

The Appraisal of Renewable Energy Facilities



Joseph Kettell, ASA
Appraisal Economics Inc.



Phone +1 201 265 3333

JKettell@ae-us.com

www.ae-us.com

Presentation Overview - Solar and Wind Energy

Technology Mix for U.S. Electric Generating Plants

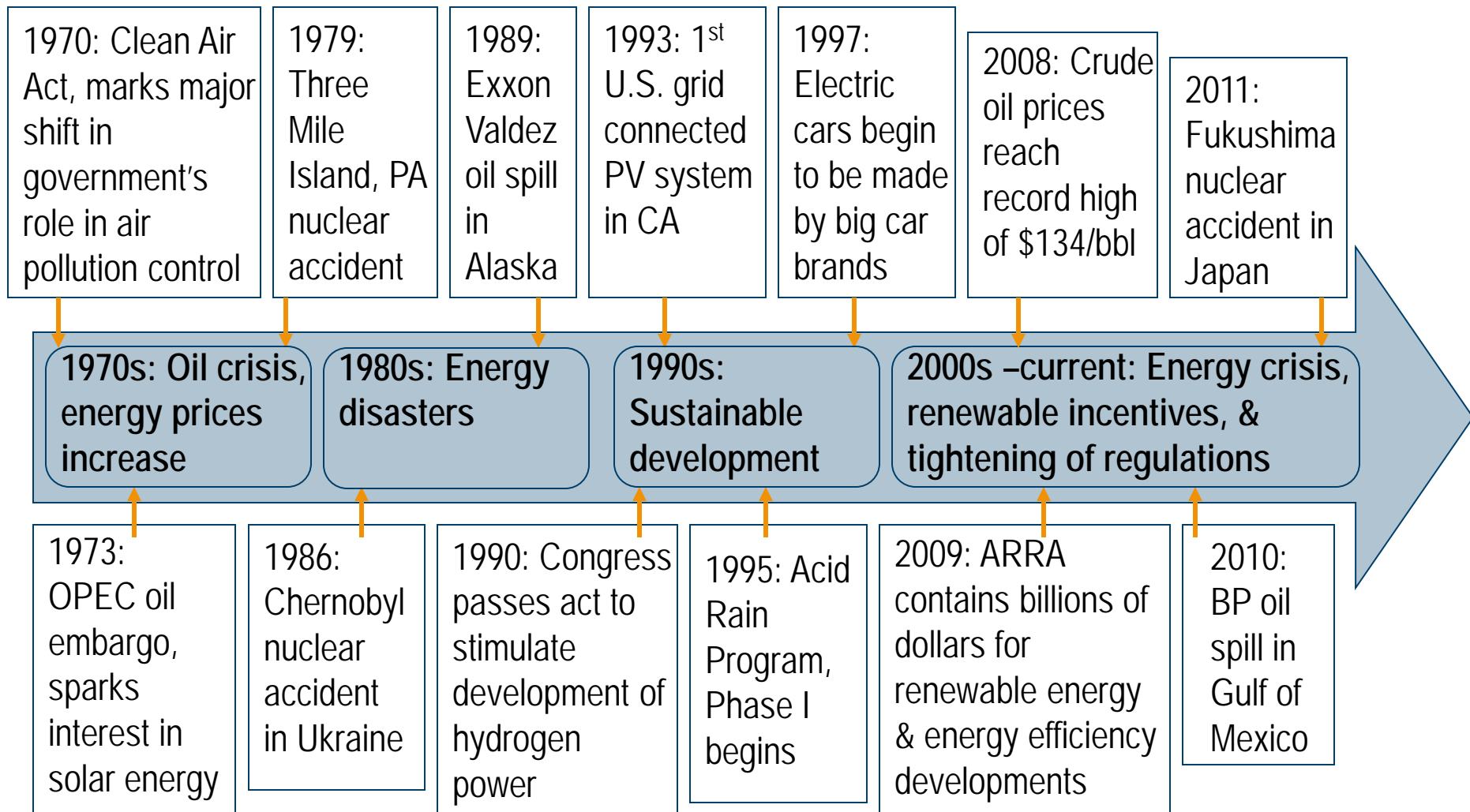
Federal Government Incentives

State Government Incentives

U.S. Solar Development and Appraisal Process

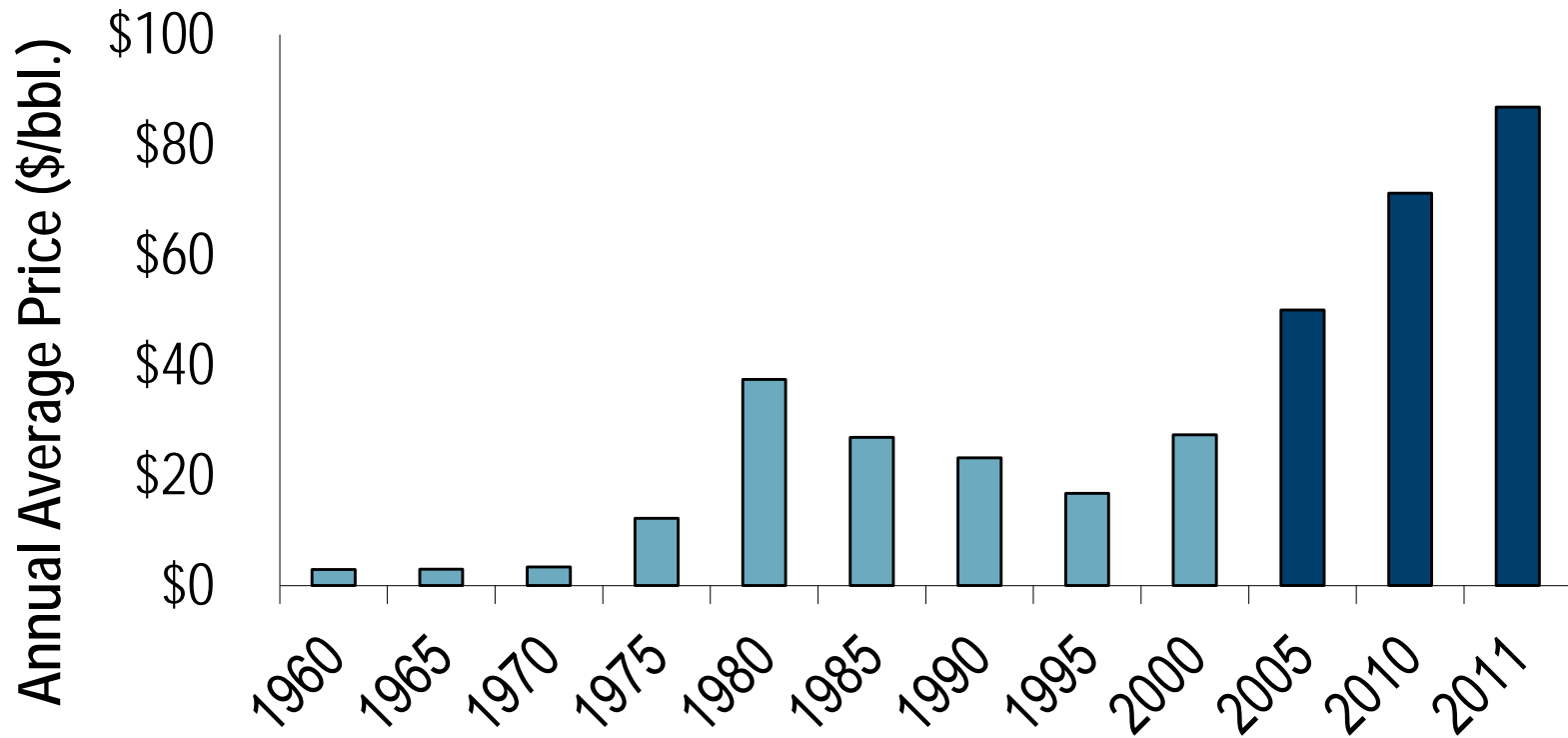
U.S. Wind Development and Appraisal Process

Events that Shaped Today's Thinking about Renewable Energy

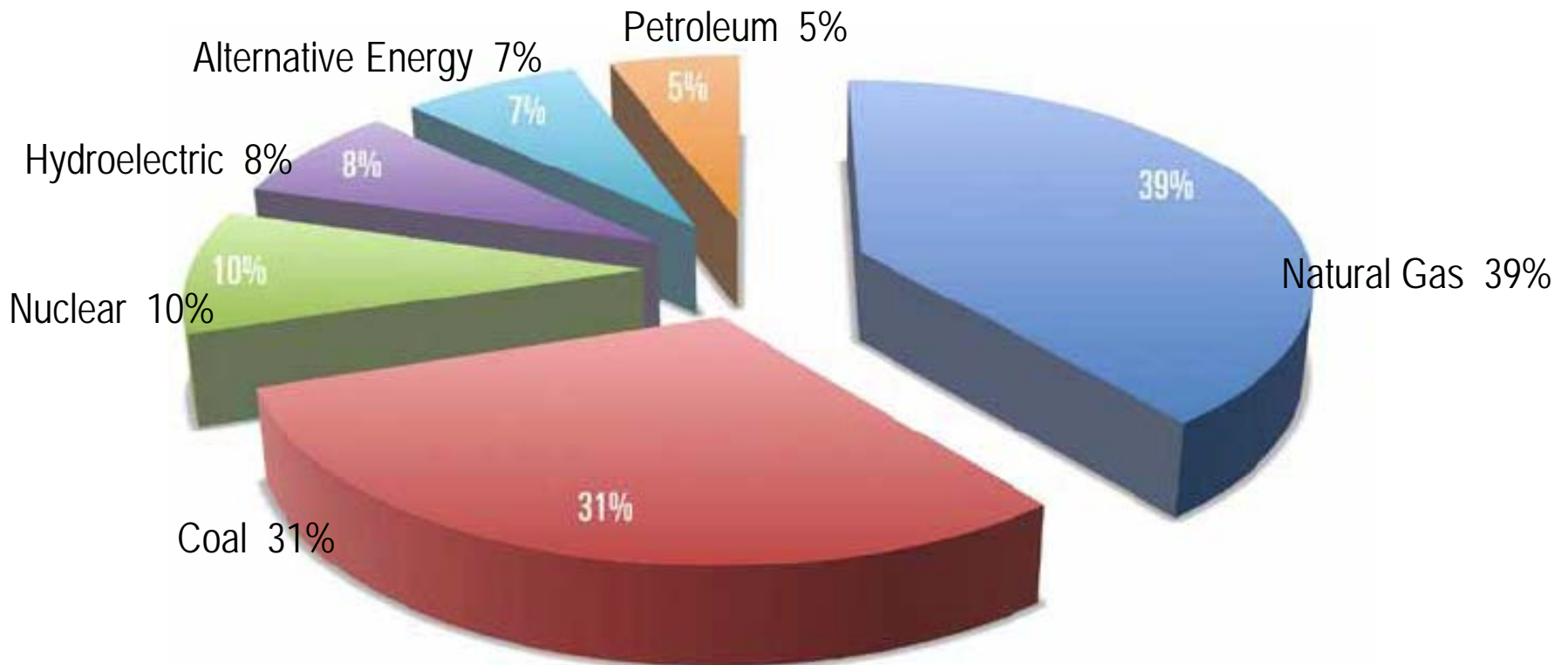


U.S. Crude Oil Prices Over the Past 50 Years

Annual average prices, 1960 - 2011



Megawatts of U.S. Capacity by Type of Fuel

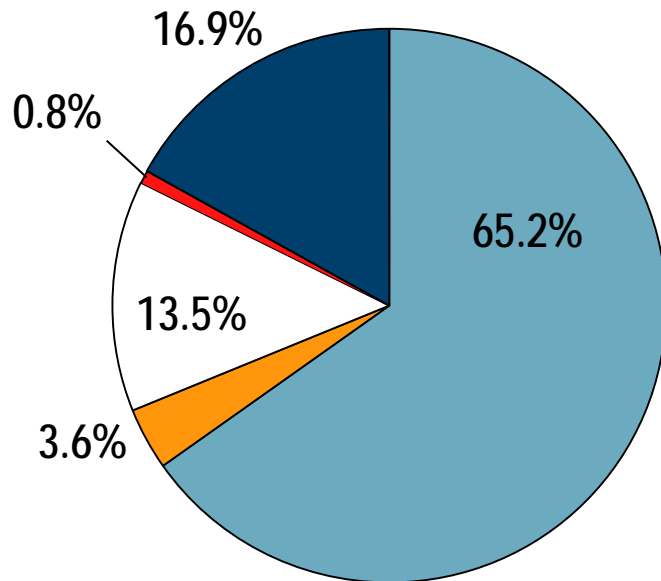


NOTE: FIGURES ARE EXPRESSED AS MEGAWATTS

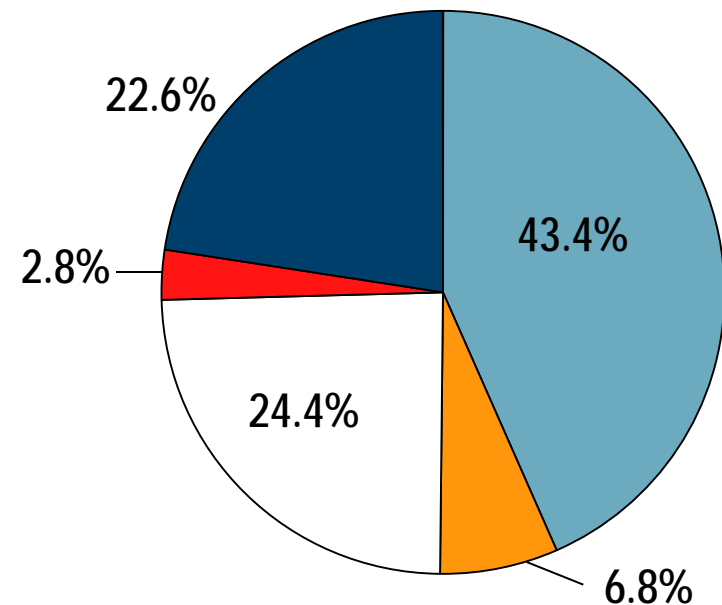
SOURCE: US ENERGY INFORMATION ADMINISTRATION'S ELECTRIC POWER ANNUAL 2010, RELEASED NOVEMBER 2011

Considerable Growth in Domestic Renewable Energy (non fossil and non nuclear)

