



U.S. Solar Industry Year in Review 2009

Supplemental Charts

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www.seia.org

Annual Growth of U.S. Solar Energy Capacity Additions

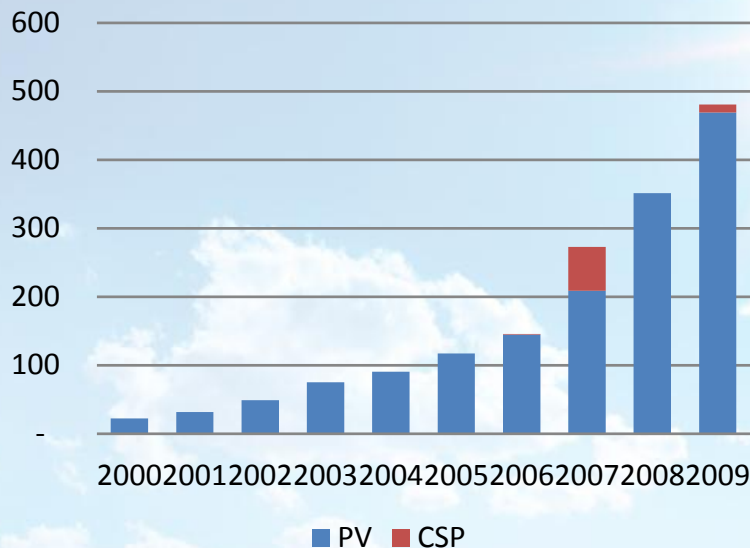
Electric CAGR*

- 2000-2005: 39%
- 2006-2009: 49%

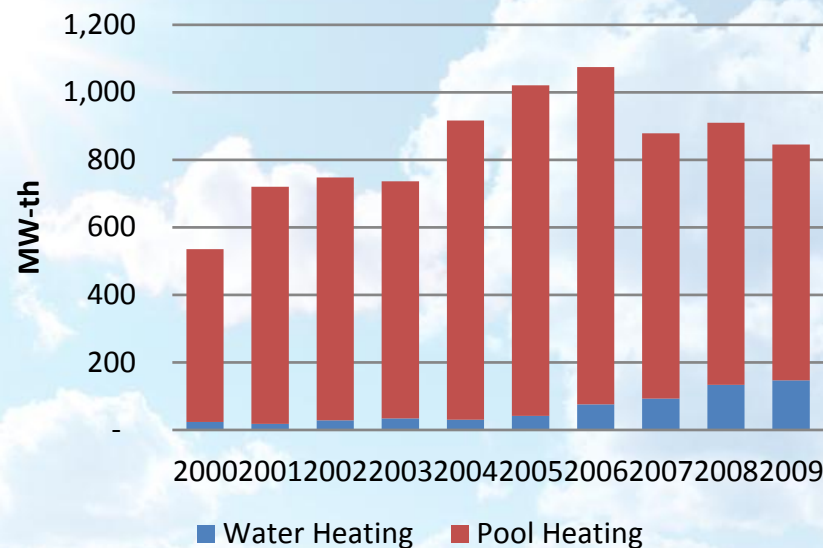
Thermal CAGR**

- 2000-2005: 14%
- 2006-2009: -8%
(Decline reflects droop in solar pool heating.)

Solar Electric Installations



Solar Thermal Collector Shipments



* Electric includes PV and CSP (including off-grid PV)

** Thermal includes solar water heating, solar pool heating, space heating and space cooling.

Steady Growth of U.S. Solar Energy Capacity

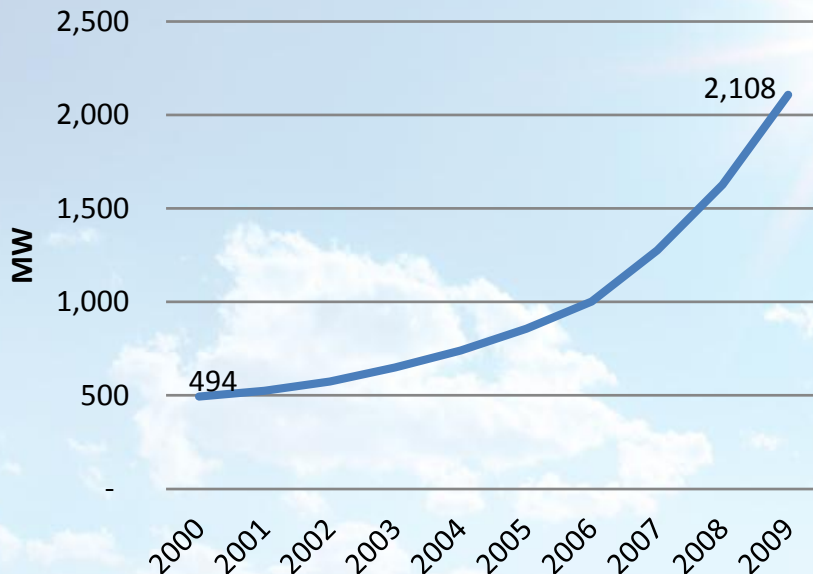
Electric CAGR*

- 2000-2005: 12%
- 2006-2009: 28%

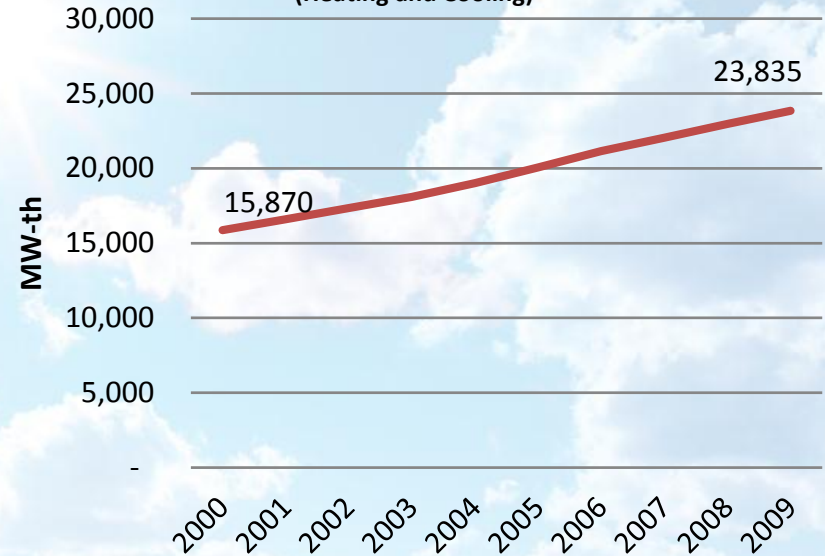
Thermal CAGR**

- 2000-2005: 5%
 - 2006-2009: 4%
- (Decline reflects drop in solar pool heating.)

Cumulative Solar Electric Capacity



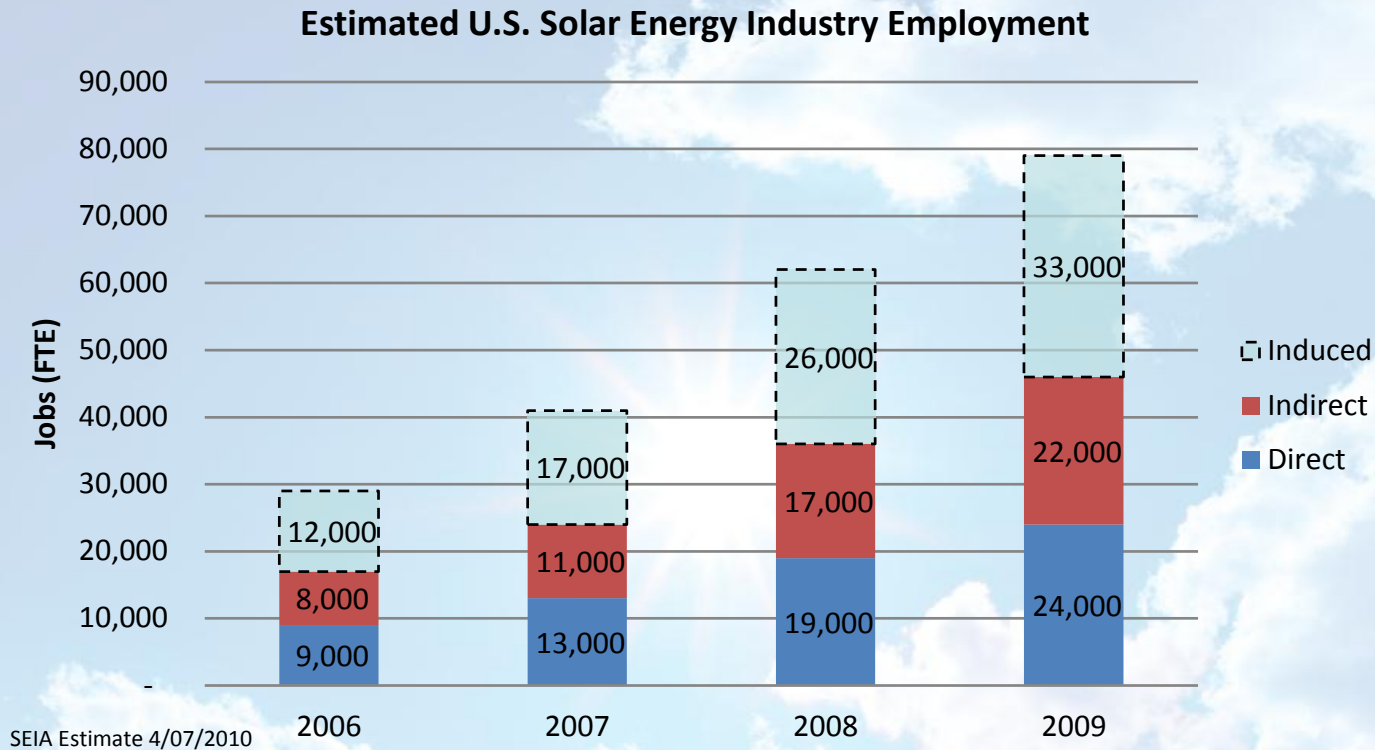
**Cumulative Solar Thermal Shipments
(Heating and Cooling)**



* Electric includes PV and CSP (including off-grid PV)

** Thermal includes solar water heating, solar pool heating, space heating and space cooling.

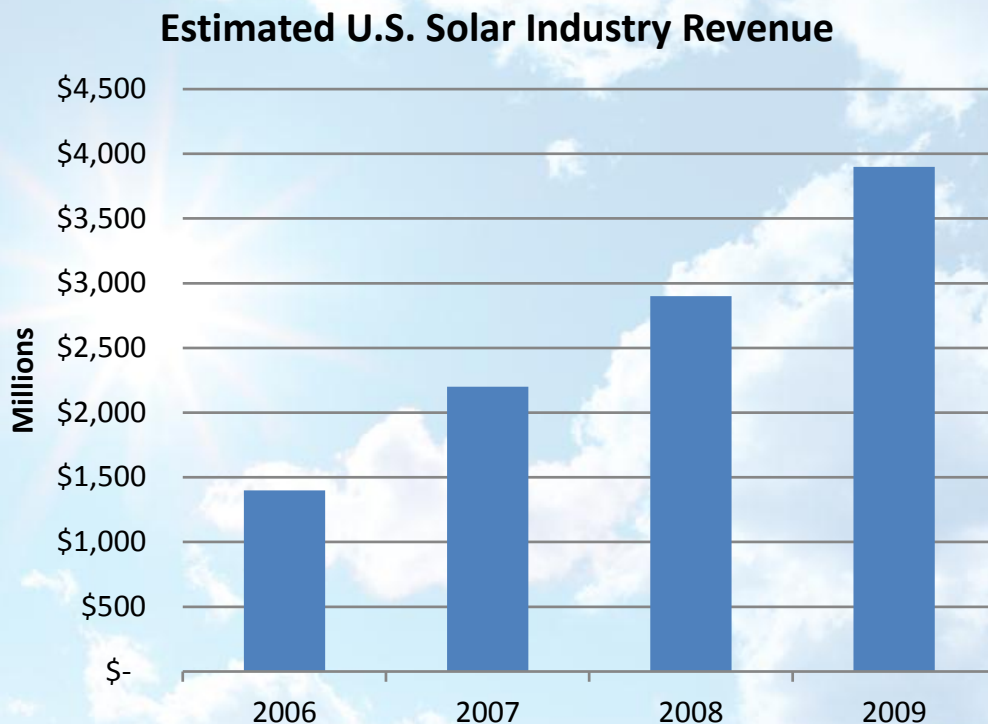
The Solar Industry Employed 46,000 Americans in 2009



- SEIA estimates that 24,000 people were directly employed in the U.S. solar energy business in 2009.
- An additional 22,000 people worked for companies that supply services and materials needed by the solar industry.
- Solar supported an additional 33,000 induced jobs in 2009. (Induced jobs are the result of the broader economic activity attributable to the solar industry.)
- **In sum, the U.S. solar industry supported 79,000 jobs in 2009, 17,000 more than the 62,000 jobs supported in 2008.**

