SEPA

solar electric power association

Helping Utilities Make Smart Solar Decisions

Utility Solar Market Trends

May 26, 2011

McIlvaine Company

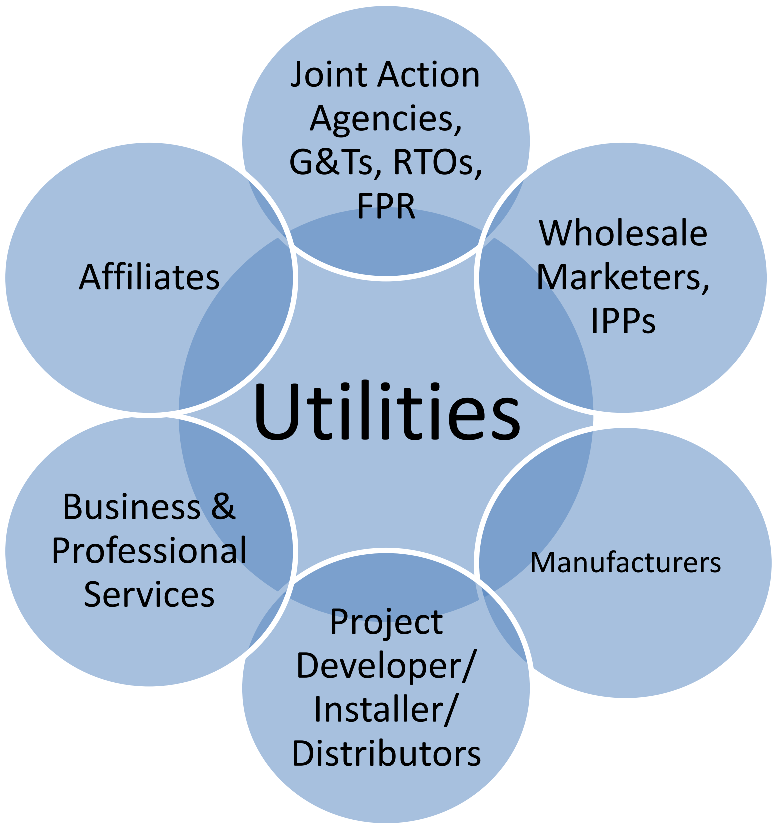
Bart Krishnamoorthy, SEPA

Presentation Overview

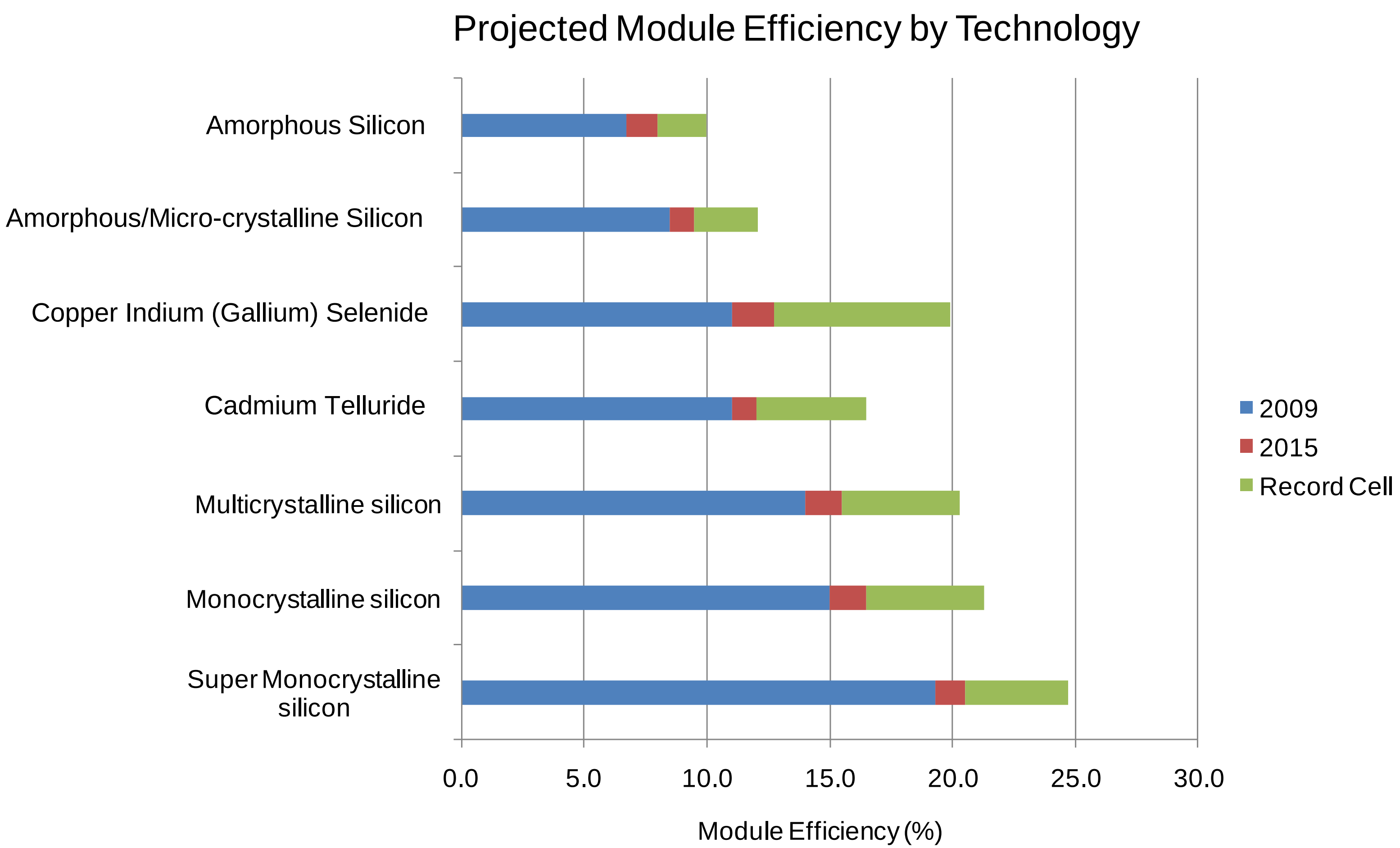
- About SEPA
- Technology Overview
- Solar Market from a Utility Context
- Evolving Solar Markets

About SEPA

- Formed in 1992 as the Utility Photovoltaic Group
- Educational non-profit organization with 263 utility and 600 non-utility members
- Provides unbiased solar information, services and events with a utility focus



PV Technologies & Efficiency



Source: SEPA PV Technology Characterization Report

PV Market Applications

Residential:

- Small (<10 kW) systems, roof-mounted
- Space-constraints meaning preference for higher efficiency and aesthetics
- c-Si dominates, but higher-efficiency thin film has opportunities

Commercial:

- Ranges from 10 kW – 2 MW, also roof-mounted
- No clear technology niche

solar electric power association

PV Market Applications

Utility-scale:

- Large (> 5 MW), ground-mounted systems; no space constraints
- All technologies currently deployed, but special area of focus for thin film companies
- c-Si often uses tracking systems to enhance output

Special applications:

- Building-integrated PV (BIPV): PV element integrated into building fabric (curtain wall, façade, shingle)