~420 billion kWh of renewable energy generation in the U.S., 2009



~724 billion kWh of renewable energy generation in the U.S., 2025

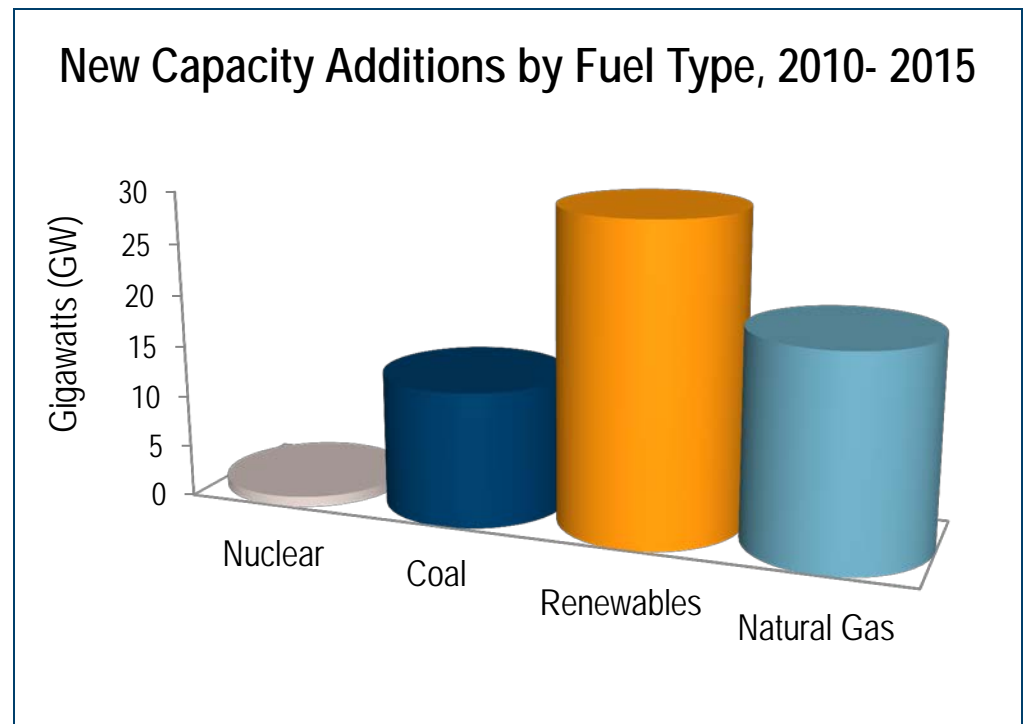


■ Hydropower ■ Geothermal □ Biomass ■ Solar ■ Wind

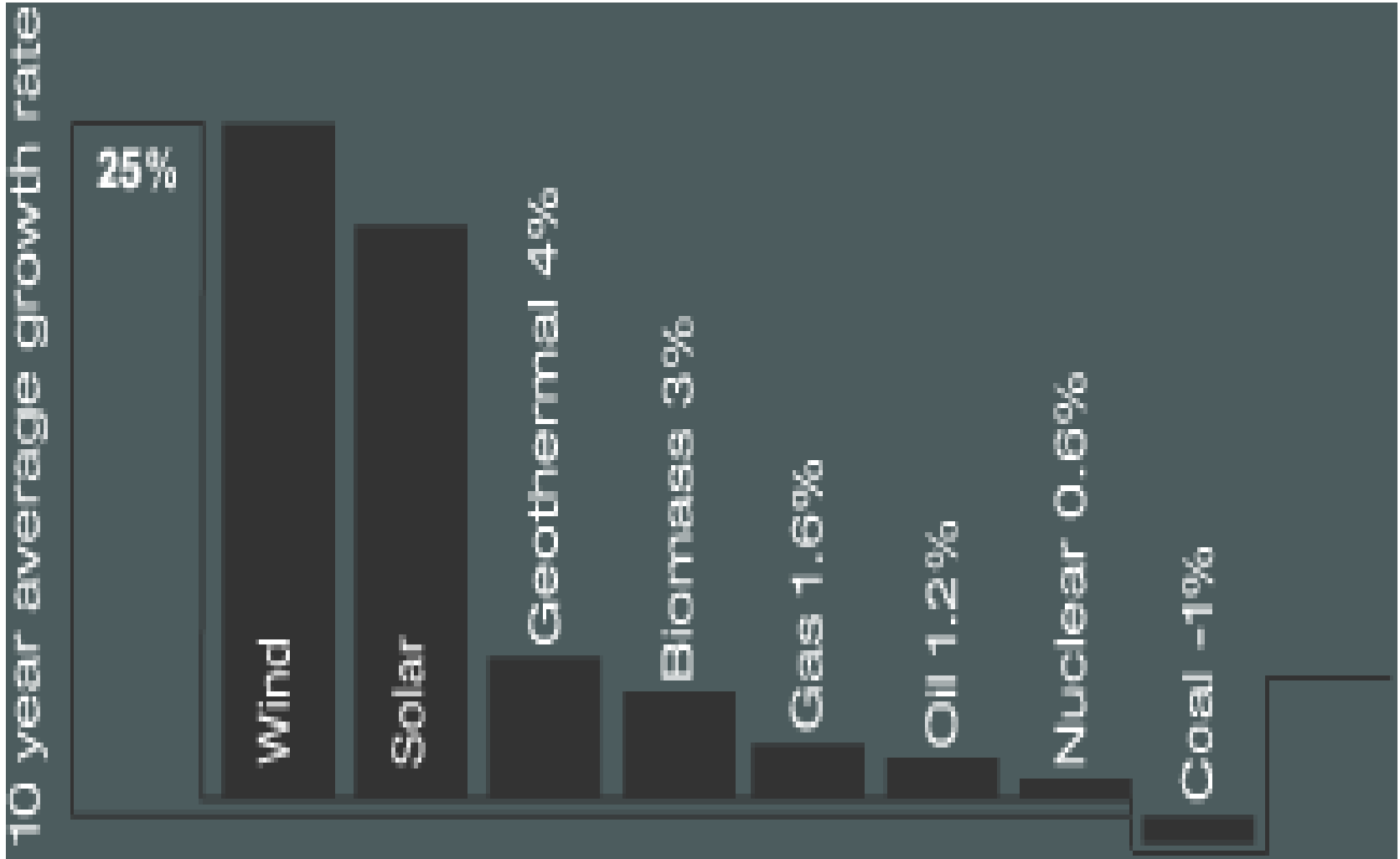
Renewable Energy Facilities will be a Large Part of New Construction

- Environmental concerns play a large role in forecasting new capacity additions
- New coal-fired plants estimated to decline as a fraction of new capacity additions due to concerns over CO₂ emissions and coal ash disposal

In January 2010, there were 22 coal projects either permitted, near construction or under construction, however by year-end, 10 projects had been cancelled. Many of the remaining projects were cancelled in 2011

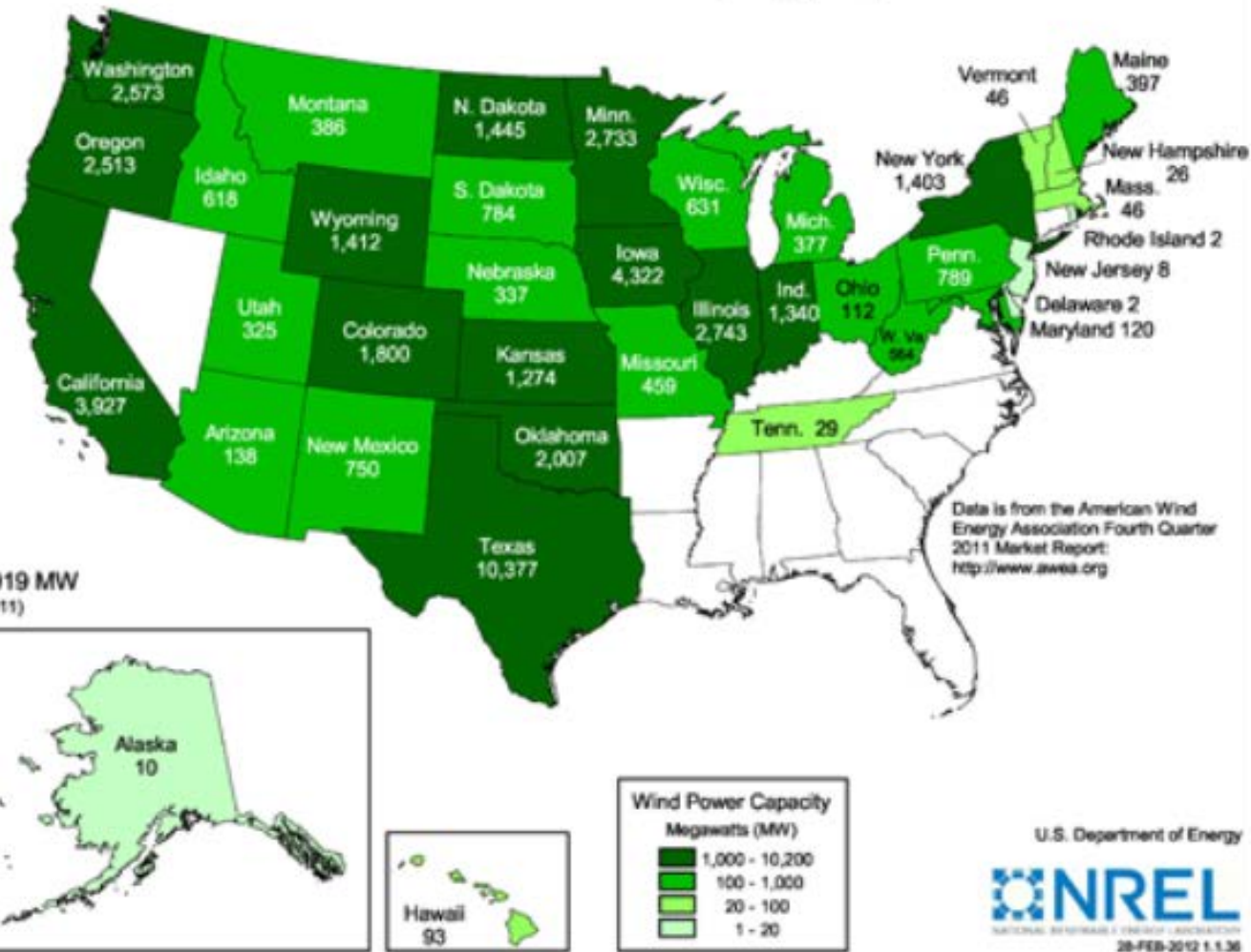


Wind is Currently the World's Fastest Growing Energy Source



Megawatts of U.S. Wind Capacity

2011 Year End Wind Power Capacity (MW)



Year End	U.S. Wind Capacity MW
2005	9,147
2006	11,575
2007	16,907
2008	24,410
2009	34,863
2010	40,267
2011	46,919

U.S. Capacity from all sources, about 1,000,000 MW

Wind Power has Potential in New England

VT: 46 MW of wind power currently online

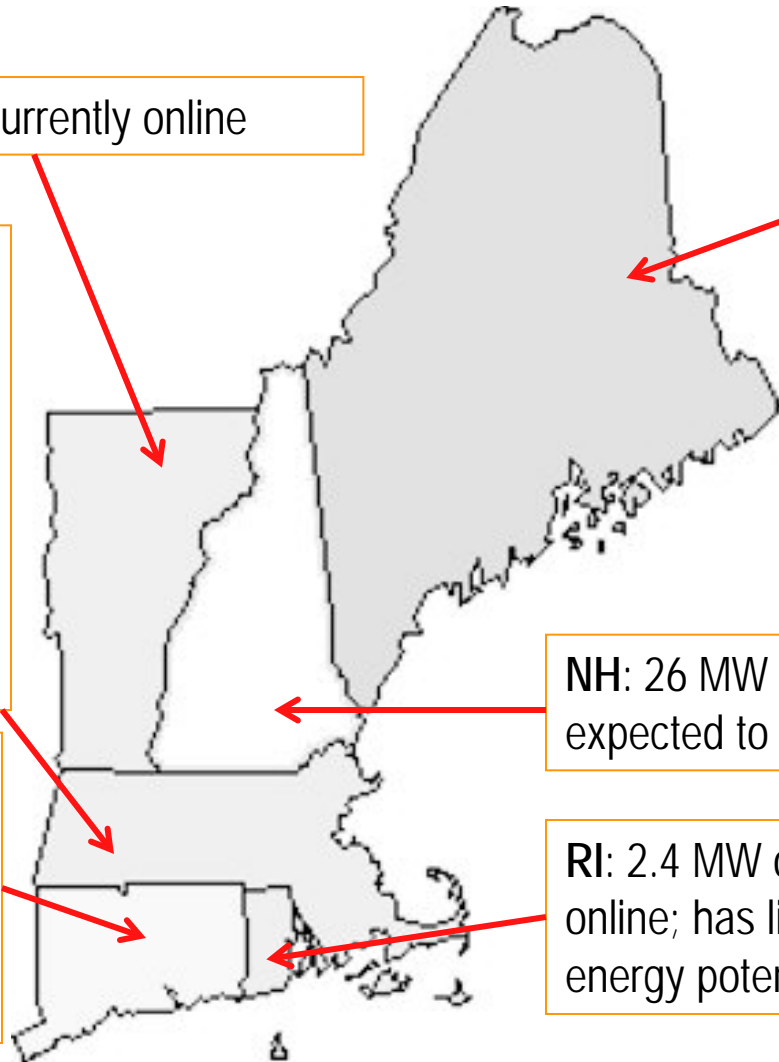
MA: 46 MW of wind power currently online; has significant offshore resources (CAPE WIND) and onshore wind that could provide ~6% of state's current electricity needs

CT: 1st utility scale wind project started construction in Q4 2011; the 4.8 MW project to be operational in 2012

ME: 397 MW of wind power currently online, with 1,398 MW of projects in queue; has significant onshore resources that could provide ~300% of state's current electricity needs

NH: 26 MW of wind power online; expected to grow 5-fold in 2012

RI: 2.4 MW of wind power currently online; has limited onshore wind energy potential

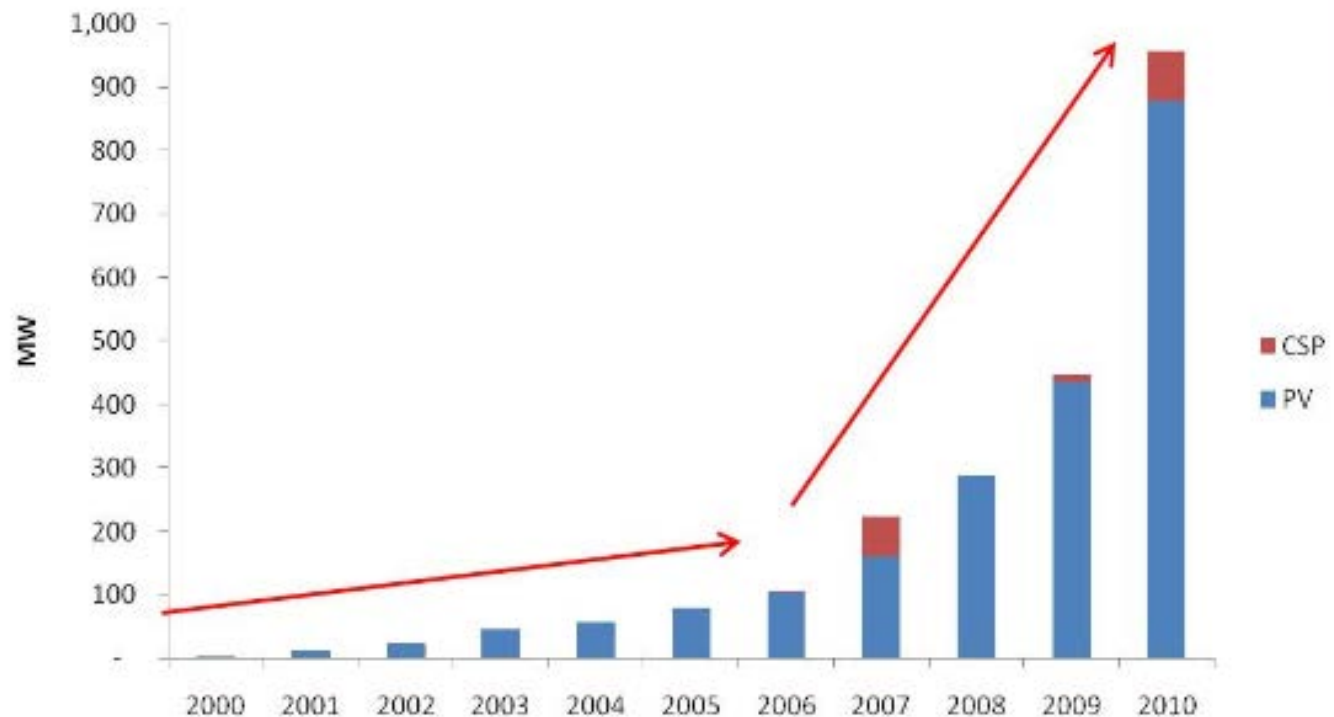


Global Wind Industry has Three Key Markets

- Europe – 76,000 MW (end of 2009)
 - Most manufacturers are based in Europe
- North America – 47,000 MW
 - The U.S. is now the largest single market, and all major global companies want to participate
- Asia – 39,000 MW
 - Chinese market is growing the most quickly, and is establishing a strong manufacturing base

Annual U.S. Solar Energy Installations

In 2011, 1,800 MW were installed in the U.S., almost doubling installed capacity to 4,500 MW (about 0.5% of total U.S. electricity production).