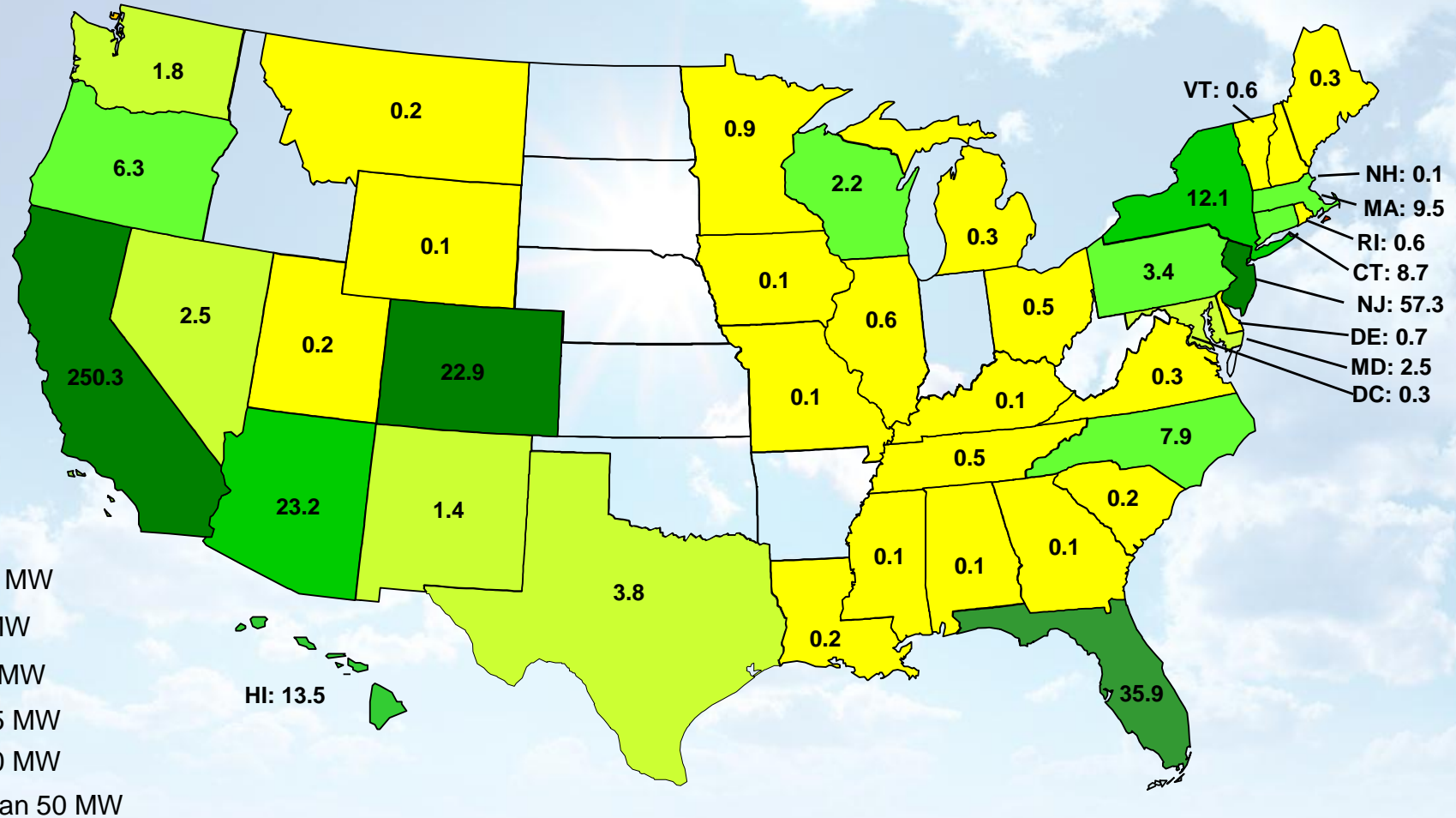
Estimated U.S. Solar Energy Industry Revenue

- SEIA estimates that total U.S. solar industry revenue grew 36 percent from 2008 to 2009.
- \$1.4 billion in venture capital also flowed to the solar industry in 2009.*



New Grid-Tied Solar Electric Installations in 2009

- 441 MW new grid-tied PV and CSP installed in the U.S. in 2009



State Grid-Tied Solar Electric Capacity Rankings

Top 10 states ranked four ways:

- California isn't always the leader.
- Hawaii and New Jersey lead in per-capita installations in 2009.
- Nevada has most cumulative capacity per capita.

New Capacity in 2009

2009 New Capacity (MW)		
1	California	220
2	New Jersey	57
3	Florida	36
4	Arizona	23
5	Colorado	23
6	Hawaii	14
7	New York	12
8	Massachusetts	10
9	Connecticut	9
10	North Carolina	8
Other		29
Total		441*

Megawatts

Cumulative Capacity in 2009

2009 Cumulative Capacity (MW)		
1	California	1,102
2	New Jersey	128
3	Nevada	100
4	Colorado	59
5	Arizona	50
6	Florida	39
7	New York	34
8	Hawaii	27
9	Connecticut	20
10	Massachusetts	18
Other		78
Total		1,653*

2009 Installations (W per Capita)

1	Hawaii	10.4
2	New Jersey	6.6
3	California	6.0
4	Colorado	4.6
5	Arizona	3.5
6	Connecticut	2.5
7	Florida	1.9
8	Oregon	1.6
9	Massachusetts	1.4
10	Vermont	1.0
National Average		1.4*

Watts per Capita

2009 Cumulative (W per Capita)

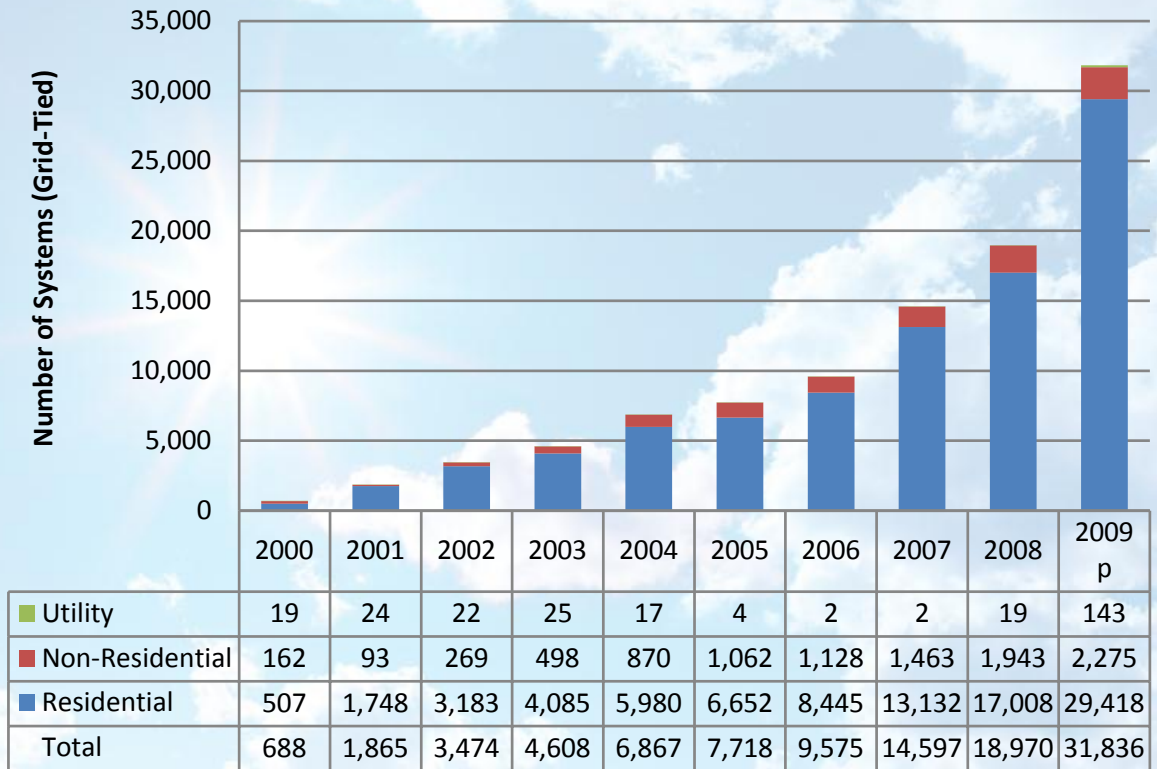
1	Nevada	38.0
2	California	29.8
3	Hawaii	20.8
4	New Jersey	14.6
5	Colorado	11.7
6	Arizona	7.5
7	Connecticut	5.6
8	Oregon	3.7
9	Delaware	2.8
10	Vermont	2.7
National Average		5.4*

* State rankings do *not* include off-grid estimates. Includes PV and CSP.

100,000 PV Systems Installed in 10 Years

- Over 29,000 homes added PV in 2009, 73% more than 2008.
- Over 2,200 businesses, non-profits and schools added PV in 2009, up 17% from 2008

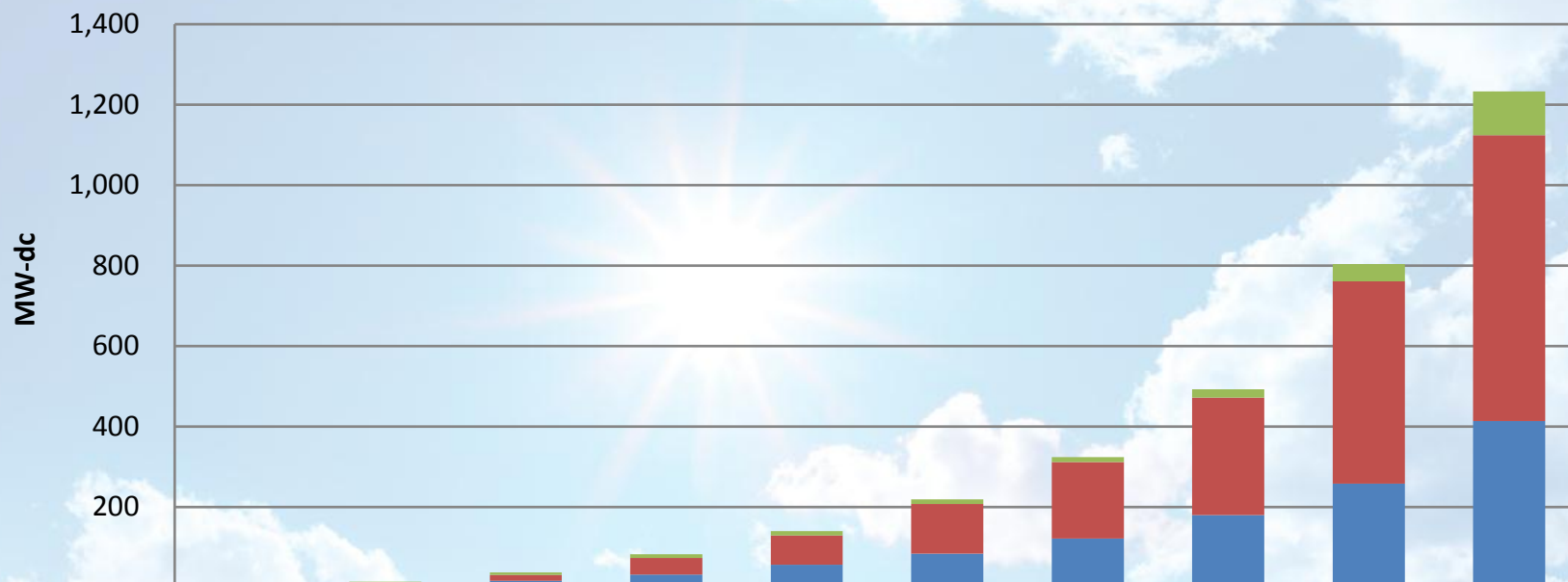
Number of New PV Systems Installed



* "Utility sector" refers to all capacity that feeds electricity directly into the distribution grid or the transmission grid, rather than primarily serving on-site use. It includes utility-scale solar power plants, utility-owned distributed systems, and non-utility owned distributed systems located on customer property that connect to the grid on the utility side of the meter.

