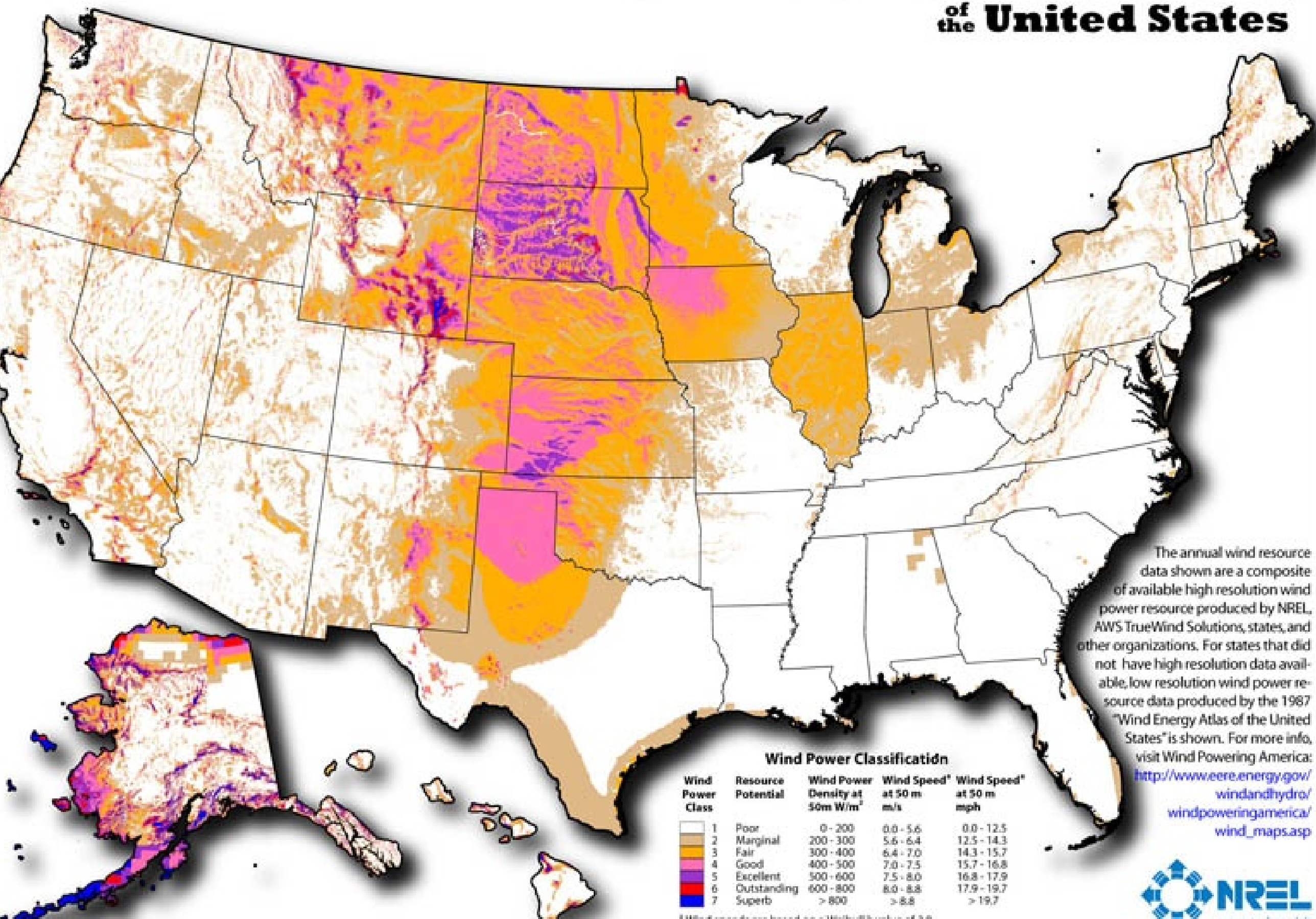
Asia-Pacific Energy Regulators Forum

August 2, 2012

Washington, D.C.