California and New Jersey on Top for Solar Installations

- Both states have aggressive policies and incentives in place to encourage renewable energy

Total PV System Installations To Date

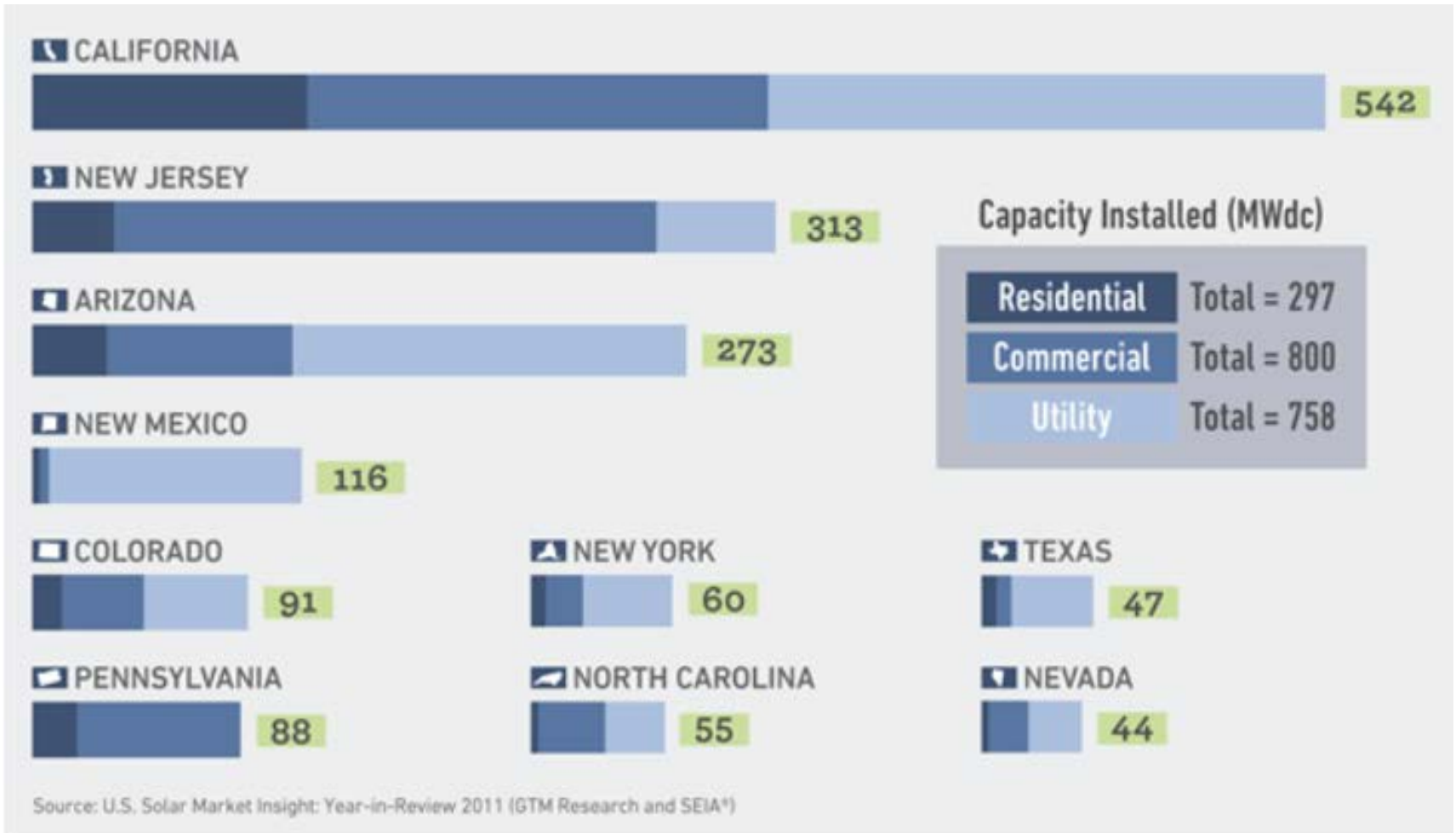
	Total Systems Installed	Total MW
California	113,368	1,181.0
New Jersey	14,529	689.1

- In 2011, the U.S. installed 1,855 MW of PV systems, representing a 109% growth over 2010

2011 PV System Installations

Top States	MW Installed
CA	542
NJ	313
AZ	273
NM	116
CO	91
PA	88
NY	60
NC	55
TX	47
NV	44
Rest of US	226
Total	1,855

State Solar Capacity Additions by Market Segment (2011)



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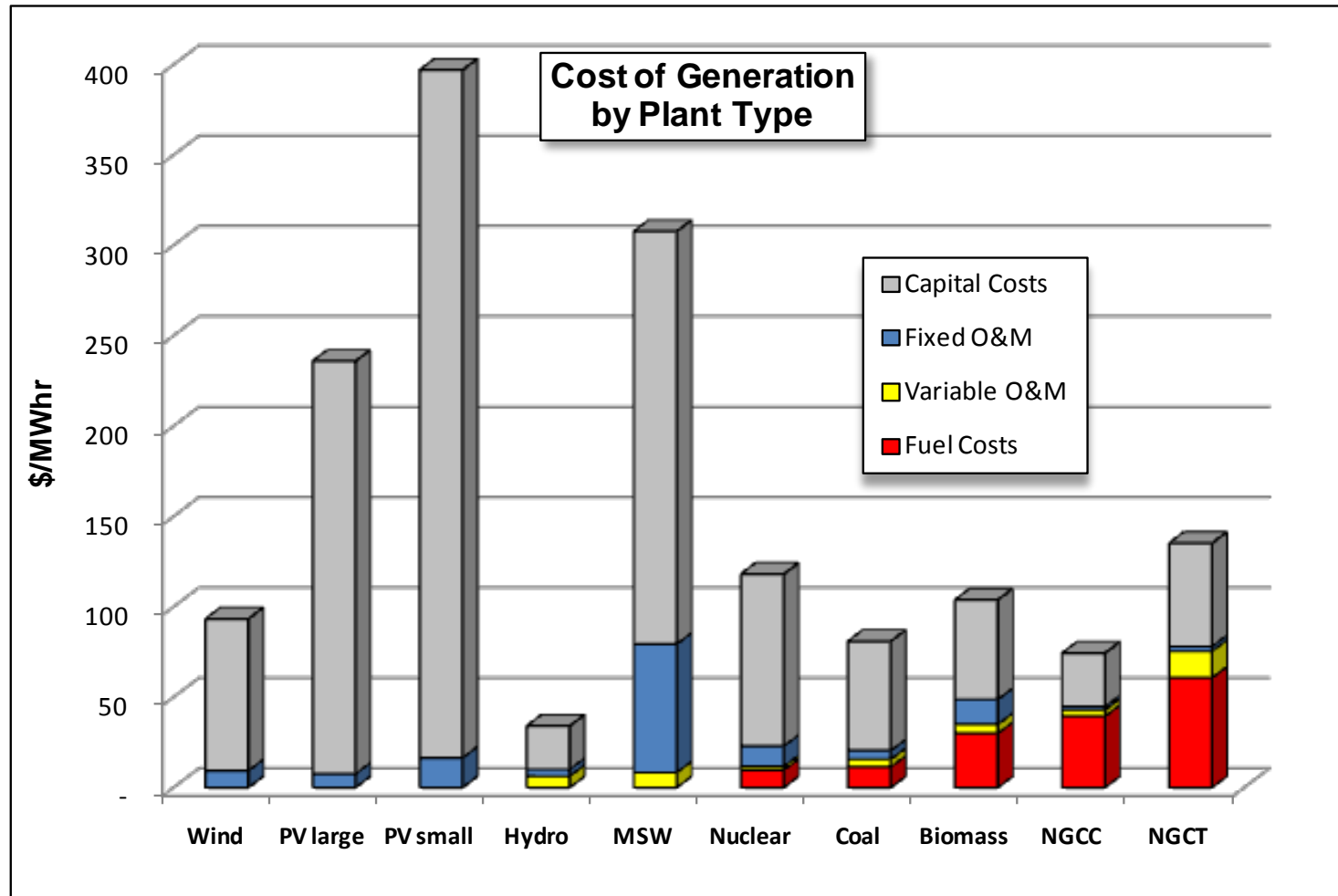
Federal Government Incentives

State Government Incentives

U.S. Solar Development and Appraisal Process

U.S. Wind Development and Appraisal Process

Why Do We Need Government Incentives ?



Federal Incentives for Wind and Solar Projects are Different

The principal federal incentive for developing and installing solar power and small wind turbines (under 100KW) is the investment tax credit (ITC) designated as the energy tax credit (ETC) under **Section 48** of the Internal Revenue Code. ITC is extended to 2017.

For large wind turbines, Section 48 does not apply for facilities starting construction after 2010. Production tax credit (PTC) is available equaling \$21 per MWh.

IRC Section 48 Investment Tax Credit (ITC) for Solar and Small Wind Turbines

- The solar ITC is 30% of the cost of the “facility” which is a dollar-for-dollar reduction in federal income tax liability
- The ITC is generally claimed when the solar facility starts up
- ITC is recaptured if facility is sold within first 5 years
- 85% of solar facility cost is depreciated over 5 years using modified MACRS

Wind Power Production Tax Credit (PTC)

- Lowers price of electricity to make it more accessible to developers
- Currently provides credit of 2.1¢ per kWh
- PTC will expire end of 2012 if not extended by Congress
- Industry needs long-term extension of PTC to encourage additional wind investment

Five Year MACRS Depreciation Table

Year	Depreciation Rate
1	20.00%
2	32.00%
3	19.20%
4	11.52%
5	11.52%
6	5.76%



Source: IRS Publication 946, Table A-1

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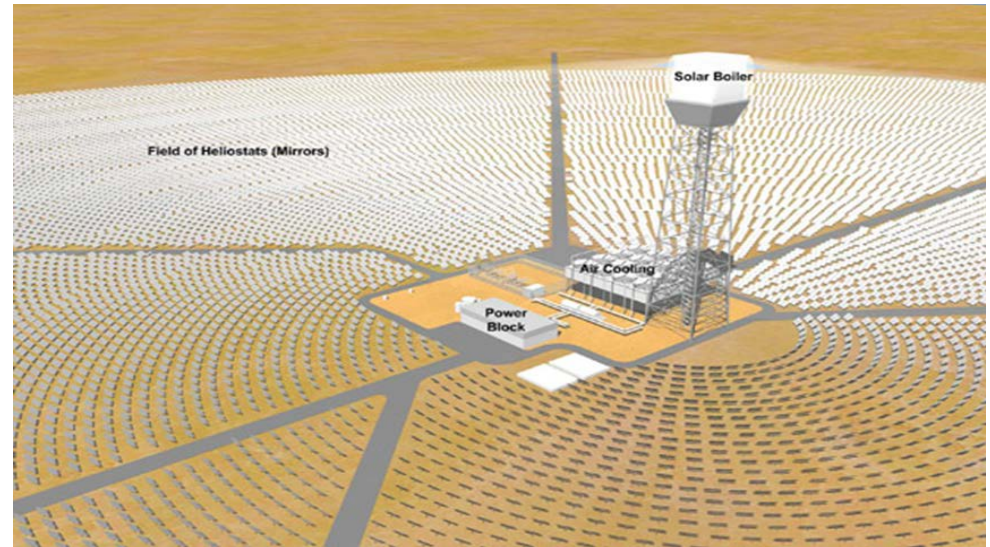
State Government Incentives

U.S. Solar Development and Appraisal Process

U.S. Wind Development and Appraisal Process

Renewable Portfolio Standard (RPS)

- The 1999-2000 federal government mandate provided the states with a mechanism to increase renewable energy generation
- The intent is to stimulate market and technology development so that renewable energy becomes economically competitive with conventional technology
- Goal is to generate about 25% of U.S. electric power from renewable sources by 2025
- State's RPS can *require* electric utilities to supply electricity from renewable energy sources



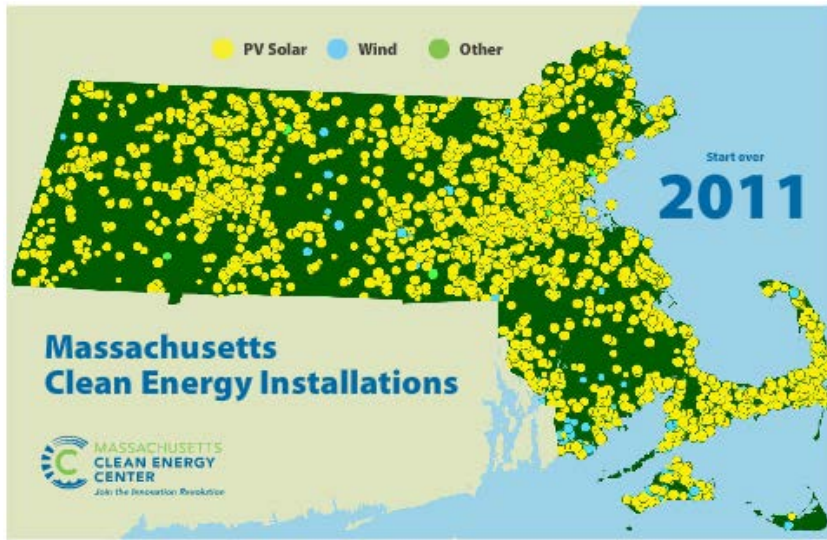
Technology Eligibility Under Renewable Portfolio Standards (RPS)

RPS eligibility varies by state

All states include photovoltaics and wind. Also biofuels, biomass, hydro, and landfill gas, are also eligible in all states



MA has Set Goal of Achieving 15% Renewables by 2020



MW installed in MA as of May 2012

Technology	Total MW
Solar	105
Wind	54

- MA is in top 5 for new solar development
- MA aims to **achieve 400 MW of total installed PV capacity by 2020**
- Clean energy development has been a proven job creator in MA (64,310 employed and growing)
- In an attempt to attract solar business development to the state, the Department of Energy Resources (DOER), through the state's RPS program, created a **Solar Carve Out (SCO) Minimum Standard**
- The SCO assures a robust development curve for PV installations and also maintains a reasonable supply/demand balance

CT has RPS Goal of 23% Renewables by 2020 (Classes I & II)

Overview

- RPS established in 1998
- Requires each electric supplier and each electric distribution company wholesale supplier to obtain at least **23% of its retail load by using renewable energy by January 1, 2020**
- Also requires at least **4% of its retail load by using combined heat and power (CHP) systems and energy efficiency**

