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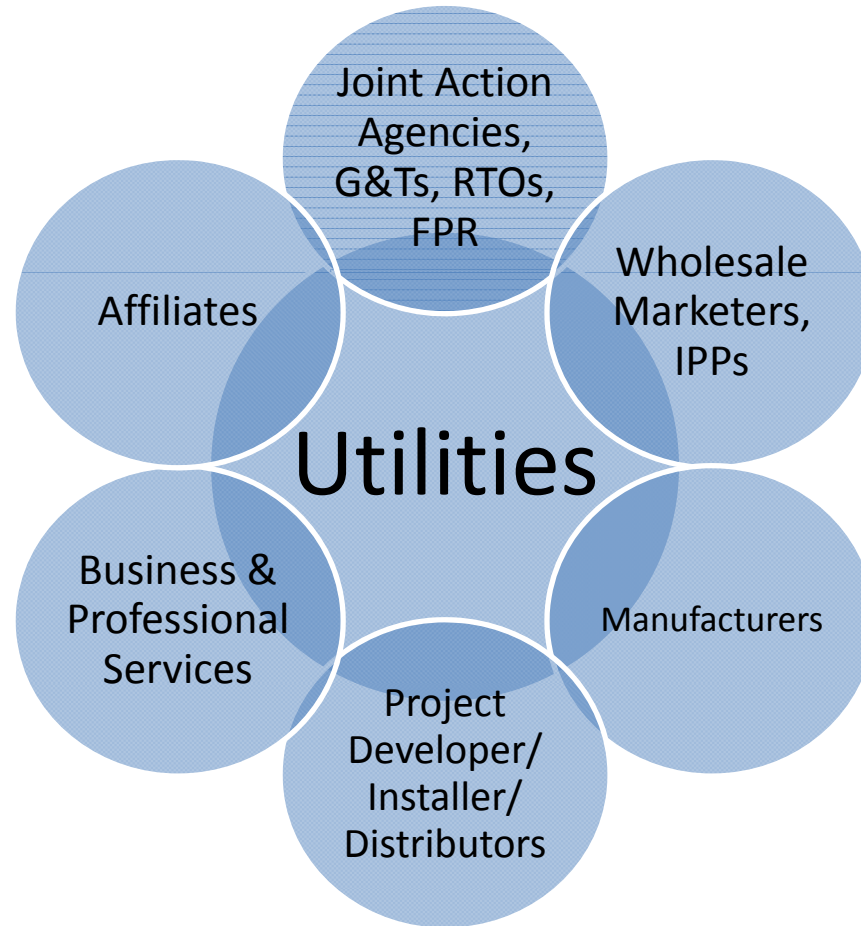


Helping Utilities Make Smart Solar Decisions

Member Time: Solar Electric Power Association

ACPAC Meeting
March 18, 2013
Raphael Isaac

Member Composition



Sampling of Members



- > 1,000 members in total
- 420 utility members
 - 90%+ of all U.S. installed solar capacity
 - 49% of all U.S. electricity customers

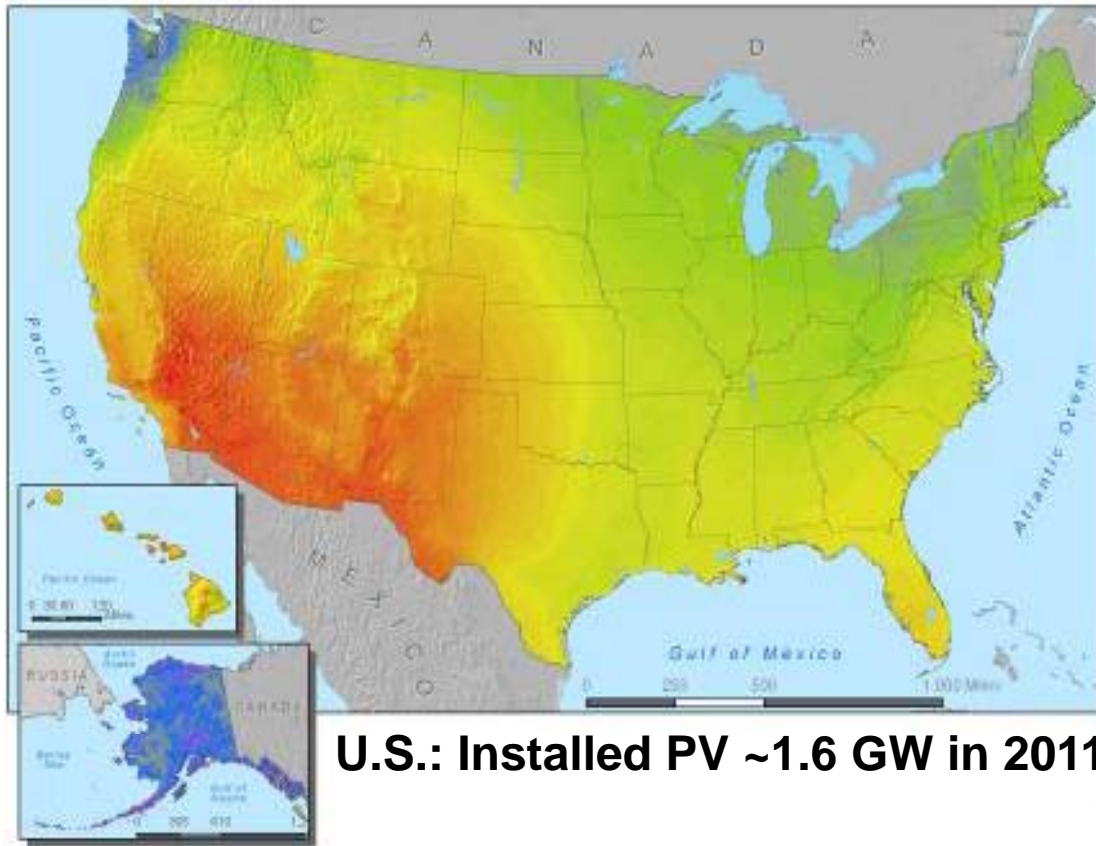




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U.S. – Unrealized Solar Potential



U.S.: Installed PV ~1.6 GW in 2011



Germany: ~7.5 GW in 2011

kWh/m²/Year

Sources: Solar Resource Availability: NREL, PV Capacity Additions: SEPA



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- Concentrating Solar (CSP)
 - ✓ Linear Concentrator Systems
 - ✓ Dish/Engine Systems
 - ✓ Power Tower Systems
 - ✓ Parabolic-trough systems



Sierra SunTower, eSolar,
Southern California



APS' Saguaro Power Plant, about
30 miles north of Tucson.