solar electric power association

CSP Technology Types

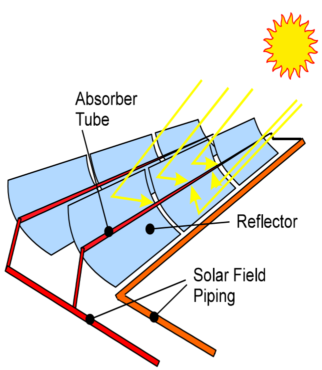


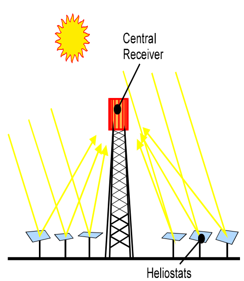

Trough

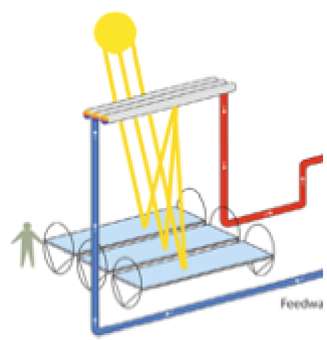
Tower

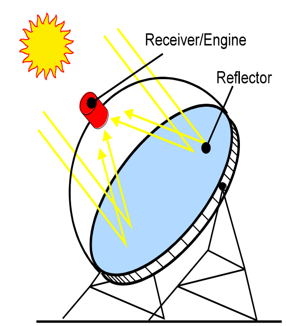
Linear Fresnel

Dishes





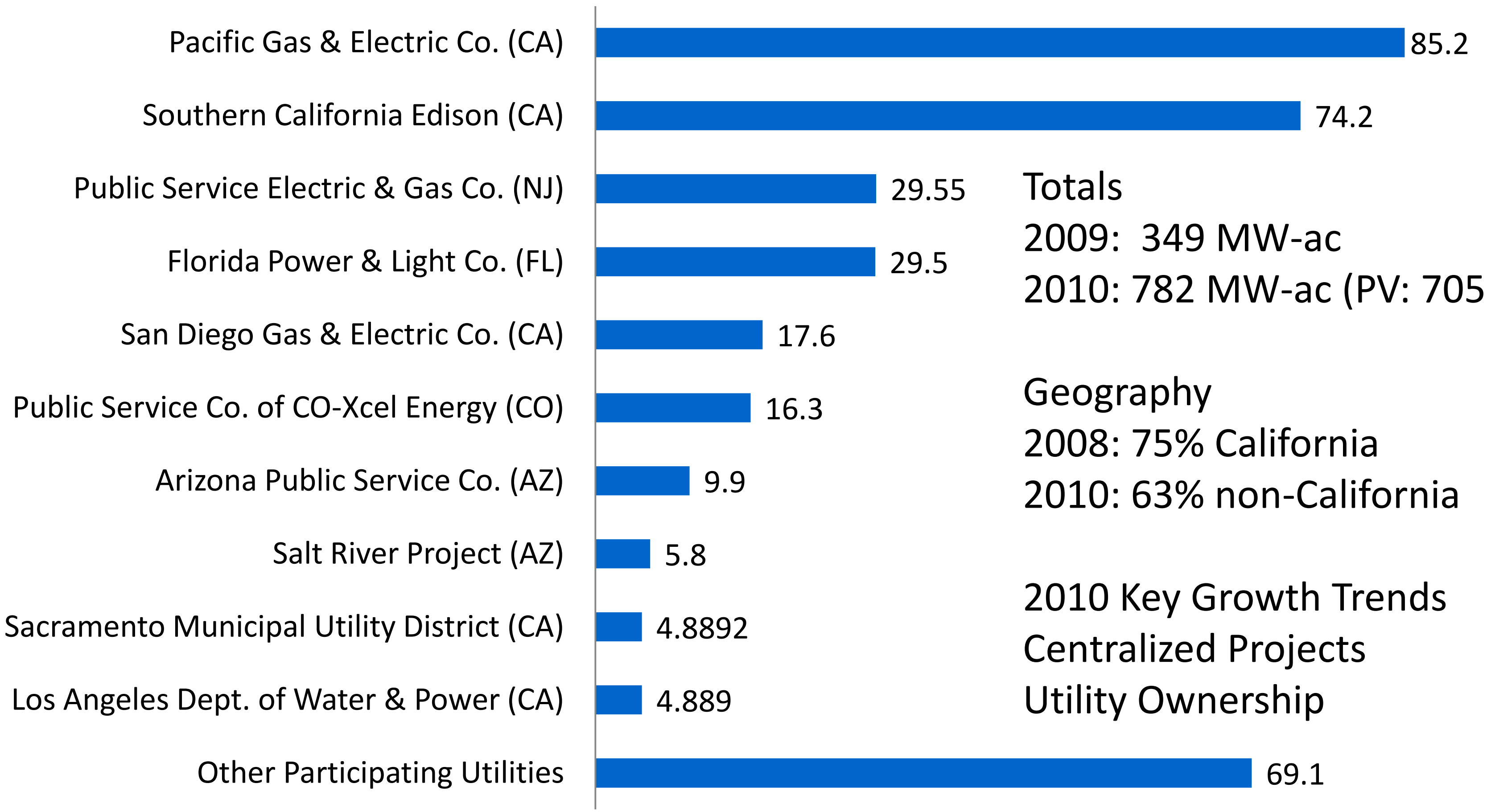




Source: DOE/NREL

Annual Installations - 2009

Solar Megawatts (MW-ac)



