Solar and Utilities Today

Crisis or Renaissance – The State of America's Energy
Sioux Falls, SD

Tom Nicholas
Regional Director
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May 12, 2009

Solar in the Midwest?

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Does Solar Work in the Central US?

- GERMANY IS THE WORLD LEADER IN SOLAR
- BOTH IN MANUFACTURING OUTPUT AND USEAGE
- GERMANY MUST BE AN IDEAL PLACE FOR SOLAR

Solar Resource – Germany vs. US

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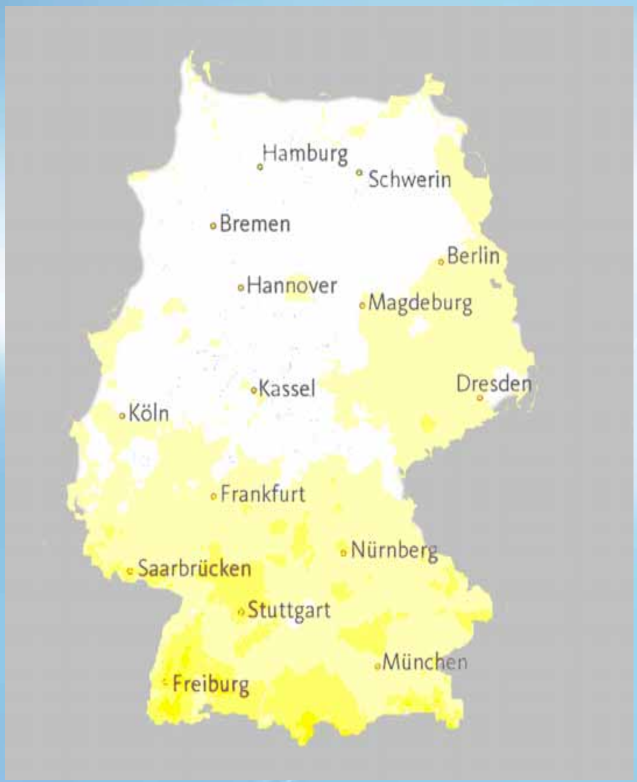

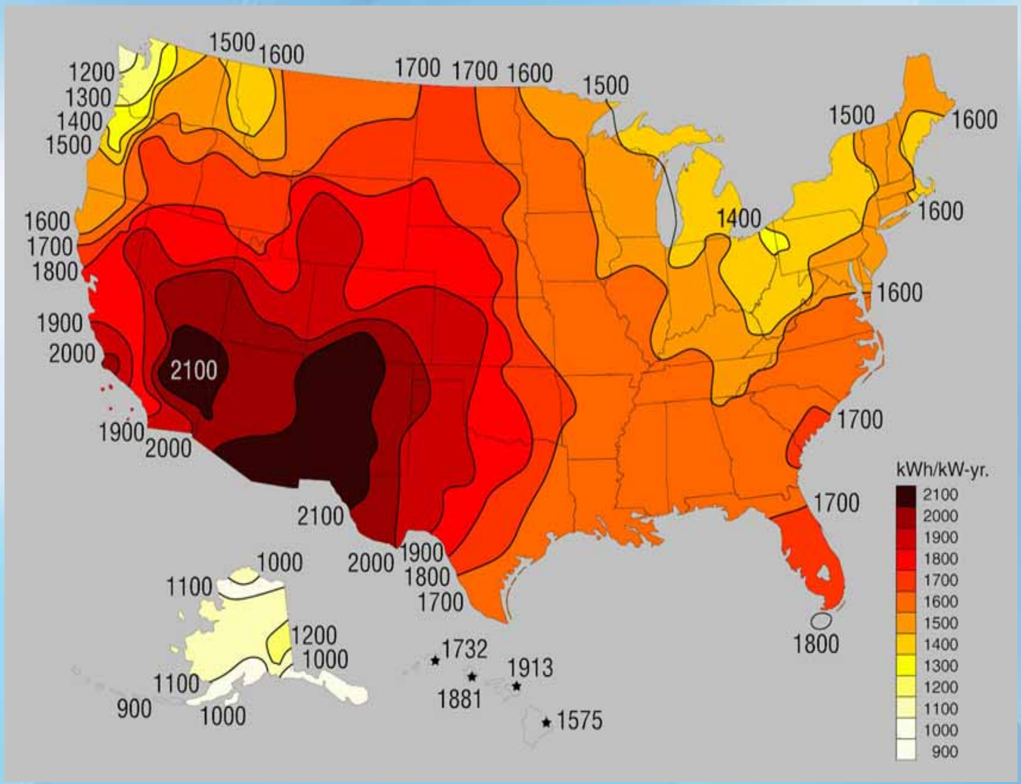

Sioux Falls Has More Solar Radiation Than:

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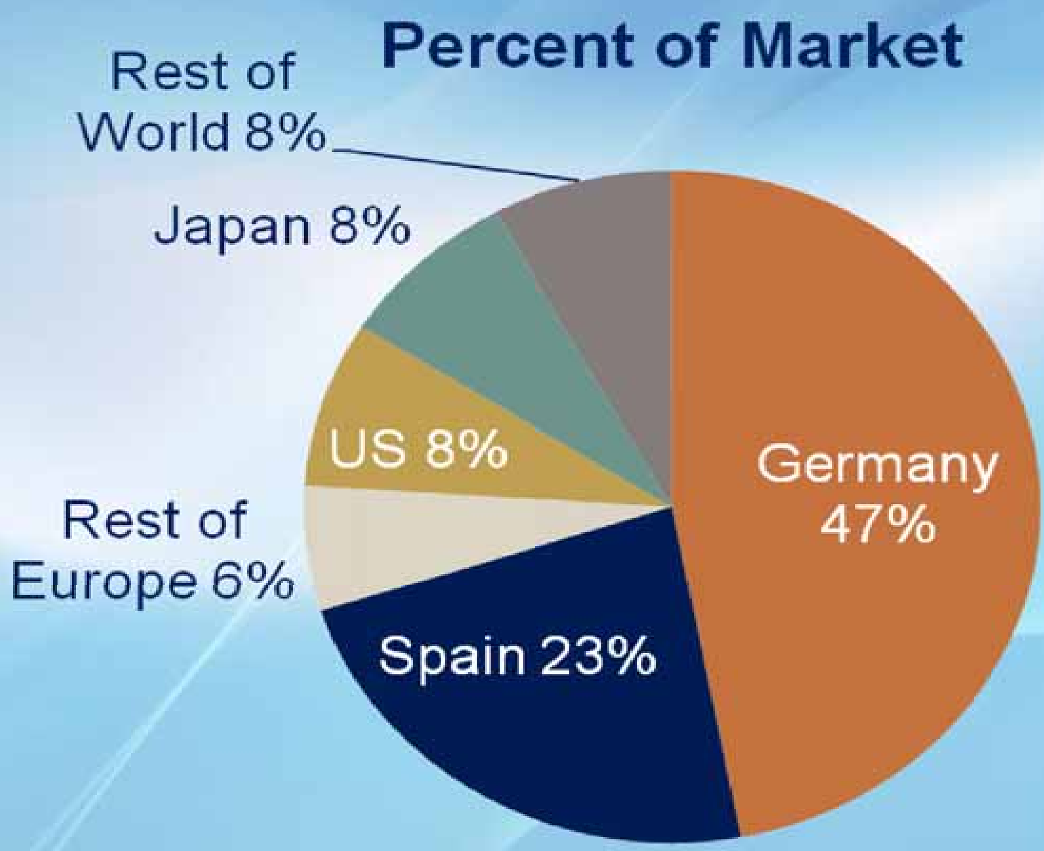
- Houston, TX
- New Orleans, LA
- Jackson, MS
- Newark, NJ
- New York City, NY
- And Almost As Much As Miami, FL