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Technology Overview

- Photovoltaic (PV)
 - ✓ Silicon
 - ✓ Polycrystalline thin films
 - ✓ Single crystalline thin film



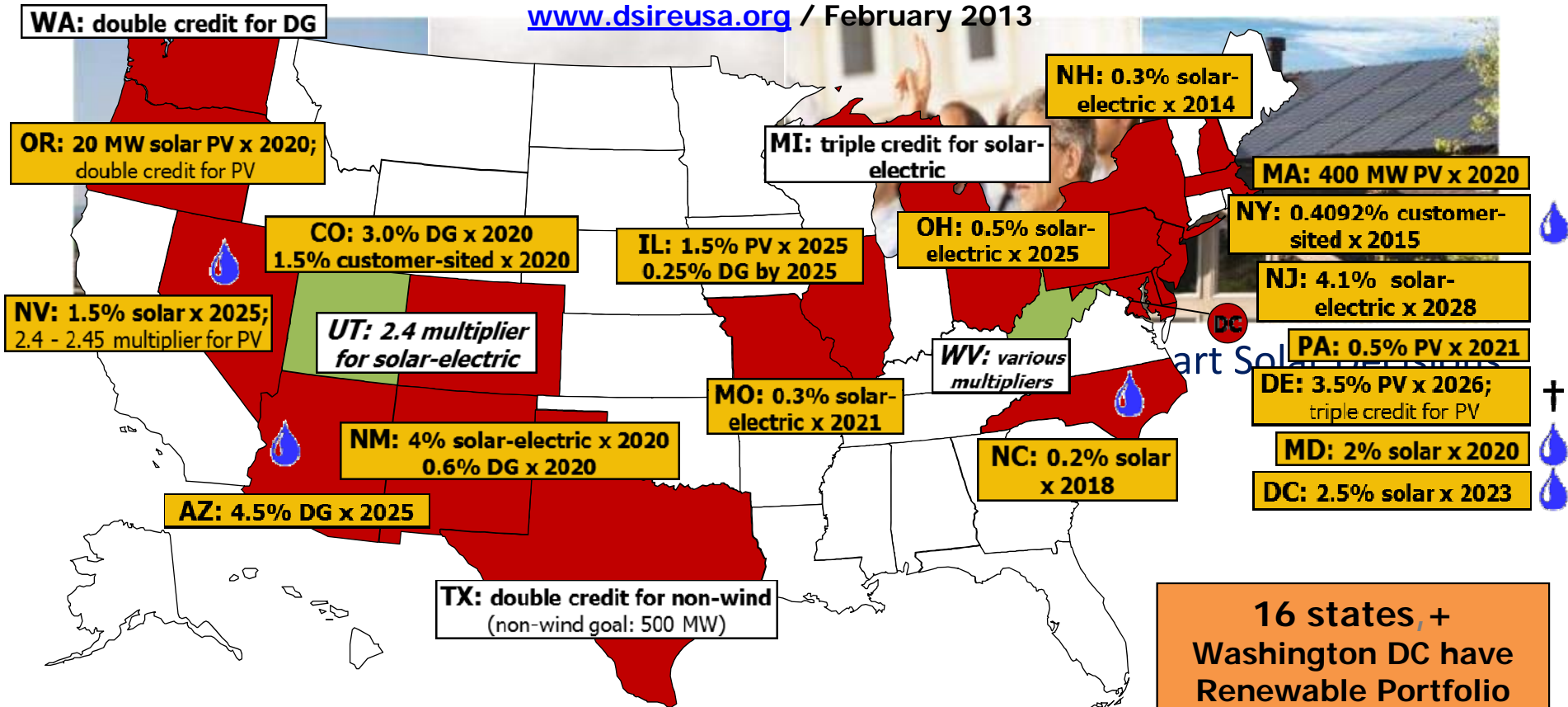


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Renewable Portfolio Standard Policies with Solar / Distributed Generation Provisions

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www.dsireusa.org / February 2013



 Renewable portfolio standard with solar / distributed generation (DG) provision

 Renewable portfolio goal with solar / DG provision

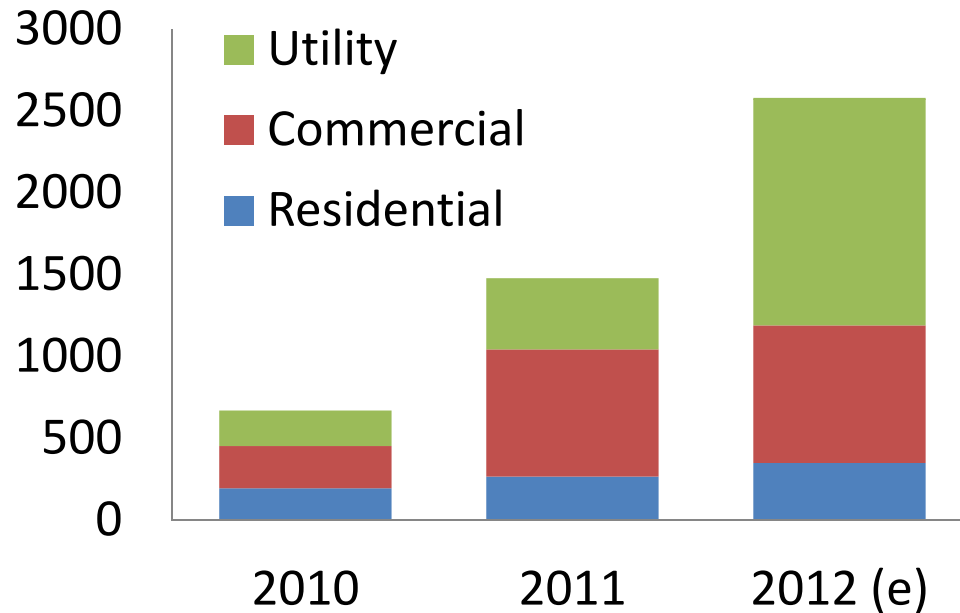
 Solar water heating counts toward solar / DG provision

