239	101,065	35	35	45
Subtotal	97,940	159,138	172,965	90	88	76
Thin-Film	10,966	21,978	53,826	10	12	24
Concentrator	452	0	125	*	0	*
Other <sup>a</sup>	0	0	0	0	0	0
Total	109,357	181,116	226,916	100	100	100

<sup>a</sup> Includes categories not identified by reporting companies.

\* = Less than 0.5 percent.

P = Preliminary.

Note: Data do not include shipments of cells and modules for space/satellite applications. Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 50. Photovoltaic Cell and Module Shipment Values by Type, 2004 and 2005**

Type	2004			2005 <sup>P</sup>		
	Value (Thousand Dollars)	Average Price (Dollars per Peak Watt)		Value (Thousand Dollars)	Average Price (Dollars per Peak Watt)	
		Modules	Cells		Modules	Cells
Crystalline Silicon						
Single-Crystal	253,558	3.09	1.94	227,751	3.48	2.20
Cast and Ribbon	188,371	3.00	1.76	318,690	3.20	2.02
Subtotal	441,930	3.04	1.92	546,440	3.30	2.17
Thin-Film Silicon	W	W	W	W	W	W
Concentrator Silicon	W	W	W	W	W	W
Other <sup>a</sup>	0	---	---	0	---	---
Total	501,739	2.99	1.92	701,718	3.19	2.17

<sup>a</sup> Includes categories not identified by reporting companies.

W = Data withheld to avoid disclosure of proprietary company data.

---= Does not apply.

P = Preliminary.

Notes: Data do not include shipments of cells and modules for space/satellite applications. Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 51. Shipments of Photovoltaic Cells and Modules by Market Sector, End Use, and Type, 2004 and 2005 (Peak Kilowatts)**

Sector and End Use	Crystalline Silicon <sup>a</sup>	Thin-Film Silicon	Concentrator Silicon	Other	2005 Total <sup>P</sup>	2004 Total
<b>Market</b>						
Industrial	21,674	525	0	0	22,199	30,493
Residential	70,986	4,029	25	0	75,040	53,928
Commercial	61,084	28,349	25	0	89,459	74,509
Transportation	1,621	0	0	0	1,621	1,380
Utility	68	0	75	0	143	3,233
Government <sup>b</sup>	8,034	20,649	0	0	28,683	3,257
Other <sup>c</sup>	9,498	274	0	0	9,772	14,316
<b>Total</b>	<b>172,965</b>	<b>53,826</b>	<b>125</b>	<b>0</b>	<b>226,916</b>	<b>181,116</b>
<b>End Use</b>						
<b>Electricity Generation</b>						
Grid Interactive	126,157	42,217	100	0	168,474	129,265
Remote	23,589	1,344	25	0	24,958	18,371
Communication	8,507	159	0	0	8,666	11,348
Consumer Goods	5,511	276	0	0	5,787	6,444
Transportation	2,159	0	0	0	2,159	1,380
Water Pumping	1,273	70	0	0	1,343	1,322
Cells/Modules to OEM <sup>d</sup>	2,008	9,669	0	0	11,677	6,452
Health						341
Other <sup>e</sup>	3,762	91	0	0	3,853	6,193
<b>Total</b>	<b>172,965</b>	<b>53,826</b>	<b>125</b>	<b>0</b>	<b>226,916</b>	<b>181,116</b>

<sup>a</sup> Includes single-crystal and cast and ribbon types.

<sup>b</sup> Includes Federal, State, local governments, excluding military.

<sup>c</sup> Other includes shipments that are manufactured for private contractors for research.

<sup>d</sup> Original equipment manufacturer.

<sup>e</sup> Other includes shipments of photovoltaic cells and modules for other uses, such as cooking food, desalinization, distillation, etc.

P = Preliminary.

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 52. Export Shipments of Photovoltaic Cells and Modules by Type, 2004 and 2005 (Peak Kilowatts)**

Item	Type							
	Crystalline		Thin-Film Silicon		Concentrator Silicon		Total	
	2004	2005 <sup>P</sup>	2004	2005 <sup>P</sup>	2004	2005 <sup>P</sup>	2004	2005 <sup>P</sup>
Cells	36,492	20,434	0	0	0	0	36,492	20,434
Modules	52,938	39,992	13,341	32,000	0	25	66,278	72,017
Totals	89,430	60,426	13,341	32,000	0	25	102,770	92,451