Wind Resource (50m)
of the United States



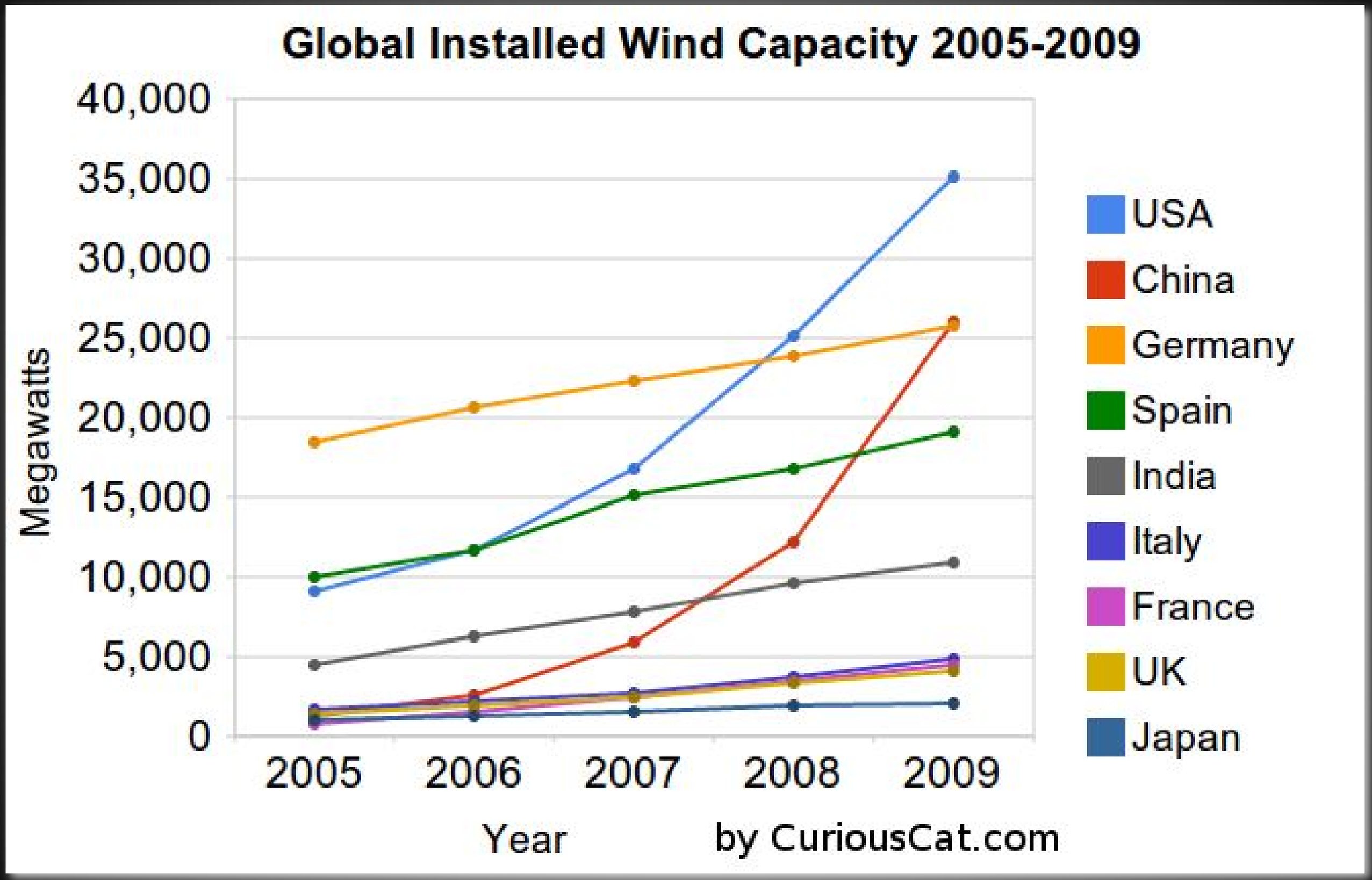
The annual wind resource data shown are a composite of available high resolution wind power resource produced by NREL, AWS TrueWind Solutions, states, and other organizations. For states that did not have high resolution data available, low resolution wind power resource data produced by the 1987 "Wind Energy Atlas of the United States" is shown. For more info, visit Wind Powering America: http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_maps.asp

