

Women Working in Alternative Energy

August 3, 2010

Prepared for the
U.S. Department of Labor, Women's Bureau
by Public Policy Associates, Incorporated
and Wider Opportunities for Women

Opening Remarks

Hilda L. Solis, U.S. Secretary of Labor
and

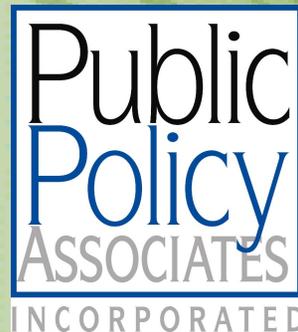
Sara Manzano-Díaz, Director, Women's Bureau
U.S. Department of Labor



Setting the Stage

Colleen Graber, Project Manager

Public Policy Associates, Incorporated



Wind Energy and Expanding the Number of Women in the Industry

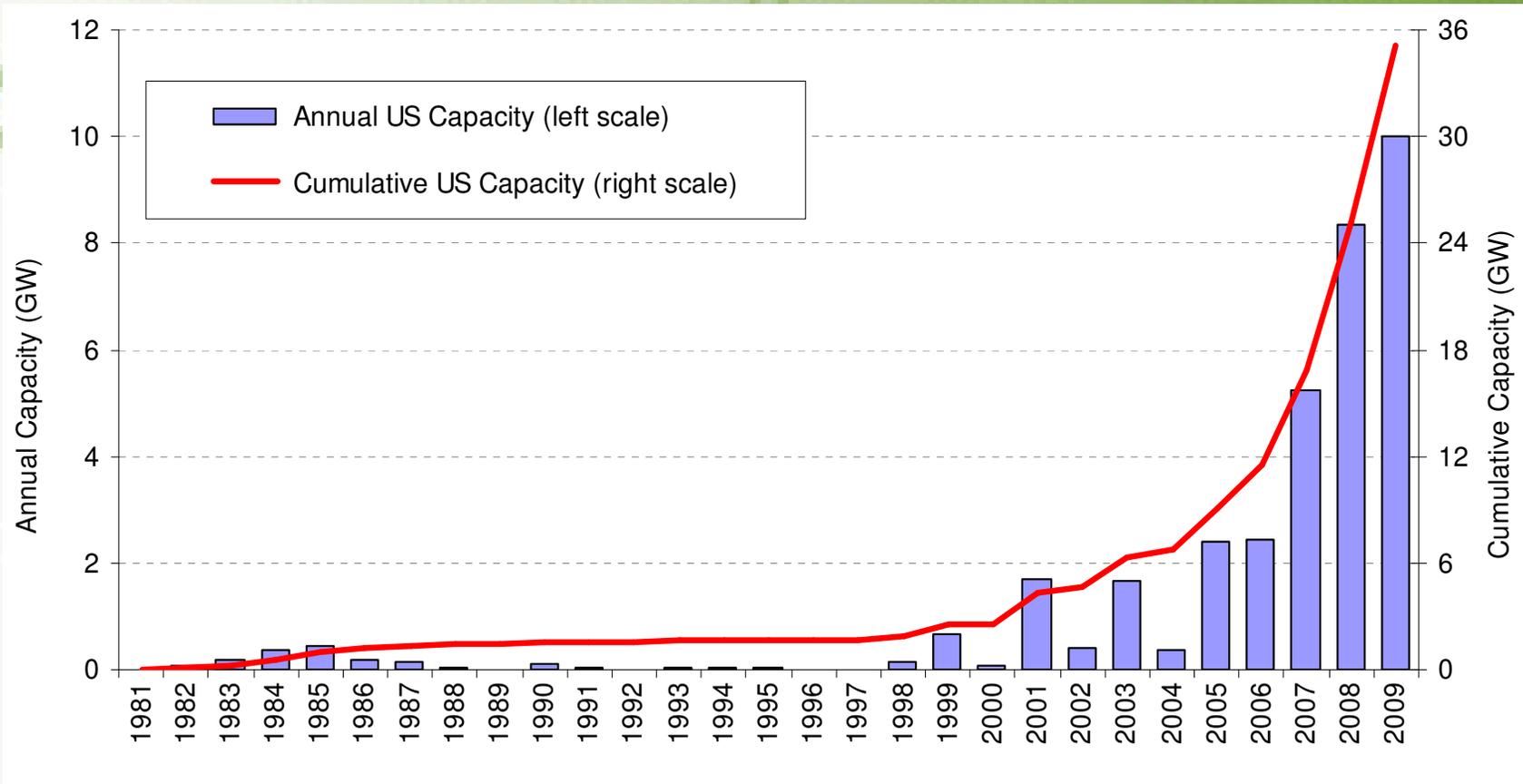
Trudy Forsyth, Senior Project Leader

National Renewable Energy Laboratory,
National Wind Technology Center, Colorado



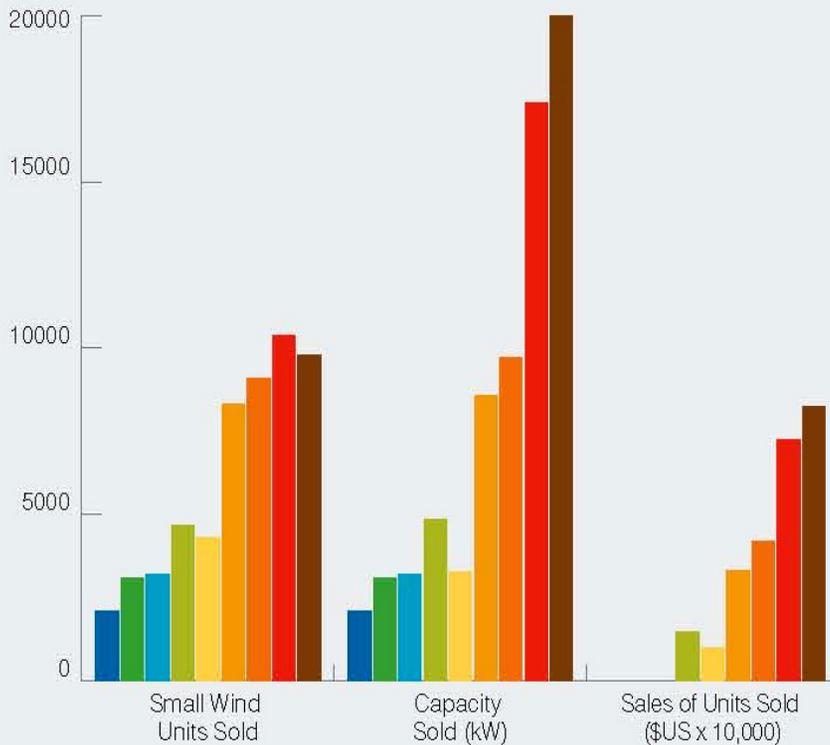
Five Years of Strong Growth

2009: 9,994 MW Added; \$21 billion Investment



- Reflects power from “large” wind (large-scale turbines)
- Second largest market (behind China) in 2009 capacity additions; largest market in terms of cumulative capacity