Percentages of Renewables Required

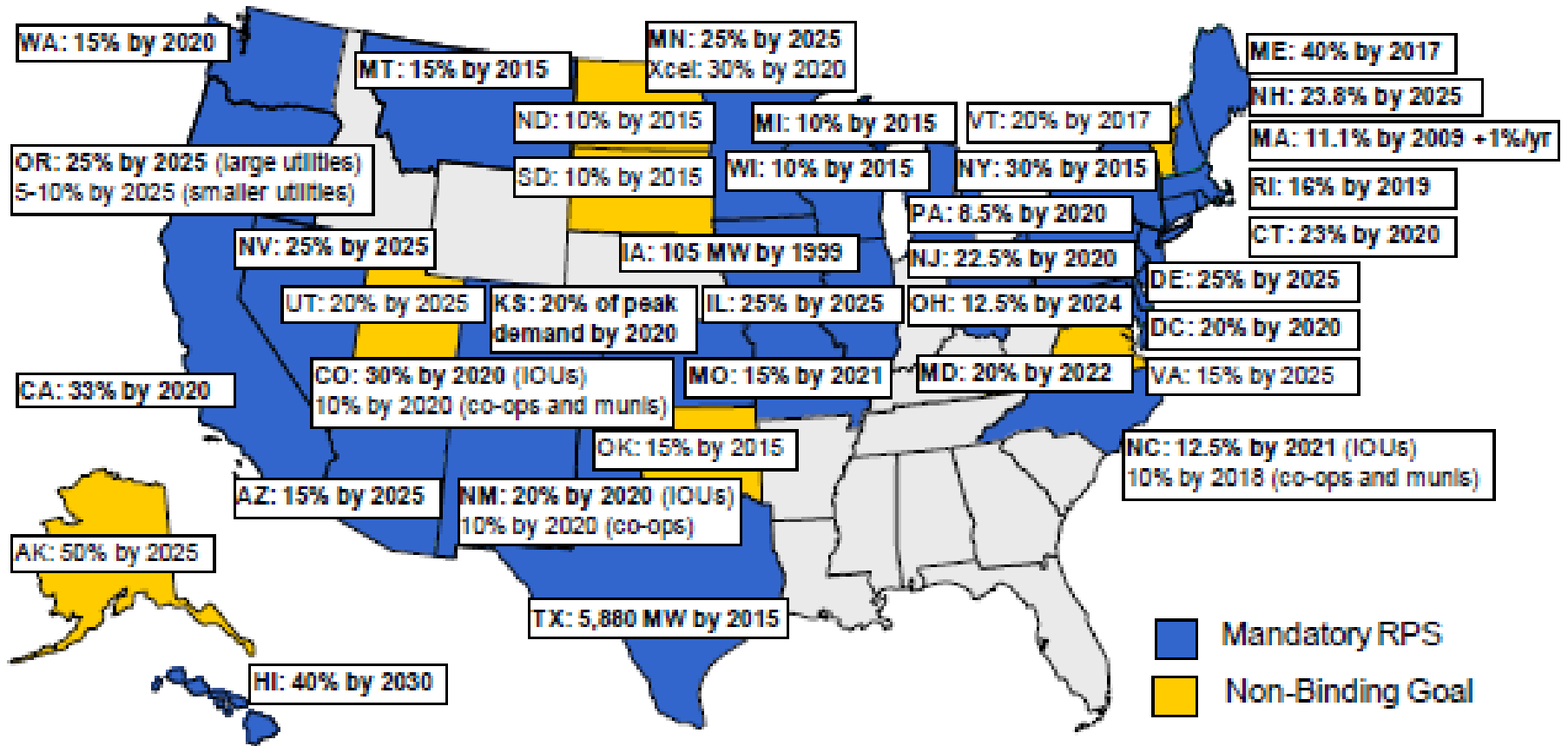
Year	Class I	Class II or	Class III	Total
		Class I (add'l)		
2010	7.0%	3.0%	4.0%	14.0%
2011	8.0%	3.0%	4.0%	15.0%
2012	9.0%	3.0%	4.0%	16.0%
2013	10.0%	3.0%	4.0%	17.0%
2014	11.0%	3.0%	4.0%	18.0%
2015	12.5%	3.0%	4.0%	19.5%
2016	14.0%	3.0%	4.0%	21.0%
2017	15.5%	3.0%	4.0%	22.5%
2018	17.0%	3.0%	4.0%	24.0%
2019	19.5%	3.0%	4.0%	26.5%
2020	20.0%	3.0%	4.0%	27.0%

Class I: **Solar, wind**, fuel cell, ocean thermal, wave/tidal power

Class II: Trash-to-energy, biomass

Class III: CHP

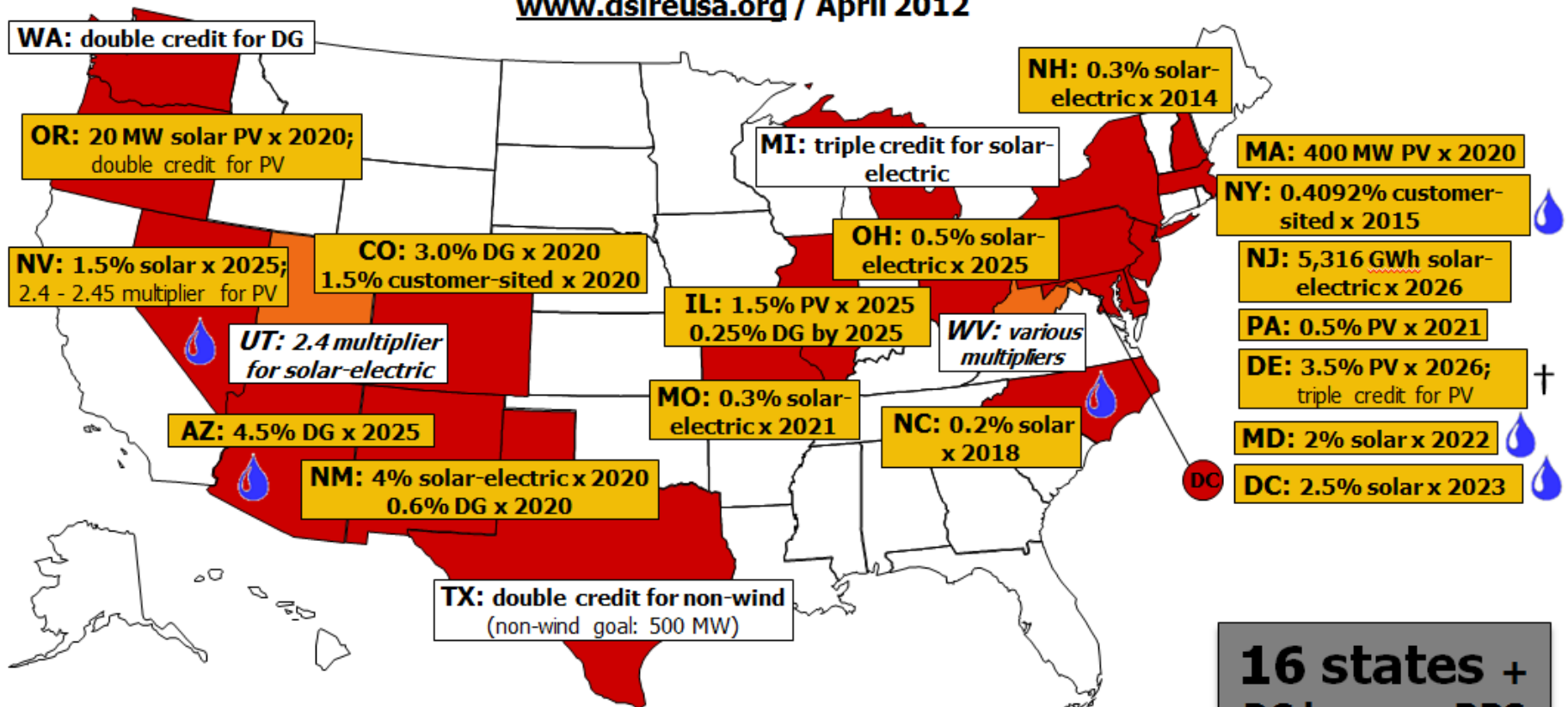
State RPS Policies and Non-Binding Renewable Goals as of June 2011



Source: Berkeley Lab

RPS Policies with Solar Production Requirements

www.dsireusa.org / April 2012



- Renewable portfolio standard with solar / distributed generation (DG) provision
- Renewable portfolio goal with solar / DG provision
- 💧 Solar water heating counts toward solar / DG provision

† Delaware allows certain fuel cell systems to qualify for the PV carve-out

16 states + DC have an RPS with solar/DG provisions

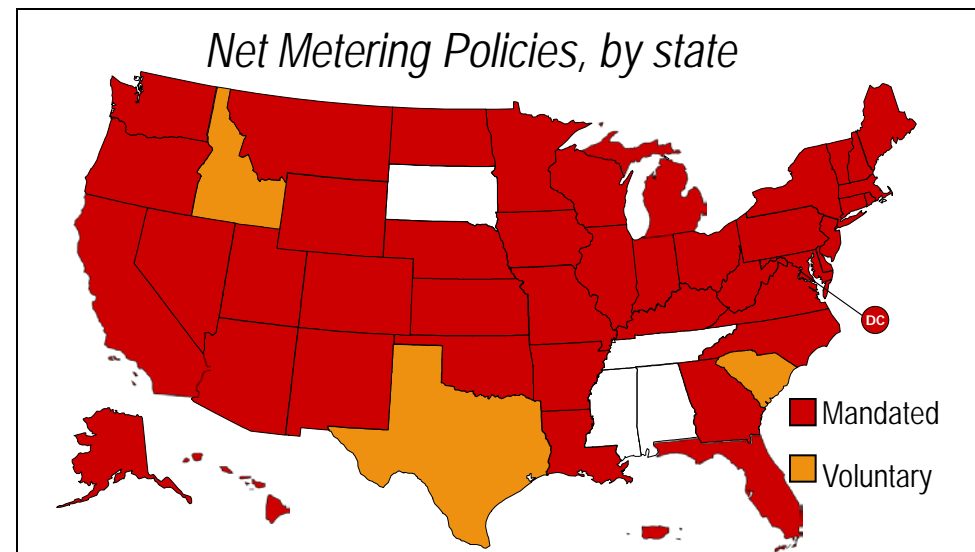
Incentives Vary by State and are Evolving

- Net Metering
- Renewable Energy Certificates (REC)
- Reduced or No Property Tax
- No Sales Tax on Equipment
- State Income Tax Credits
- No Permitting Cost
- Public Benefits Fund and Government Sponsored Loan Programs

Incentives encourage alternative energy by reducing initial equipment costs and providing revenue stream to secure financing

Over 40 States Have Implemented Net Metering Policies

- Net metering allows electric customers who generate solar energy to “bank” excess electricity on the grid, typically in the form of kWh credits
- These **credits offset electricity purchased** when the customer’s solar energy system is not generating enough electricity to meet its needs
- Usually **customers can receive retail rates** for electricity sold to the grid, but in some states electricity that flows back to the grid will obtain a rate lower than retail prices



Net Metering Policies Vary by State

For Example: Net metering in NJ (established in 1999)

- Allows net metering for **systems up to 2 MW** for **all customer types**
- **No company limit** on aggregate net metering capacity
- Any **net excess generation** during a billing period is **carried forward** to the customer's next bill as a full kWh credit (**at the utility's retail rate**)
- At the end of a **12-month period**, the **utility purchases remaining excess electricity** at the utility's avoided cost rate
- **Customers own SRECs (solar renewable energy certificates)** associated with the electricity they generate
- Go to www.DsireUSA.org for detail on each states current incentive programs

MA 2010 Solar Renewable Energy Certificates (SRECs) Carve-Out

- SREC model provides renewable energy credits and additional long-term financing for solar investors
- Acts as an **incentive for solar energy** by providing a production subsidy to electricity generated from solar
- Energy associated with SREC is sold separately and is used by another party
- **Electricity suppliers are the primary purchasers of SRECs** (only receive a certificate, not necessarily the electricity generated from the System) to meet state RPS solar requirement

How MA SRECs work?

- Each time a system generates 1.0 MWh of electricity, an SREC is earned and placed in the customer's electronic account
- SRECs were set at \$600 each in 2010 and can be reduced by 8% per year by Dept. of Energy Resources. In 2011 SREC's were sold at \$550.

The MA Senate Unanimously Passed SB 2214 on April 5, 2012

What this means for renewable energy in MA:

- Preserves a framework for energy efficiency policy
- Expands net metering opportunities
- Opens net metering to anaerobic digestion (a renewable technology that reduces waste going to landfills)
- Extends and expands long term contracting for renewable energy
- Resolves property tax issues for solar projects

Provides energy users with an **incentive to install** renewable generation and the ability to **save on their energy costs**

Reduces financing costs to developers → thereby reducing costs to energy customers

Facilitates residential, commercial and industrial **deployment** of technologies whose costs are declining

What SB 2214 Means for MA Property Taxes

Under **prior MA law**, only a wind or solar system being utilized as an **auxiliary power system** for heating purposes or that is supplying energy to an otherwise taxable property is **exempt** from local property taxes

SB 2214: an act relative to competitively priced electricity in the Commonwealth

- **Expands the existing property tax exemption** to include any Class I renewable generation facility that supplies 50% or more of its output to: (i) the municipality in which the facility is located, or (ii) to the government entity that owns the land on which the facility is located
- Solar or wind powered systems that are capable of producing no more than **125% of the annual power consumption of the host property** and located behind the meter serving the energy needs of the host property would also qualify for exemption (for 20 years)
- Other solar or wind powered systems that do not meet this standard could qualify for exemption if the owner makes a **“payment in lieu of taxes”** to the municipality where the system is located **equal to 5% of its gross electricity sales**, including the receipt of net metering credits

Most Actively Traded Solar Renewable Energy Certificates (SREC)

Sixteen states plus the District of Columbia have passed separate solar carve-outs. The major SREC products traded are the following:

Massachusetts SREC	New Jersey SREC
Ohio, In-State SREC	Ohio, Adjacent-State SREC
Pennsylvania SREC	Delaware SREC
District of Columbia SREC	Maryland SREC



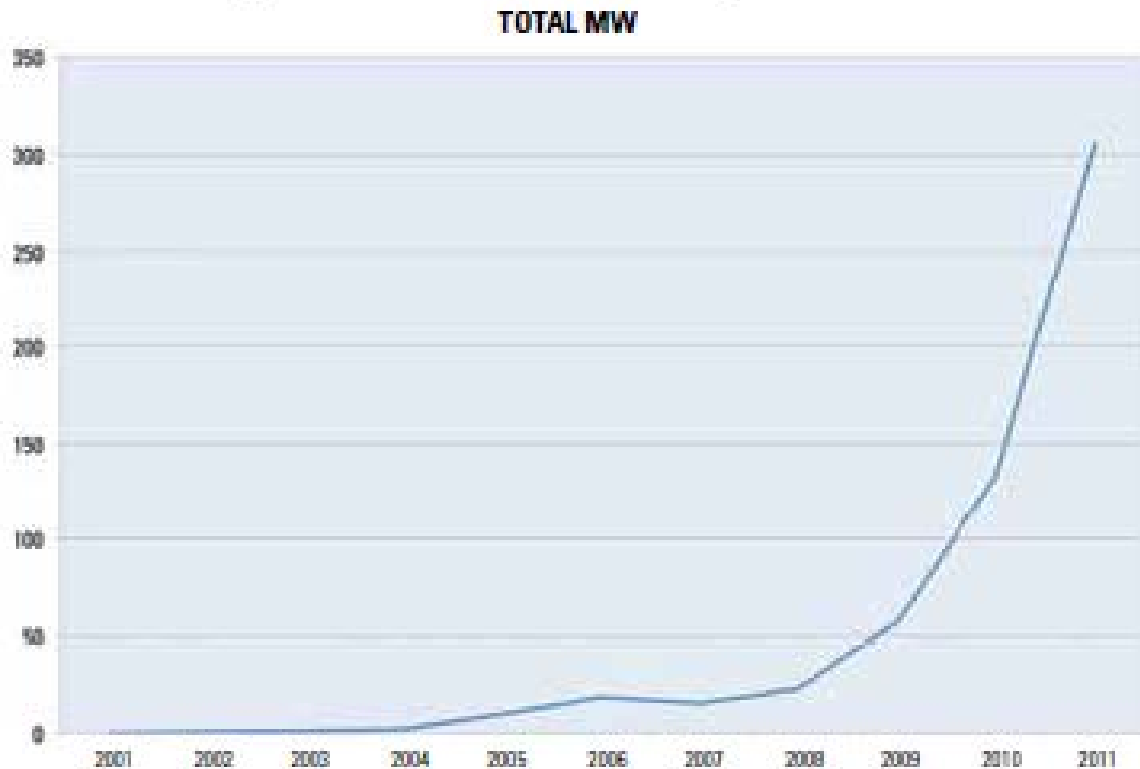
Nellis Solar Power Plant in the United States, one of the largest photovoltaic power plants in North America.