Wind Power Classification

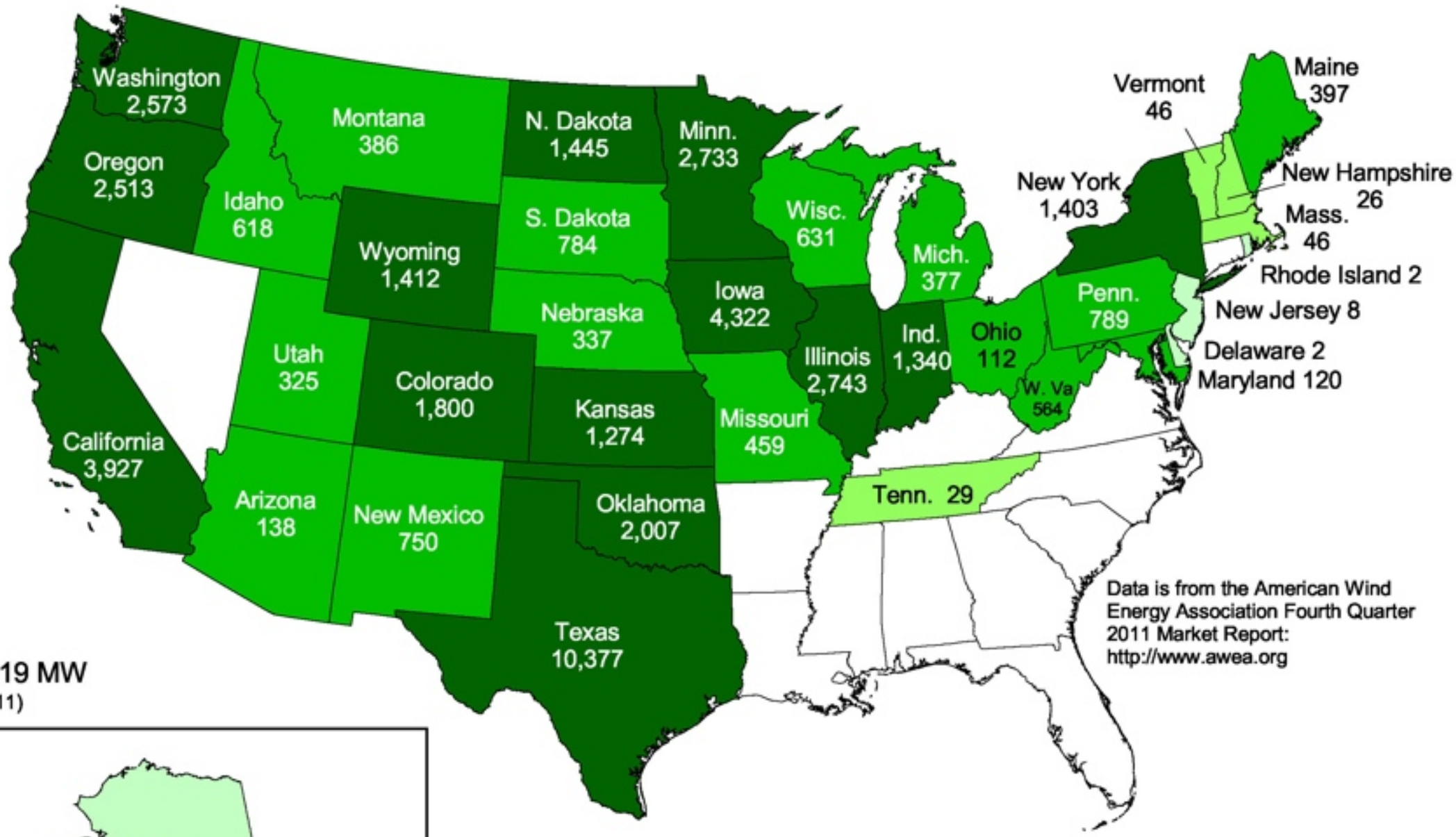
Wind Power Class	Resource Potential	Wind Power Density at 50m W/m²	Wind Speed* at 50 m m/s	Wind Speed* at 50 m mph
1	Poor	0 - 200	0.0 - 5.6	0.0 - 12.5
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	> 800	> 8.8	> 19.7