Growth of U.S. Small Wind Market

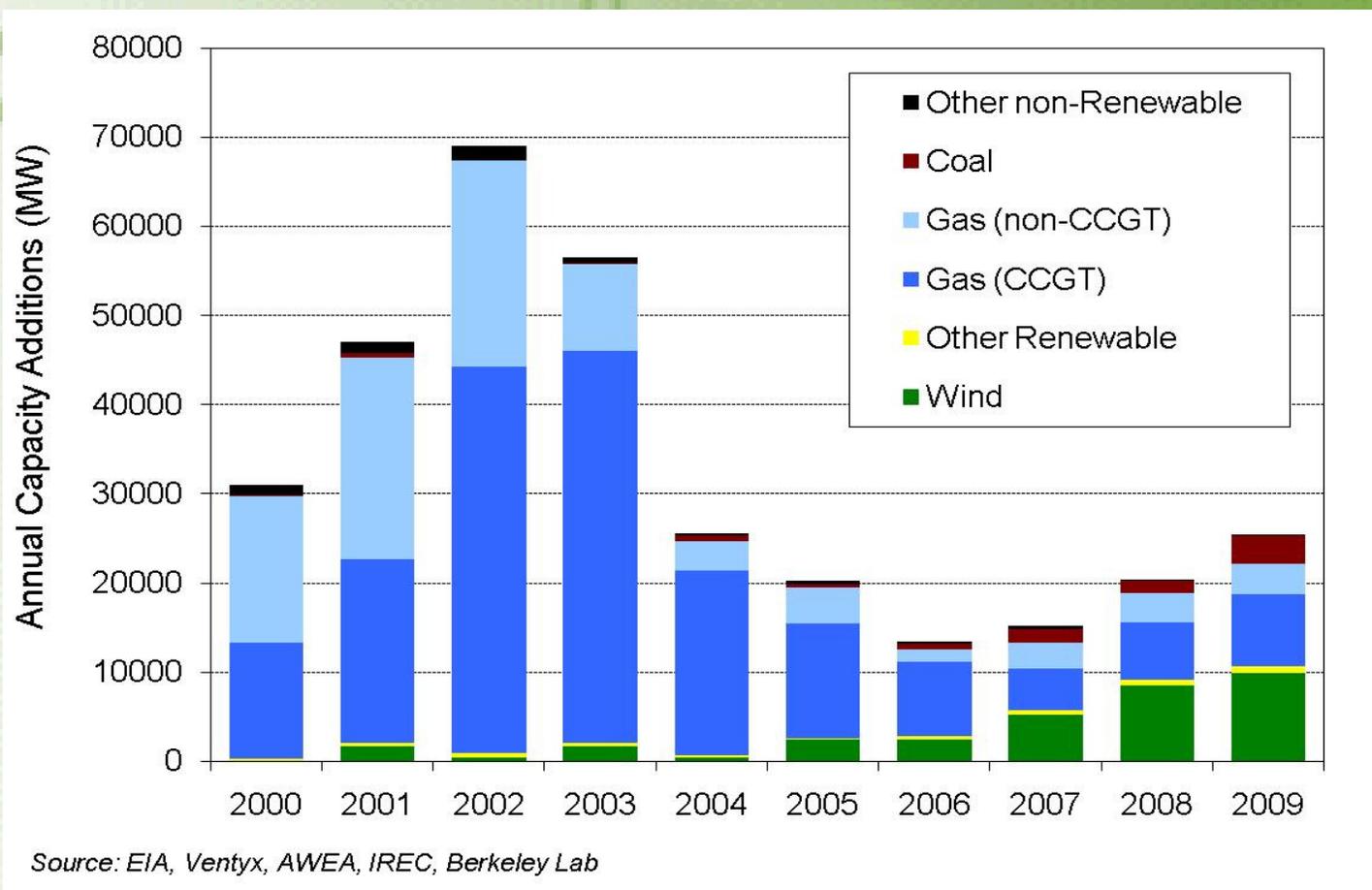


Year	Units	kW	Sales \$US
2001	2,100	2,100	(not avail.)
2002	3,100	3,100	(not avail.)
2003	3,200	3,200	(not avail.)
2004	4,671	4,878	\$1,489
2005	4,324	3,285	\$990
2006	8,329	8,565	\$3,320
2007	9,092	9,737	\$4,197
2008	10,386	17,374	\$7,266
2009	9,800	20,300	\$8,240

Source: American Wind Energy Association

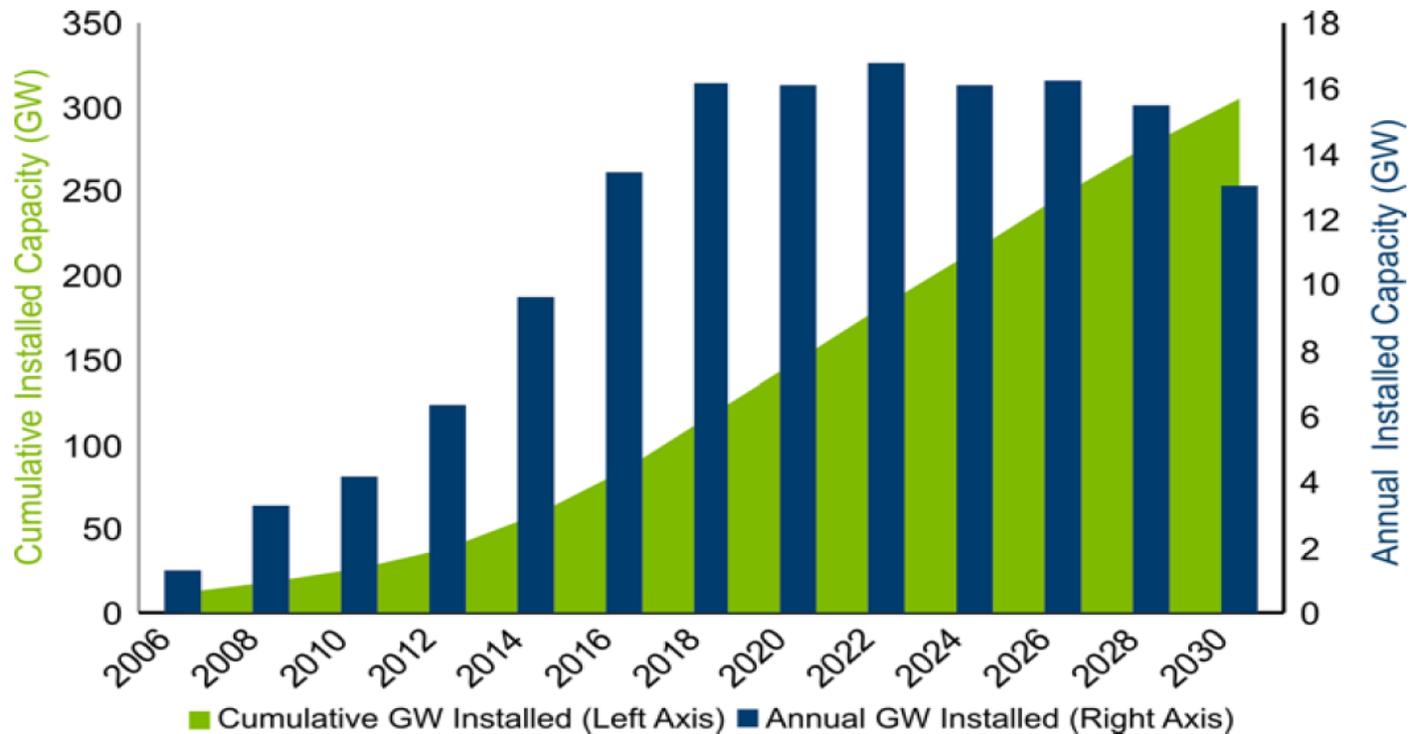


Wind Is a Major Source of New Capacity Additions: 39 Percent in 2009



What does 20 percent wind look like?