Most Actively Traded Renewable Energy Certificates (REC)



NEW ENGLAND		
Massachusetts Class I	Massachusetts Class II	Connecticut Class I
Connecticut Class II	Connecticut Class III	Maine New
Maine Existing	Rhode Island New	Rhode Island Existing
New Hampshire Class I	New Hampshire Class II	New Hampshire Class III
New Hampshire Class IV		
PJM		
New Jersey Class I	New Jersey Class II	DC Tier I
DC Tier II	Pennsylvania Tier I	Pennsylvania Tier II
Maryland Tier I	Maryland Tier II	Ohio, In-State Non-Solar
Ohio, Adjacent Non-Solar	Delaware New	Delaware Existing

New Jersey Solar Installations By Year



NJ SREC prices, Energy Year 2011

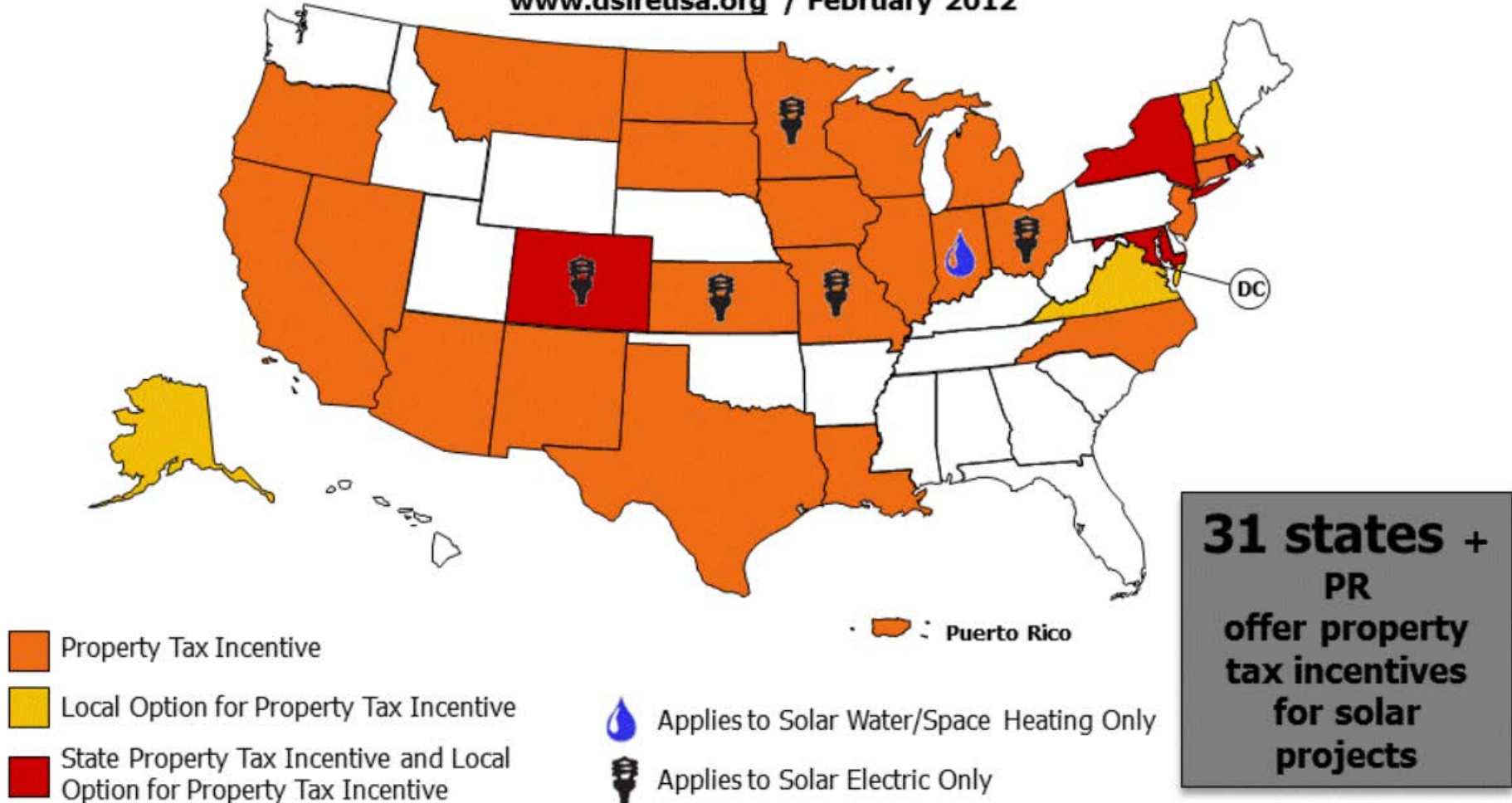
	Monthly High	Monthly Low
Nov-2011	\$675.00	\$170.00
Oct-2011	\$675.00	\$203.00
Sept- 2011	\$693.00	\$140.00

The first compliance year of New Jersey's solar carve-out was 2005. The state used a rebate system before switching to a SREC-based model in 2007.

Source: New Jersey Board of Public Utilities

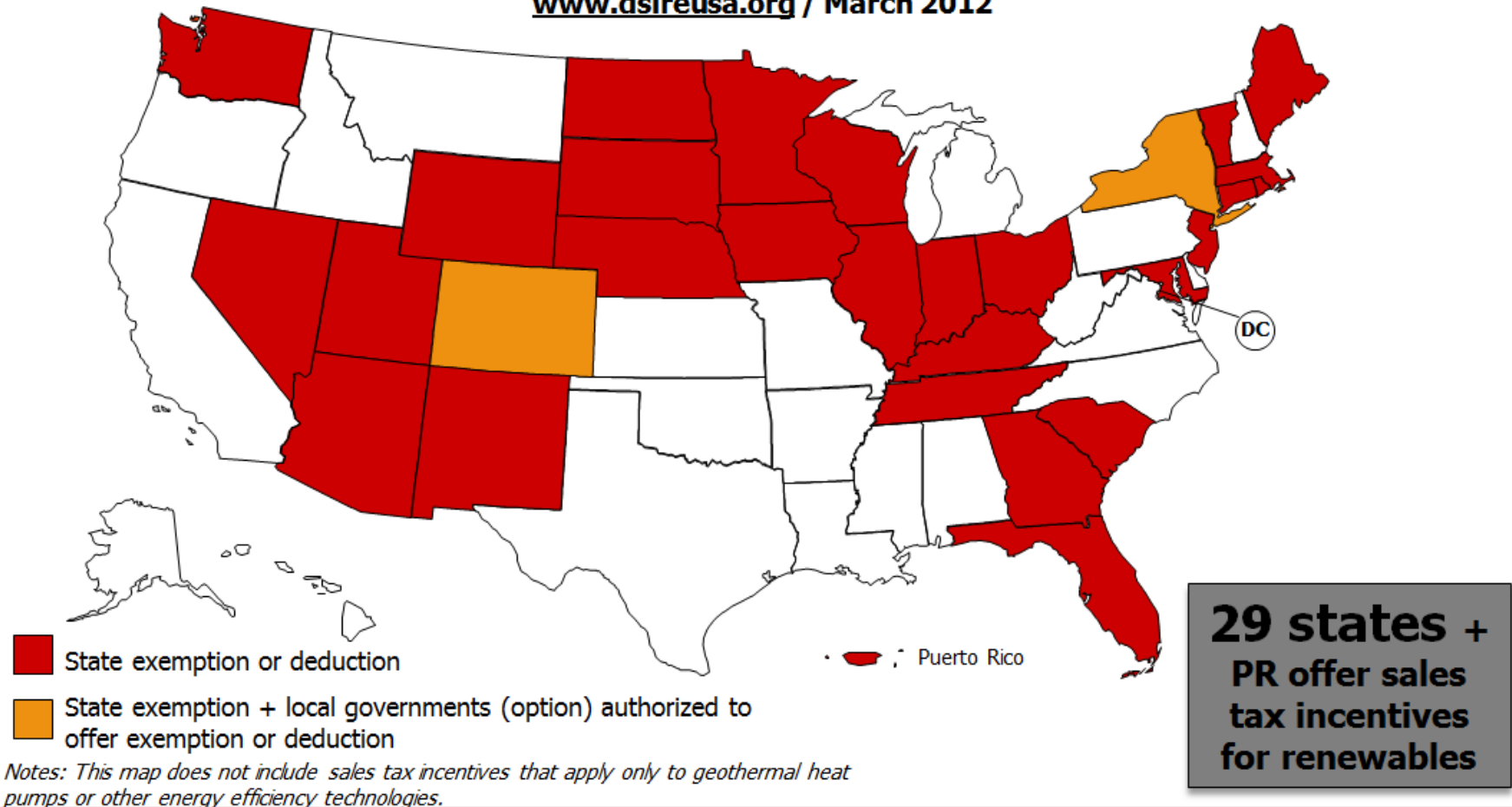
Other RPS Incentives: State Property Tax Incentives for Solar Projects

www.dsireusa.org / February 2012



State Sales Tax Incentives for Renewables

www.dsireusa.org / March 2012



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Best States for Future Solar Projects

Solar indices

Rank	State	Solar index
1	California	75
2	Hawaii	70
2	Massachusetts	70
4	New Mexico	68
5	Nevada	66
6	Colorado	64
6	Arizona	64
8	Texas	63
9	Maryland	60
9	Florida	60



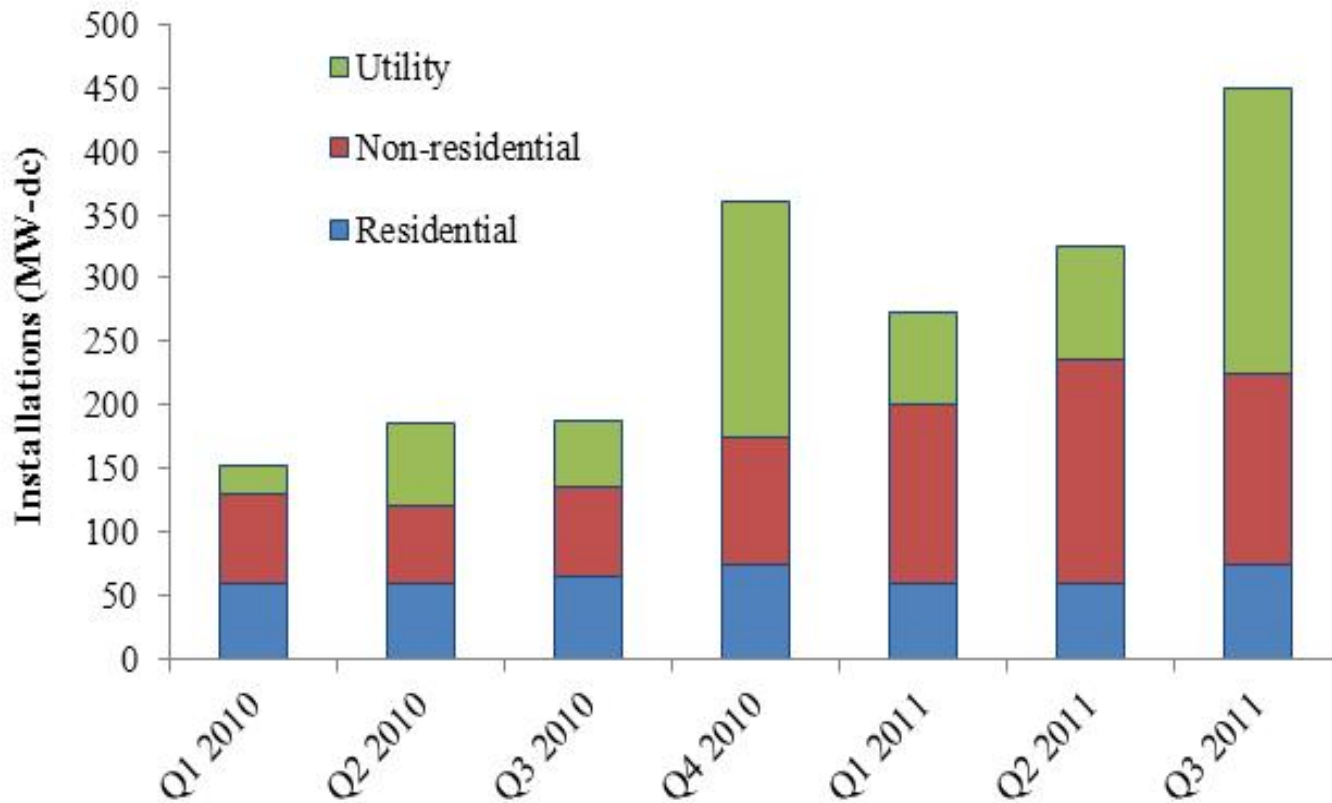
1.8 Megawatt Plant in Pittsfield, MA
Largest Solar Installation in New England

E&Y Long-term Solar Indices as of 2012

2.2 MW Solar Facility Under Construction

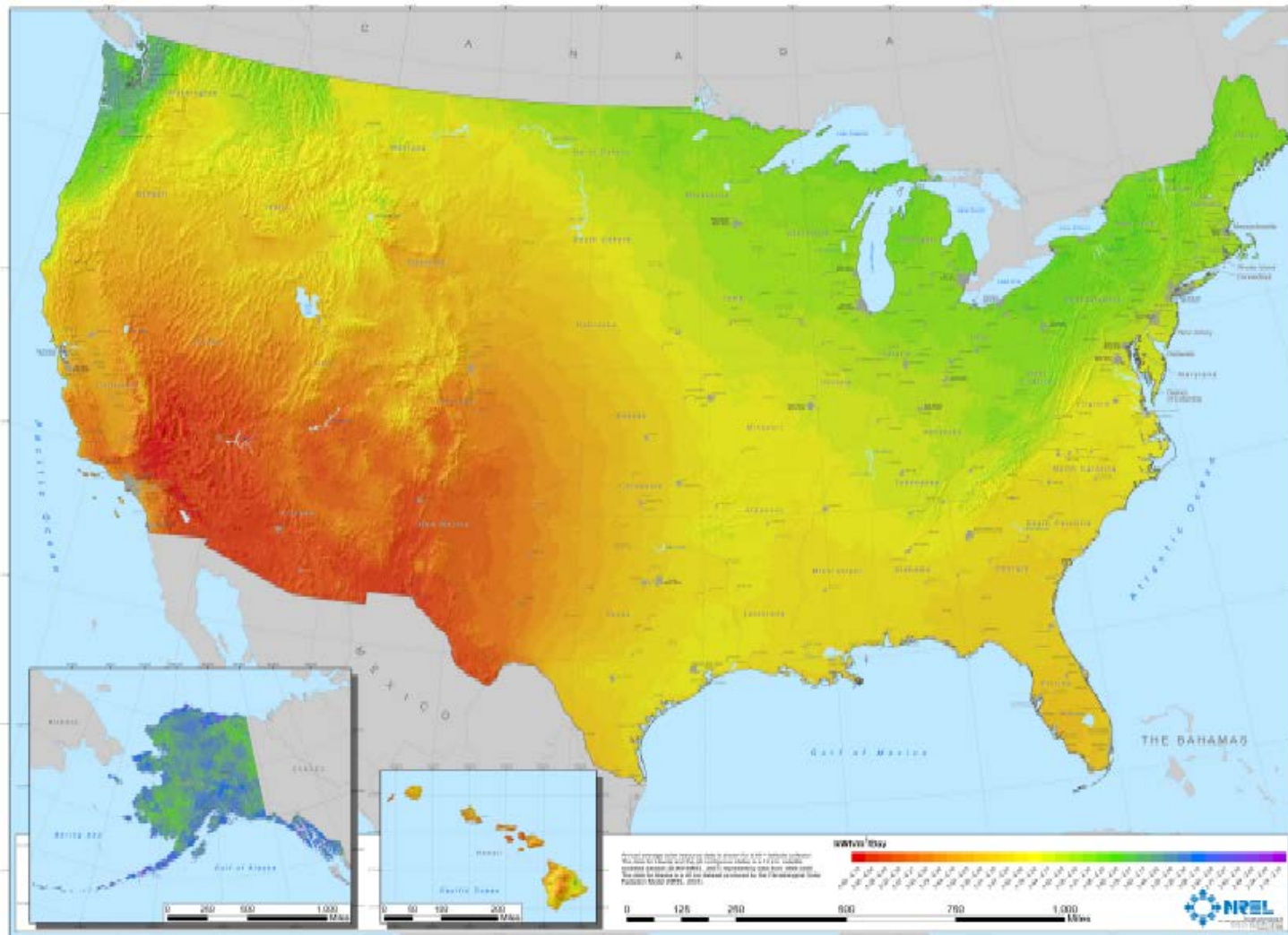


Grid Connected PV Solar Capacity Additions by Sector



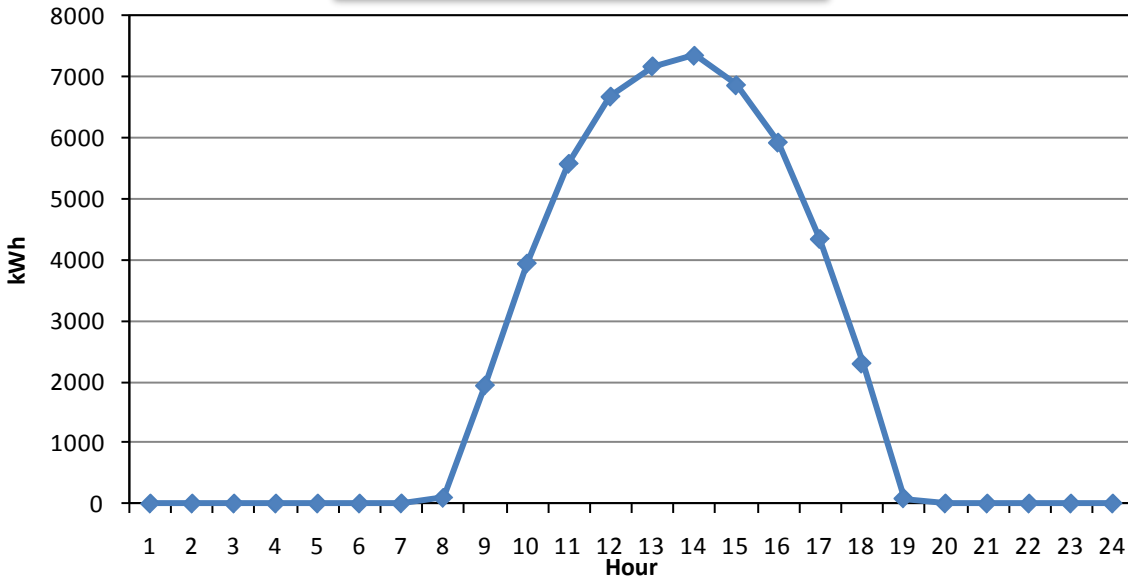
Source: Solar Energy Industries Association, *US Solar Industry Year in Review, Third Quarter 2011*