Cumulative Grid-Tied PV Capacity Passes the 1 GW Mark

Cumulative Grid-Tied PV Capacity



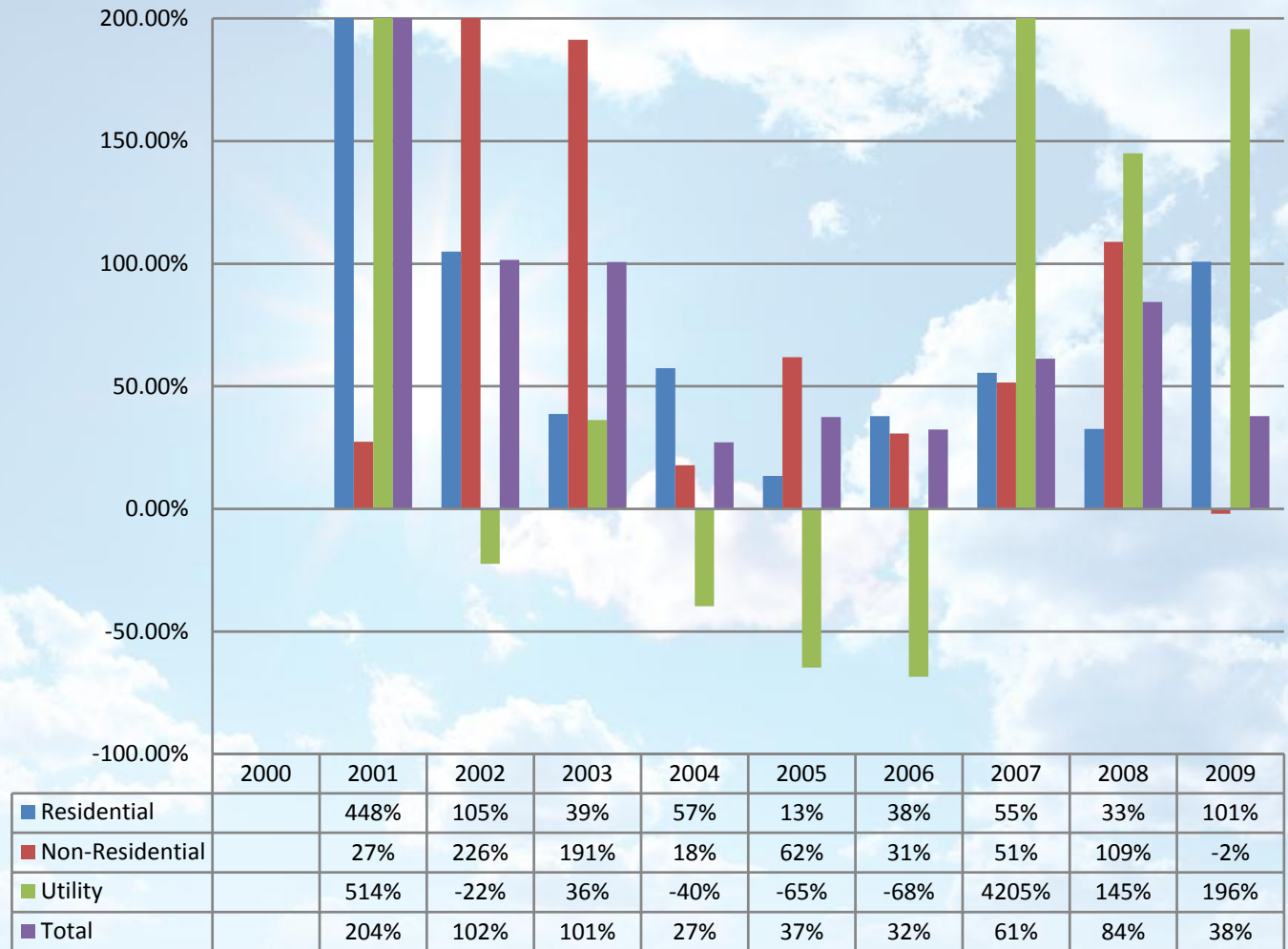
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009p
Utility	0	3	6	9	11	12	12	21	43	109
Non-Residential	2	5	14	41	73	124	190	292	503	710
Residential	1	6	17	33	57	84	122	180	258	414
Total	18	29	52	97	155	234	339	508	819	1,248

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Growth in Grid-Tied PV Capacity Additions

- Large increases in both Residential and Utility Sectors* due, in part, to improved ITC
- Non-residential sector held back by economy and delay in TGP startup

Year-Over-Year Change in Installations by Capacity

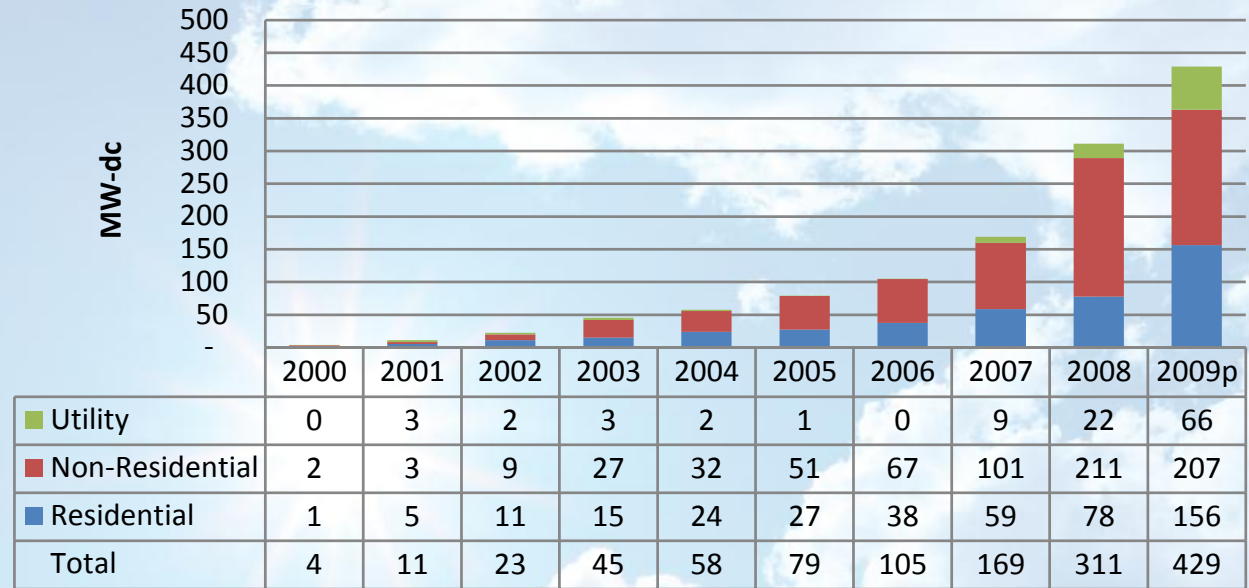


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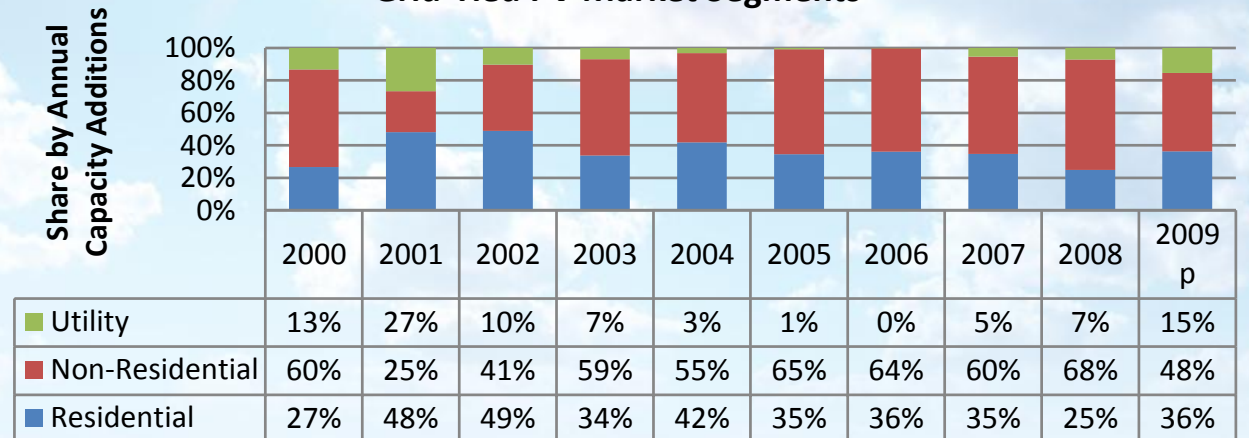
Grid-Tied PV Capacity Additions

- Grid-tied annual growth from 2000-2009: CAGR = 69%
- Shifting demand in each market segment.
- Notable increase in residential market share in 2009.
- Utility sector* nearly tripled in annual MW from 2008.

Grid-Tied PV Installations



Grid-Tied PV Market Segments

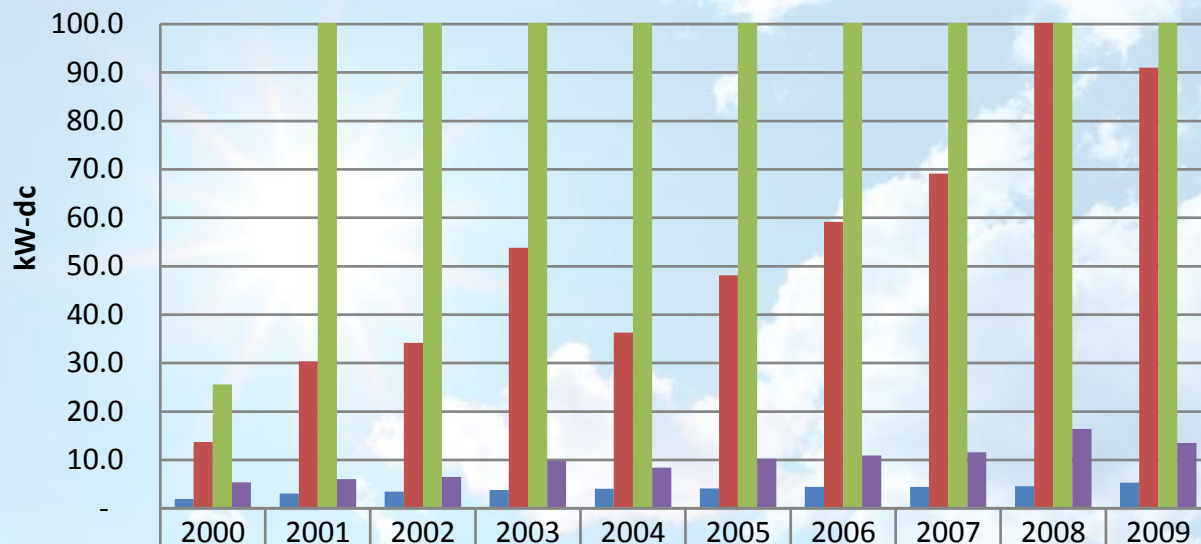


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Larger PV Systems to Meet Increasing Electricity Demand

- Residential systems have gotten larger every year for the last decade.
- Commercial system sizes are on an upward trend.

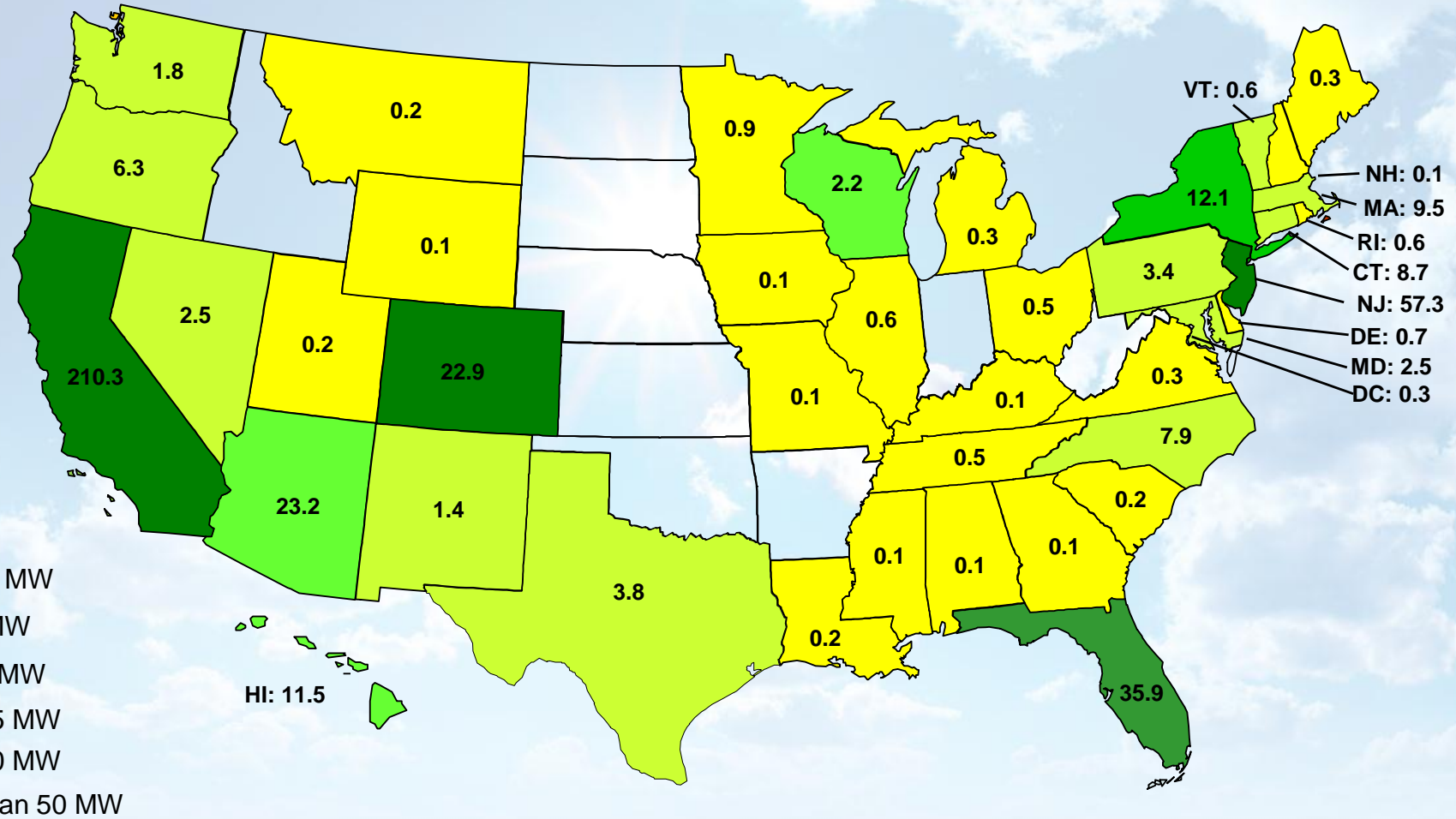
Average Grid-Tied PV System Size



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Residential	1.9	3.1	3.5	3.7	4.0	4.1	4.5	4.5	4.6	5.3
Non-Residential	13.7	30.4	34.2	53.8	36.3	48.1	59.2	69.1	108.8	91.0
Utility	25.6	124.2	105.1	126.1	111.8	167.5	105.5	4,542.	1,171.	460.1
All	5.4	6.0	6.5	9.8	8.4	10.2	10.9	11.6	16.4	13.5

