

solar electric power association



Helping Utilities Make Smart Solar Decisions

Utility Solar Business Models:

Expanding New Solar Markets

February, 16, 2011

IEA PVPS TASK 1 WORKSHOP



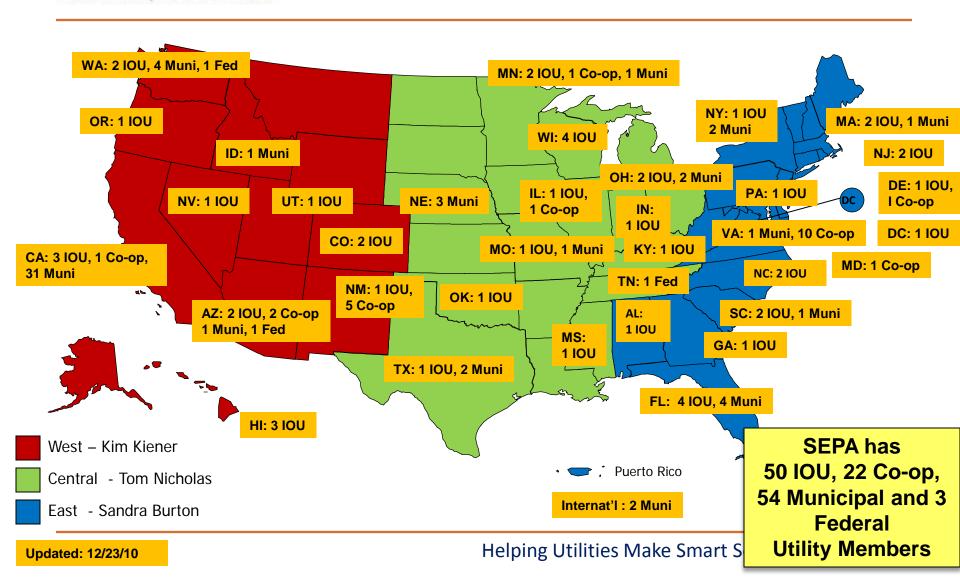
About SEPA

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





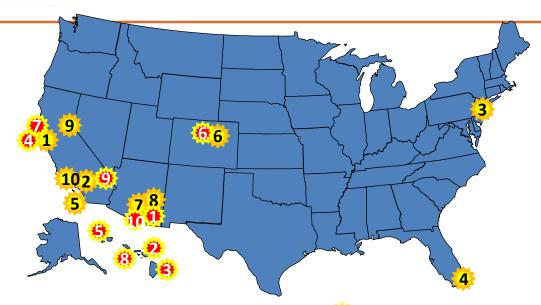
Utility Membership





Most Solar Active Utilities

solar electric power association





Annual Solar Megawatts (MW-ac)

'09 '08

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

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

'09 '08

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



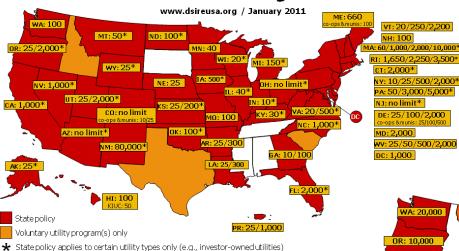
Evolving Solar Markets

- Three market stages:
 - 1. Customer-driven: customer owned, customer-sited, net metered
 - 2. Industry-driven: third-party owned, customer sited, net metered
 - 3. Utility-driven markets [emerging]:
 - Utility Solar Procurement
 - Utility Solar Business Models
- As solar markets evolve and change, new opportunities for expansion result



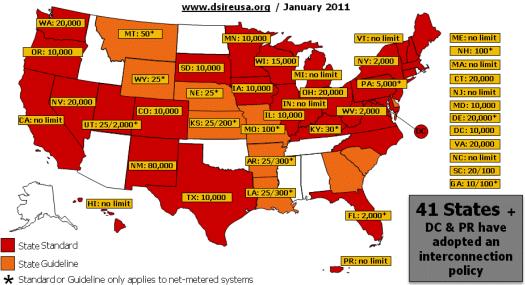
Net Metering & Interconnection Policies

Net Metering



Utilities remain important to the customer-sited market...