**P = Preliminary.**

**Notes: Totals may not equal sum of components due to independent rounding.**

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**

**Table 53. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2005**

Country	Peak Kilowatts <sup>P</sup>	Percent of U.S. Exports
Africa		
Angola	0.3	*
Egypt	232.3	0.3
Gambia	1.3	*
Kenya	84.0	0.1
Nigeria	76.7	0.1
South Africa	548.5	0.6
Total	943.1	1.0
Asia		
China	1,938.7	2.1
Hong Kong	2,935.1	3.2
India	1,480.2	1.6
Israel	14.0	*
Japan	1,085.2	1.2
Malaysia	1.9	*
Nepal	93.0	0.1
North Korea	78.4	0.1
Oman	64.0	0.1
Pakistan	64.3	0.1
Philippines	37.0	*
Saudi Arabia	1.0	*
Singapore	8,560.2	9.3
South Korea	575.3	0.6
SriLanka	12.9	*
Taiwan	114.3	0.1
Thailand	101.0	0.1
United Arab Emirates	1.0	*
Vietnam	3.0	*
Total	17,160.5	18.6
Europe		
Austria	587.0	0.6
Belgium	4.0	*
Denmark	56.0	0.1
Federal Republic of Germany	49,249.9	53.3
Finland	20.0	*
France	43.0	*
Italy	673.1	0.7
Kazakhstan	1.1	*
Luxembourg	925.0	1.0
Netherlands	11,996.7	13.0
Norway	0.2	*
Poland	1.0	*
Portugal	1,902.0	2.1
Russia	17.0	*
Slovakia	90.0	0.1
Spain	706.4	0.8
Sweden	0.2	*
Switzerland	183.8	0.2
Turkey	1.6	*
United Kingdom	555.2	0.6
Uzbekistan	1.0	*
Total	67,014.2	72.5
North & Central America		
Antigua and Barbuda	1.6	*
Bermuda	1.0	*
Canada	3,226.5	3.5
Costa Rica	342.6	0.4
Dominican Republic	64.4	0.1
Guadeloupe	271.6	0.3
Guatemala	16.2	*
Haiti	53.7	0.1
Honduras	32.5	*
Martinique	4.6	*
Mexico	1,073.7	1.2
Netherlands Antilles	14.3	*
Nicaragua	0.8	*

**Table 53. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2005 (Continued)**

Country	Peak Kilowatts <sup>P</sup>	Percent of U.S. Exports
Panama	56.2	0.1
Trinidad and Tobago	1.0	*
Total	5,160.7	5.6
Oceania & Australia		
Australia	1,006.0	1.1
New Zealand	66.3	0.1
Total	1,072.3	1.2
South America		
Argentina	120.3	0.1
Bolivia	33.7	*
Brazil	461.1	0.5
Chile	39.7	*
Colombia	55.0	0.1
Ecuador	2.5	*
Guyana	16.5	*
Peru	355.2	0.4
Uruguay	1.2	*
Venezuela	14.9	*
Total	1,100.1	1.2
Total U.S. Export	92,450.9	100.0

**P = Preliminary.**

**\* = Value less than 0.05 percent.**

**Note: Totals may not equal sum of components due to independent rounding.**

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**

**Table 54. Shipments of Complete Photovoltaic Module Systems, 2003-2005**

<b>Shipment Information</b>	<b>2003</b>	<b>2004</b>	<b>2005<sup>P</sup></b>
Complete Photovoltaic Module System Shipped	5,525	16,990	37,115
Peak Kilowatts	9,545	8,110	6,583
Percentage of Total Module Shipments	12	6	3
Value of Systems (Thousand Dollars)	50,412	39,459	43,029

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**

**Table 55. Employment in the Photovoltaic Manufacturing Industry, 1996-2005**

<b>Year</b>	<b>Number of Companies</b>	<b>Number of Person-Years</b>
1996	25	1,280
1997	21	1,736
1998	21	1,988
1999	19	2,013
2000	21	1,913
2001	19	2,666
2002	19	2,696
2003	20	2,590
2004 <sup>p</sup>	19	2,916
2005 <sup>p</sup>	29	3,108

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**



**Table 56. Companies Expecting to Introduce New Photovoltaic Products in 2006**

New Product Type	Number of Companies
Crystalline Silicon	
Single-Crystal Silicon Modules	9
Cast Silicon Modules	7
Ribbon Silicon Modules	2
Thin-Film	
Amorphous Silicon Modules	4
Other (Thin Film)	3
Other (Flat Plate)	1
Concentrators	1
Nonmodule System Components	0

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**

**Table 57. Number of Companies Involved in Photovoltaic-Related Activities, 2004 and 2005**

Type of Activity	Number of Companies	
	2004	2005 <sup>P</sup>
Cell Manufacturing	12	12
Module or Systems Design	18	23
Prototype Module Development	13	18
Prototype Systems Development	9	9
Wholesale Distribution	16	19
Retail Distribution	10	7
Installation	6	7
Noncollector System Component Manufacturing	3	3

**P = Preliminary.**

**Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."**