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

16 states, + Washington DC have Renewable Portfolio Standards with Solar and/or Distributed Generation provisions

U.S. Market Growth Megawatts-AC

Megawatts (AC)



Top Utilities (2011):

PG&E (CA) – 288 MW-ac
PSEG (NJ) – 181 MW-ac
APS (AZ) – 144 MW-ac
SCE (CA) – 139 MW-ac
ACE (NJ) – 61 MW-ac

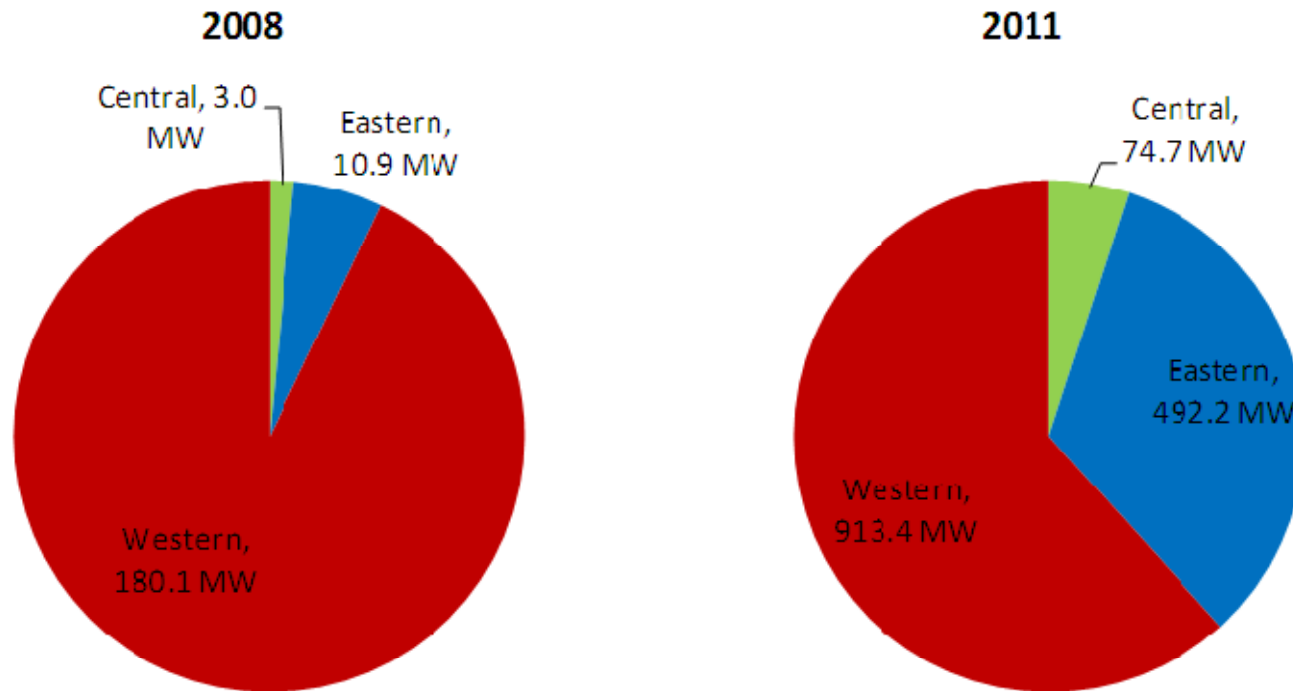
Top States (2012):

California (Utility)
New Jersey (Commercial)
Arizona (Utility)
Nevada (Utility)
Massachusetts (Commercial)

**Cumulative 2012 (e):
6200 MW-ac**

Source: 2010 & 2011 – SEPA; 2012 estimate – GTM Research

Regional Growth



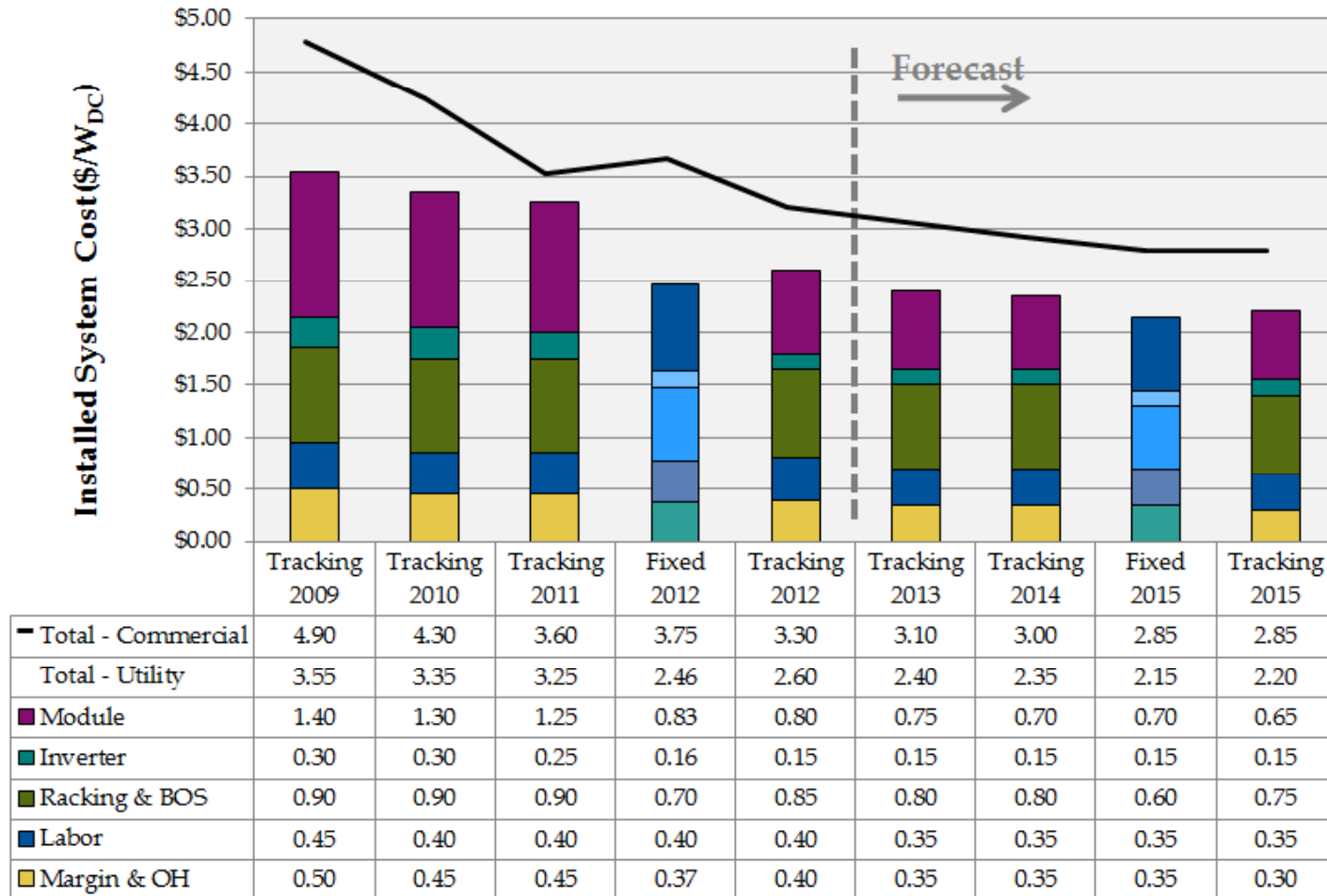
Source: Solar Electric Power Association, 2011 SEPA Utility Solar Rankings