2007 PV Demand by Country



Source: Solarbuzz.com

ABOUT SEPA

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About SEPA

- 501(c)3 membership organization
- Reliable source of unbiased information about solar technologies, policies, and programs
- 555 Utility, Solar Industry, and Stakeholder members
- 18 member board of directors (14 utilities)

About SEPA

- Based in Washington DC
- No Lobbying
- Go-to resource for unbiased and actionable solar intelligence.
- One-on-one Counseling
- Unique joint partnership
- Make solar practical and profitable in today`s shifting energy landscape

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Bi-Weekly Newsletter

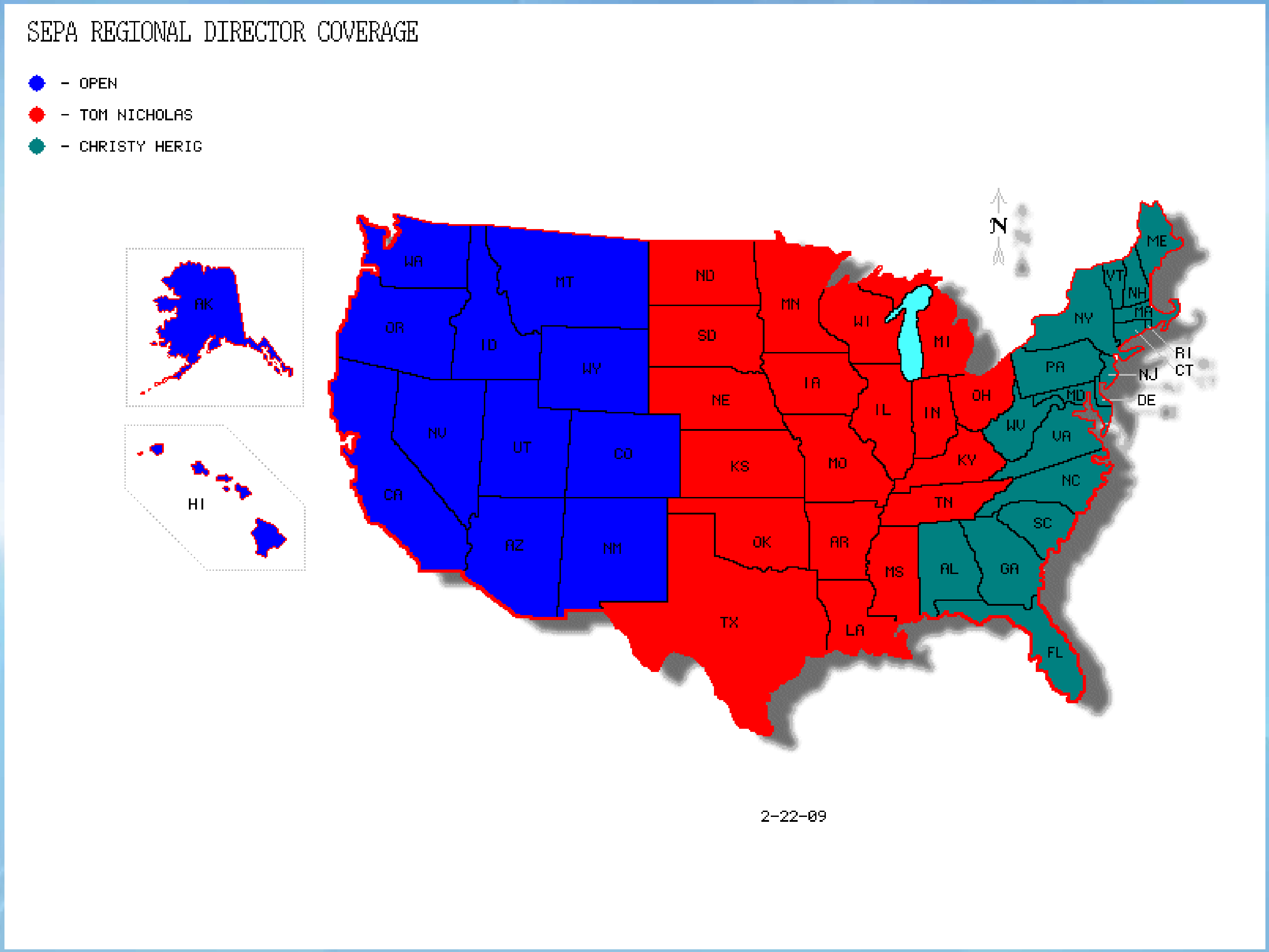
Newsletter Content:

- Utility News
- Solar Industry News
- Policy News
- Listing of open RFPs
- Listing of upcoming Solar Events

SEPA Members (as of 03/09):

Electric Utilities	–	135 members
Solar Industry	–	245 members
Stakeholders	–	175 members

Regional Director Territories



SEPA Educational Programming

- Regional Workshops – April 13 – 14 ,Knoxville, TN
- Fact Finding Mission – May 17 – 22, Spain
- Utility Conference, July 28 – 29, San Jose, CA
- Solar Power International, October 27 – 29, Anaheim CA
- Monthly Phone Seminars

Technology

Solar Electric Technologies

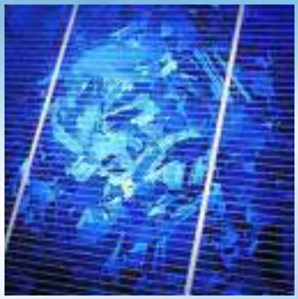
- Two primary types

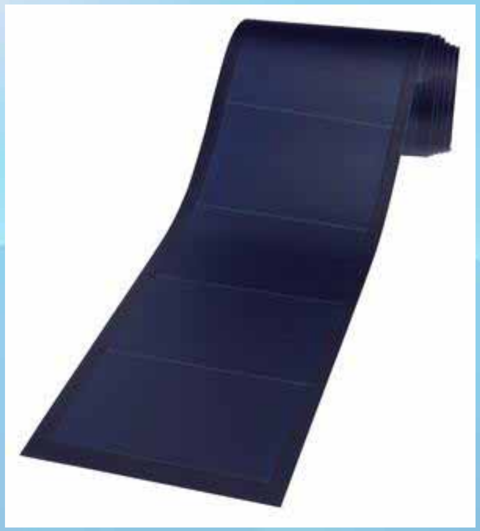
Photovoltaic's (PV)