* Wind speeds are based on a Weibull k value of 2.0

NREL


Global Installed Wind Capacity 2005-2009
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Megawatts
2005
2006
2007
2008
2009
Year
by CuriousCat.com
USA
China
Germany
Spain
India
Italy
France
UK
Japan

2011 Year End Wind Power Capacity (MW)



Total: 46,919 MW
(As of 12/31/2011)

Data is from the American Wind Energy Association Fourth Quarter 2011 Market Report: http://www.awea.org

U.S. Department of Energy

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

28-FEB-2012 1.1.36

Total Installed Wind System Prices and Costs of Electricity (US)

Year	LCOE Range (cents/kwh)
2002-2003	$.038 to $.058
2009-2010	$.058 to $.075
2012-2013	$.036 to $.042
2011	47000 MW

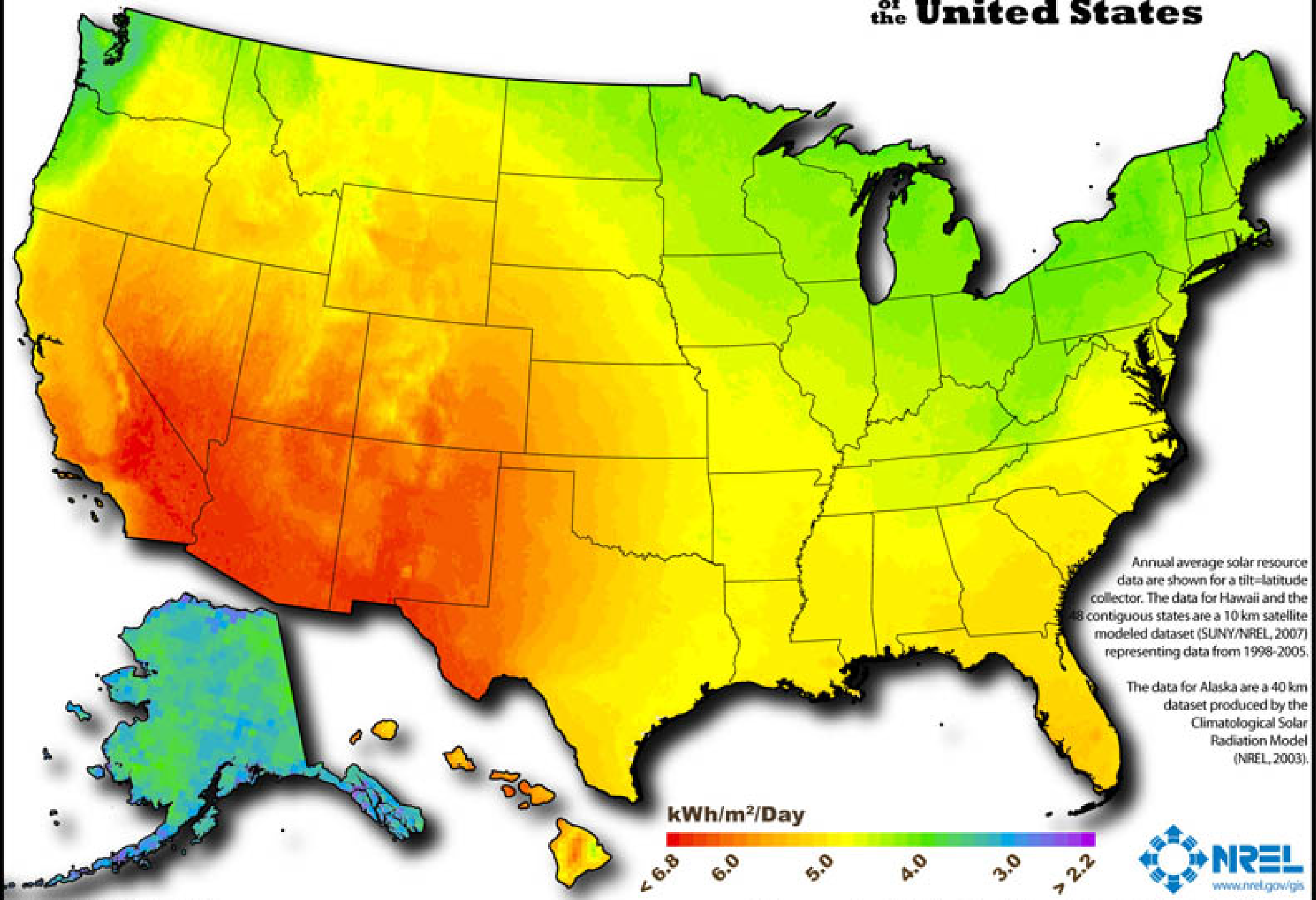
Source: NREL Wind Energy Report 2012

Integrated Solution Strategies for Coordinated Wind Power and Grid Development

- International Experience and China Practices

State Grid Energy Research Institute
Vestas Wind Technology (China) Co., Ltd

Photovoltaic Solar Resource of the United States



Annual average solar resource data are shown for a tilt=latitude collector. The data for Hawaii and the 48 contiguous states are a 10 km satellite modeled dataset (SUNY/NREL, 2007) representing data from 1998-2005.