Figure 1-4. Annual and cumulative wind installations by 2030



Workers are needed to achieve this growth

A “windsmith” on the job

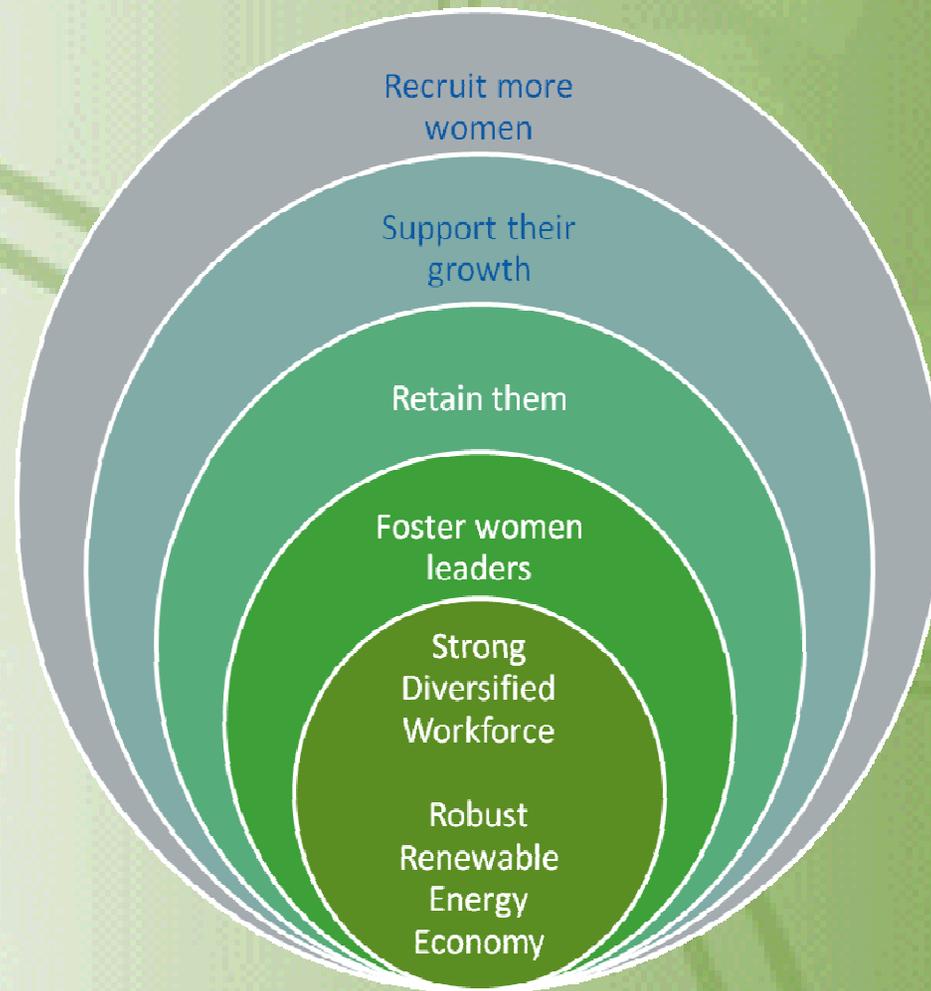


Women in Wind Energy: Our Mission

*To promote education,
professional
development, and the
advancement of
women to achieve a
strong diversified
workforce and
support a robust
renewable energy
economy.*



The WoWE Imperative



Idea Hatched: Spring 2005



2005

2006

2007

2008

2009

WoWE starts



Telling Our First Story of a Woman in Wind

- First luncheon at WINDPOWER 2005 in Denver with first fellowship recipients
- Celebrating the memory of Rudd Mayer, wind energy pioneer
- 120 people with standing room only



Growing at the Grassroots



- *June 2006:* WoWE's inaugural chapters formed: first Portland, then Seattle
- By early 2010, WoWE had over 30 chapters across the US and Canada



Connecting, Advancing, and Retaining Women

- Mentoring program launched in June 2008.
- 60 mentors and mentees in the first round.
- Third round began in May 2010.



Welcome to The Mentoring Connection



Harness the power of the Internet to make your mentoring programs easier to set up and manage. Find how easy it can be to deliver quality results, while requiring less staff time to operate and manage.

[Click Here](#) to learn more.

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Brochure (95 Kb)

Member Login

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New member login:
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Functions available to you now.

Contacts	Sign-up	Features	Benefits
Best Practices	Sales		

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Building Community Online



The screenshot shows the homepage of the Women of Wind Energy (WoWE) website. At the top, there is a search bar with the text "enter keyword to search" and a "go" button. Below the search bar are three navigation links: "Build the WoWE Network", "Find a WoWE Chapter", and "Join us on Facebook". The main header features the WoWE logo, which consists of the text "women of ENERGY" with a stylized green fan icon. Below the header is a navigation menu with links: "About WoWE", "Support WoWE", "Celebrate Women in Wind", "Advance Your Wind Energy Career", "Get Involved", "Contact", and "Leadership Login". The main content area is divided into three columns. The left column features a large image of a woman sitting on a wind turbine. The middle column features a woman in a white lab coat. The right column features two women in safety gear. Below these images is a large green banner with the text: "WOMEN OF WIND ENERGY  IS A NONPROFIT ORGANIZATION THAT PROMOTES THE ENGAGEMENT, PROFESSIONAL DEVELOPMENT, AND ADVANCEMENT OF WOMEN IN THE WIND INDUSTRY." Below this banner is a call to action: "Women and men who share our goals are invited to [join today](#)". On the right side of the page, there is a "WoWE News and Events" section. It includes two news items: "October 2009: WoWE Announces Hire of New Executive Director" and "September 2009: WoWE Launches New Website". At the bottom of the page, there is a footer with links: "Home", "Programs & Services", "Giving to WoWE", "Sharing Stories", "Join WoWE Today", "Find a Chapter", "Apply for WINDPOWER Fellowship", and "Contact WoWE".

www.womenofwindenergy.org

Women's Employment in the Biomass Industry

Kelly Tiller, Ph.D., President and CEO

Genera Energy, Tennessee





Overview

- Next Generation Biofuels
 - 🌱 Introduction to advanced biofuels
 - 🌱 Market and policy drivers
 - 🌱 Industry status and outlook
- Feedstock Supplies
 - 🌱 Ag-Energy interface
- Opportunities for Women
 - 🌱 Agriculture
 - 🌱 STEM
 - 🌱 Finance
 - 🌱 Business leadership and development