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2013 and Beyond

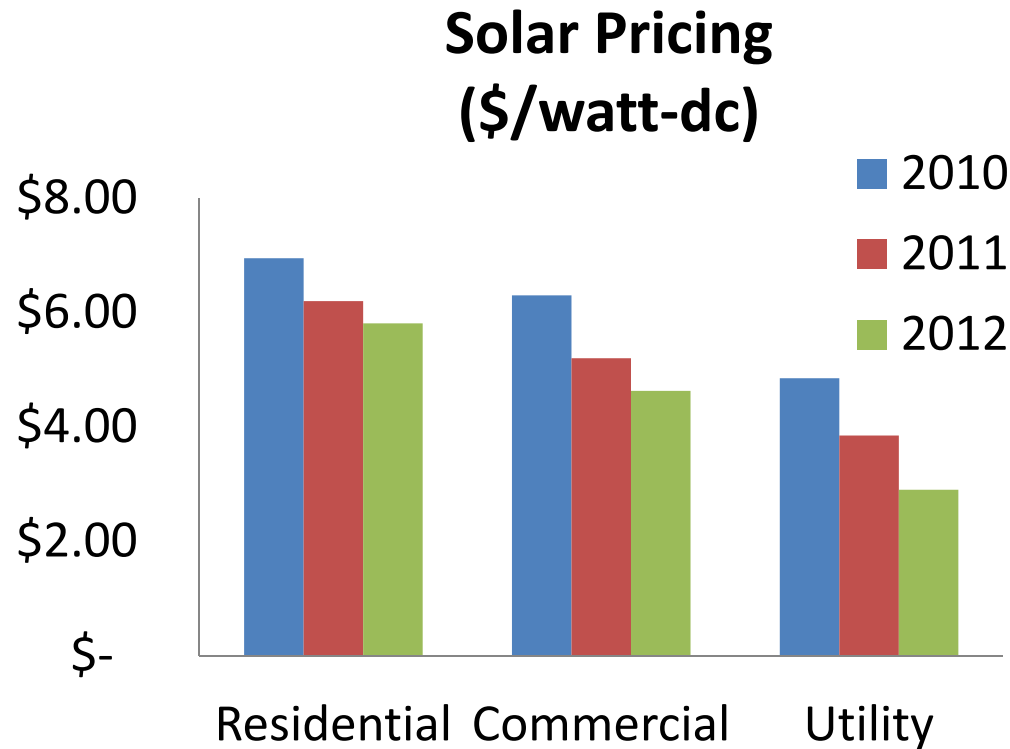


Helping Utilities Make Smart Solar Decisions

1. Renewable Requirements & Goals
2. Economic development interests
3. Lower solar costs
4. Customer solar interests
5. Competition for customers



Installed Cost 2010-2012 (Q1 Data Only)



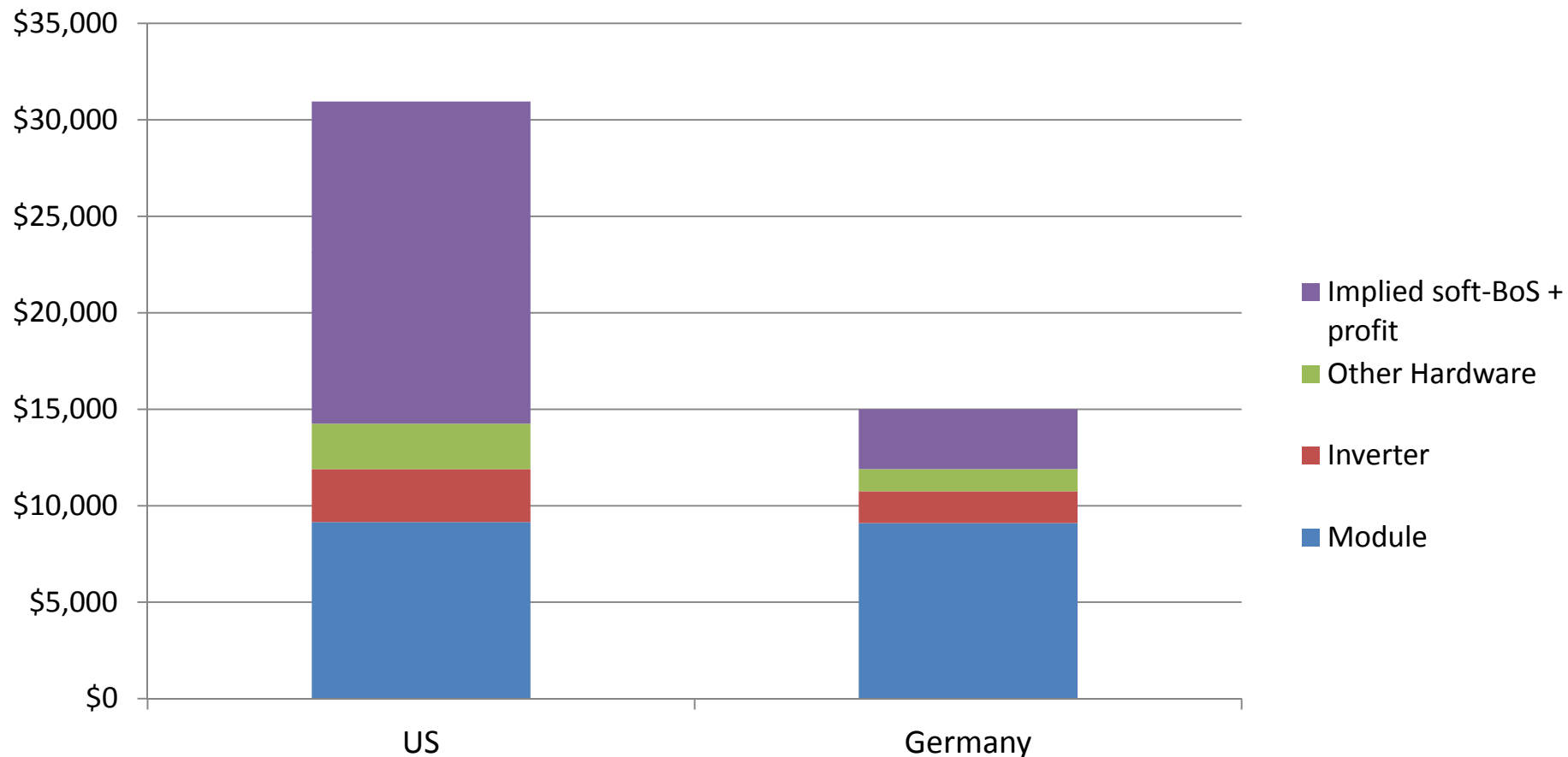
Q2 2012 Price Leaders:
 Residential: \$4.32 (TX)
 Commercial: \$3.80 (NJ)
 Utility: \$2.60 (US)