The data for Alaska are a 40 km dataset produced by the Climatological Solar Radiation Model (NREL, 2003).

Author : Billy Roberts - October 20, 2008

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy.

Total Installed PV System Prices and Costs of Electricity (Global Avg)

Year	System Price ($/w)	LCOE Range (cents/kwh)
2007	$7.20	28 - 47
2008	$7.00	27 - 45
2009	$5.12	20 - 34
2010	$4.55	18 - 30
2011	$3.47	14 - 23
2012*	$2.69	11 - 19
2013*	$2.43	10 - 17
2014*	$2.19	9 - 15
2015*	$2.02	8 - 14
2016*	$1.87	7 - 14
2017*	$1.73	7 - 13
2018*	$1.60	6 - 12
2019*	$1.48	6 - 11
2020*	$1.37	6 - 10
2021*	$1.28	5 - 10

LCOE – Levelized Cost of Electricity

Source: Clean Edge, Inc. 2012 (*estimated)

U.S. SOLAR INDUSTRY INDICATORS
FOR THE FIRST QUARTER OF 2011

SOLAR SYSTEM PRICE
-15%
(VS. Q1 2010)

NEW SOLAR PV INSTALLATIONS
+66%
Q1 2010
Q1 2011

INSTALLED SOLAR
2.85GW ENOUGH TO POWER 570,000 CUMULATIVE TYPICAL HOMES

UNDER CONSTRUCTION
1.1GW CONCENTRATING SOLAR POWER

ENOUGH TO POWER 220,000 TYPICAL HOMES

TOTAL GROWTH
OF U.S. SOLAR MARKET FROM '09–'10
(BY REVENUE)
67%

100,000 U.S. SOLAR INDUSTRY JOBS
MORE JOBS THAN U.S. STEEL PRODUCTION

(ACCORDING TO SOLAR ENERGY INDUSTRIES ASSOCIATION; BUREAU OF LABOR STATISICS)

MANUFACTURING GROWTH
(YEAR-OVER-YEAR; THE FEDERAL RESERVE)