Advanced Biofuels

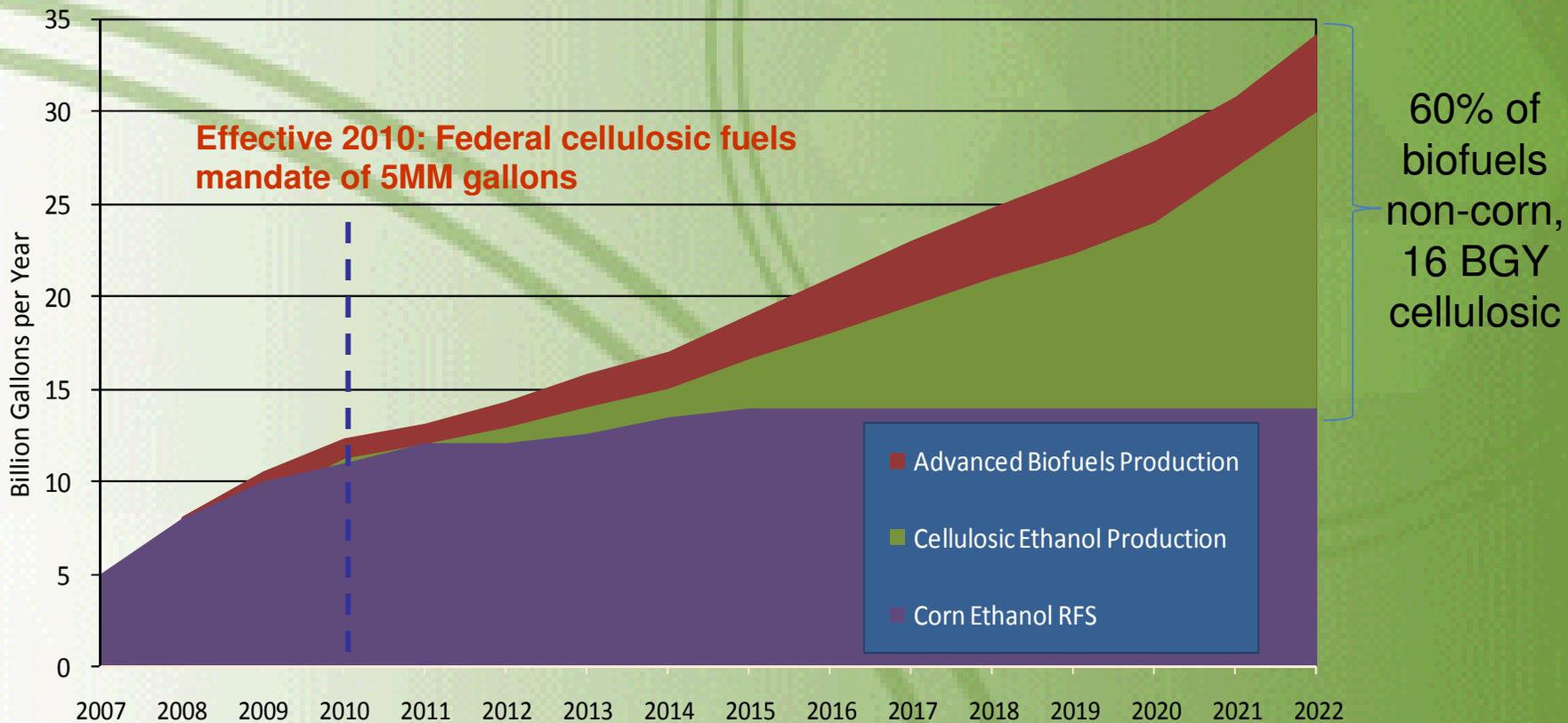
A broad category of liquid transportation fuels made using advanced technologies from a range of widely available biomass sources

- Variety of conversion platforms
 - Biochemical
 - Thermochemical
 - Pyrolysis
 - Catalysis
- Advanced fuel products
 - Ethanol
 - Butanol
 - Green diesel
 - Green gasoline
 - May be “drop-in” fuels from traditional feedstocks such as corn, sugarcane, vegetable oils
- Variety of biomass feedstocks
 - Crop residues
 - Corn cob, stover
 - Wheat straw
 - Opportunistic residues
 - Dedicated energy crops
 - Switchgrass
 - Energy cane
 - Biomass sorghum
 - Woody biomass
 - Forest residue, wood waste
 - Forest crops
 - Municipal solid waste
 - Algae



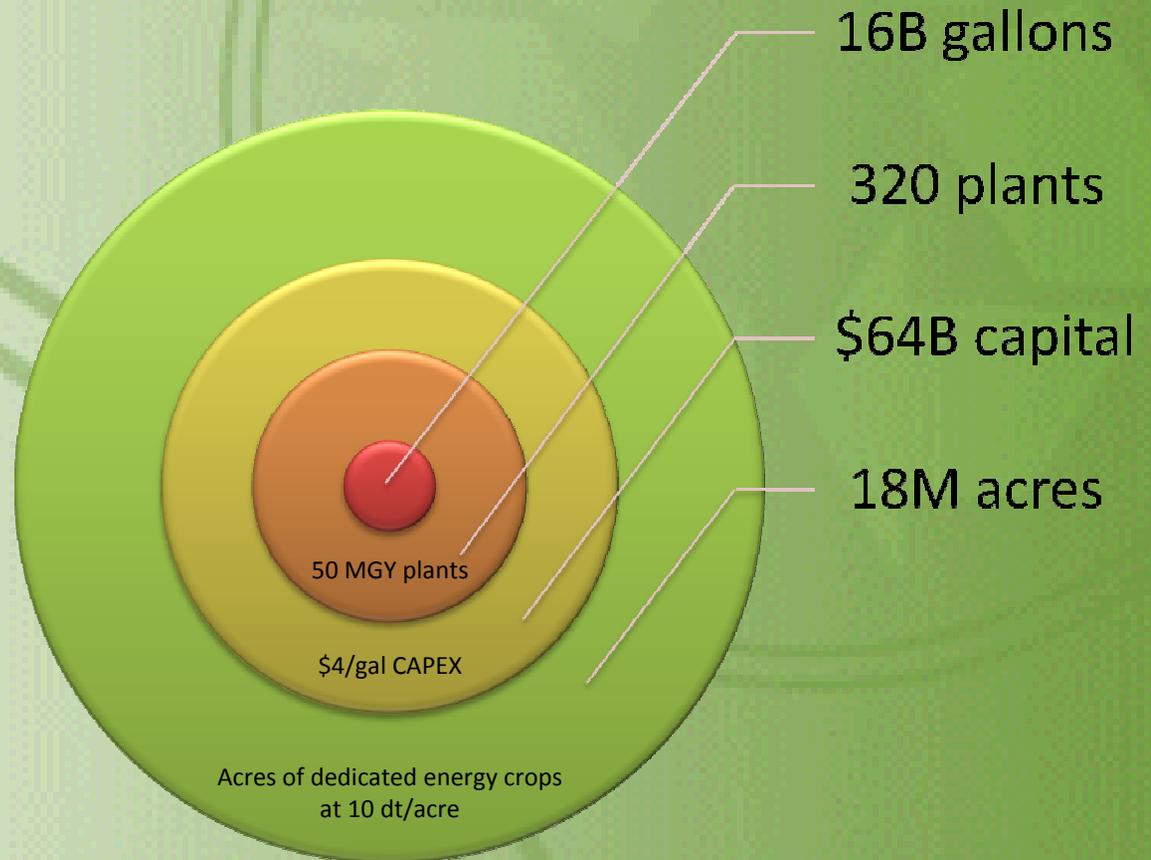
Expanded Renewable Fuels Mandate

Federal, expanded Renewable Fuels Standard (RFS2), as expanded in 2007 Energy Policy Act (EISA)



RFS2 Requires Aggressive Buildout

- Average 40 new construction starts per year by 2012
- 300+ plants likely operated on dedicated energy crops or short rotation woody crops
- Requires > 2M acres/yr **NEW** energy crops beginning 2011



Meeting the 2022 Federal Mandate for Cellulosic Ethanol

The Advanced Biofuels Industry

Energy Crop Supply Chain

Large-scale production of dedicated biomass energy crops; management of biomass supply chains



Biofuels, Bioproducts R&D

RD&D capabilities and capacity in biochemical, thermochemical, chemical catalysis, bioengineering

Business Dev't, Policy

Diverse and broad business and policy support; financial, business, legal, sustainability, analytical, technology commercialization

Engineering, Commercial Ops

Large capital-intensive infrastructure required, with skilled workforce to construct and operate



Manufacturing

- Industrial engineering
- Process engineering
- Construction
- Manufacturing
- Plant operations



R&D, Laboratory

- Chemists
- Biologists
- Materials scientists
- Chemical engineers
- Process engineers
- All “omics” fields
- Laboratory technicians
- Computational scientists