Concentrating Solar Power (CSP)

Photovoltaic's

- Two primary types commercially available
  - Crystalline Silicon
    - Mono
    - Poly
    - Ribbon
  - Thin film
    - Amorphous silicon (a-Si)
    - Cadmium telluride (CdTe)
    - Copper indium gallium (CIGS)
    - Copper indium diselenide (CIS)





Concentrating Solar Power

- Two primary types commercially available

Concentrating PV (CPV)

Solar Thermal Electric

Heliostat Tower

Stirling Dish

Parabolic Trough

Compact linear fresnel lens

NEW UTILITY DRIVERS

New Utility Drivers

- Renewable Portfolio Standards
- ITC Passage to 2016
- Volatile Fuel Prices
- Increasing Costs of Generation

New Utility Drivers

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- New Administration
- Climate Change
- Decreasing Solar Technology Costs
- Customer Demand for “Green”

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Markets

Total Solar-Supported Employment With ITC Extension

Source: Navigant Consulting, 2008

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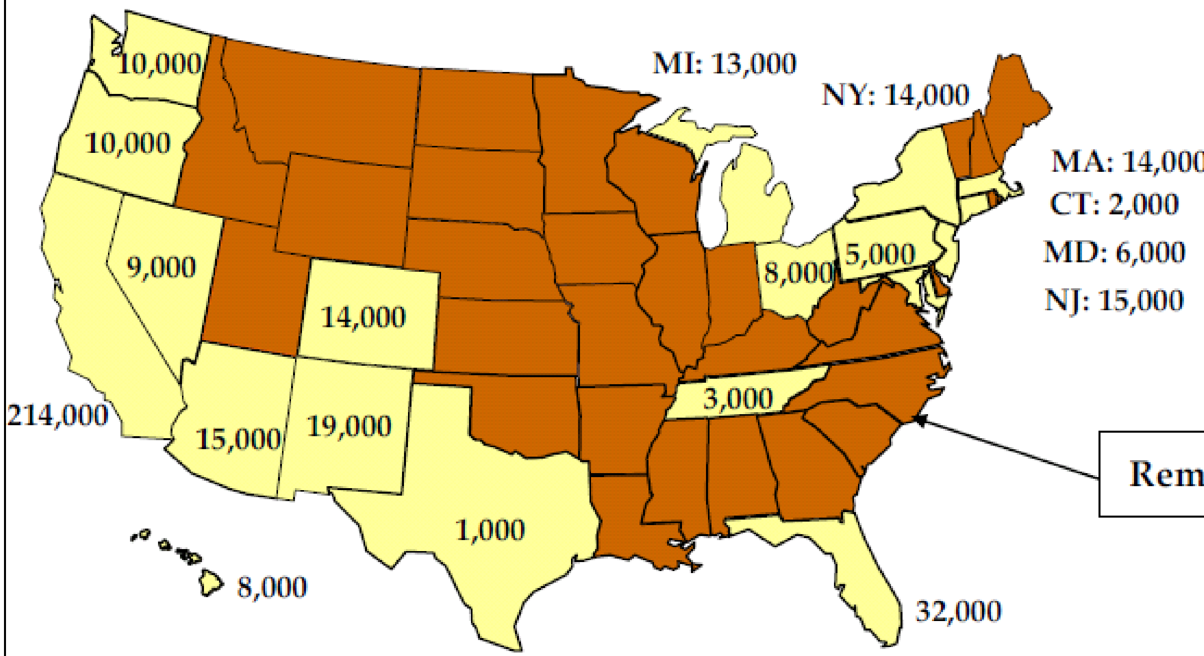
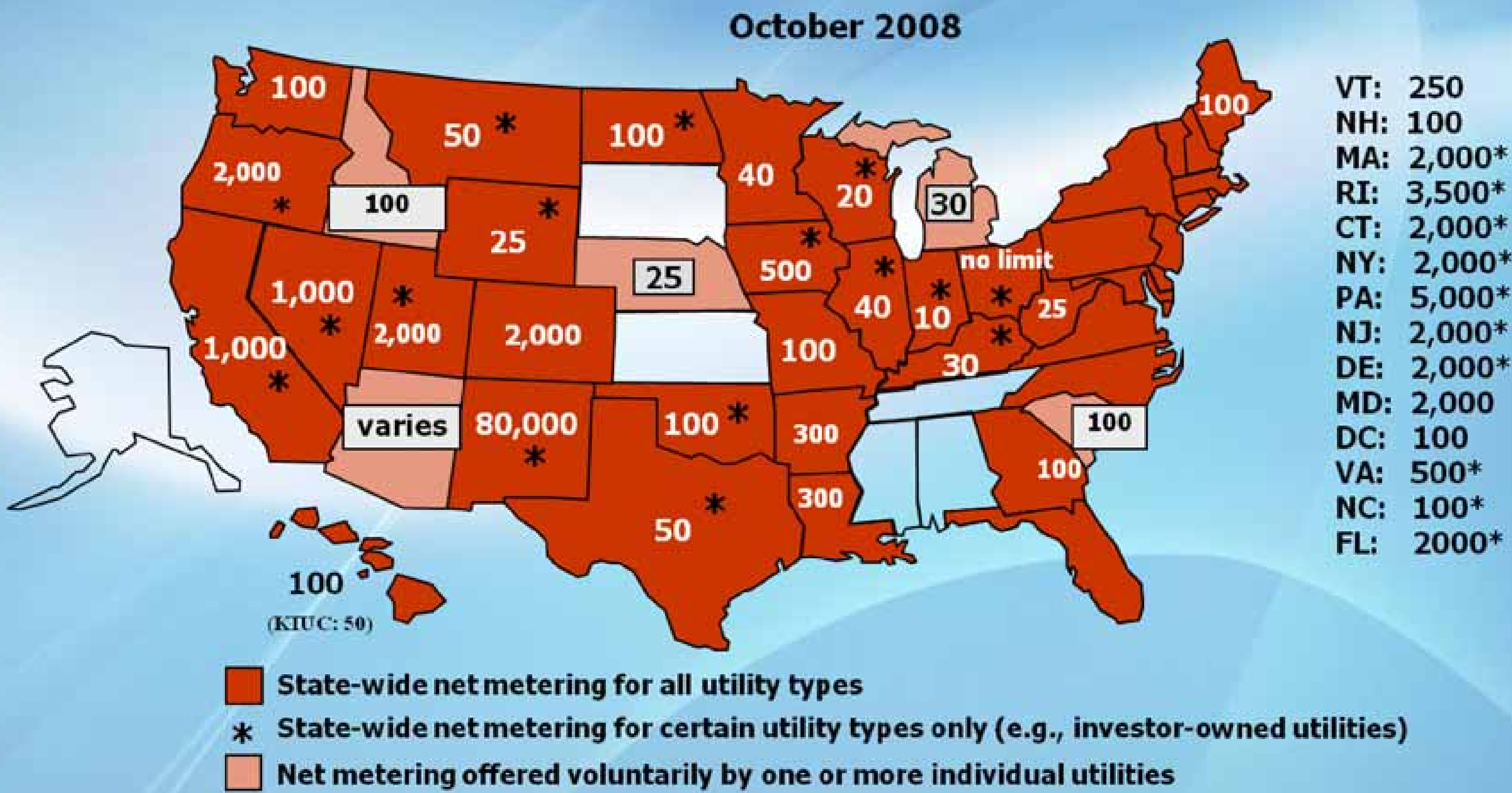
2016 Solar Direct, Indirect, and Induced Employment: 440,000 Jobs[1]



- Of these 440,000 jobs, 110,000 jobs are directly in the solar industry. The remaining jobs are in industries supporting the solar industry or are a result of economic activity stimulated by the U.S. solar industry.