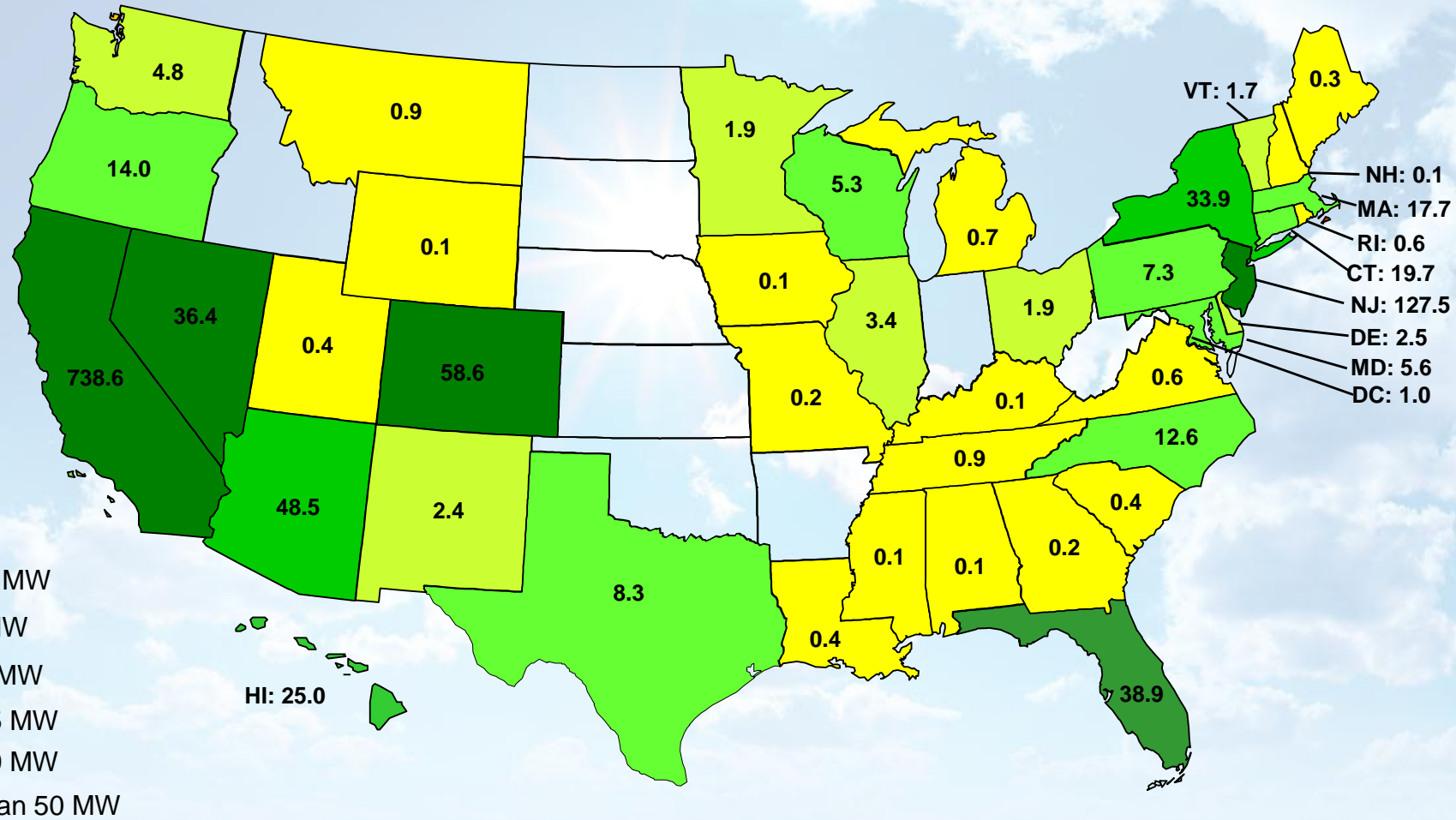
New Grid-Tied PV Installations in 2009

- 429 MW new grid-tied PV installed in the U.S. in 2009



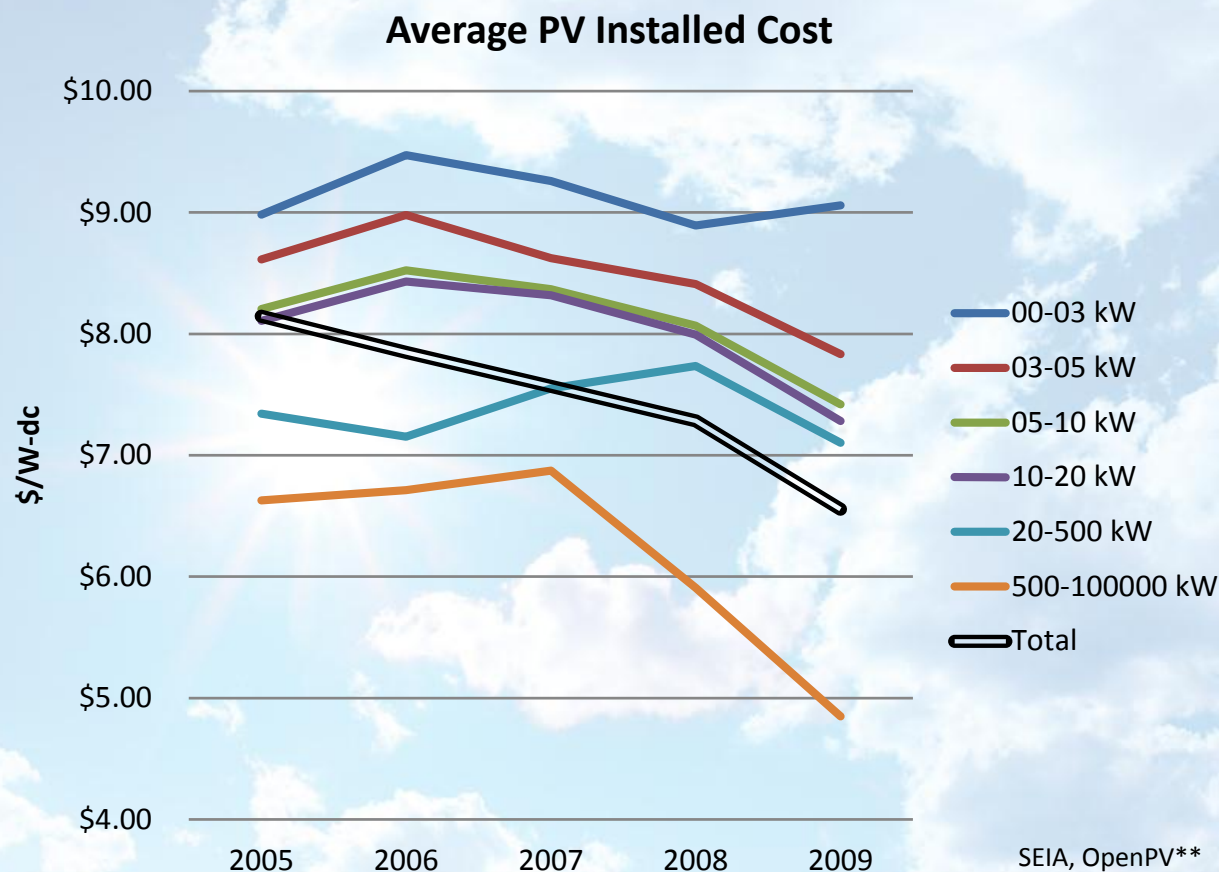
Cumulative Grid-Tied PV Capacity at the end of 2009

- 1,248 MW cumulative grid-tied PV in U.S. at end of 2009



Average Installed Cost of PV

- In 2009, PV Module prices fell 40 percent.
- Average module price per watt in mid-2008 was \$3.50-4.00.*
- Average module price per watt at the end of 2009 was \$1.85-2.25.*
- This is beginning to help bring down the installed cost.



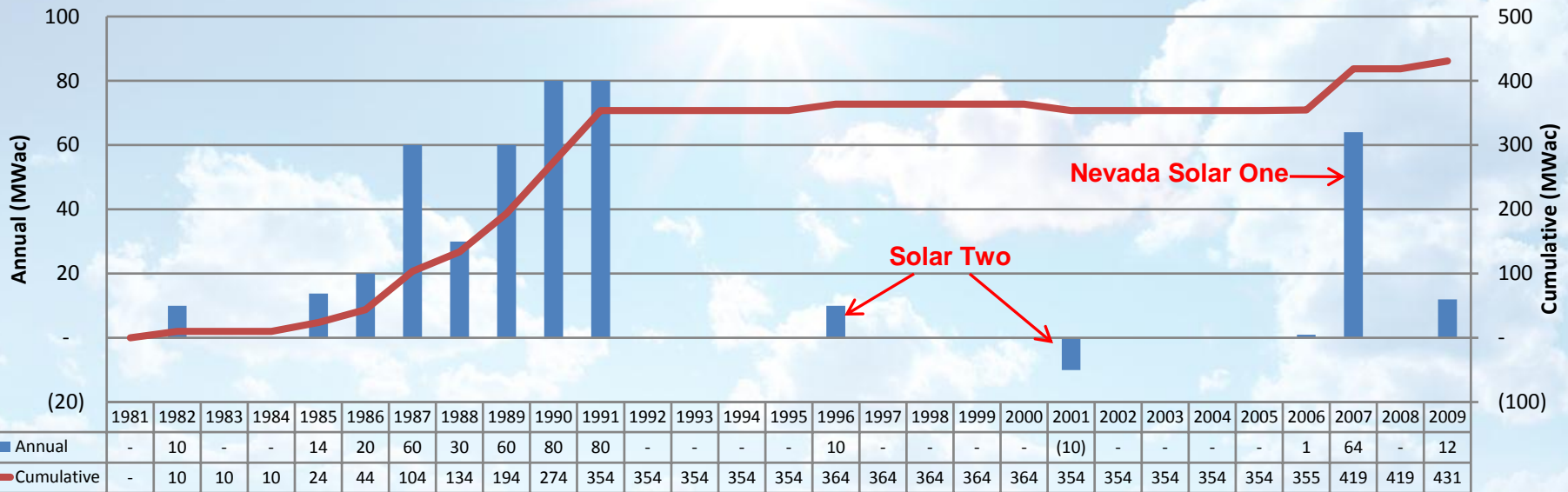
* Paula Mints, Navigant Consulting, Inc.