Feedstock Production & Supply

- Farm production and management
- Agronomists, soil scientists, pathologists, geneticists
- Feedstock handling, storage, transportation, conveyance
- Extension and outreach
- Feedstock logistics and supply chain management
- Seed production, sales
- Custom operations
- Input suppliers
- Farm equipment, measurement, sensors



Support Services

- Policy
- Economics
- Legal
- Financial
- Business development
- Sustainability
- Communications
- Marketing



Integrated Biomass Industry Value Chain

*The biomass value chain spans from farms to processing to consumers.
Biomass is the common foundation for a number of pathways and processes to create
biofuels, biochemicals, bioproducts, biomaterials, biopower, and bioenergy.*



Opportunities for Women

- Agriculture
- Science, technology, engineering, math (STEM) disciplines
- Finance
- Policy
- Business leadership and development
- Legal and professional
- Consumer products and marketing



Genera Energy: *Who We Are*

- Genera is a for-profit limited liability company wholly owned by the University of Tennessee Research Foundation. It was founded in 2008.
- Genera provides a vehicle to leverage state and federal funding with private research and development investments, strategic partnerships and collaborations to further the research, economic development, and clean energy objectives of the state and the University of Tennessee.
- Genera focuses on developing integrated biomass supply chain solutions and strategic partnerships to support the bioenergy industry.



Genera Energy: *Portfolio*

- **Genera's portfolio of public-private clean energy projects includes:**
 - Biomass, biofuels, biorefining, capital management, energy crops and, on the horizon, a Biomass Innovation Park located adjacent to Genera's Vonore biorefinery.
- **The Park is a research, demonstration and development area focusing on:**
 - Purpose-grown energy crops that integrates the entire biomass supply chain in one location: harvest, handling, storage, densification, transportation, pre-processing, and conversion.



Genera Energy: *What We Do*

- Genera plays a key role in implementing the University of Tennessee's Biofuels Initiative (UTBI), a \$70.5 million State investment in developing a cellulosic biofuels industry in the state, with a farm field to filling station comprehensive approach.
- Genera has partnered with DuPont Danisco Cellulosic Ethanol, LLC in the construction and operation of a demonstration-scale cellulosic ethanol biorefinery in Vonore, Tennessee, using switchgrass produced on 6,000 acres in East Tennessee.
 - **The biorefinery began producing ethanol from cobs in early 2010, and is transitioning the process to operate on switchgrass in 2011.**



U.S. Photovoltaic Market and the Role of Utilities

Julia Hamm, President & CEO

Solar Electric Power Association,
Washington D.C.

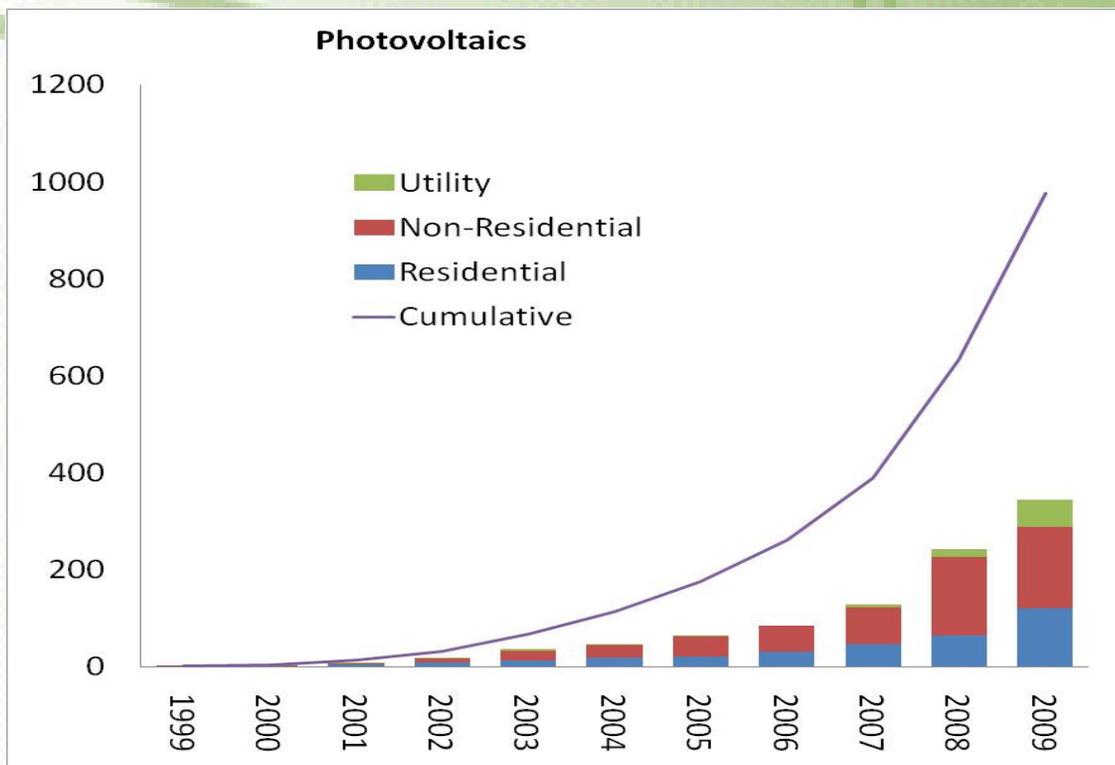


About SEPA: *Helping Utilities Make Smart Solar Decisions*

- **Formed in 1992 as the Utility Photovoltaic Group**
- **The single most-trusted source for solar information and collaborative dialogue with the solar industry**
 - Provide unbiased, reliable information
 - Answer utilities' solar questions, big and small
 - Help utilities collaborate with peers
 - Serves as a bridge between the utility and solar industries
- **Membership**
 - 115 utility members represent ~40% of U.S. electric industry
 - 600+ solar industry & stakeholder members
- **Board of Directors: 13 of 18 members are from electric utilities**



U.S. Installed Photovoltaic Capacity



PV Cumulative by State (MW)

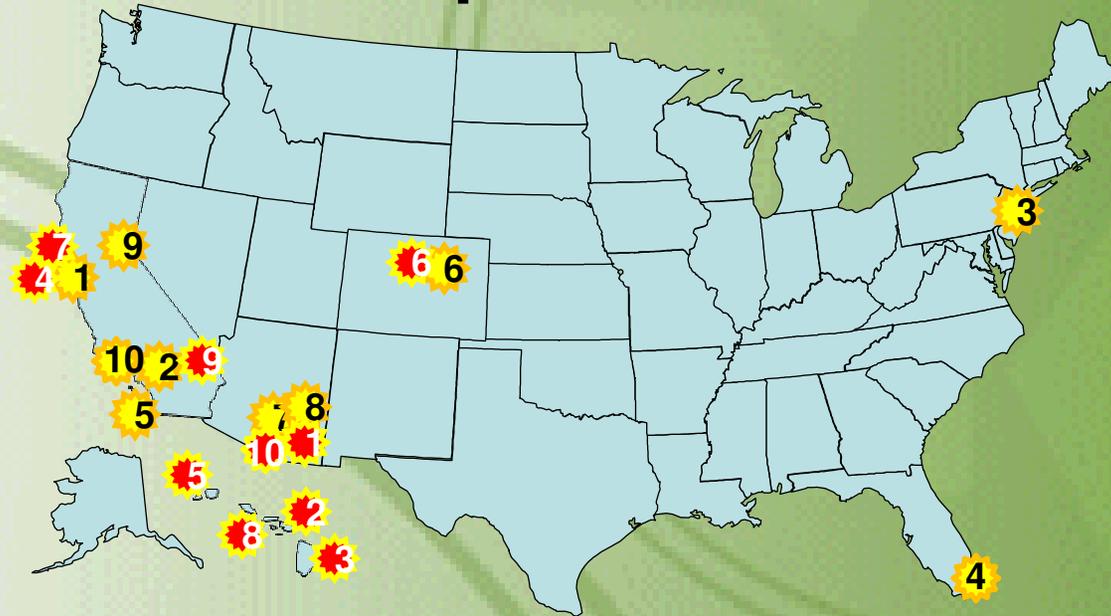
1. California – 743
2. New Jersey – 102
3. Nevada – 80
4. Colorado – 47
5. Arizona – 40