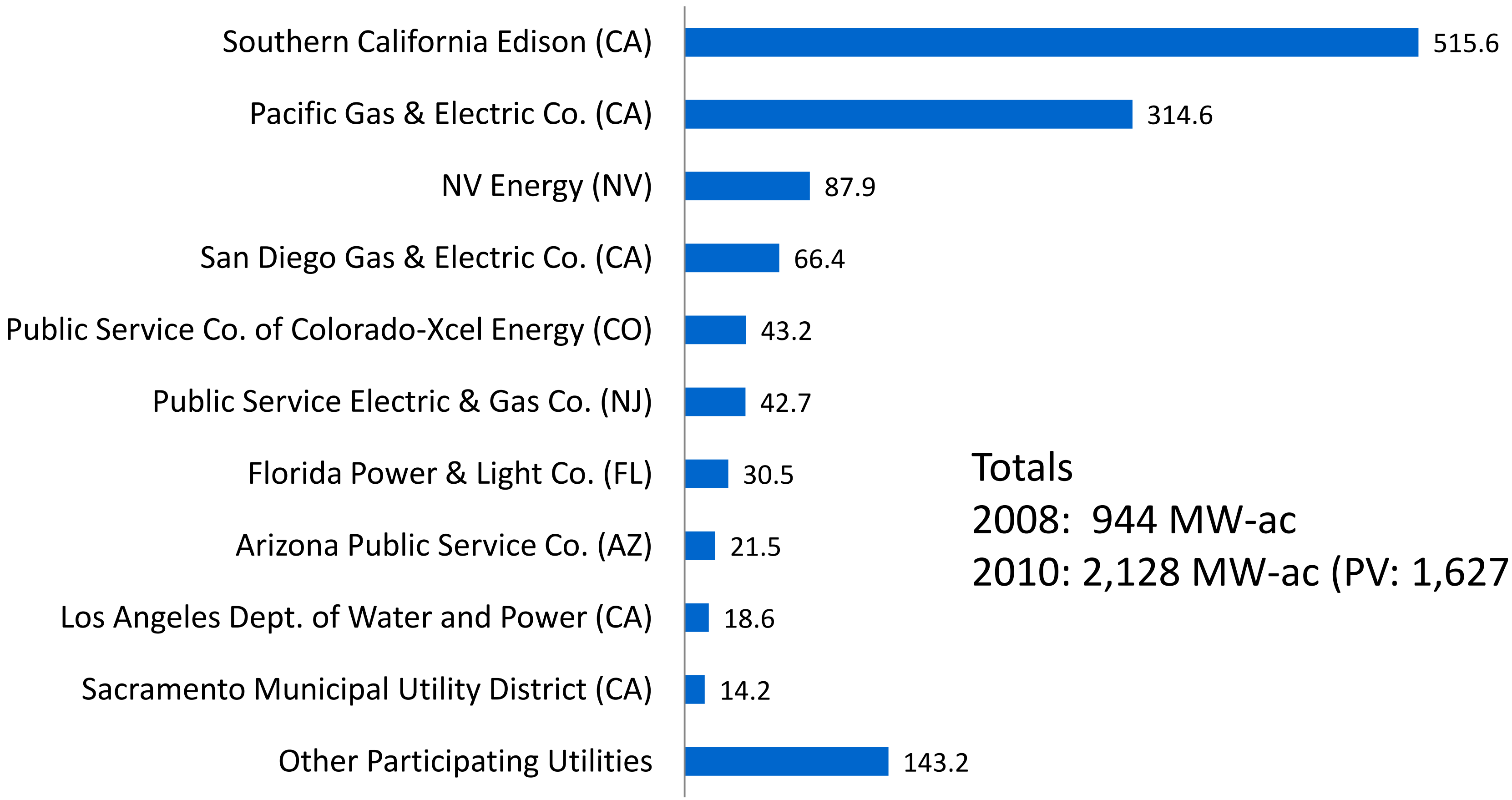
Totals
2009: 349 MW-ac
2010: 782 MW-ac (PV: 705 MW)