<4%
U.S. ECONOMY

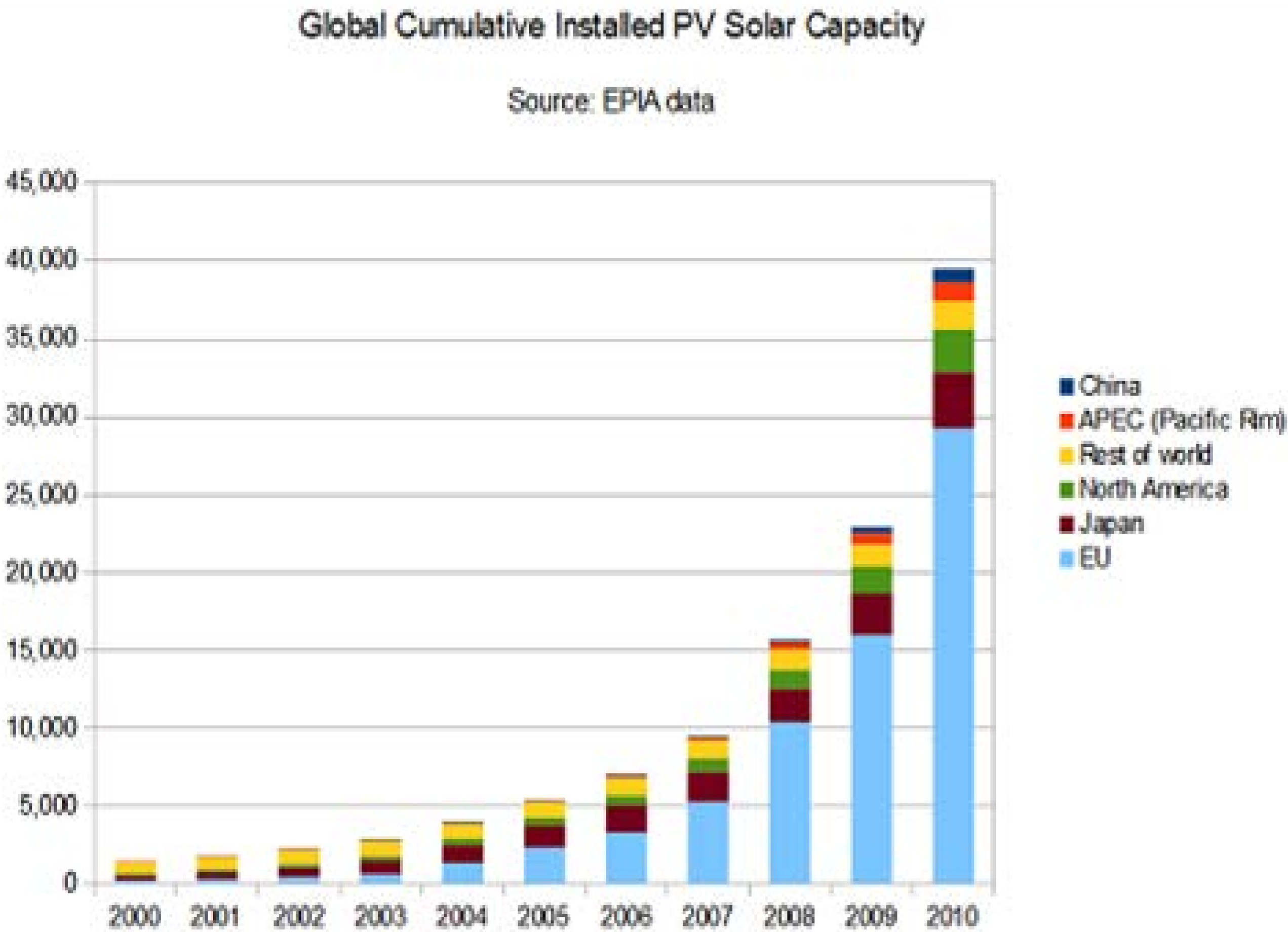
31%
SOLAR

TOP 10 SOLAR STATES

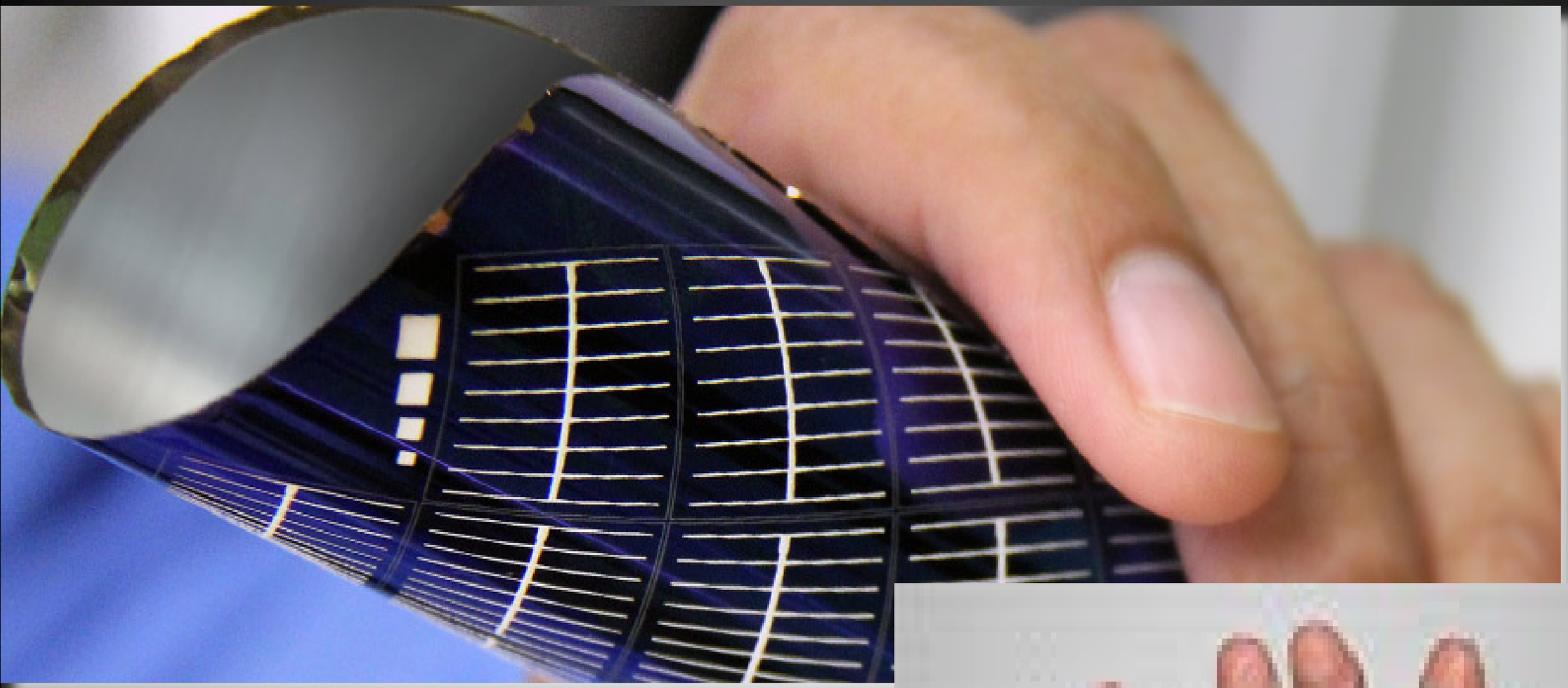
	Q1 2011	Q1 2010	CHANGE IN RANK
CA	1	1	–
NJ	2	2	–
AZ	3	3	–
PA	4	8	▲4
CO	5	5	–
NY	6	7	▲1
MA	7	9	▲2
MD	8	16	▲8
OR	9	13	▲4
TX	10	15	▲5

greentechmedia: SEIA Solar Energy Industries Association®

Q1 2011 vs. Q1 2010


Global Cumulative Installed PV Solar Capacity
Source: EPIA data
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
China
APEC (Pacific Rim)
Rest of world
North America
Japan
EU