Largest PV Systems (MW)

1. DeSoto (FL) - 25
2. Blythe (CA) - 21
3. Nellis (NV) – 14
4. Space Coast (FL) – 10
5. El Dorado (CA) – 10



2009 Top Ten Rankings: Annual MW and Solar Watts-per-Customer



 **Annual Solar Megawatts (MW-ac)**

'09	'08	Rank	Utility	Value
#1	1	1	Pacific Gas & Electric Co. (CA)	85.2
#2	2	2	Southern California Edison (CA)	74.2
#3	5	3	Public Service Electric & Gas Co. (NJ)	29.6
#4	NR	4	Florida Power & Light Co. (FL)	29.5
#5	3	5	San Diego Gas & Electric Co. (CA)	17.6
#6	4	6	Xcel Energy (CO)	16.3
#7	6	7	Arizona Public Service Co. (AZ)	9.9
#8	25	8	Salt River Project (AZ)	5.8
#9	9	9	Sacramento Municipal Utility Dist. (CA)	4.8892
#10	12	10	Los Angeles Dept. Water & Power (CA)	4.889

 **Annual Solar Watts-per-Customer (Watts-ac)**

'09	'08	Rank	Utility	Value
#1	NR	1	Sulphur Springs Valley Electric Co-op (AZ)	56.0
#2	4	2	Maui Electric Co. (HI)	33.8
#3	6	3	Hawaii Electric Light Co. (HI)	31.4
#4	25	4	City of Santa Clara/Silicon Valley Power (CA)	22.3
#5	2	5	Kauai Island Utility Co-op (HI)	18.8
#6	8	6	Black Hills Energy (CO)	16.4
#7	5	7	Pacific Gas & Electric Co. (CA)	16.2
#8	9	8	Hawaiian Electric Co. (HI)	15.5
#9	19	9	Southern California Edison (CA)	15.3
#10	NR	10	Graham County Electric Co-op (AZ)	14.8



Source: SEPA, 2009.

Market Sectors

Residential

- Generally customer owned and net metered
- Third-party ownership model in place in some states

Commercial

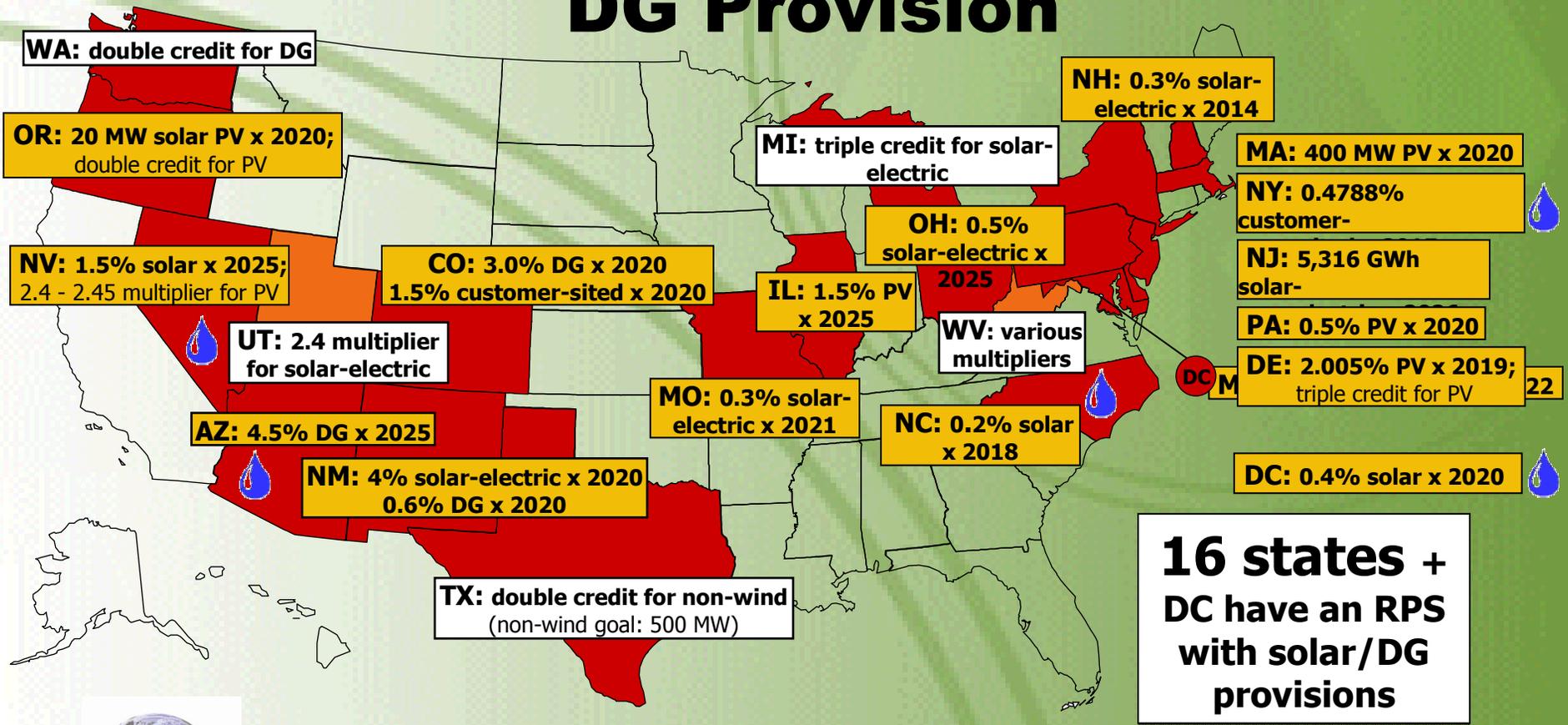
- Generally third-party owned and net metered

Utility

- Large projects generally third-party owned with power sold to utilities through long-term power purchase agreements
- Starting to see utility owned projects – both large scale and distributed in nature (see later examples)