Commercial Net Metering

Source: IREC October 2008



Renewable Portfolio Standards

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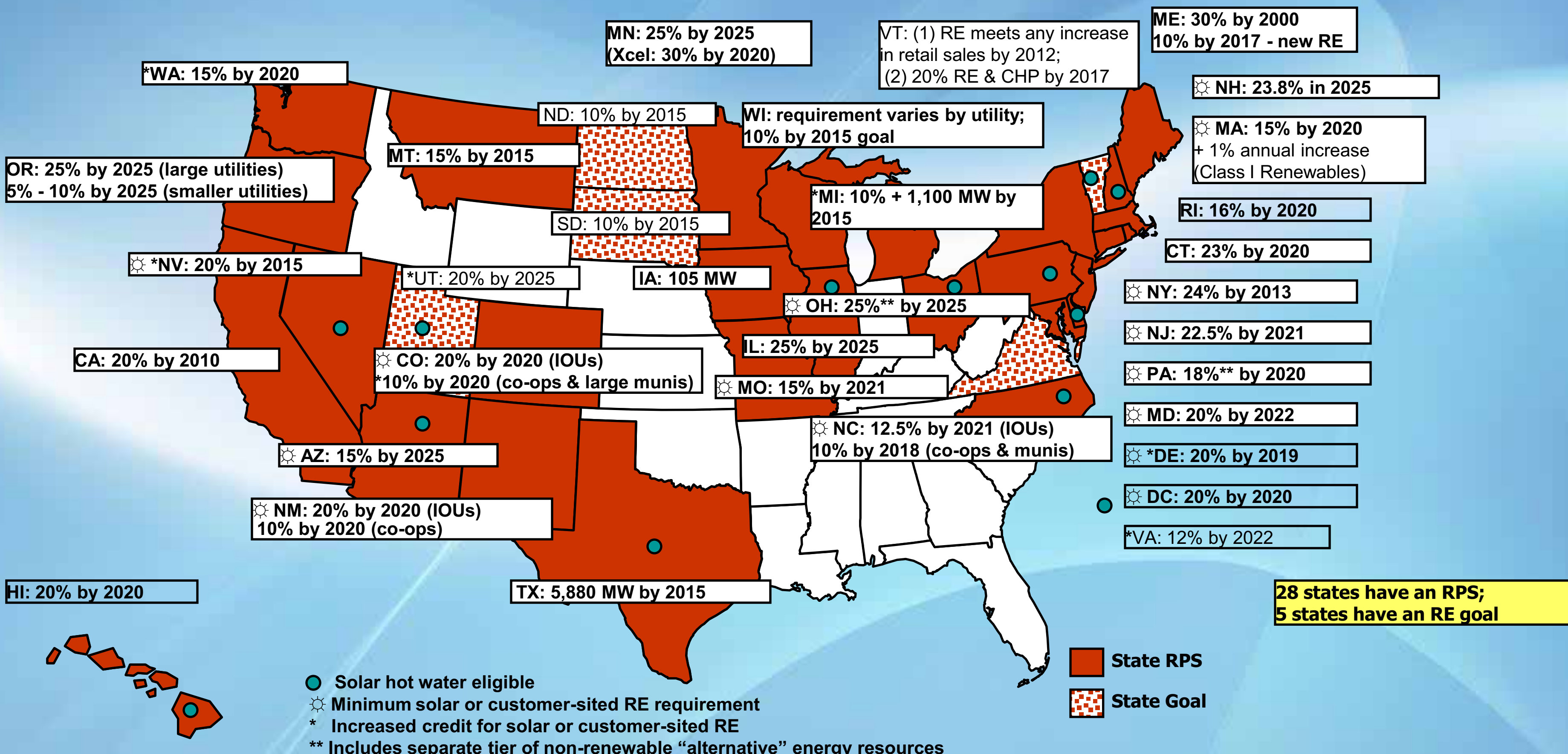
February 2009 *Source: www.dsireusa.org*



Solar/DG Provisions in RPS Policies

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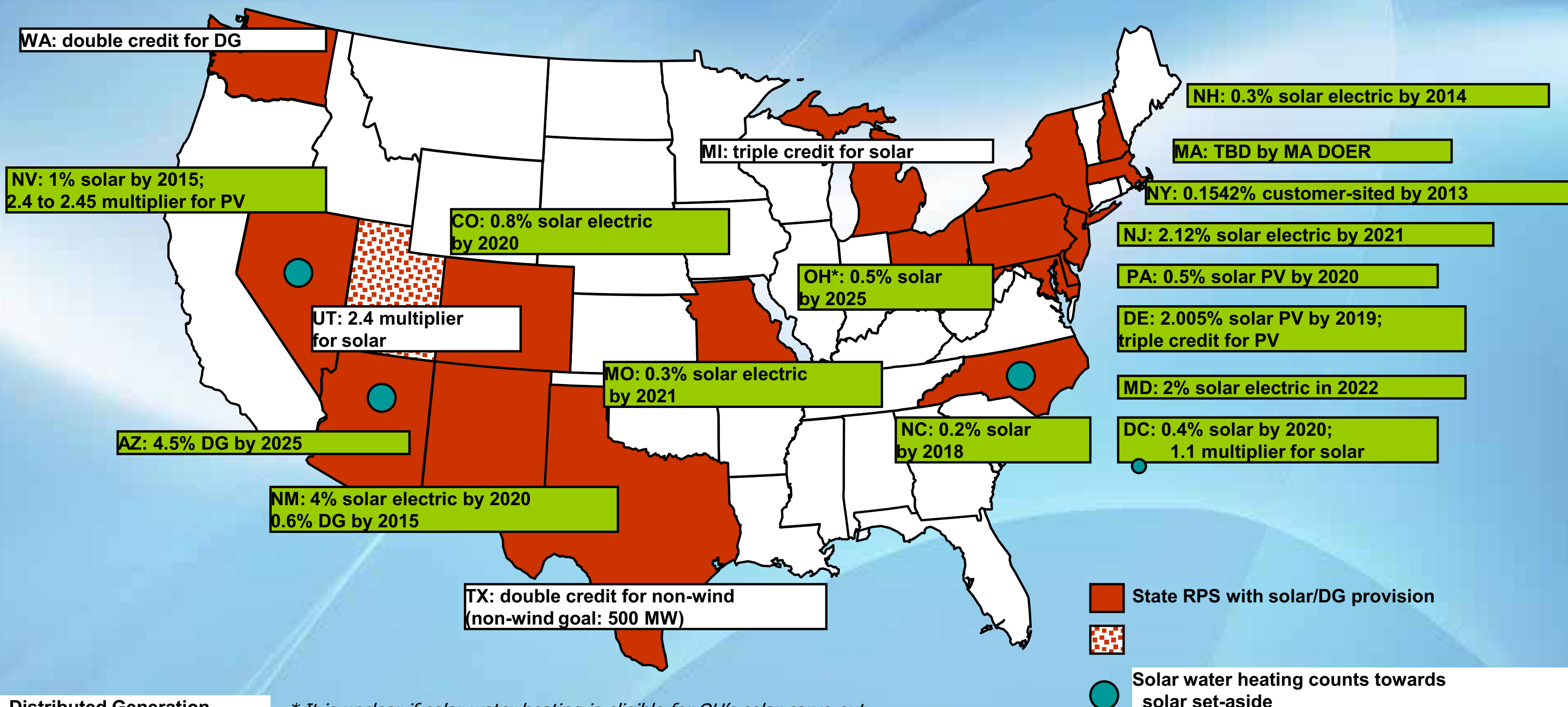
February 2009