Geography
2008: 75% California
2010: 63% non-California

2010 Key Growth Trends
Centralized Projects
Utility Ownership

Cumulative Installations

Solar Megawatts (MW-ac); data as of 12/09



Totals
2008: 944 MW-ac
2010: 2,128 MW-ac (PV: 1,627 MW)

SEPA
solar electric power association

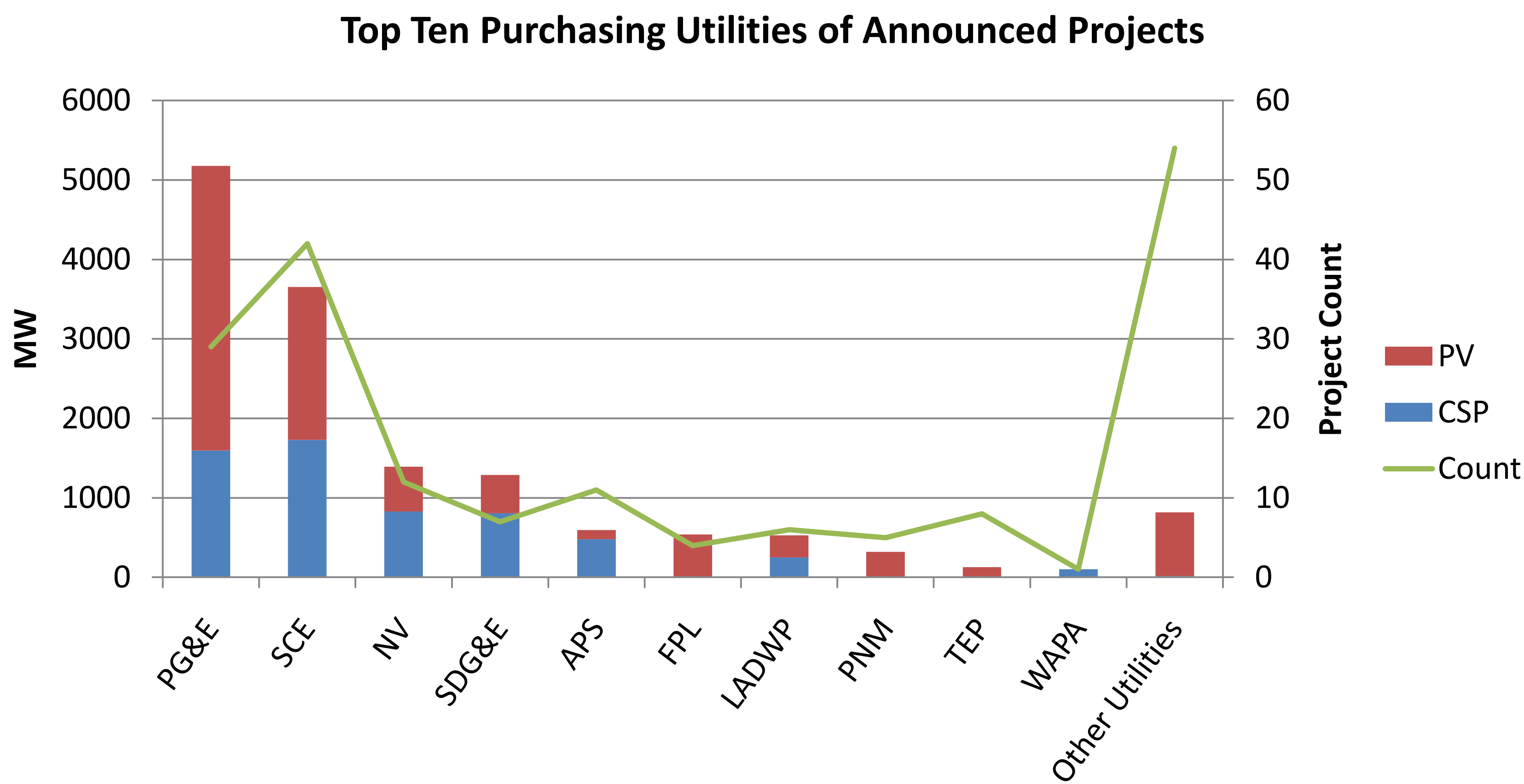
Largest Projects in 2010

	Project	MW	Tech.	Owner/Offtaker
1	Martin Solar Center	75 MW	CSP	Florida Power & Light (FL)
2	Copper Mountain	48 MW	PV	Pacific Gas & Electric (CA)
3	Cimarron 1 Solar	30 MW	PV	Tri-State G&T (CO)
4	Greater Sandhill	16 MW	PV	Xcel Energy-CO (CO)
5	Blue Wing Solar	14.5 MW	PV	CPS Energy (TX)
6	Jacksonville PV Davidson (Phase 2)	12 MW	PV	JEA (FL) Duke Energy Carolinas (NC)
7	Wyandot Solar Farm	10.1 MW	PV	Ohio Power-AEP (OH)
8	Space Coast Solar	10 MW	PV	Florida Power & Light (FL)
9	Exelon City Solar	8 MW	PV	Exelon (IL)
10	CalRENEW-1	5 MW	PV	Pacific Gas & Electric (CA)

Largest Existing Projects

	Project	MW	Tech.	Utility Owner/Offtaker
1	SEGS VIII (1990) SEGS IX (1991)	80 MW	CSP	Southern California Ed. (CA)
2	Martin Solar Center (2010)	75 MW	CSP	Florida Power & Light (FL)
3	Nevada Solar One (2007)	64MW	CSP	NV Energy (NV)
4	Copper Mountain (2010)	48 MW	PV	Pacific Gas & Electric (CA)
5	Cimarron 1 Solar (2010) SEGS II (1986) SEGS III (1987) SEGS IV (1987) SEGS V (1988) SEGS VI (1989) SEGS VII (1989)	30 MW	PV CSP CSP CSP CSP CSP CSP	Tri-State G&T (CO) Southern California Ed. (CA) Southern California Ed. (CA) Southern California Ed. (CA) Southern California Ed. (CA) Southern California Ed. (CA) Southern California Ed. (CA)
6	DeSoto Solar Center (2009)	25 MW	PV	Florida Power & Light (FL)
7	FSE Blythe (2009)	21 MW	PV	Southern California Ed. (CA)
8	Greater Sandhill (2010)	16 MW	PV	Xcel Energy-CO (CO)
9	Davidson 1 & 2 (2010)	15.5 MW	PV	Duke Energy (NC)