5-10% decline Q1 to Q2

Where can it go?
 If Germany is an indicator:
 Residential: < \$3
 Commercial: < \$2
 Utility: < \$1.50

Source: GTM Research

Residential Solar 5kW: US vs. Germany



Data courtesy of LBNL: Seel, Barbose, & Wiser, "Why are Residential PV Prices in Germany So Much Lower Than in the United States," September, 2012

Time to Installation



**New York City's
Goal**

100 days

from inception to completion



**Germany
Today**

8 days

from inception to completion

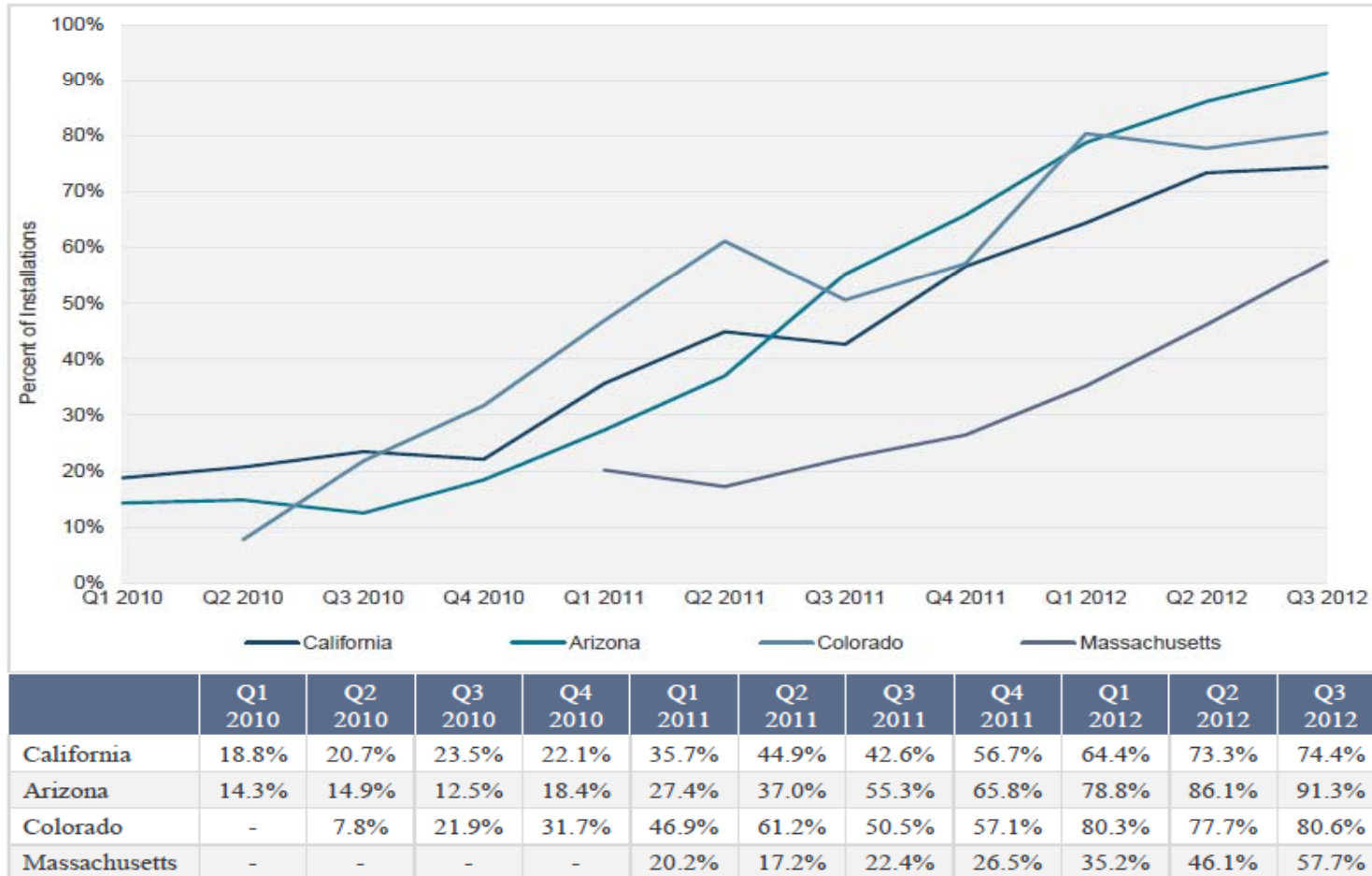
The Permitting Process: Challenges

Local permitting processes add on average

\$2,516

to the installation cost of residential PV

Third Party Ownership Leasing and PPA Models Increase Domination



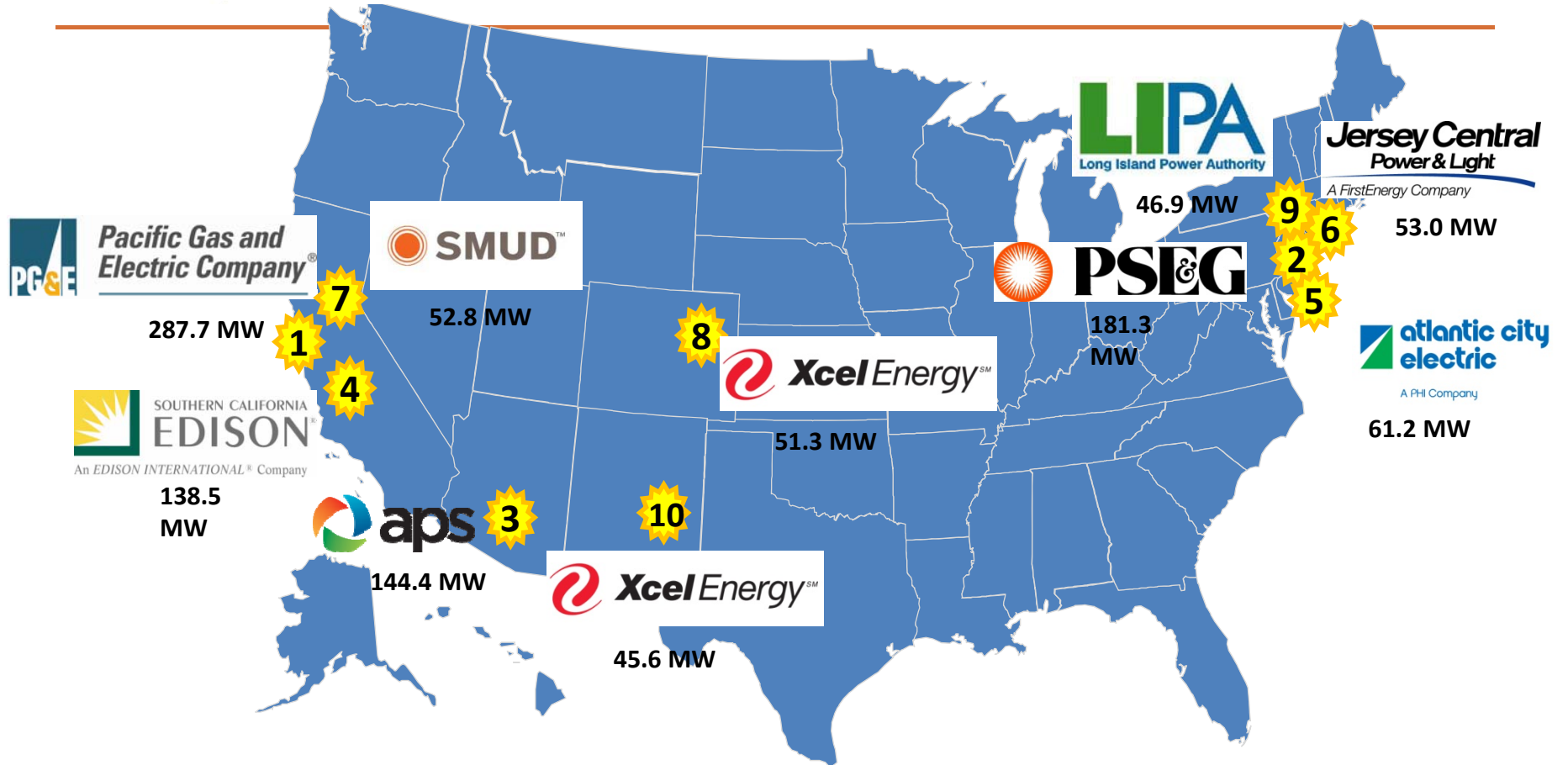
Source: GTM Research



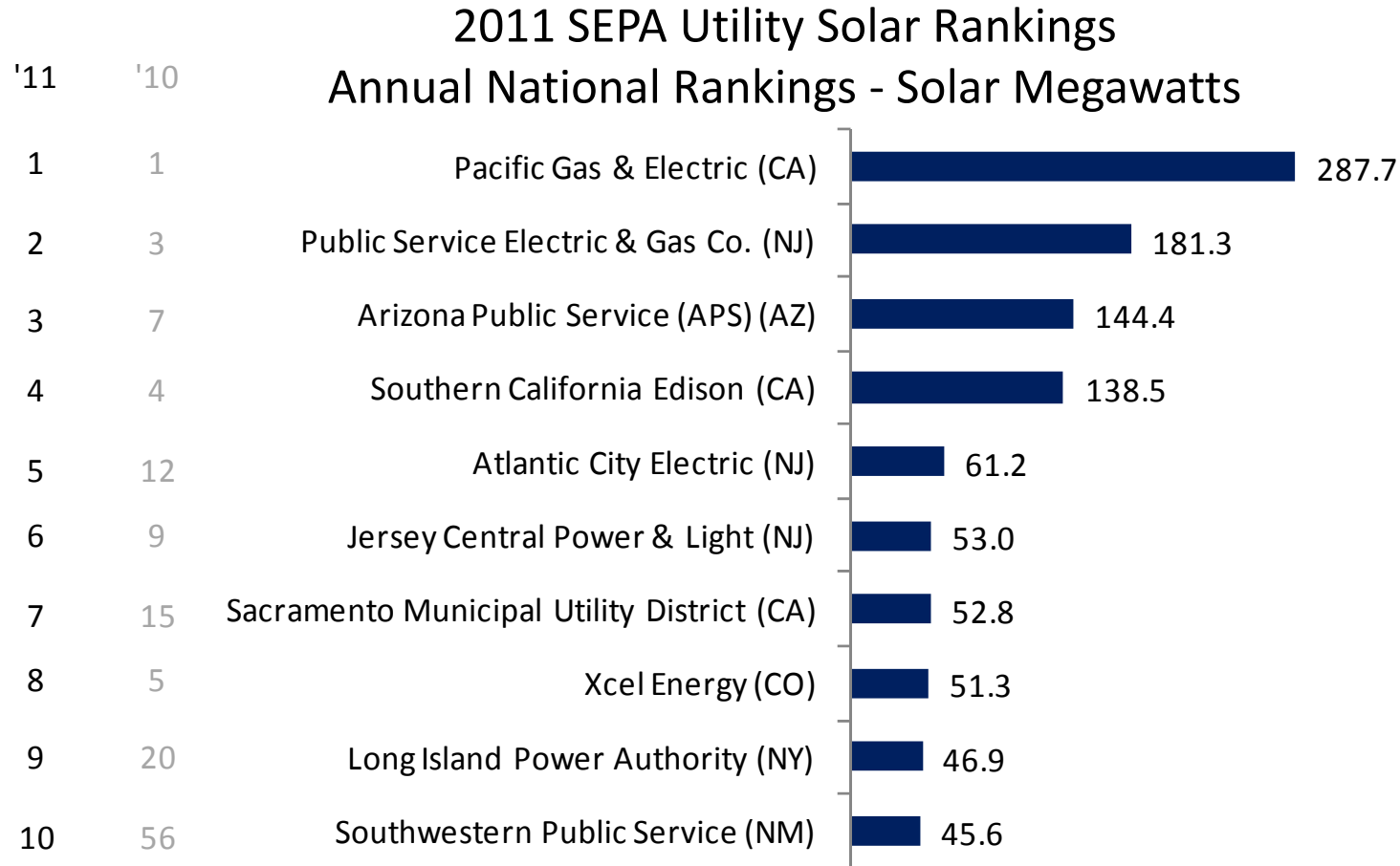
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2011 Top Ten Solar Utilities