Source: www.dsireusa.org

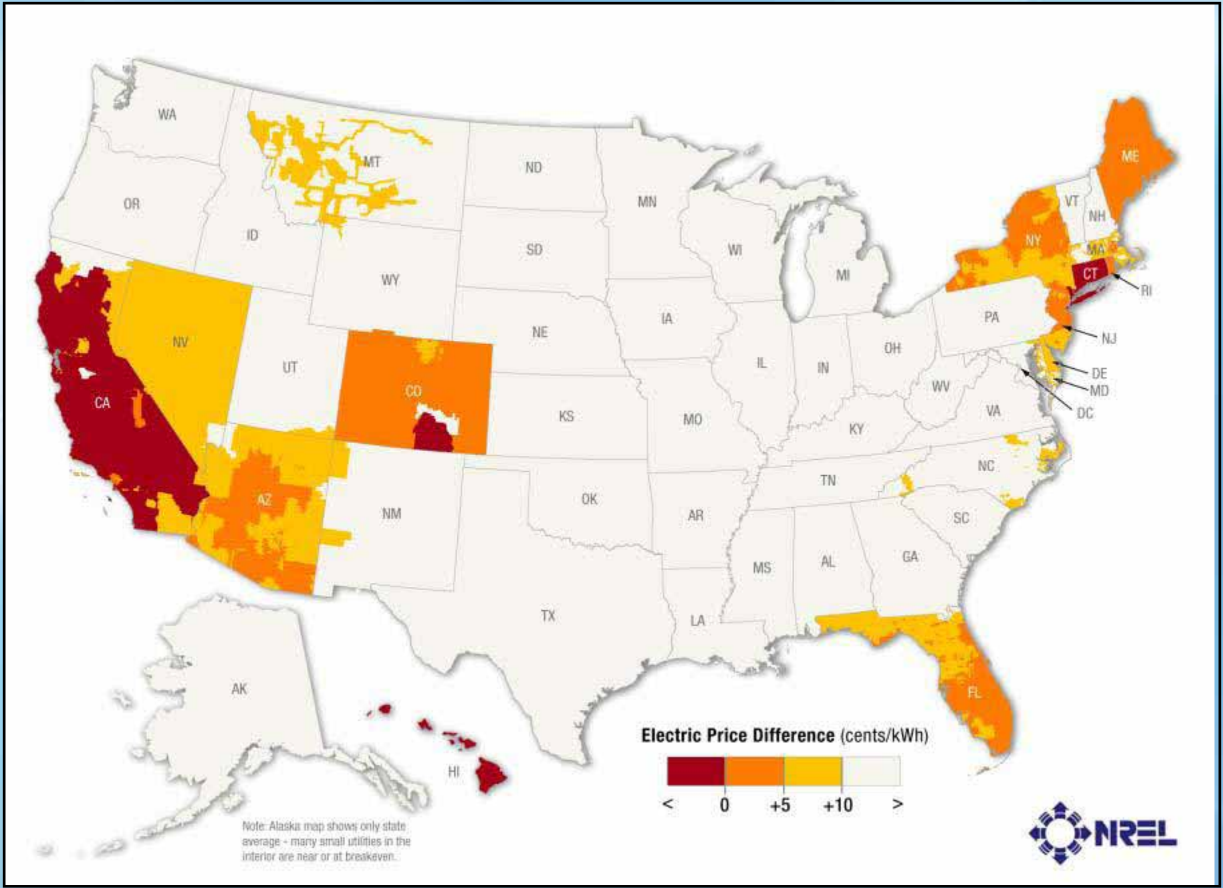


DG: Distributed Generation

** It is unclear if solar water heating is eligible for OH's solar carve-out.*

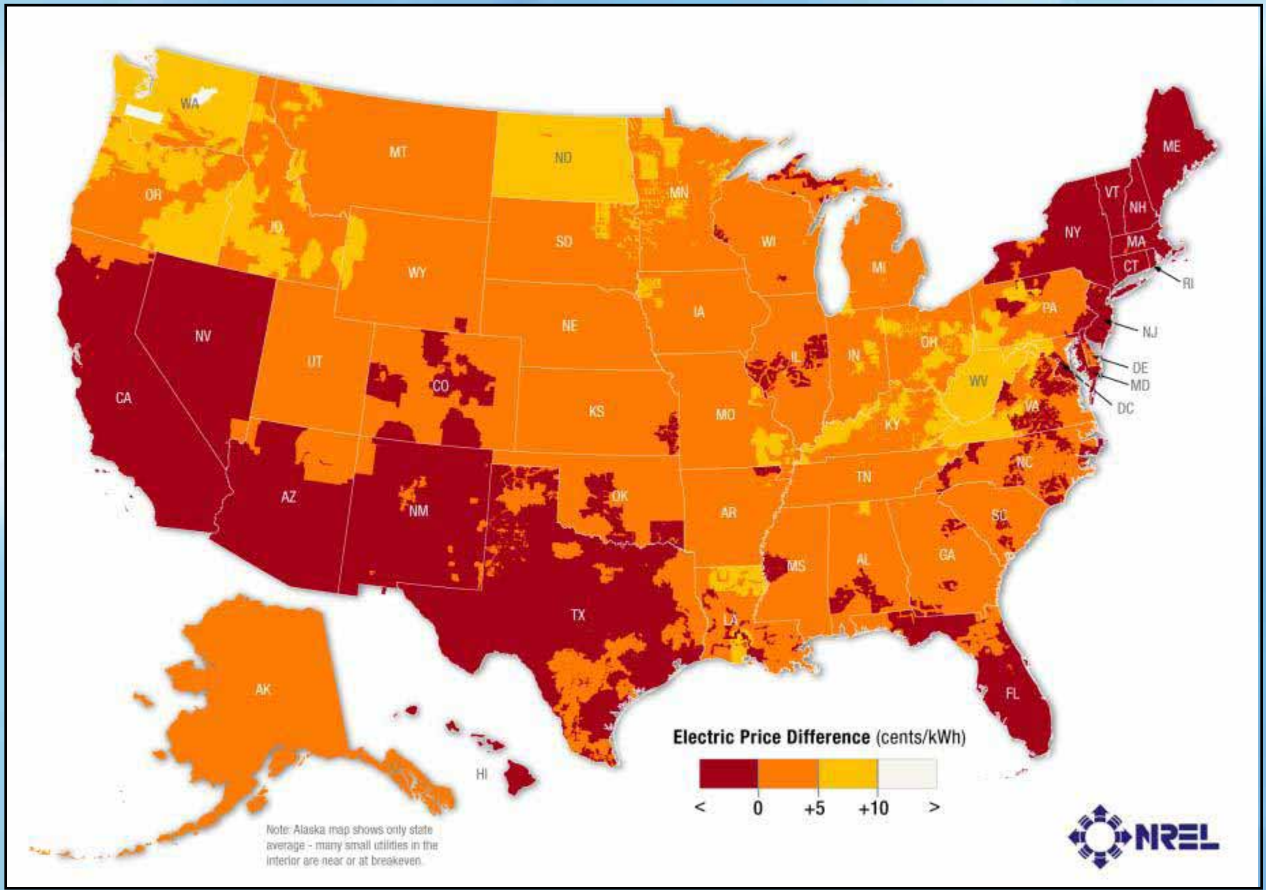
Grid Parity Today

- Currently PV is financially competitive where there is some combination of high electricity prices, excellent sunshine and/or state/local incentives



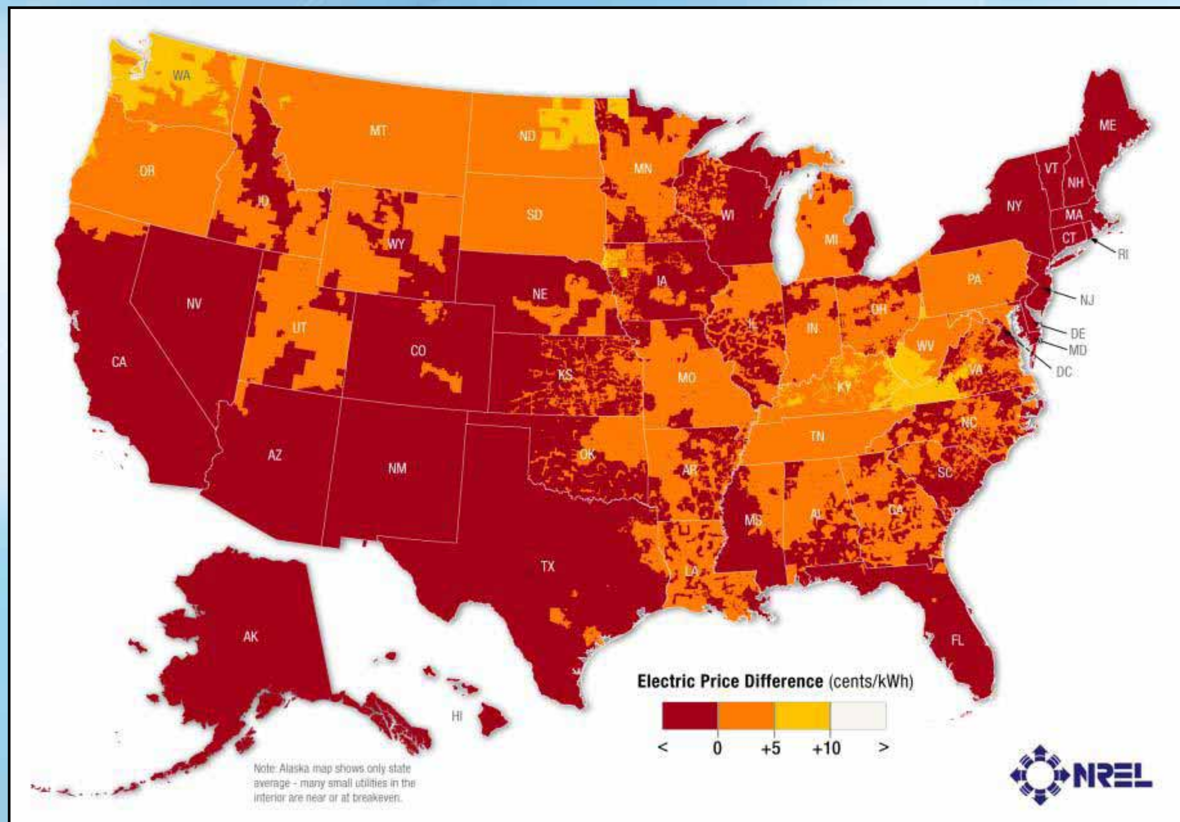
Grid Parity in 2015; Moderate Electricity Price Increases

- Attractive in about 250 of 1,000 largest utilities, which provide ~37% of U.S. residential electricity sales.
- 85% of sales (in nearly 870 utilities) are projected to have a price difference of less than 5 ¢/kWh between PV and grid electricity.
- In large areas, PV is cheaper than grid electricity



Grid Parity in 2015; Aggressive Electricity Price Increases

- Attractive in about 450 of 1,000 largest utilities, which provide ~50% of U.S. residential electricity sales.
- 91% of sales (in nearly 950 utilities) are projected to have a price difference of less than 5 ¢/kWh between PV and grid electricity.
- In most high population areas, PV is cheaper than grid electricity



US PV Demand by State

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State	2006 (MW DC)	2007 (MW DC)	06 - 07 % change	2007 Market Share	2006 Rank
1. California	69.5	88.8	28%	58%	1
2. New Jersey	17.9	16.4	-8%	11%	2
3. Nevada	3.2	14.7	365%	10%	3
4. Colorado	1.0	12.5	1178%	8%	7
5. New York	3.0	4.3	45%	3%	4
6. Arizona	2.1	2.8	30%	2%	5
7. Hawaii	0.7	2.4	236%	2%	9
8. Connecticut	0.7	1.8	174%	1%	10
9. Massachusetts	1.5	1.4	-5%	<1%	6
10. Oregon	0.5	1.1	112%	<1%	11
All Other States	3.2	5.6	75%	4%	
Total	**103.2**	**151.9**	**45%**		

Table 1: TOP TEN STATES
Ranked by Grid-Connected Photovoltaic Capacity Installed in 2007 (MW_{DC}/yr)