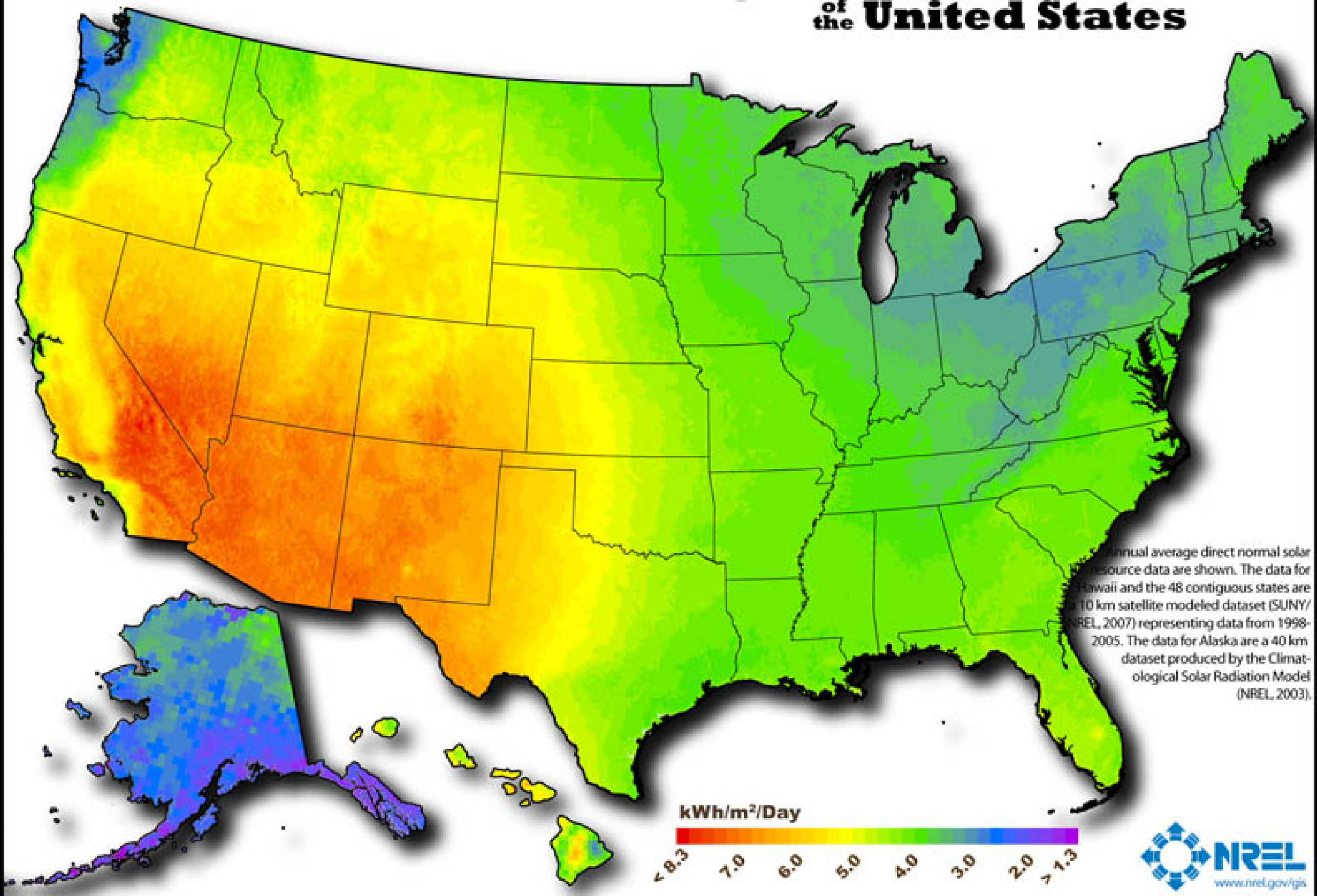
Source: NREL



Source: AirForce Times

Source: CleanTechnica

Concentrating Solar Resource of the United States



Annual average direct normal solar resource data are shown. The data for Hawaii and the 48 contiguous states are a 10 km satellite modeled dataset (SUNY/NREL, 2007) representing data from 1998-2005. The data for Alaska are a 40 km dataset produced by the Climatological Solar Radiation Model (NREL, 2003).

Author : Billy Roberts - October 20, 2008

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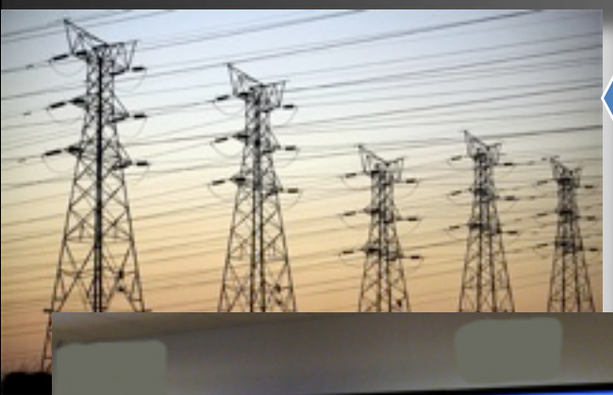
Source: BrightSource Energy

Doppler