** Capacity-Weighted Average. Data from OpenPV.nrel.gov downloaded 3/30/10.

CSP's Nearly 3 Decades of Experience

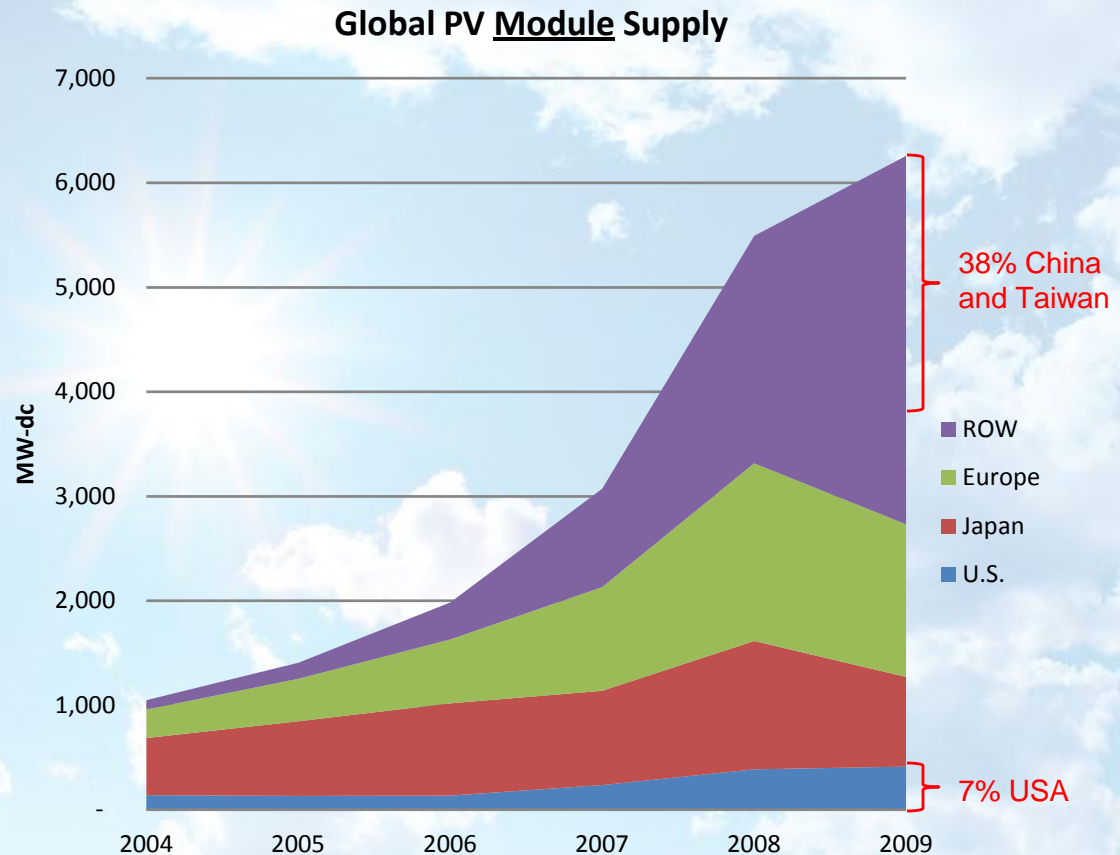
- CSP Plants have been in continuous operation in the U.S. since 1982.
- The U.S. has more total CSP capacity than any other country.

CSP Capacity



PV Module Manufacturing by Country

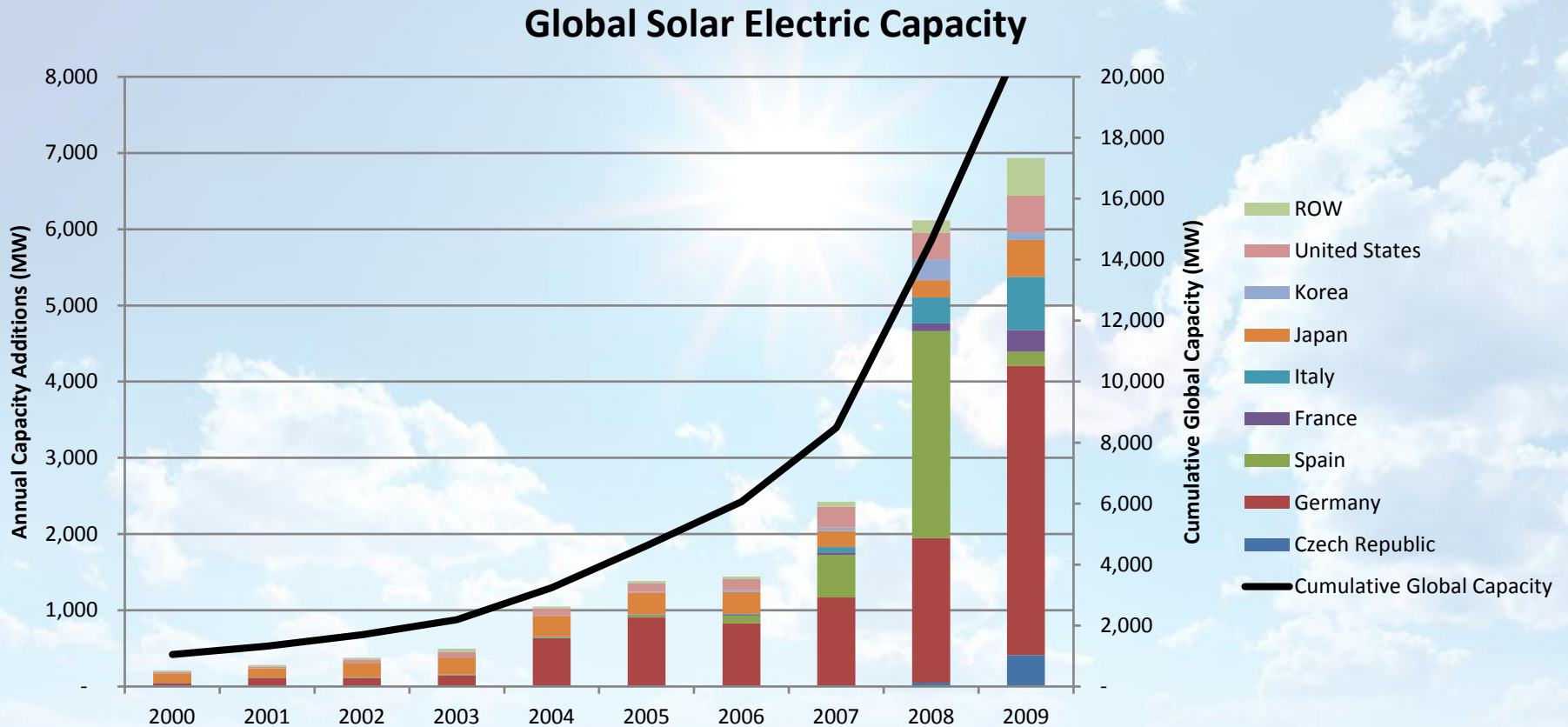
- U.S. was largest PV manufacturer in 1980's.
- Both demand and supply have grown faster abroad.
- U.S. still has enough manufacturing capacity to meet all domestic demand.
- U.S. PV module production grew 7% from 2008 to 2009.
- U.S. solar industry engages in 2-way trade.
 - Exports, cells, modules and materials



Source: Paula Mints,
Navigant Consulting, Inc.

Global Solar Electric Capacity

- Global solar electric capacity has passed 21 GW.
- Germany has nearly half the cumulative global capacity.



International Solar Electric Capacity Rankings

Top 10 countries ranked four ways:

- U.S. does well on measures of capacity.
- U.S. is doing less than other countries on a per capita basis.

New Capacity in 2009

2009 New Capacity (MW)		
1	Germany	3,800
2	Italy	700
3	Japan	484
4	United States	481*
5	Czech Republic	411
6	Belgium	292
7	France	285
8	Spain	180
9	China	125
10	Korea	100
Total		6,932**

2009 New Capacity (W per Capita)

1	Germany	46.2
2	Czech Republic	40.2
3	Belgium	28.0
4	Italy	12.0
5	France	4.4
6	Spain	4.4
7	Japan	3.8
8	Canada	2.2
9	Korea	2.1
10	United States	1.6*
Average		2.8**

Cumulative Capacity in 2009

2009 Cumulative Capacity (MW)		
1	Germany	9,677
2	Spain	3,595
3	Japan	2,628
4	United States	2,108*
5	Italy	1,158
6	Czech Republic	465
7	France	465
8	Korea	458
9	Belgium	362
10	China	125
Total		21,537**

2009 Cumulative (W per Capita)

1	Germany	117.5
2	Spain	88.7
3	Czech Republic	45.5
4	Belgium	34.8
5	Japan	20.7
6	Italy	19.9
7	Korea	9.4
8	France	7.3
9	United States	6.9*
10	Portugal	6.4
Average		8.7**

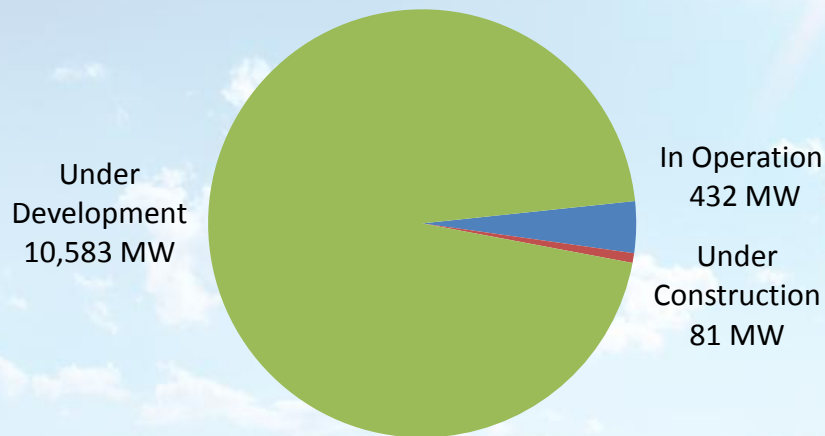
* Country rankings include off-grid estimates for U.S..

** Includes estimates for several other countries; not a global figure.

CSP Getting Ready to Take Off

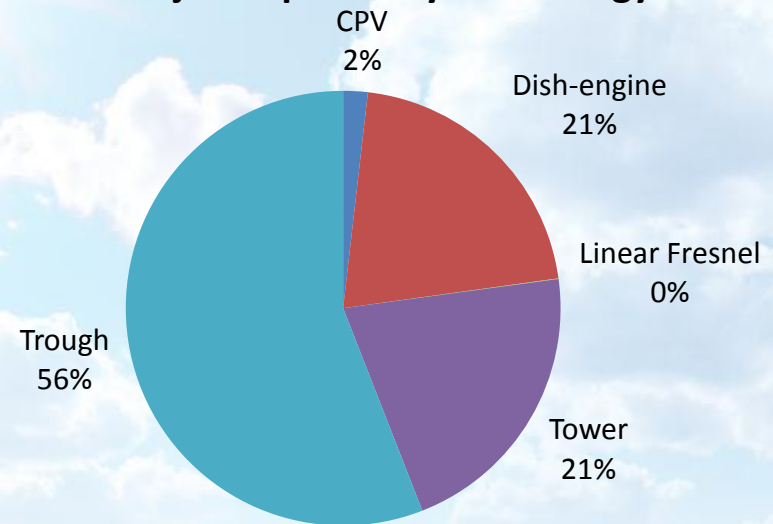
- Dozens of CSP projects totaling over 10,500 MW are now under development.
- The U.S. has more operating CSP capacity than any other country.

CSP Project Pipeline by Status



SEIA, 2/19/10

CSP Project Pipeline by Technology

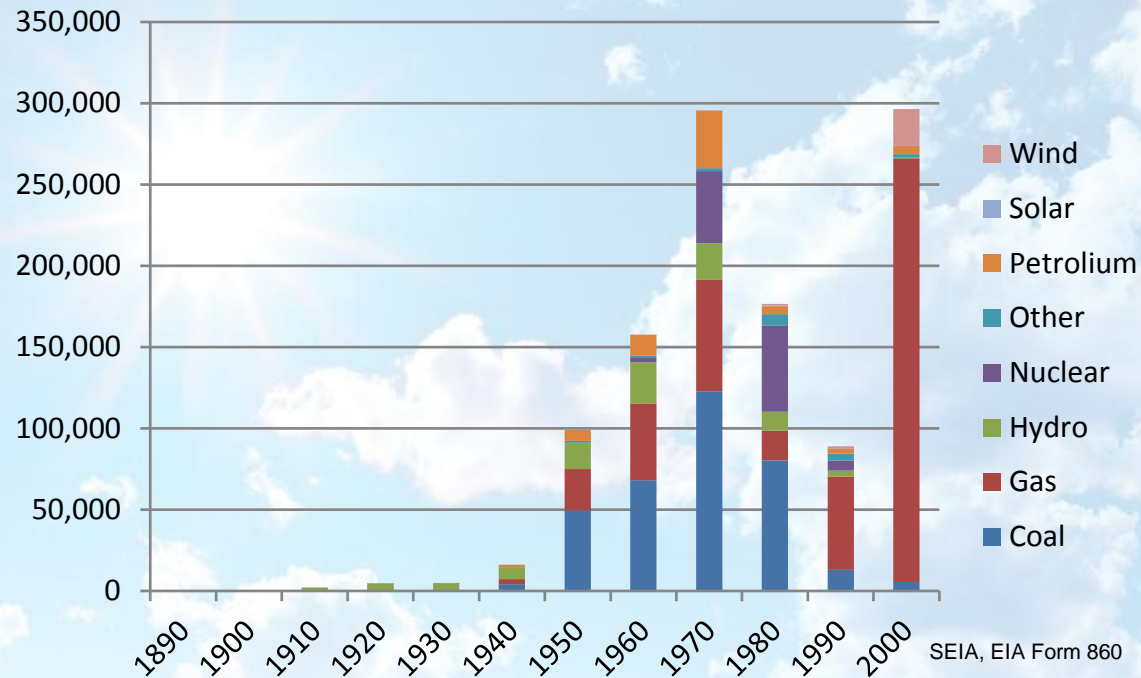


SEIA, 2/19/10

Precedent for Rapid Expansion

- The overall growth in the electric power sector shows the ability to rapidly ramp up capacity.
- In 1998 the entire U.S. added less than 3 GW of new capacity
 - In 1999: 11 GW
 - In 2000: 31 GW
 - In 2001: 46 GW
 - In 2002: 69 GW
- Annual installations increased 25x in 5 years