Solar Resources in the U.S. are Plentiful Especially in the Southwest



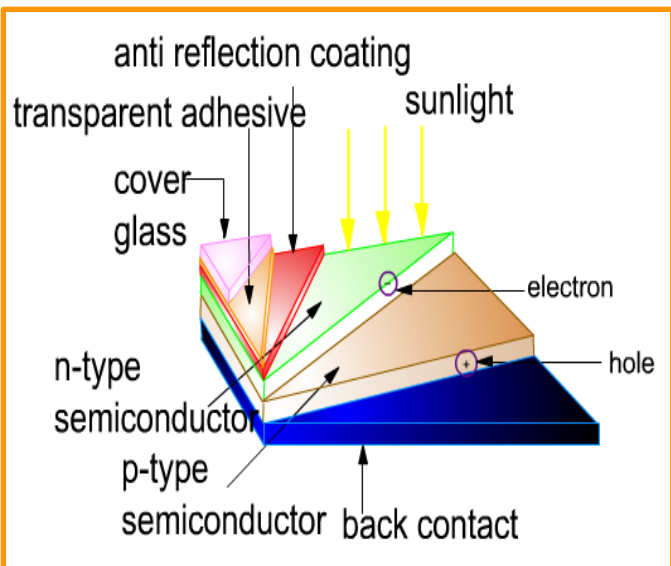
Solar is an Intermittent Source of Power

Solar 10 MW Utility Scale
Hourly Energy from Day in July

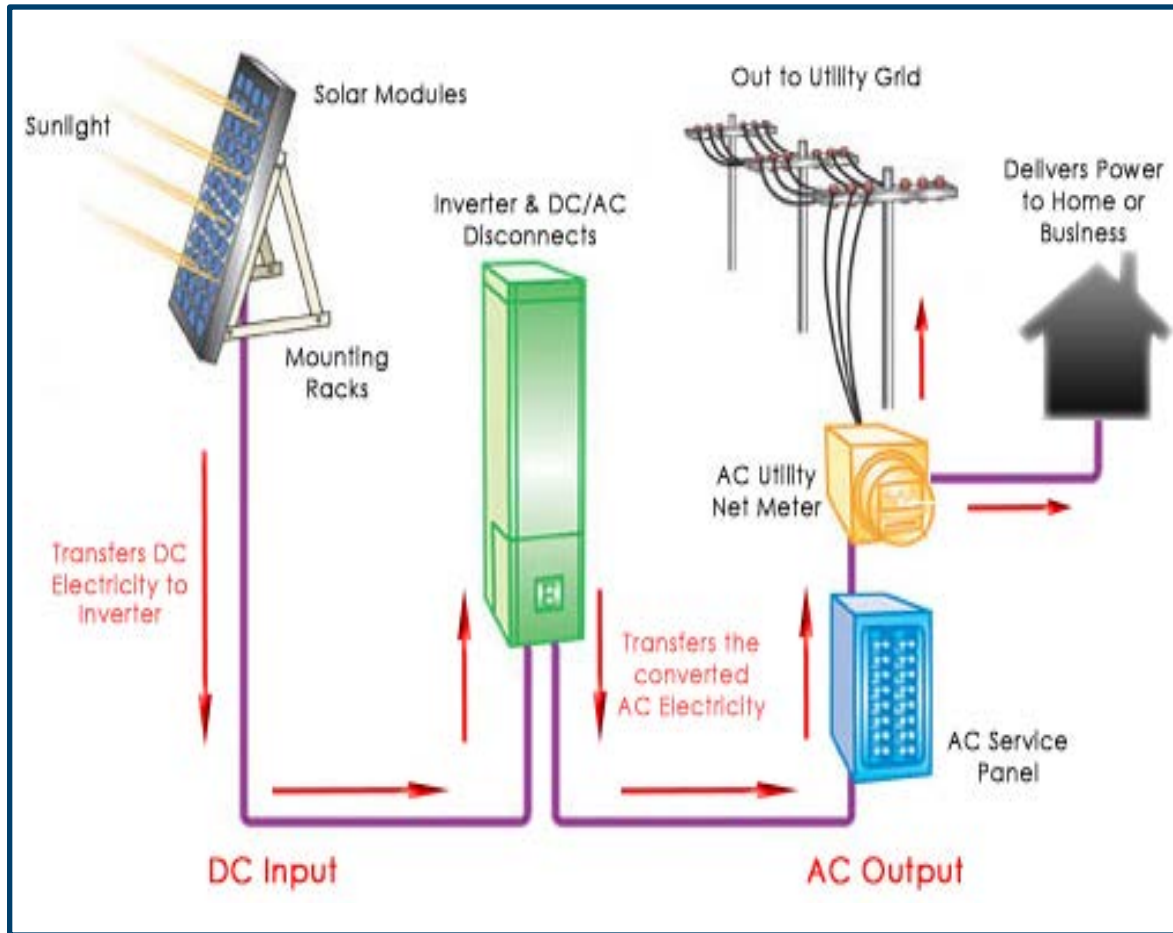


How a PV Solar System and Module Work

Layers of a typical PV module



How a PV Solar System Works



Crystalline Silicon PV Panel Technology is Proven and Reliable

- 85 to 90% of the market share
- Single and multi-crystalline modules
 - Multi-crystalline is less expensive, but less efficient
- Long lifetime (most manufacturers' warranties are for 25 years)
- Technology challenges: reduce materials, improve cell concepts, automate manufacturing
- Efficiency levels are currently 16-20%
- Degradation between 0.25% to 0.5% per year
- Single crystalline cell prices \$1.14 per watt compared to \$1.09 per watt for multi-crystalline



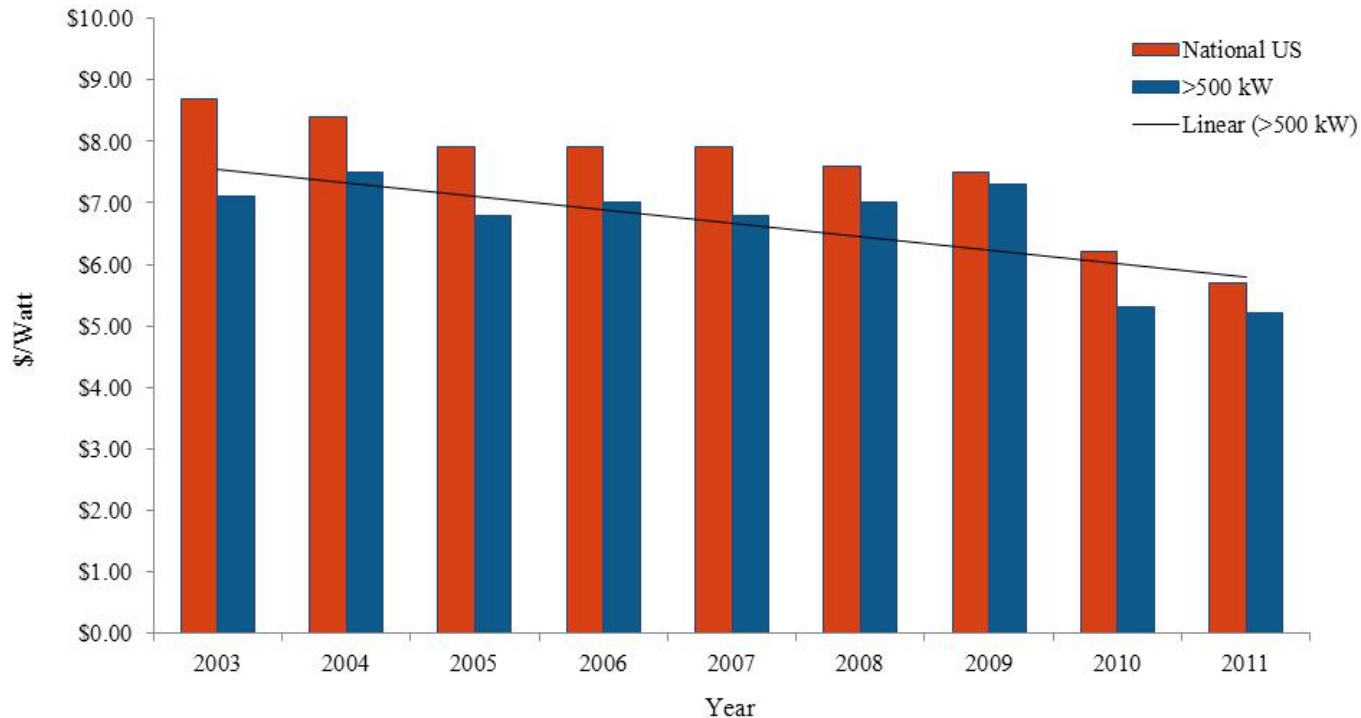
Thin Film Technologies and Costs Improving

- Market share is expanding rapidly
- Advantages: relatively low consumption of raw materials, high automation and production efficiency, ease of building integration and improved appearance
- Disadvantages: lower efficiency, limited experience with lifetime performances
- Manufacturing costs per watt < \$1



Total Solar System Installation Costs are Forecasted to Continue Declining

U.S. Solar PV System Average Prices, \$/kW, 2001- 2011



Source: Solar Energy Industries Association, US Solar Industry Year in Review, Third Quarter 2011

Lease Financing Structure of Solar Installation



Major System Component Useful Lives

PV System component	Useful Life
PV modules	30 years
Inverter	15 years
Installation sub-structure	55 years

PV Modules: Most Costly Component of the Solar System

Cost Components	Average Cost Allocation
PV Module	60%
Inverter	10%
Other equipment (mounting structure, wiring, meter, switches)	15%
Installation	15%



Typical Cost for a Residential Rooftop Solar Unit (4.4 KW)

SOLAR COMPONENT COST	Total Cost	Cost/Watt	labor hours	Cost/Hour
Component Costs:				
Module	\$9,460	\$2.15		
Mounting hardware	1,320	0.30		
Inverter	3,000	0.68		
Combiner boxes	88	0.02		
Meter	88	0.02		
System monitor	396	0.09		
DC, AC- Disconnects	44	0.01		
Fuses and holders	44	0.01		
Wiring and related components	<u>88</u>	<u>0.02</u>		
Subtotal	14,528	3.30		
Material markup at 30% of component cost	<u>4,358</u>	<u>0.99</u>		
Total component cost	18,886	4.29		
Sales tax @ 8.75%	<u>1,653</u>	<u>0.38</u>		
Direct Labor Costs:				
Electrical labor hours	1,584	0.36	22	\$72.00/hr
Hardware labor hours	<u>1,764</u>	<u>0.40</u>	<u>35</u>	\$50.40/hr
Total direct labor costs	3,348	0.76	57	
Overhead at 54% of total direct labor cost	1,808	0.41		
Profit at 30% of total direct labor cost	<u>1,004</u>	<u>0.23</u>		
Total overhead and profit	2,812	0.64		
Indirect Costs:				
Permitting	1,000	0.23		
Grid interconnect	<u>1,320</u>	<u>0.30</u>		
Total indirect costs	2,320	0.53		
Total installed PV System cost	<u>\$29,019</u>	<u>\$6.60</u>		

Obsolescence Factors for Solar Installations

Physical:

- Unless PV system has solar tracking capability, there are no moving parts
- Wear-and-tear is minimal
- EUL could be life of roof

Functional:

- Degradation 0.5% annually
- Today, state-of-art efficiency about 20%
- Will increase at least another 20% by 2030

Economic:

- Too low electricity selling price to build solar unit without government incentives
- Deduct ITC of 30%.

Income Approach on Solar System

Approach to value

- Use of a discounted cash flow analysis as opposed to a direct capitalization method
- Cash flows are not constant:
 - Timing of rebates, typically only in year 1
 - Other incentives, such as PBIs, are for a specified number of years (usually 5)
 - PPA expiration prior to end of EUL
 - Degradation rate
 - Accelerated depreciation

Cash flow considerations

- Estimated yearly generation (kWh)
- PPA terms
- Current and forecasted electricity rates
- Rebates (if applicable)
- SRECs / PBIs
- O&M costs
- Insurance costs
- Inverter replacement costs

A Typical Solar System will Produce Cash Flows for 35 Years

Key assumptions

Year 1 rebate

Return to market electricity rate upon PPA expiration

Add'l expense to replace inverter at end of life (~year 15)

	1	2	3	4	5	6	7	8	9	10	11	...
Electricity generation (kWh)	1,720,000	1,711,400	1,702,843	1,694,329	1,685,857	1,677,428	1,669,041	1,660,696	1,652,392	1,644,130	1,635,909	
PPA rate (\$/kWh)	0.120	0.124	0.127	0.131	0.135	0.139	0.143	0.148	0.152	0.157	0.200	
SRECs (\$/kWh)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Revenues												
Electricity revenues	\$206,400	\$211,529	\$216,786	\$222,173	\$227,694	\$233,352	\$239,151	\$245,094	\$251,184	\$257,426	\$327,182	
SREC revenues	17,200	17,114	17,028	16,943	16,859	16,774	16,690	16,607	16,524	16,441	16,359	
Total rebate (cash grant)	1,691,250											
Total revenue	1,914,850	228,643	233,814	239,116	244,553	250,126	255,841	261,701	267,708	273,867	343,541	
Expenses												
Inverter Replacement (around year 15)												
O&M	\$16,913	\$17,335	\$17,769	\$18,213	\$18,668	\$19,135	\$19,613	\$20,104	\$20,606	\$21,121	\$21,649	
Insurance	22,550	22,550	22,550	22,550	22,550	22,550	22,550	22,550	22,550	22,550	22,550	
Total expenses	39,463	39,885	40,319	40,763	41,218	41,685	42,163	42,654	43,156	43,671	44,199	
EBITDA	\$1,875,387	\$188,758	\$193,495	\$198,353	\$203,335	\$208,441	\$213,678	\$219,047	\$224,552	\$230,196	\$299,342	