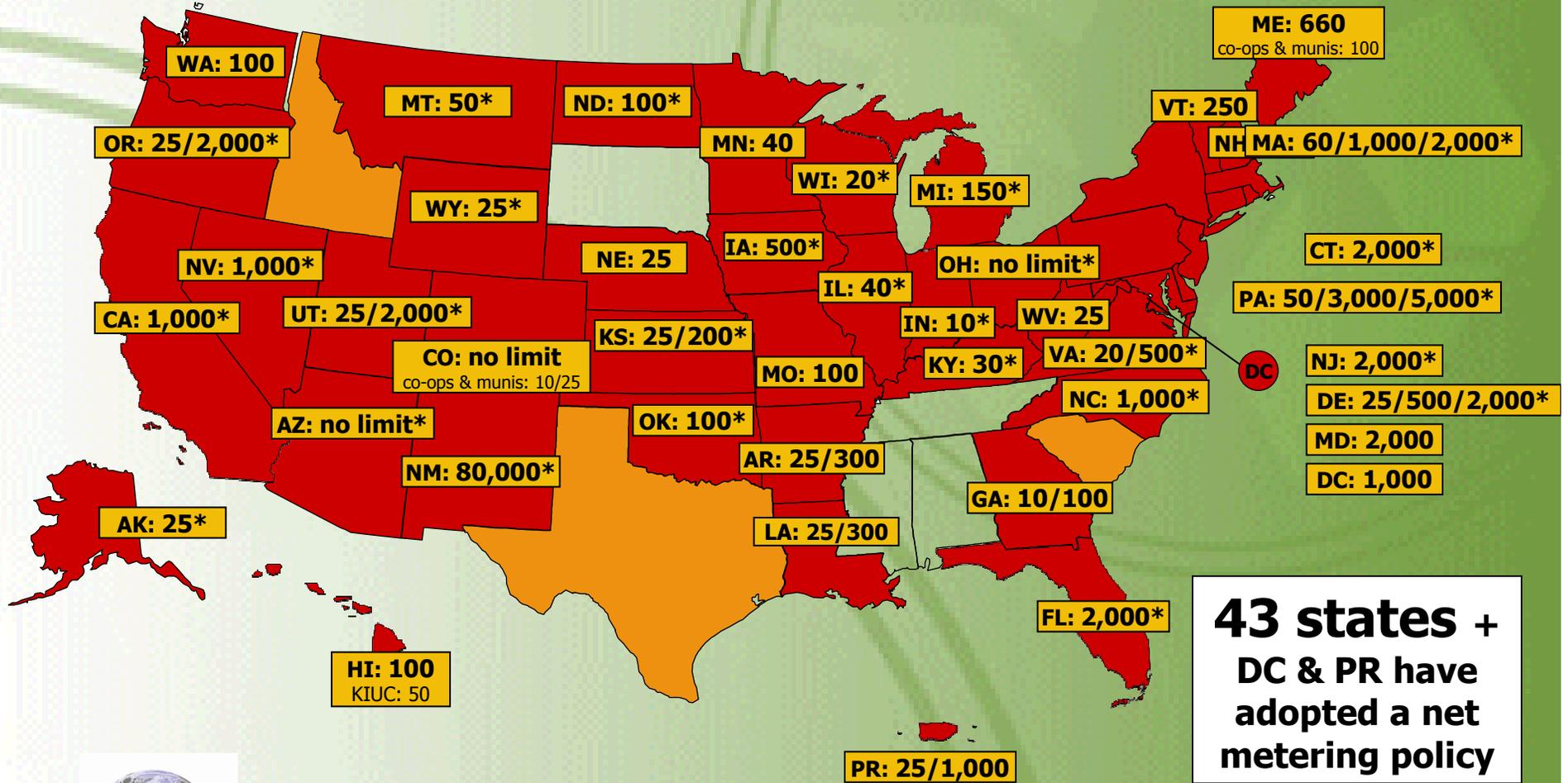


Policy Mechanisms: Renewable Portfolio Standard with Solar or DG Provision



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

Policy Mechanisms: Net Metering

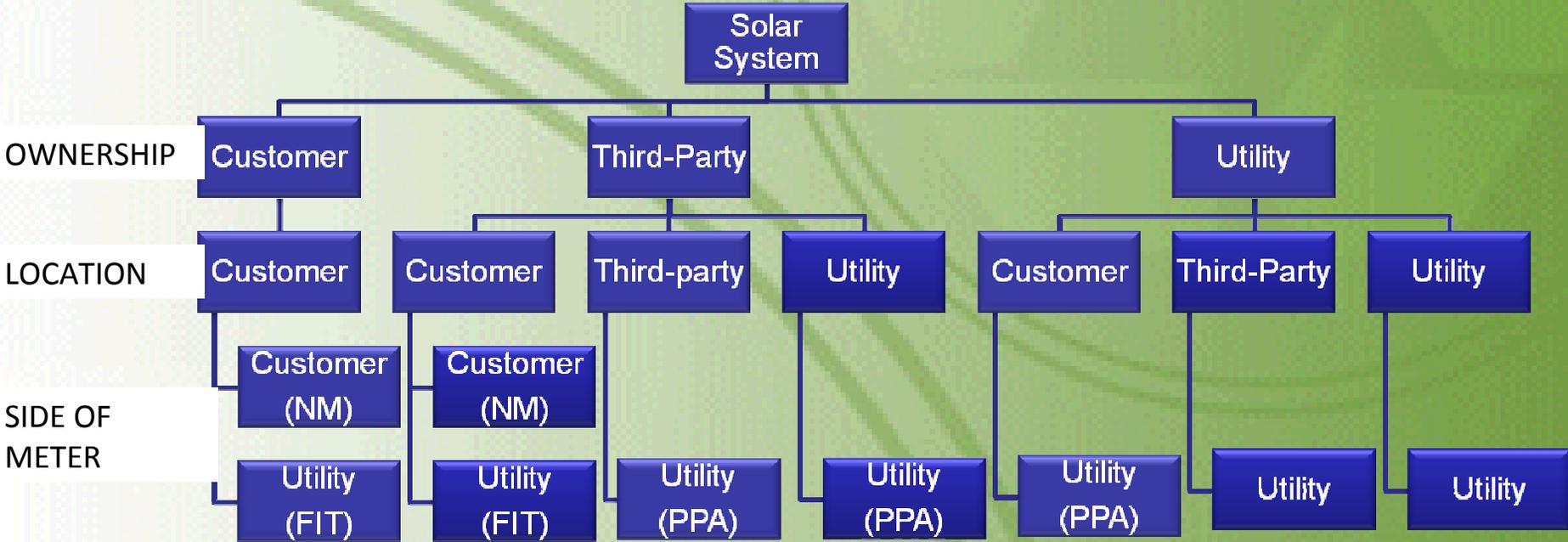


- State policy
- Voluntary utility programs only

State policy applies to certain utility types only (e.g., investor-owned utilities)

Note: Numbers indicate individual system capacity limit in kW. Some limits vary by customer type, technology and/or application. Other limits might also apply.