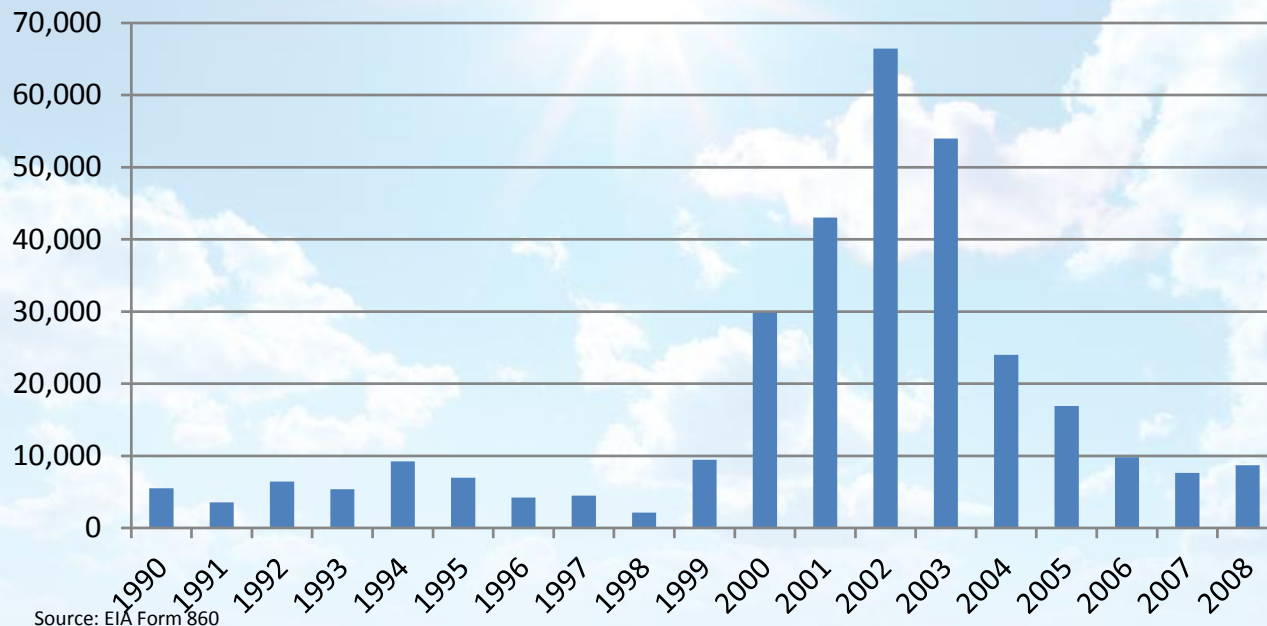
U.S. Power Plant Additions by Decade



Natural Gas Sets Precedent for Rapid Expansion

- Natural gas plants construction jumped from 2.1 GW in 1998 to 66.4 GW in 2002 (CAGR of 136%).
- From 1990 to 2002, new natural gas plant construction grew an average of 23% per year.
- Since 2006, solar installations have averaged 49% annual growth.

U.S. Natural Gas Plant Additions



Source: EIA Form 860

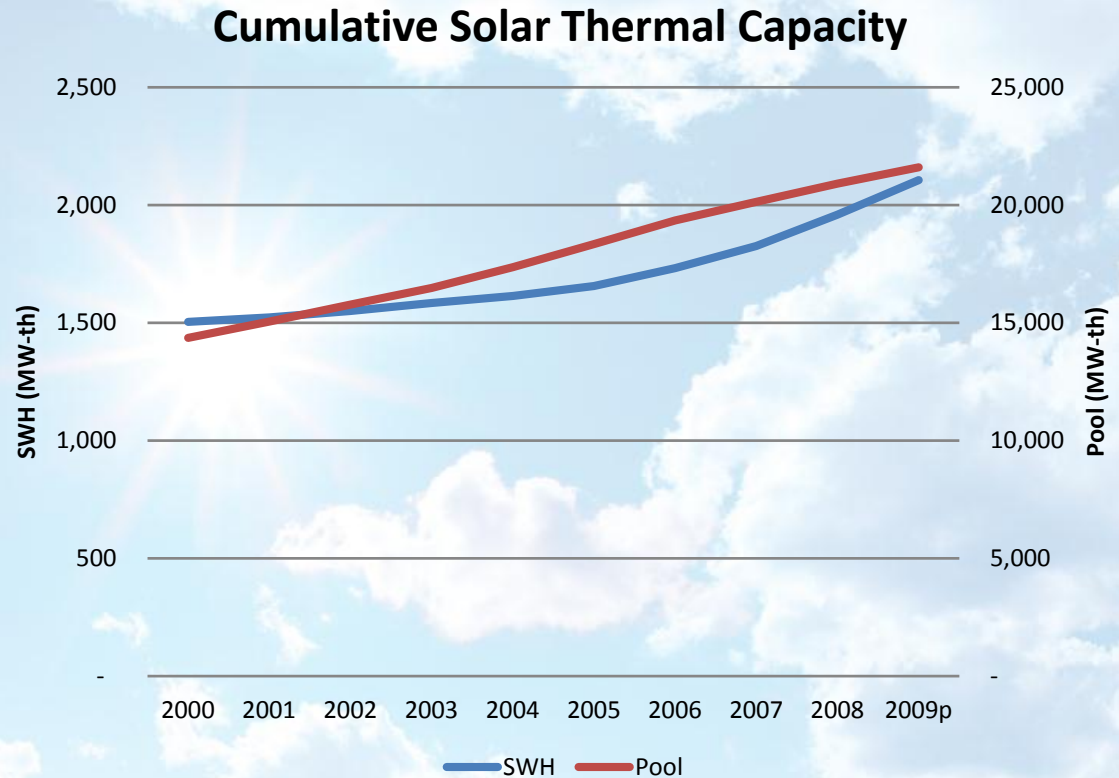
Steady Growth Over Ten Years

CAGR 2000-2009

- Total:
 - Solar Water Heating:
 - Solar Pool Heating:

CAGR 2006-2009

- Total:
 - Solar Water Heating:
 - Solar Pool Heating:



Solar Heating and Cooling Annual Shipments

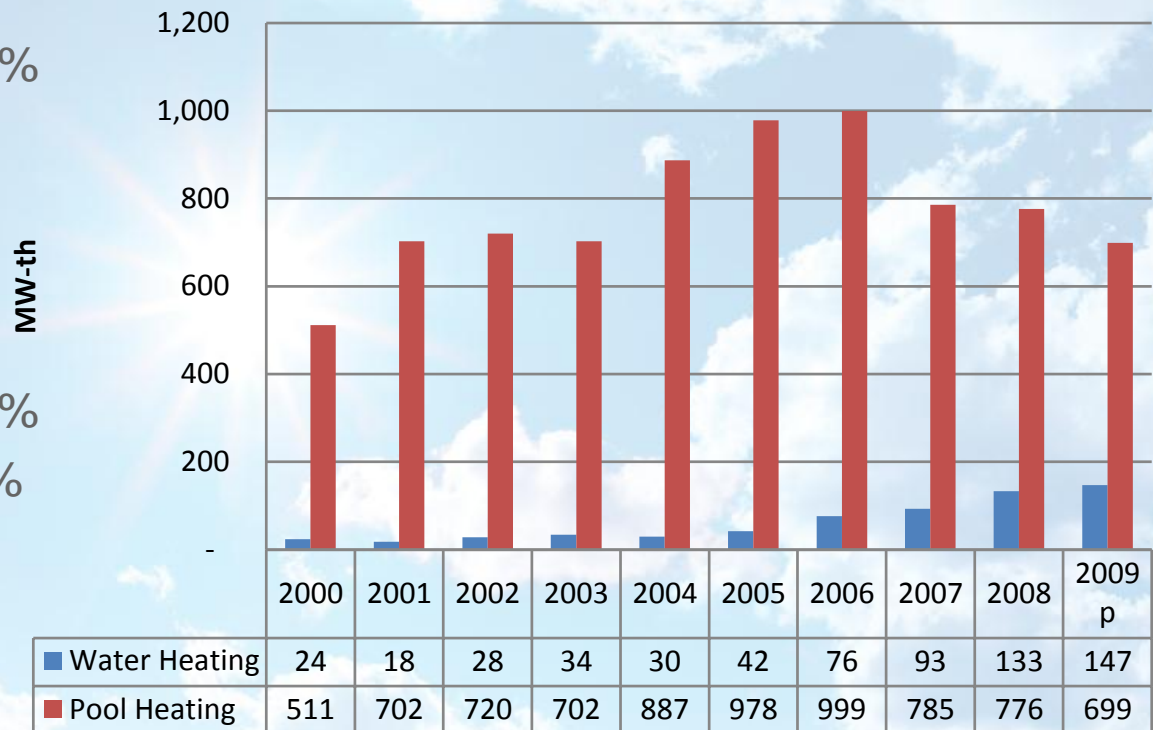
CAGR 2000-2009

- Total: 5%
 - Solar Water Heating: 22%
 - Solar Pool Heating: 4%

CAGR 2006-2009

- Total: -8%
 - Solar Water Heating: 25%
 - Solar Pool Heating: -11%

Solar Thermal Collector Shipments



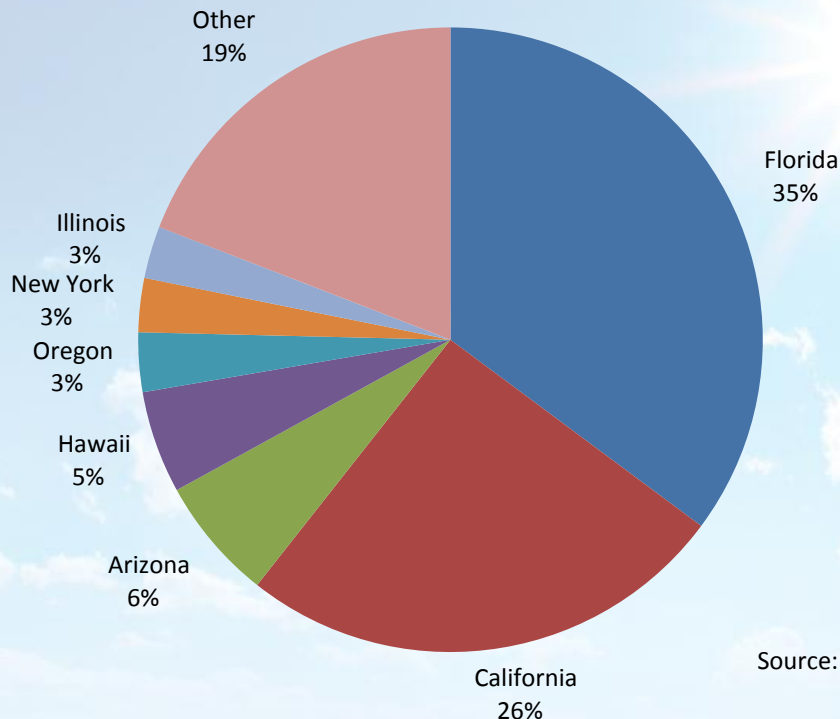
Source: EIA, SEIA*

* Water heating figures include collectors for combined water heating and space heating applications.

Solar Heating and Cooling Shipments

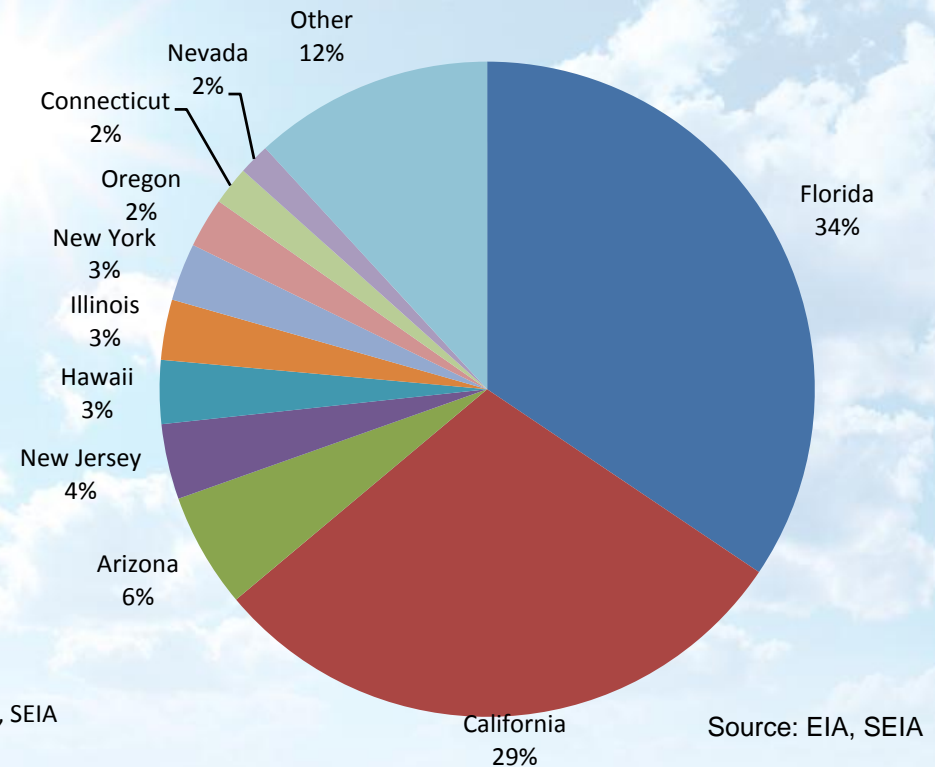
- Florida, California and Arizona remained the top 3 destinations for solar thermal collectors through 2008.