Presentation Overview - Solar and Wind Energy

Technology Mix for U.S. Electric Generating Plants

Federal Government Incentives

State Government Incentives

U.S. Solar Development and Appraisal Process

U.S. Wind Development and Appraisal Process

Wind Turbine Installations



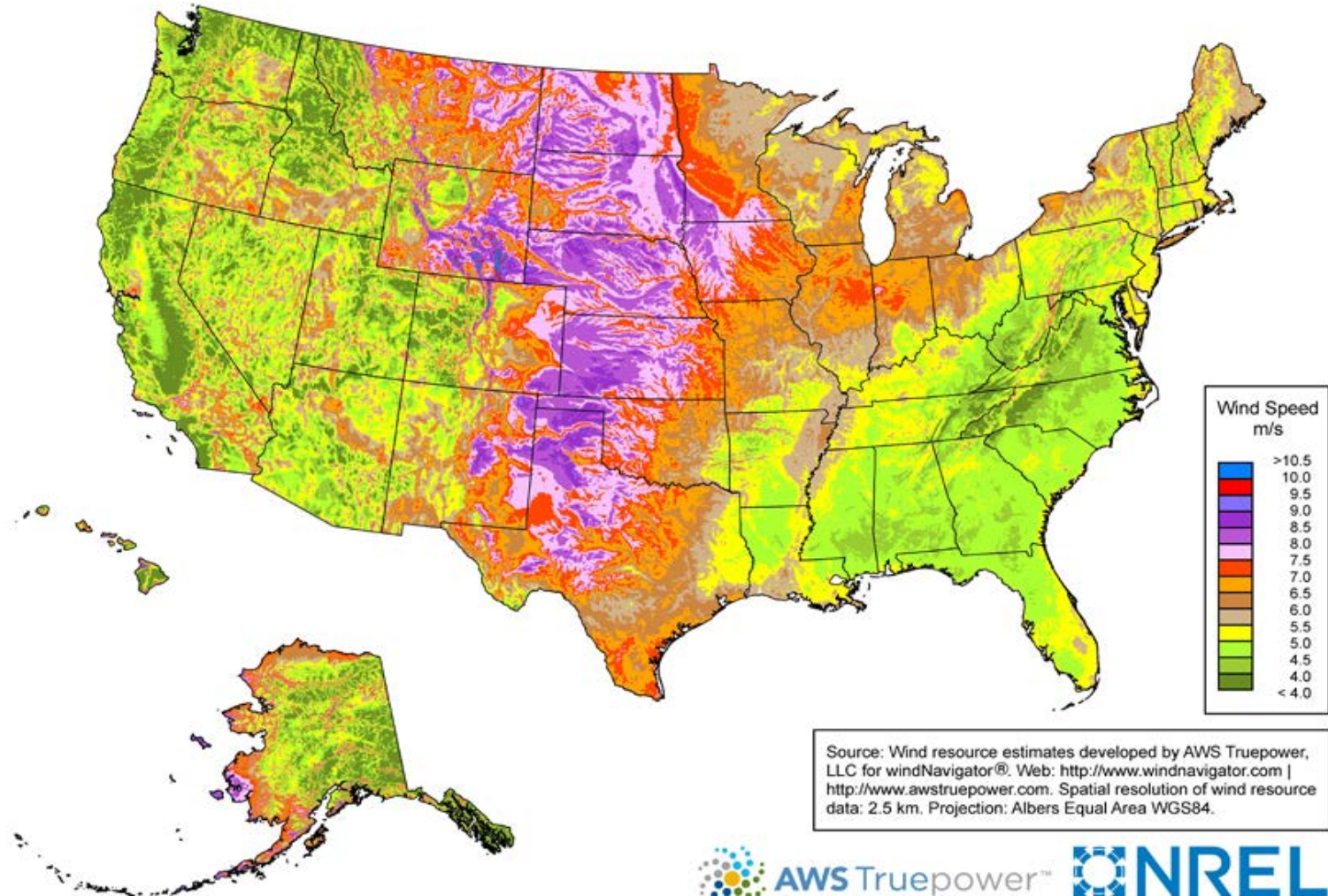
Best States for Future Wind Projects

Wind indices

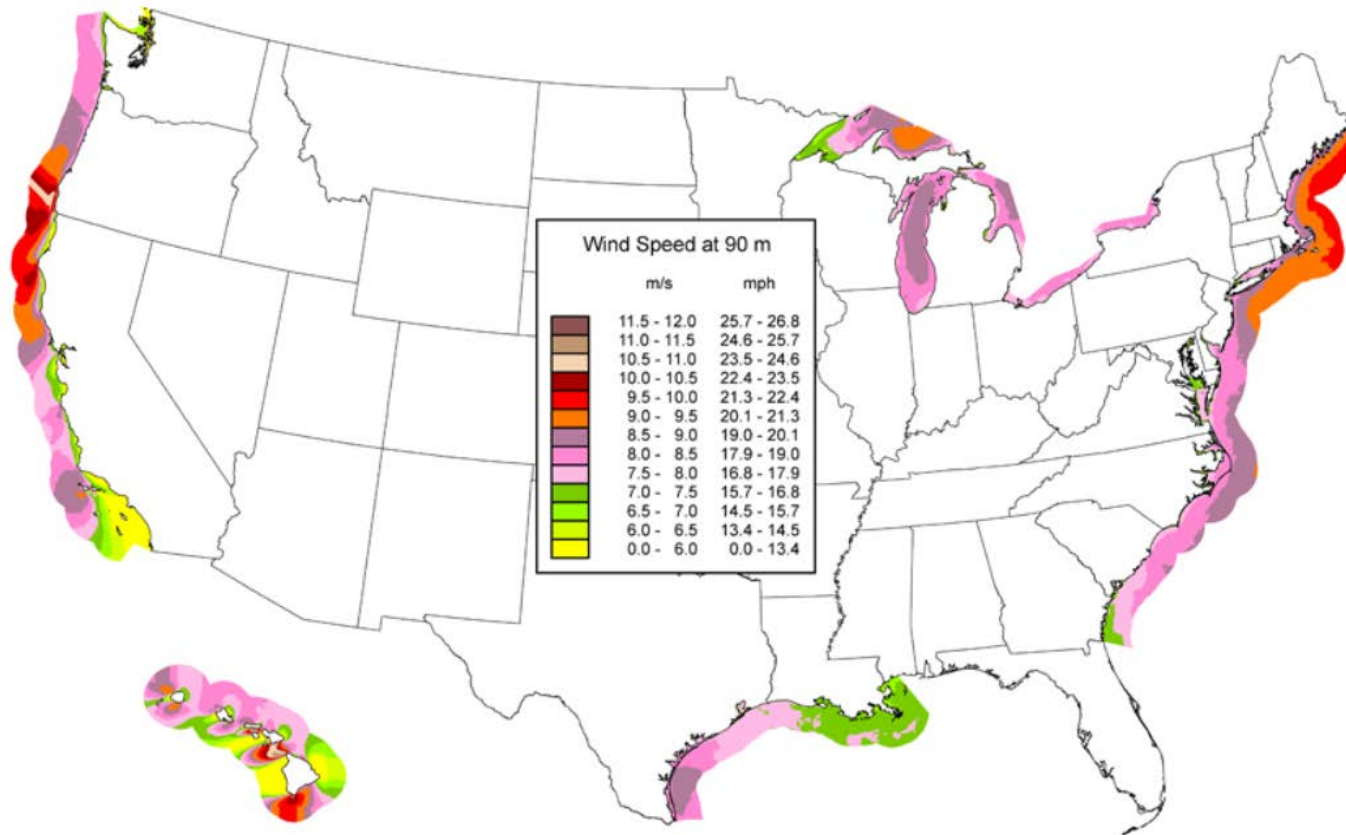
Rank	State	Wind index
1	California	74
2	Colorado	72
3	New Mexico	71
4	Illinois	70
4	Texas	70
6	Pennsylvania	68
7	New York	67
7	Iowa	67
9	Oregon	66
9	Oklahoma	66



Wind Resources are Plentiful in Areas of Low Population



U.S. – Annual Average Offshore Wind Speed at 90 Meters



Offshore Wind Turbines

Advantages:

- More wind speeds
- Less noise pollution
- Less visual impact

Disadvantages:

- Difficult to install and maintain
- Energy losses due long distance transport



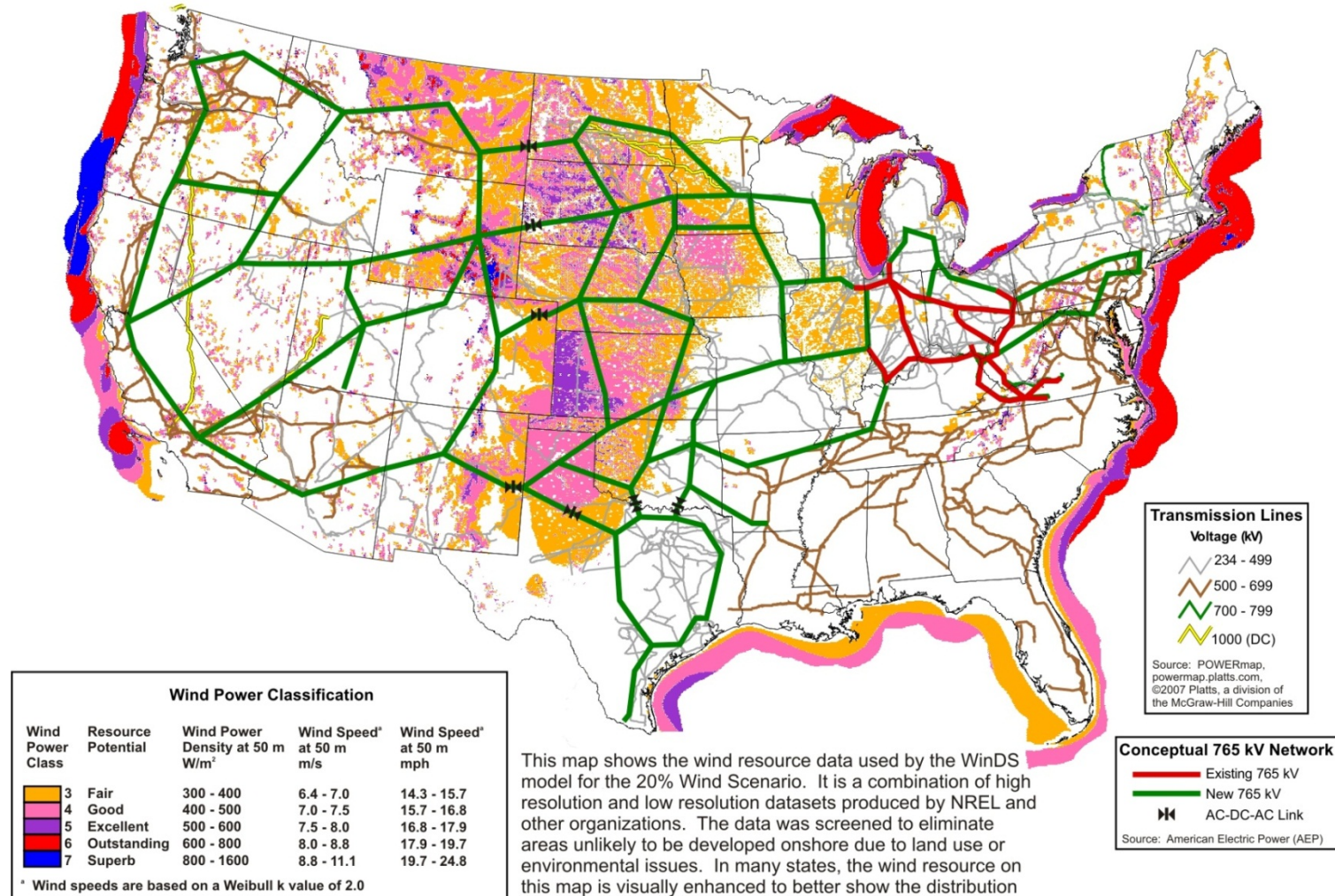
Wind Power Brings Transmission into Question

The Grain Belt Express Clean Line

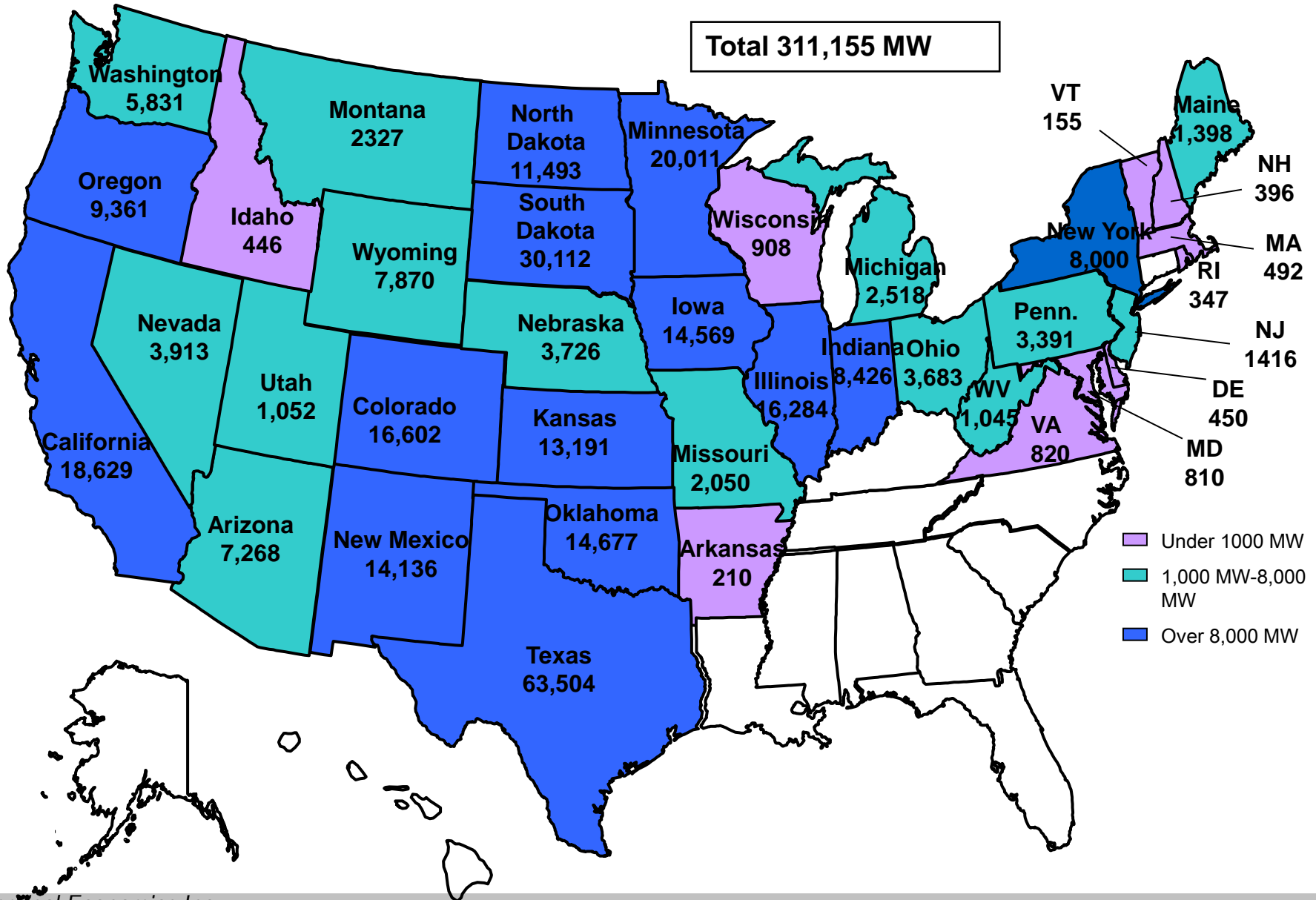
- **\$1.7 billion** high-voltage line connecting Kansas wind farms with St. Louis and Ohio River Valley
- **550 miles** and capable of moving 3,500 MW
- Western Kansas has great wind energy potential: Wind developers have projects permitted, but need additional transmission infrastructure
- Transmission project still needs approval from federal and state regulators
- Construction could start by 2014 and be complete by 2016



Transmission Plan for 400 GW of Wind Energy



Wind Power in Queues (MW)