10	Blue Wing (2010)	14.5MW	PV	CPS Energy (TX)

Future Large Projects



Data and Maps Available Online: http://tinyurl.com/sepadatamap

Evolving Solar Markets

Three U.S. solar market stages:

1. Customer-driven: customer owned, net metered
2. Industry-driven: third-party owned, net metered
3. Utility-driven: scale and utility value
   - Utility Solar Procurement
   - Utility Solar Business Models

SEPA Focus Area

As solar markets evolve, new opportunities for expansion result.

SEPA
solar electric power association

Utility Ownership

www.tinyurl.com/SEPADataMap

- Select Utility Ownership Programs
  - APS: 100 MW
  - Pacific Gas & Electric: 250 MW
  - Southern California Edison: 250 MW
  - San Diego Gas & Electric: 26 MW
  - Public Service Electric & Gas: 120 MW
  - Duke Energy: 10 MW
  - Florida Power & Light: 110 MW

- Characteristics
  - Majority PV technologies
  - Majority distributed projects
  - Majority IOUs

solar electric power association

Unregulated Utilities

- Unregulated Utilities and Utility Holding Companies are making investments in solar…

1. Solar Project Development and Operation
   - Sempra Generation (SDG&E): 48 MW for PG&E
   - PSEG Solar: 10 MW for Ohio Power
   - Exelon Generation – 8 MW for ComEd
   - NextEra (FPL): 10 MW for FP&L
   - Duke Energy Generation: 14.5 MW in Texas for CPS Energy

2. Capital Investments
   - PG&E : $60M financing SolarCity; $100M financing SunRun

SEPA
solar electric power association

Conclusions

- Fast domestic market growth
- New growth areas in centralized and utility ownership
- 3 market stages, latest being utility driven
  - Procurement for RPS compliance
  - Adding solar value to utilities

SEPA

solar electric power association

Helping Utilities Make Smart Solar Decisions

Bart Krishnamoorthy

bkrishnamoorthy@solarelectricpower.org