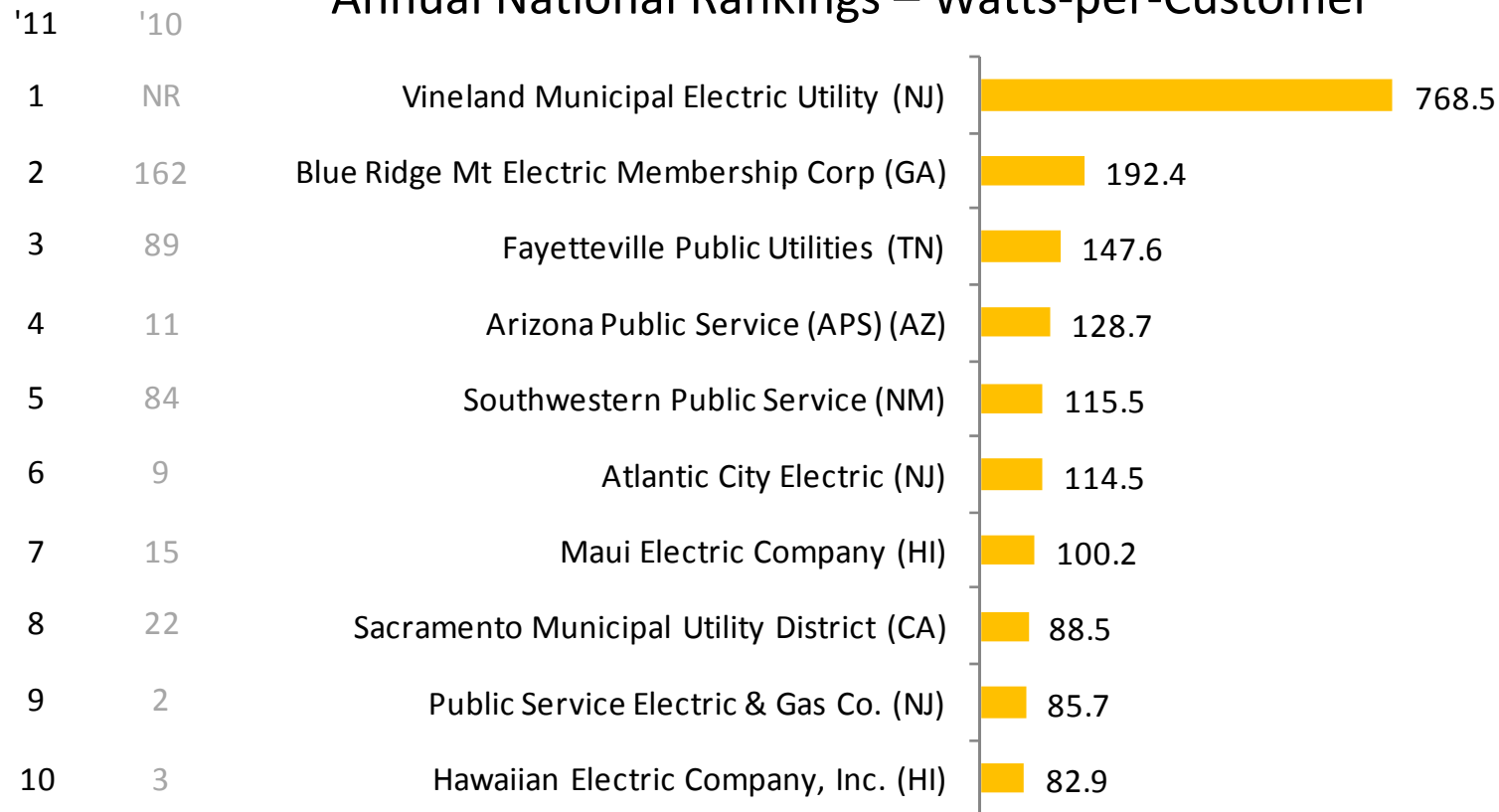


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Source: Solar Electric Power Association, 2011 SEPA Utility Solar Rankings

2011 SEPA Utility Solar Rankings Annual National Rankings – Watts-per-Customer



Source: Solar Electric Power Association, 2011 SEPA Utility Solar Rankings

National Rankings

Cumulative – Megawatts

'11	'10	Utility	MW _{AC}
1	2	Pacific Gas & Electric (CA)	762
2	1	Southern California Edison (CA)	741
3	3	Public Service Elec. & Gas (NJ)	299
4	8	Arizona Public Service - APS (AZ)	198
5	7	Xcel Energy (CO)	136
6	4	Florida Power & Light Co. (FL)	122
7	6	San Diego Gas & Electric Co. (CA)	121
8	5	NV Energy (NV)	108
9	9	Jersey Central Power & Light (NJ)	104
10	10	Atlantic City Electric (NJ)	99
		Other Utilities	948
		Total	3638