Source: IREC

Past - Historical US PV Installation Capacity

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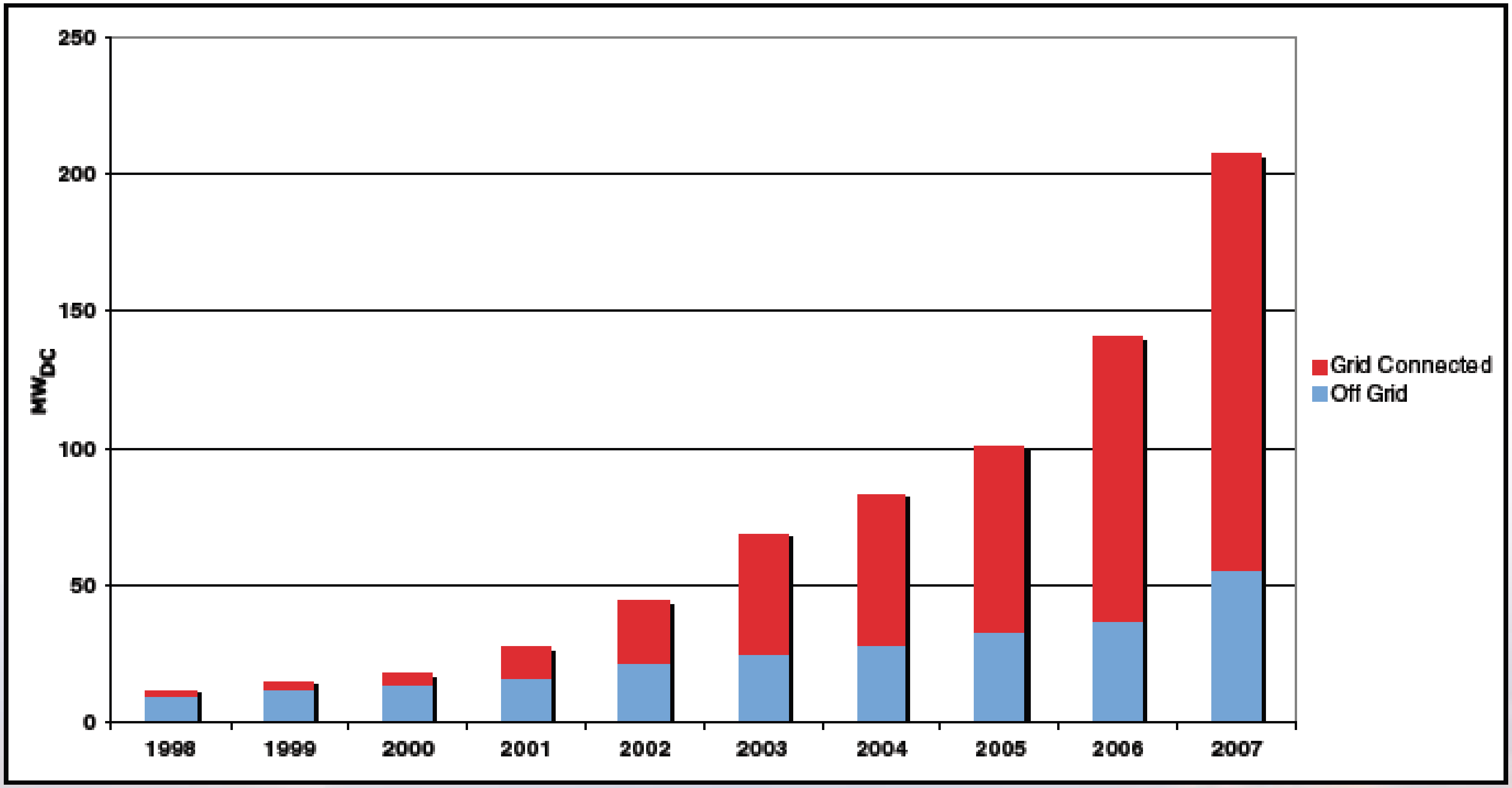

Fig. 1: Capacity of Annual U.S. Photovoltaic Installations (1998-2007)
Off-Grid Data from PV Energy Systems

Source: IREC

Future - 2016 US Installation Projections PV and CSP

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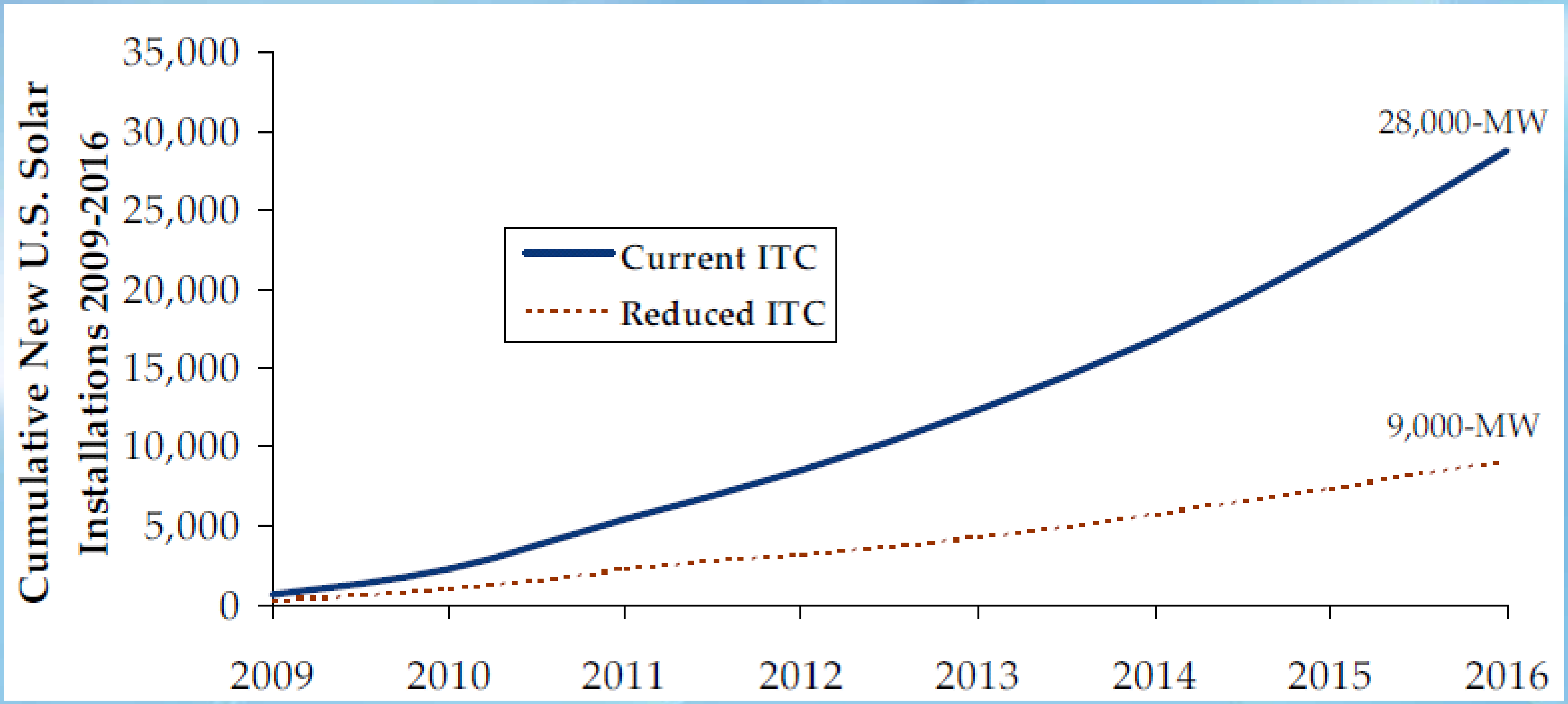
Cumulative New U.S. Solar Installations from 2009 to 2016 (MW)



Notes:
1. PV market converted from MWDC to MWAC using an 84% de-rate.
2. Solar Water Heating market data converted from area to energy using a conversion factor of 0.7 m2/kWth.
3. CSP is represented in MWAC.
4. Data does not include solar installations prior to 2009.