Destination of Solar Thermal Collector Shipments in 2008



Source: EIA, SEIA

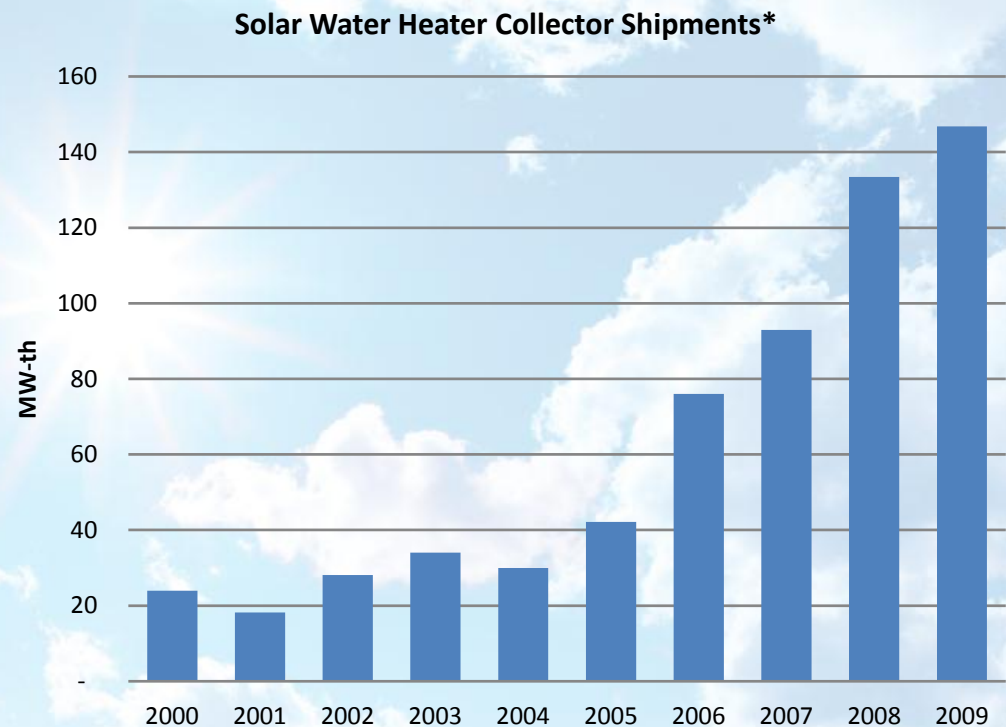
Cumulative Shipments by Destination (2003-2008)



Source: EIA, SEIA

Solar Thermal (Heating and Cooling) Market in 2009: Solar Water Heating

- Solar water heater shipments managed slight growth.
- Starting in 2009, the \$2,000 cap on the ITC for residential solar water heater installations was removed.

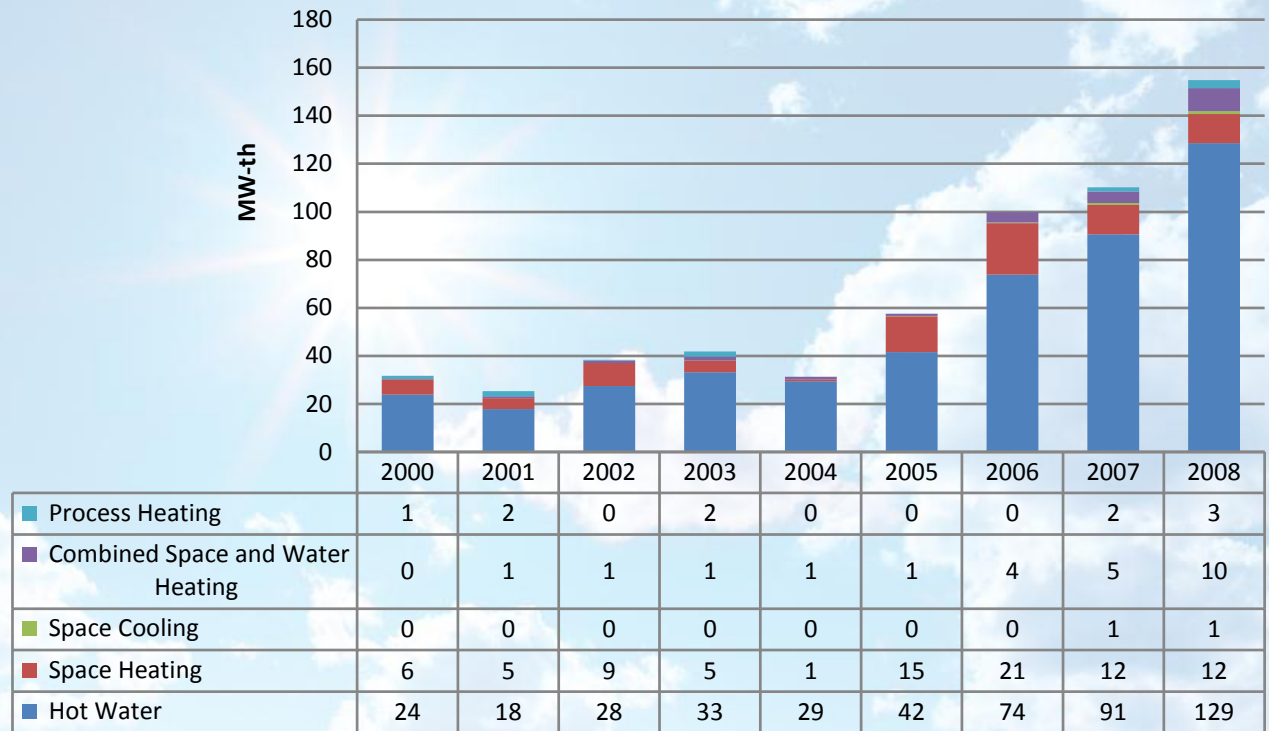


* Data for 2009 is an estimate. Data for 2000-2008 is from EIA.

Versatile Technology: Solar Thermal Collectors' Many Uses

- After pool heating, water heating remains the dominate application of solar thermal collectors.
- Space heating has huge potential.

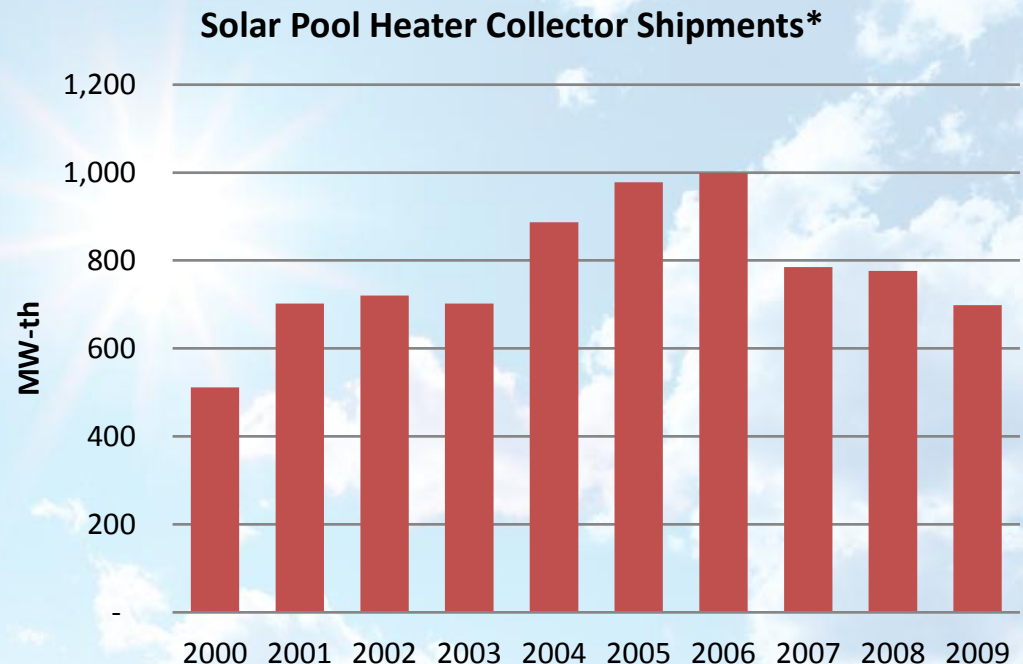
**Shipments of Solar Thermal Collectors by End-Use
(Excluding Pool Heating)**



Source: EIA, SEIA

Solar Thermal (Heating and Cooling) Market in 2009: Solar Pool Heating

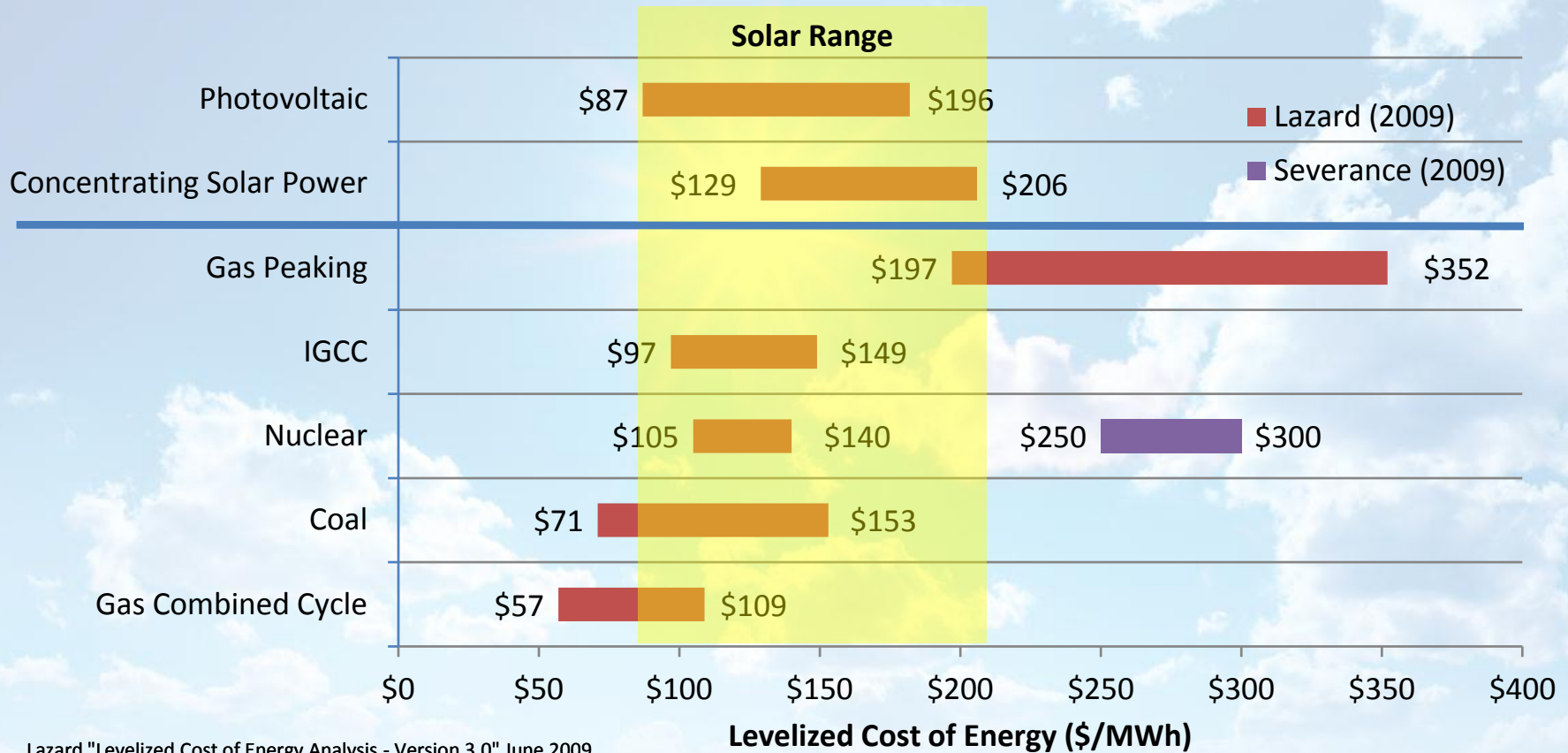
- Solar pool heating has suffered with the broader housing industry.
- Solar energy systems used to heat pools are *not* eligible for the federal ITC.