Wind Power Works the Opposite of a Fan

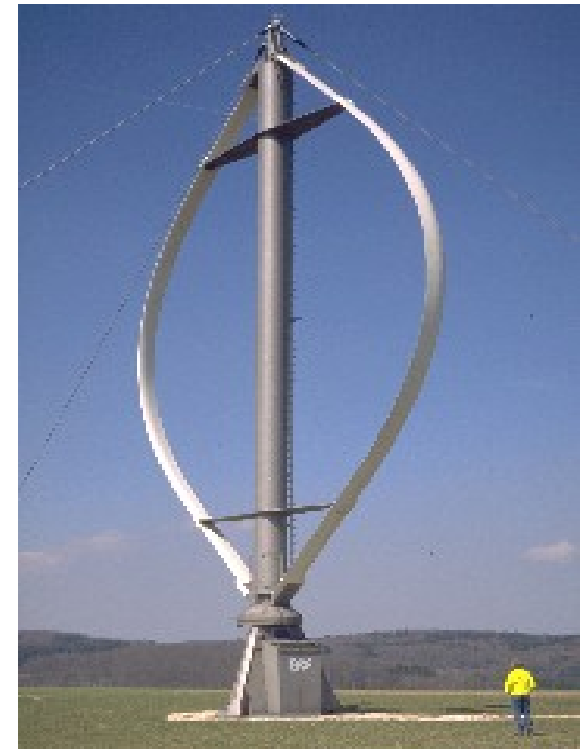
Horizontal axis
(most common)



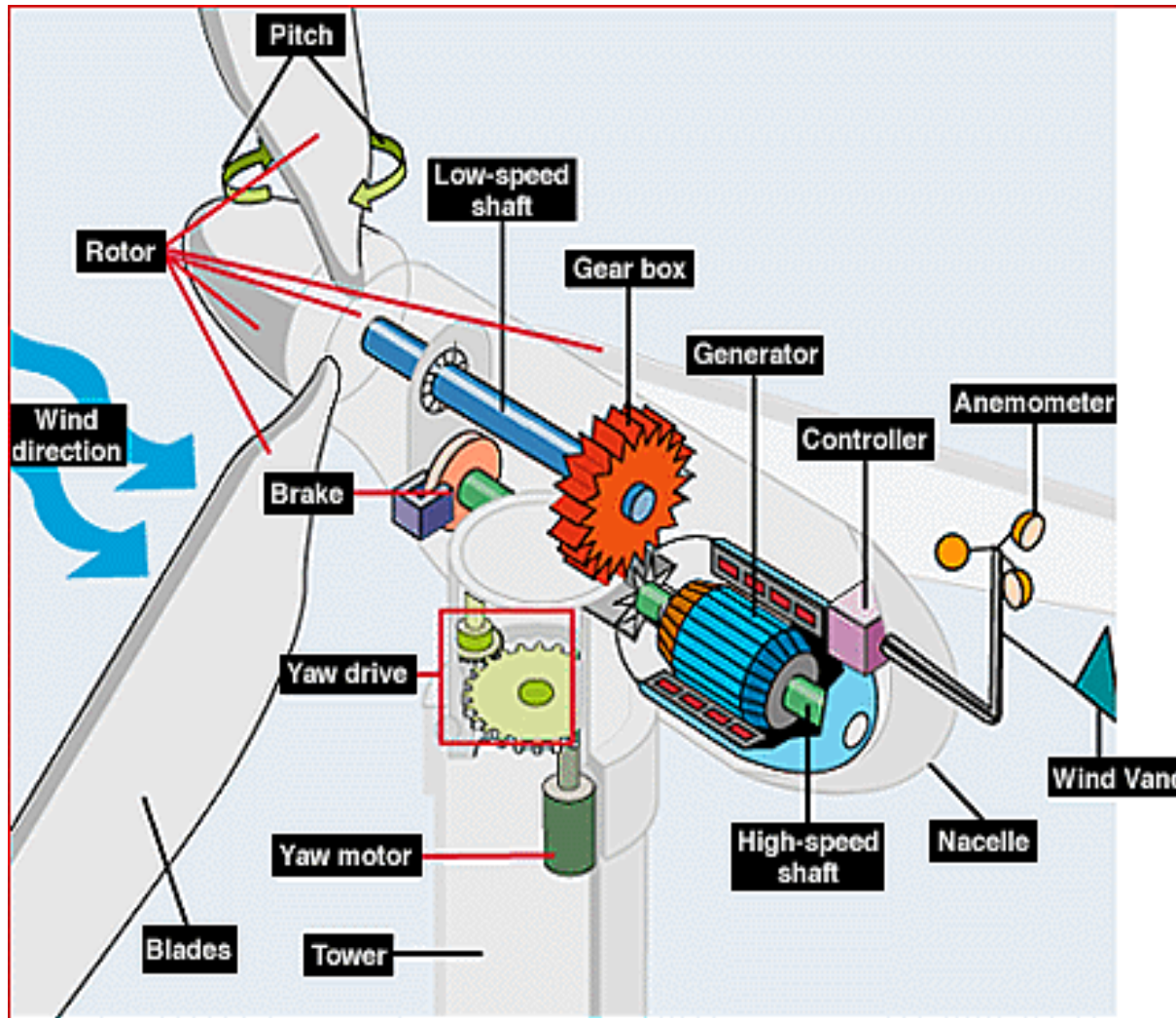
Vertical axis



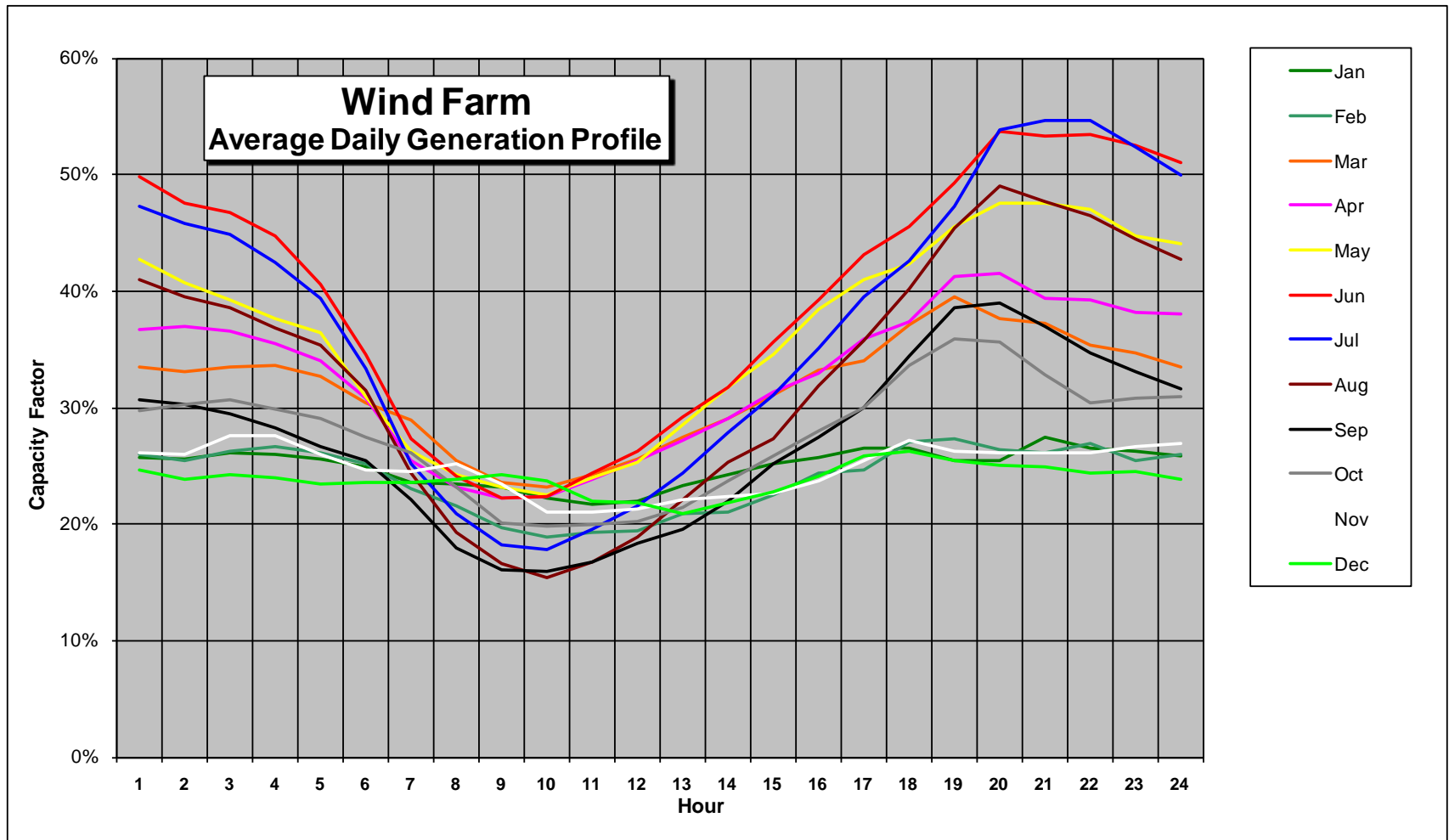
Darrieus (egg-beater) axis



The Major Components of a Horizontal Axis Wind Turbine



Capacity Factor Based on Wind Variability



Investment Cost Will Decline as Technology Improves

	Investment Costs*	O&M Costs
On-Shore	\$1.4 – 2.6 million/MW	\$12 – 32/MWh
Off-Shore	\$3.1 – 4.7 million/MW	\$21 – 48/MWh



On-Shore

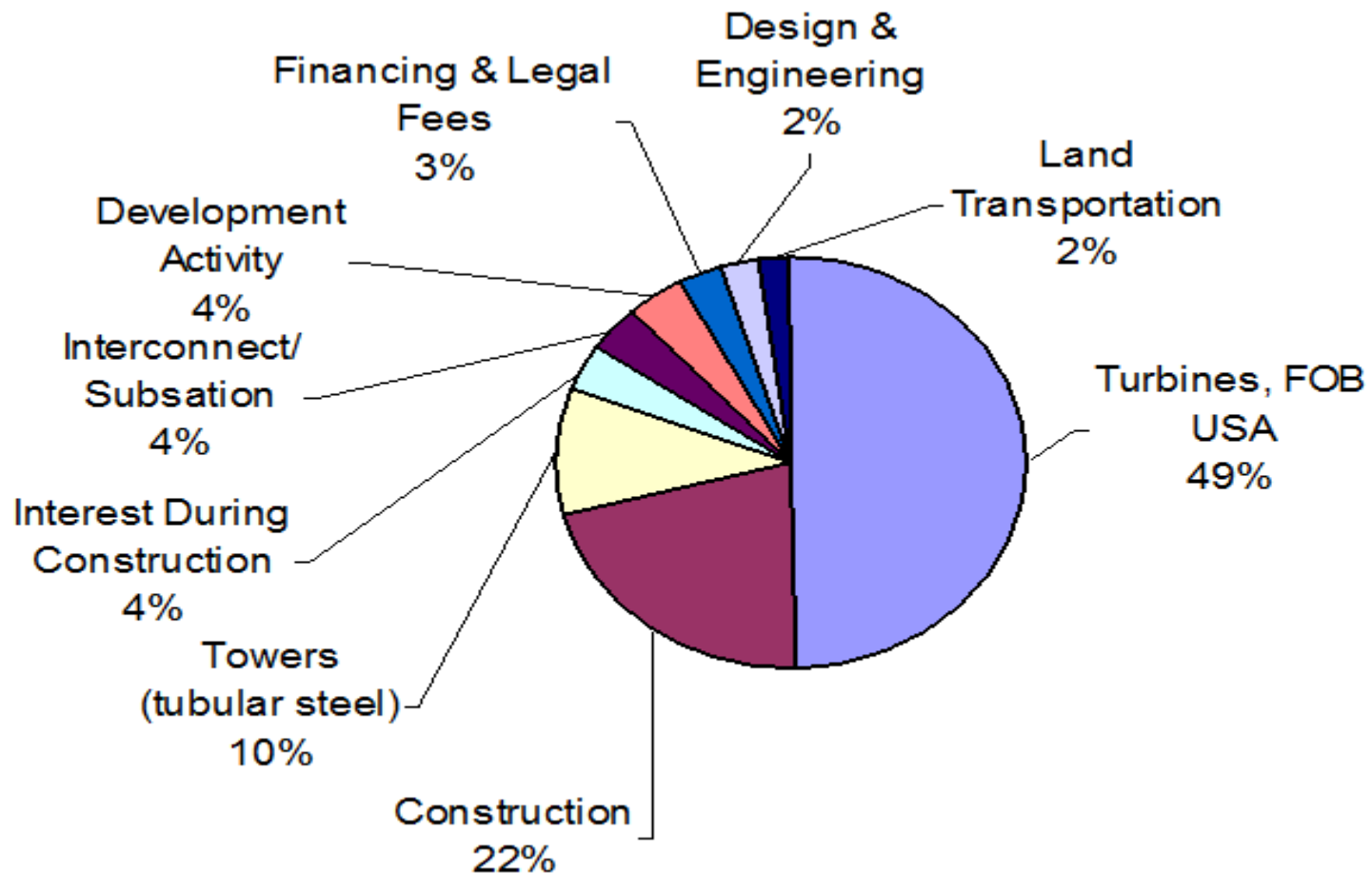
- Turbines = 75% of investment cost
- Can be competitive (in terms of pricing) with new conventional power plants in certain markets (like CA)
- “Double Cropping” in rural areas

Off-Shore

- More wind = greater generation potential
- More space = larger turbines
- Turbine makes up only 50% of investment cost
- Other major costs: foundation and cabling (varies based on distance from shore and water depth)
- **Investment costs can be double on-shore costs**

**includes turbine, grid connection, foundations, & infrastructure*

Land Based Wind Power Construction Cost



Wind Turbine Power Output Variables

Output increases with cube of wind speed

Going from 12 mph to 15 mph doubles output

Wind speed of 33 mph provides maximum with today's technology

Output increases with square of blade length

Doubling blade length increases output 4 times

The higher tower height the better

Wind speed 10 percent greater going from

150 ft to 300 ft tower, providing 30% more power



Example of Wind Turbine Appraisal

Nameplate Capacity	2,000	KW
Hours/Year	8,760	
Rated	17,520,000	KWh/yr
Capacity Factor	0.30	
Production	5,256,000	KWh/yr
Sale Price of Electricity	0.05	\$/KWh
Production Tax Credit	0.021	\$/KWh
Annual Revenue	373,176	\$/yr
O&M Cost (\$22.83/MWH)	120,000	
Land Cost	10,000	
Profit before Tax	243,176	
PV at 6% for 25 years	\$ 3,106,355	

Check for Wind Turbine Calculation

<u>Given:</u>			
Average Wind Speed	16	mph	
Turbine Blade Length	40.5	meters (130 feet)	
<u>Find: Annual Revenue</u>			
<u>Calculations:</u>			
Turbine Yield (from Chart)	1,050	KWh/sq. meters/yr	
Sweep Area	5,154	sq meters	$\pi \times r^2$
Production	5,411,349	KWh/yr	
Sale Price of Electricity	0.05	\$/KWh	
Production Tax Credit	0.021	\$/KWh	
Annual Revenue	384,206	\$/yr	

Average Wind Speed mph	Energy Yield KWh/m ² /yr
9.0	230
10.1	340
11.2	470
12.3	610
13.4	770
14.6	930
15.7	1,090
16.8	1,230
17.9	1,360
19.0	1,480
20.2	1,570

There Are Over 470 Wind Turbine Component Manufacturing Facilities in the U.S.

-  GE Energy : top supplier in the U.S. in 2011, delivered turbines with a capacity of 2,000 MW
- **Vestas** : delivered 1,768 MW
- **SIEMENS** : delivered 939 MW

"It is urgent that Congress extend the PTC now...or risk losing a new manufacturing sector to foreign countries."

– Denise Bode, AWEA's CEO

World's largest turbine manufacturer. Recently reported it **would cut 1,600 U.S. jobs** should Congress fail to extend the tax credit

QUESTIONS?



Contact Information

Joseph Kettell, Managing Director
Appraisal Economics Inc.

+1 201 265 3333

JKettell@ae-us.com

www.ae-us.com