Solar Configurations

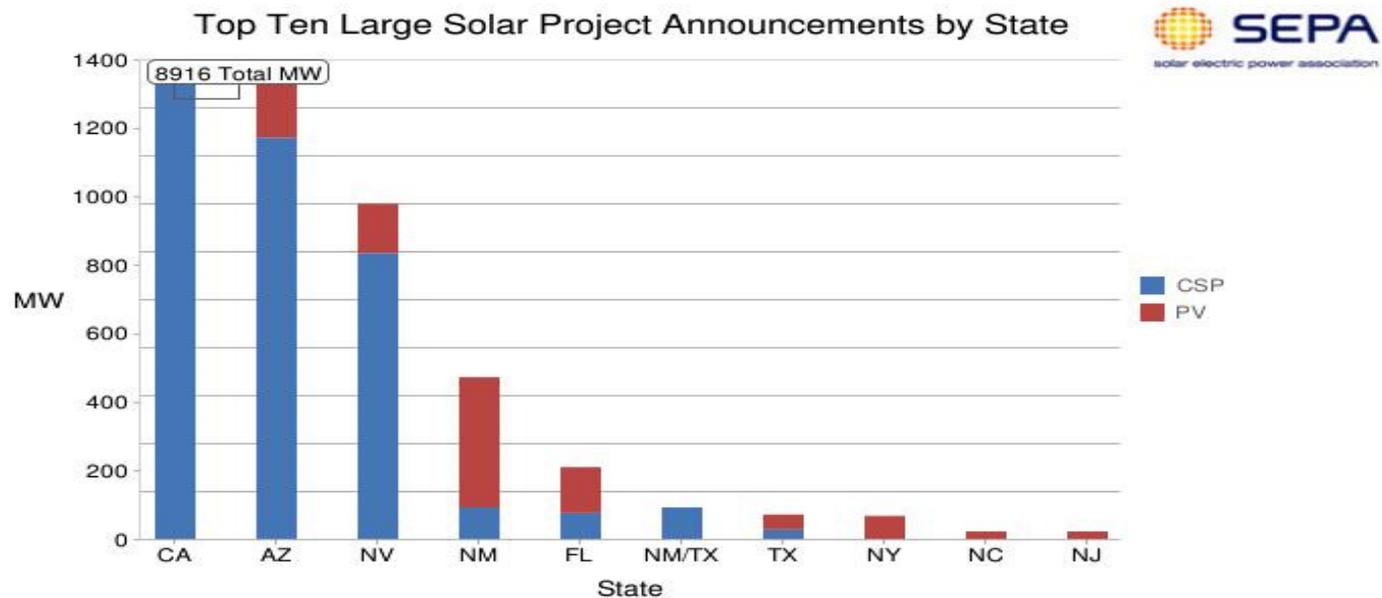


NM – Net metering

FIT – Feed in tariff

PPA – Power purchase agreement

Ten Largest Solar Project Announcements by State, 2010-2016

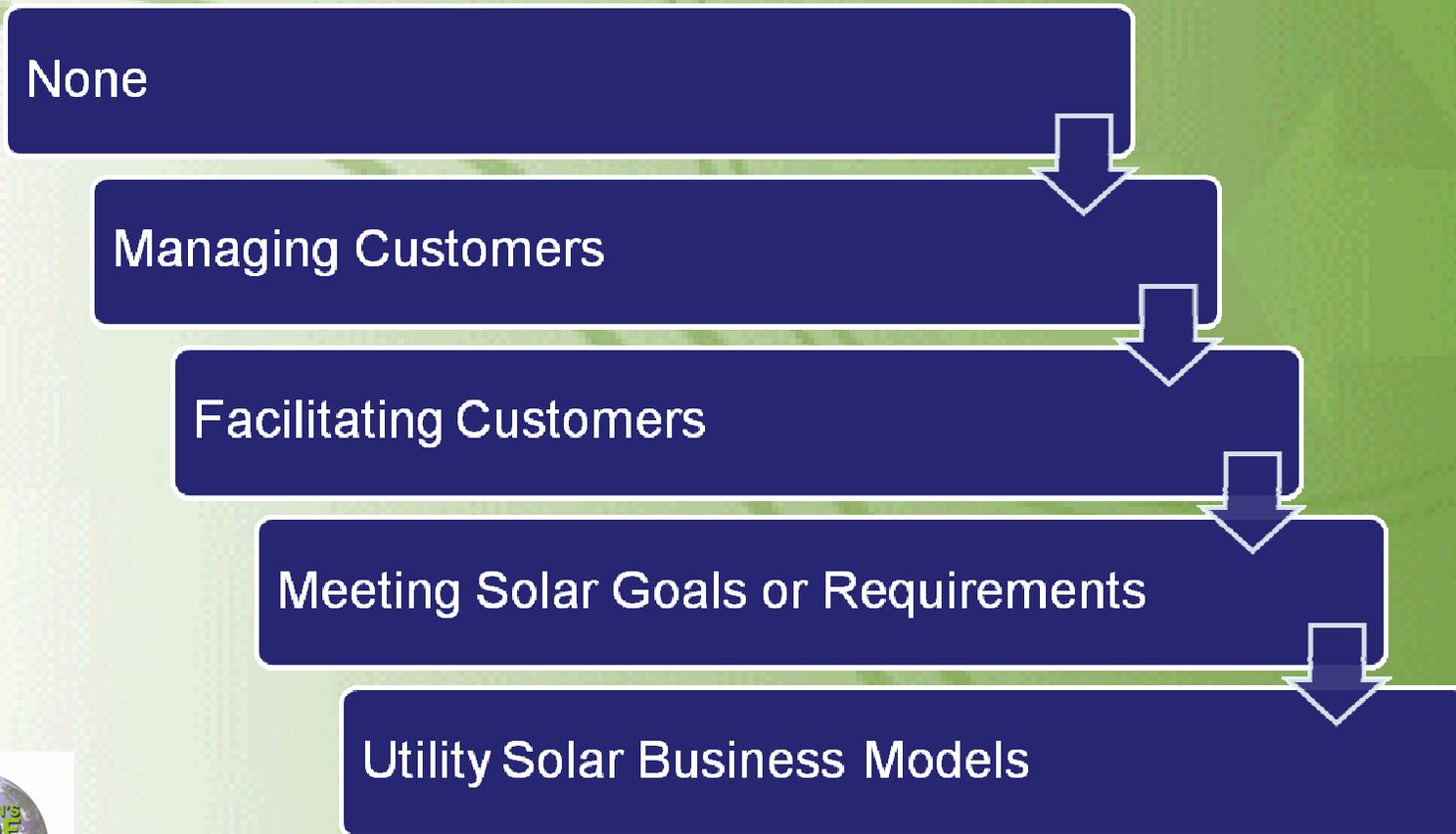


State	CA	AZ	NV	NM	FL	NM/TX	TX	NY	NC	NJ
Total	8916	1432	978	472	209	92	71	67	22	22
PV	3550	261	144	380	134	0	44	67	22	22
CSP	5366	1171	834	92	75	92	27	0	0	0



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Disclaimer: This solar project announcement dataset is based on projects 5MW or greater using publicly available data and may not represent all planned solar projects.

Utility Engagement in Solar



Utility Solar Business Model Categories

Ownership

Energy Purchases

Financing



Utility Ownership Example

Florida Power & Light – 110 MW of Central Station Plants



Aero
Photo

727.520.8181
www.aerophoto.com

Desoto Next Generation Solar Energy Center

Image # 90724 1010
Date 07.24.09

Desoto Next Generation Solar Energy Center

- Completed in October 2009
- 25 MW - the largest solar photovoltaic plant in the U.S.
- Located on FPL-owned property in DeSoto County, FL
- Plant consists of more than 90,500 solar panels



Utility Ownership Example

PSE&G – 80 MW of Distributed Solar



Solar-4-All Program

- 200,000 utility poles with 200 watt panels totaling 40 MW
- 40 MW of systems on other utility, public, and private sites



Utility Ownership Example

Southern California Edison – 250 MW of Distributed Rooftop Solar



SCE Solar Rooftop Program

- 250 MW of aggregated 1-2 MW systems on leased commercial and industrial customer rooftops
- Approved by CPUC with pairing of 250 MW of third-party-owned distribution systems



Utility PPA Example

Tri-State Generation & Transmission

30 MW PV Plant



Tri-State G&T Program

- 30 MW thin film (First Solar) PV plant
- Covers 250 acres
- Owned by Southern Company and Turner Renewable Energy
- All output purchased by Tri-State



Utility Financing Example

PSE&G – Solar Loan Program



Solar Loan Program

- 81 MW program
- Rate of return earned on \$250 million in loans repaid with renewable energy credits
- Cost recovery on administrative costs



Careers in the Solar Industry

- Manufacturing
- Research & Development
- Support Services
- Expertise for utilities



Solar Employment Study

- Joint project with SEPA, Solar Energy Industries Association, and The Solar Foundation
- Attempting to determine:
 - Current employment levels
 - What employment demands can be expected in 1-5 years
- Study findings will be released in October 2010



Learn More about the U.S. Solar Market

North America's
Largest B2B
Solar Event

**SOLAR
POWER 10**
INTERNATIONAL

October 12-14, 2010
Los Angeles, CA



Question and Answer Period





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