* Data for 2009 is an estimate. Data for 2000-2008 is from EIA.

Energy Cost Comparison

- Solar is increasingly competitive with traditional generation technologies
- Almost always less expensive than new peaking plants
- Increasingly less expensive than new baseload

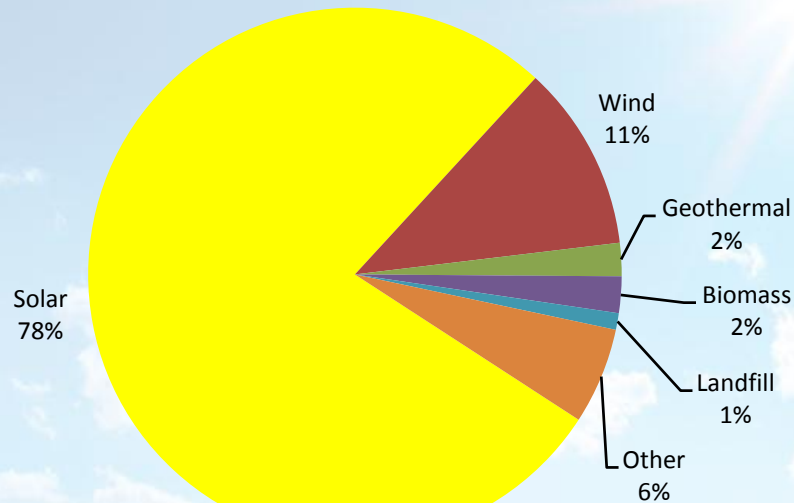


Lazard "Levelized Cost of Energy Analysis - Version 3.0" June 2009
 Severance, C. "Business Risks and Costs of New Nuclear Power" January 2009

Treasury Grants Awards as of April 20, 2010

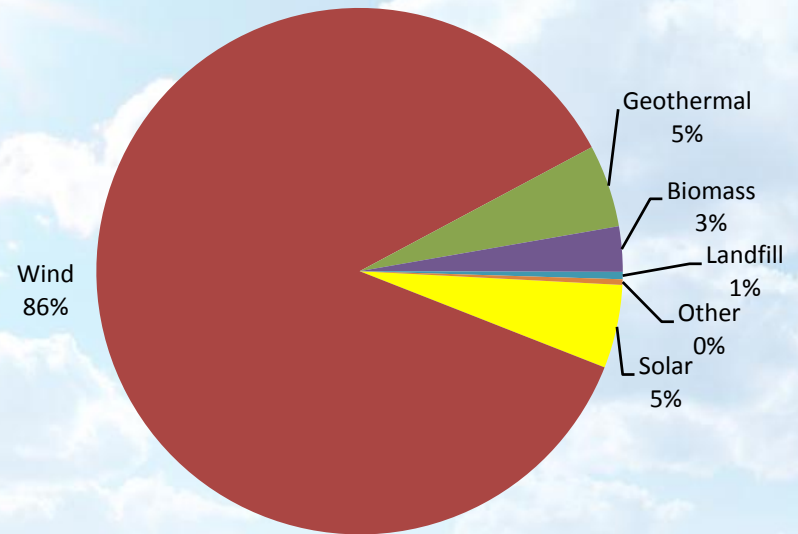
- \$3 billion in grants to date
- Over \$10 billion in project value
- 497 projects

Treasury Grant Awards (by Number of Projects)



As of 4/20/10

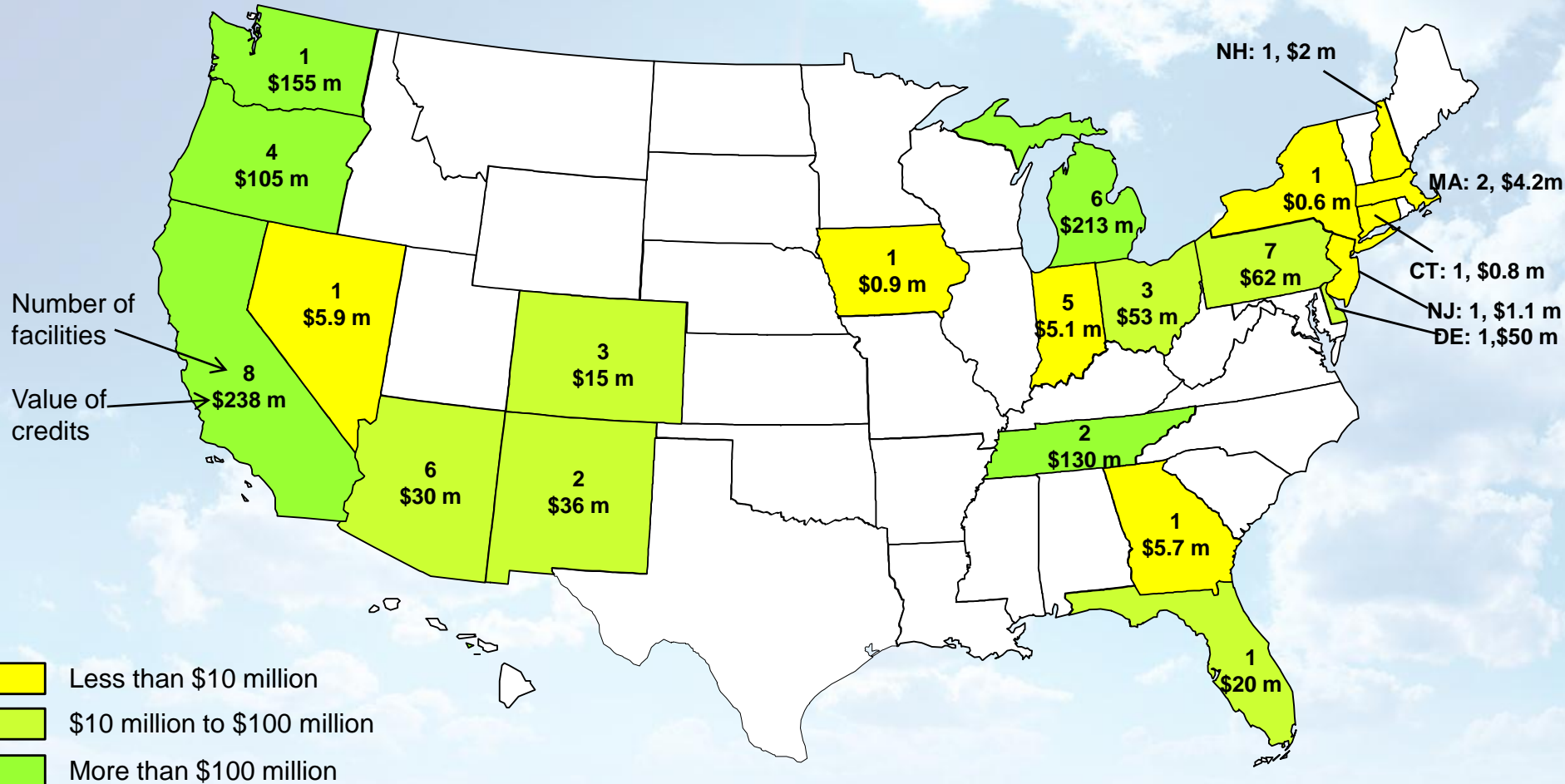
Treasury Grant Awards (by Value)



As of 4/20/10

Manufacturing Tax Credit Awards for Solar Manufacturing

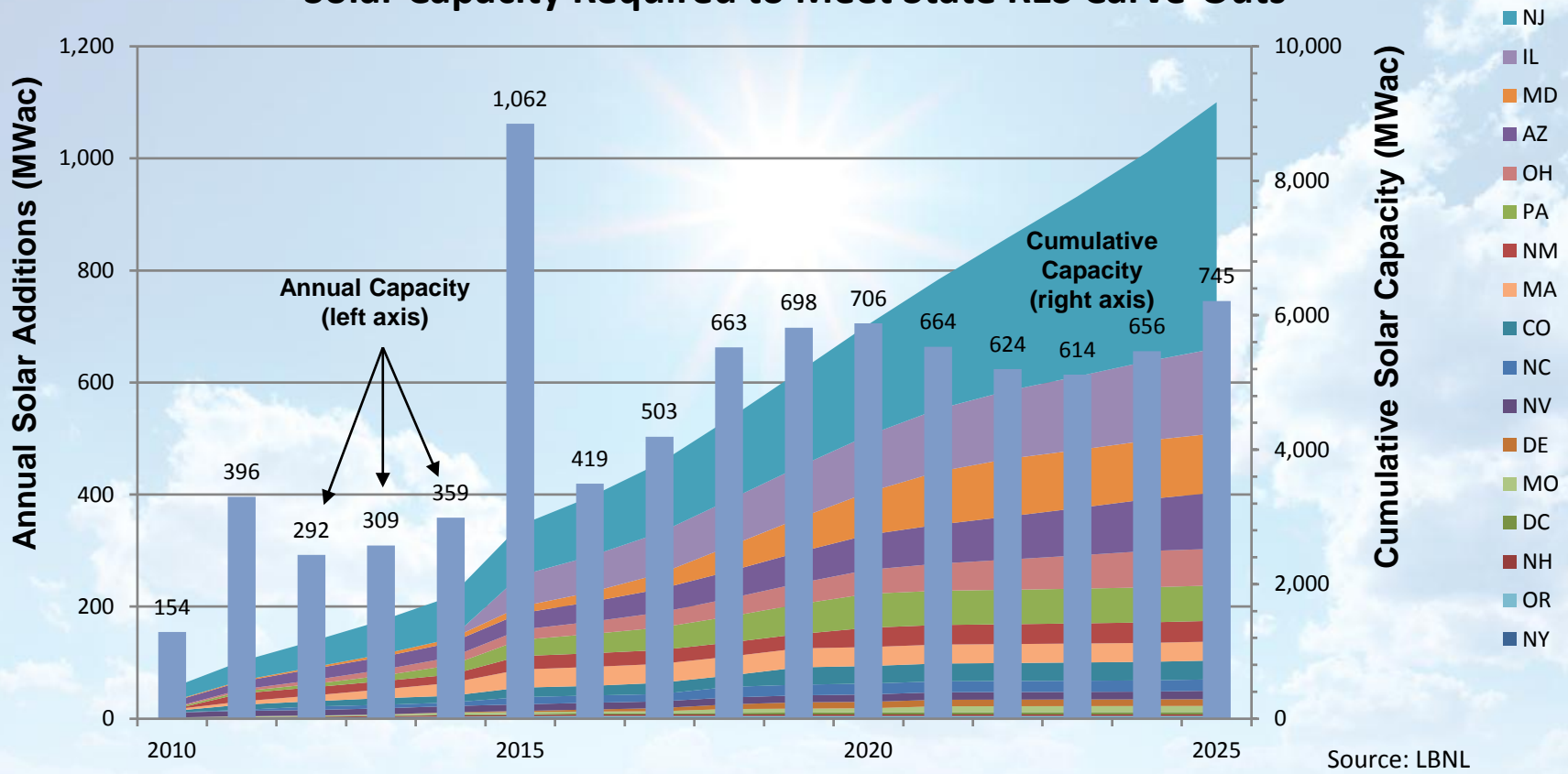
- \$1.156 billion in credits for solar projects
- Projects value over \$3.8 billion
- 61 new or upgraded facilities
- At least 21 States



State RES Solar and DG Carve-Out Requirements

- State RES carve-outs will set the baseline demand for solar over the next 15 years.

Solar Capacity Required to Meet State RES Carve-Outs



What's a Watt?

One megawatt of solar power capacity can provide 1,300 to 2,500 MWh (1.3 to 2.5 million kWh) of electricity per year, enough to supply 120 to 220 average American homes.

- **Watt (W):** A watt is a unit of power (like horsepower used to measure engines) that measures the rate of flow of energy. Solar equipment is often measured in peak watts or maximum power output rating. $1 \text{ W} = 1 \text{ joule/second}$. (A joule is a unit of energy equal to 0.24 calories.)
- **Kilowatt (kW):** $1 \text{ kW} = 1,000 \text{ W}$ or 1.34 horsepower.
- **Megawatt (MW):** $1 \text{ MW} = 1,000 \text{ kW} = 1,000,000 \text{ W}$.
- **Gigawatt (GW):** $1 \text{ GW} = 1,000 \text{ MW} = 1 \text{ million kW} = 1 \text{ billion W}$
- **Kilowatt-hour (kWh):** A kilowatt-hour is a unit of energy necessary to provide 1 kW of power for 1 hour. 1 kWh can power a 100-W light bulb for 10 hours. The average American household uses 936 kWh of electricity per month. (EIA, <http://www.eia.doe.gov/cneaf/electricity/esr/table5.html>)
- **Watt-thermal (W_{th}):** Solar thermal systems (water heating, pool heating, etc.) do not provide power but instead provide thermal energy or heat. However, to roughly compare solar thermal capacity to solar electric capacity, thermal capacity is reported in watts-thermal by treating one square meter of collector area as equivalent to 700 watts of solar electric capacity.