Source: Navigant

2016 Forecast Broken Down by Technology

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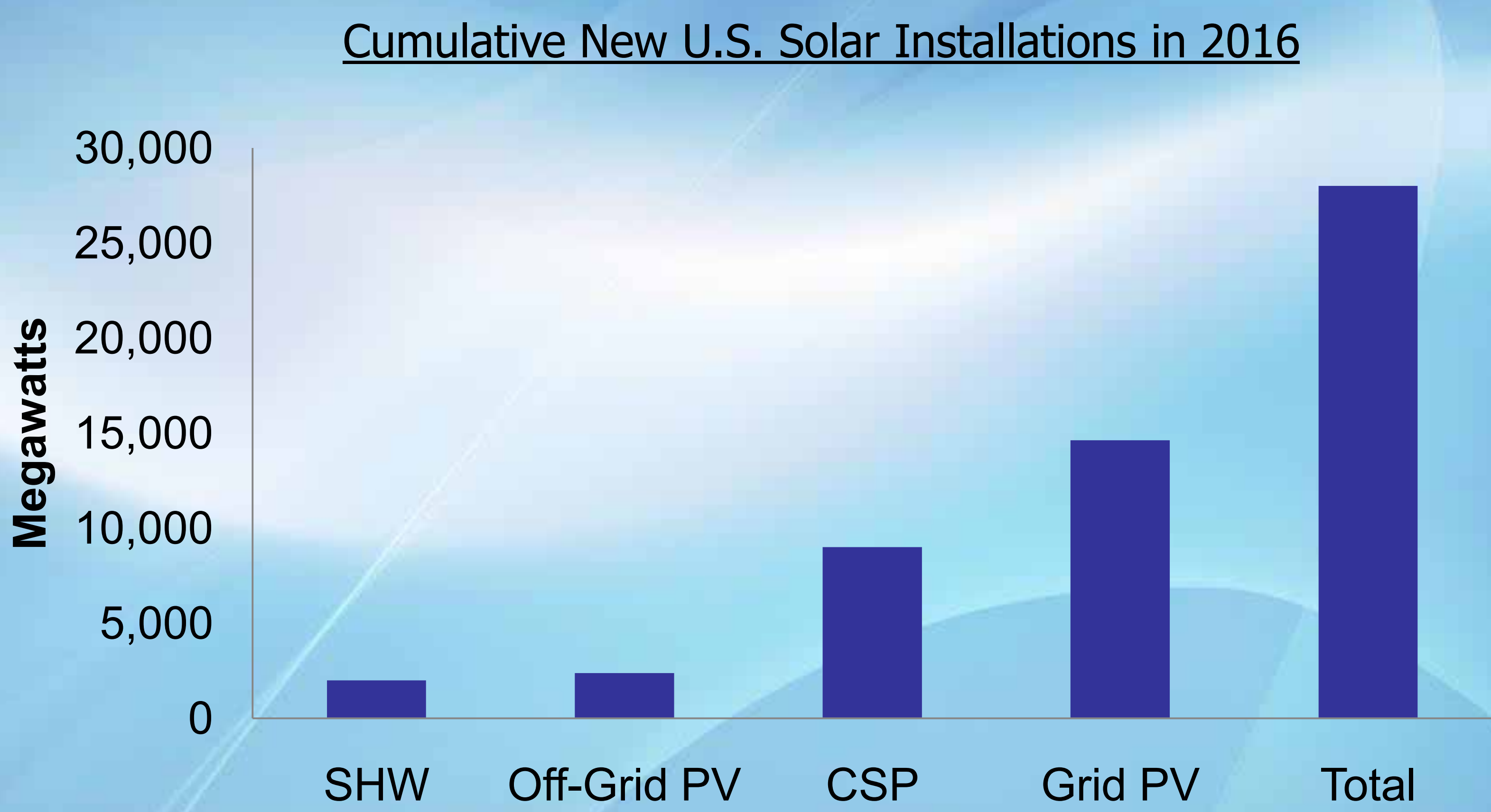

(approximations)

Source: Navigant Consulting

Utility PV Project Announcements

Utility	Type	Site	MW	Timeframe
Duke Energy - NC	Centralized PV	TBD	21.5	end of 2010
Duke Energy - OH	Centralized PV	TBD	12.35	2012
Florida Power & Light	Centralized PV	Utility	25	2009
Florida Power & Light	Centralized PV	Utility	10	2010
Sempra Generation	Centralized PV	Developer	10	end of 2008
FL Municipal Power Auth.	Centralized PV	TBD	10	end of 2009
Xcel Energy	Centralized PV	Developer	8	2007
Nevada Power	Centralized PV	Customer	14	2007
CPS Energy	Centralized PV	Developer	100	end of 2010
Arizona Public Service	Centralized PV	Customer	125	2009-2013
Pacific Gas & Electric	Centralized PV	Developer	550	2011-2013
Pacific Gas & Electric	Centralized PV	Developer	250	2010-2012
Pacific Gas & Electric	Centralized PV	Utility	5	2009
Pacific Gas & Electric	Centralized PV	Utility	2	2009
Portland General Electric	Centralized PV	Government	0.104	2009
Southern California Edison	Distributed PV	Customer	250	2008-2012
Duke Energy - NC	Distributed PV	Customer	20	TBD
Long Island Power	Distributed PV	Customer	50	2009-2011
San Diego Gas & Electric	Distributed PV	Customer	80	TBD
Total			**1543**	

CSP Announcements

	MW	State	Technology	Date	Notes
SEGS	**354**	**CA**	**Trough**	**80's & 90's**	**9 phases**
Saguaro	**1**	**AZ**	**Trough**	**2006**	
NV Solar 1	**64**	**NV**	**Trough**	**2007**	
SCE	500	CA	Sterling	2012	350 MW expansion
SDG&E	300	CA	Sterling	2012	500 MW expansion
PG&E	554	CA	Trough	2011	
PG&E	500	CA	Tower	2010	
PG&E	177	CA	CLFR	2010	
APS	280	AZ	Trough	2011	
SW CSP	250	AZ	TBD	TBD	APS et al.
NM CSP	50+	NM	TBD	TBD	PNM et al.
FPL	300	CA/FL	CLFR	TBD	10 MW (FL)
Total	**419** / 2911				

Bold - installed

Source: Morse Associates, SEPA, EPRI

Thank you!

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