National Rankings

Cumulative – Watts-per-Customers

'11	'10	Utility	Watts _{AC}
1	NR	Vineland Municipal Electric (NJ)	991
2	5	Maui Electric Co. (HI)	209
3	66	Blue Ridge Mountain EMC (GA)	195
4	11	Atlantic City Electric (NJ)	185
5	2	Kauai Island Utility Co-op (HI)	179
6	18	Arizona Public Service - APS (AZ)	176
7	1	Southern California Edison (CA)	152
8	117	Fayetteville Public Utilities (TN)	150
9	9	Hawaiian Electric Co. (HI)	149
10	6	Pacific Gas & Electric (CA)	146



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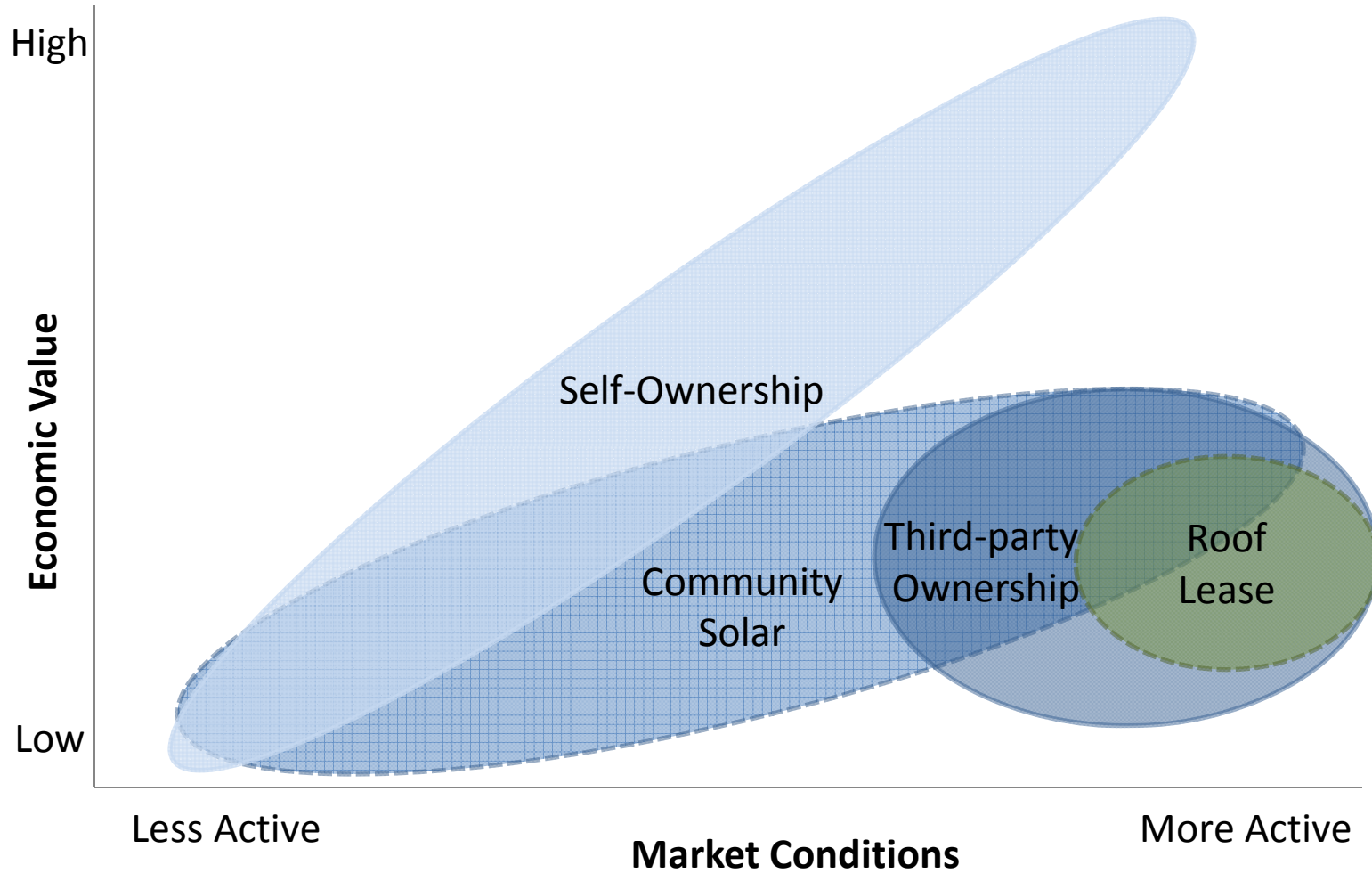
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Largest Projects - Annual

	Project	MW	Tech.	Purchasing Utility
1	Mesquite Solar I	37.5	PV	Pacific Gas and Electric (CA)
2	Long Island Solar Farm (LISF)	32	PV	Long Island Power Authority (NY)
3	Webberville Solar	30	PV	Austin Energy (TX)
4	Stillwater Solar Plant	24	PV	Sierra Pacific Power (NV)
5	Copper Crossing Solar Ranch Roadrunner Solar Project Stroud Solar Station Sun City Project	20	PV	Salt River Project (AZ) El Paso Electric (TX) Pacific Gas and Electric (CA) ¹ Pacific Gas and Electric (CA)
6	Sand Drag Solar Project	19	PV	Pacific Gas and Electric (CA)
7	Pilesgrove Solar Project	18	PV	Atlantic City Electric (NJ)
8	Paloma Solar Plant Cotton Center Solar	17	PV	Arizona Public Service (AZ) ¹ Arizona Public Service (AZ) ¹
9	Bagdad Solar Plant Five Points Solar Station West Side Solar Station	15	PV	Arizona Public Service (AZ) Pacific Gas and Electric (CA) ¹ Pacific Gas and Electric (CA) ¹
10	Carlsbad Regional Airport	11	PV	Xcel Energy NM (NM)

¹The purchasing utility is also the project owner.

Consumer Solar Options



- One or more utility-managed photovoltaic projects from which customers can benefit from a fractional share of the electricity output
- The utility takes on risk for the customer (cost, maintenance, performance, etc) in exchange for enhancing utility and customer value:

Utility Value	Customer Value
Control deployment and contain costs	Flexibility to move within utility area
Available to more customers	Simple, customer friendly process
Lower cost than other incentive programs	No up-front or maintenance costs
Use towards renewable goals	Pricing benefits
Enhanced relationship with customer	Utility operates for customer