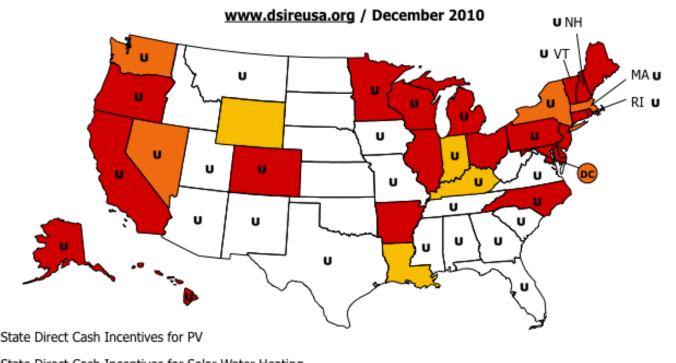
Interconnection Policies





Utility Incentive Programs

Direct Cash Incentives for Solar Projects



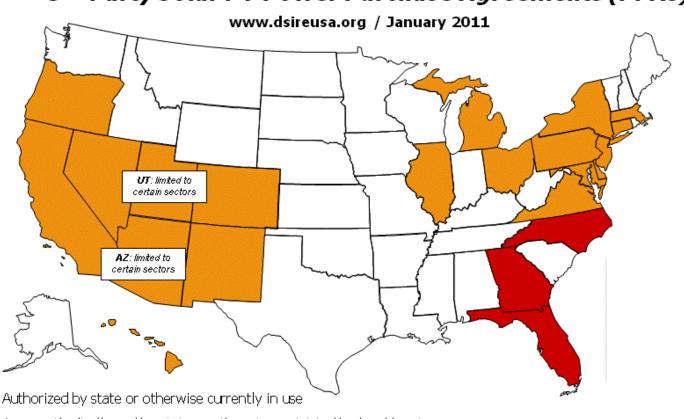
Incentive programs must adjust to changing market conditions to manage taxpayer and ratepayer funds wisely

- State Direct Cash Incentives for Solar Water Heating
- State Direct Cash Incentives for both PV and Solar Water Heating
- Utility Direct Cash Incentive(s) for PV and/or Solar Water Heating



Third-party Market Rules

3rd-Party Solar PV Power Purchase Agreements (PPAs)



Commercial market expansion could be limited in certain states

Apparently disallowed by state or otherwise restricted by legal barriers

Status unclear or unknown





Utility-Driven Markets

1. Utility Solar Procurement

 Standard offers, auctions, and RFPs for large amounts of distributed and centralized, utility-side of the meter projects

2. Utility Solar Business Models

 Utilities actively innovating to capture value in solar markets



1. Utility Solar Procurement

- Utilities responding to legislation, commission, management, customer or pricing needs
- Activity in California, Solar RPS states, and Florida
- Two types:
 - Distributed
 - Centralized

RPS Policies with Solar/DG Provisions www.dsireusa.org / January 2011 WA: double credit for DG NH: 0.3% solar-DR: 20 MW solar PV x 2020, AI: triple credit for solar-MA: 400 MW PV x 2020 electric sited x 2015 CO: 3.0% DG x 2020 U: 5,316 GWh solar VV: 1.5% solar x 2025; electric x 2026 WV: various A: 0.5% PV x 2021 UT: 2.4 multiplier multipliers for solar-electric triple credit for PV MD: 2% solar-electric x 2022 NM: 4% solar-electric x 2020 DC: 0.4% solar x 2020 0.6% DG x 2020 TX: double credit for non-wind (non-wind goal: 500 MW) 16 states + DC have an RPS Renewable portfolio standard with solar / distributed generation (DG) provision with solar/DG Renewable portfolio goal with solar / distributed generation provision provisions Solar water heating counts toward solar provision



Distributed Procurement

- Utilities requesting up to 20MW projects through streamlined bidding processes
- Standard contract and rate terms
- Examples
 - Pacific Gas & Electric Solar PV PPA RFO
 - 50 MW/yr for five years (250 MW total)
 - Projects 1-20 MW, primarily ground-mounted
 - Auction bids accepted from lowest to highest after meeting screening criteria until 50 MW met
 - Results: released RFO Feb 2; closes March 2



Distributed Procurement

- Examples (cont'd)
 - Southern California Edison Solar PV Request for Offers
 - 50 MW/yr for five years (250 MW total)
 - Projects 0.5-10 MW, primarily rooftops
 - Bids accepted from lowest to highest after meeting screening criteria until 50 MW met
 - Results: 29 contracts for 51 MW in 2010 RFO; 2011 RFO in Apr
 - SMUD Feed-in Tariff
 - 100 MW RFP program total
 - Projects up to 5 MW
 - FIT based on published TOD rates
 - Results: waiting list after 2010 RFP; unknown future plans



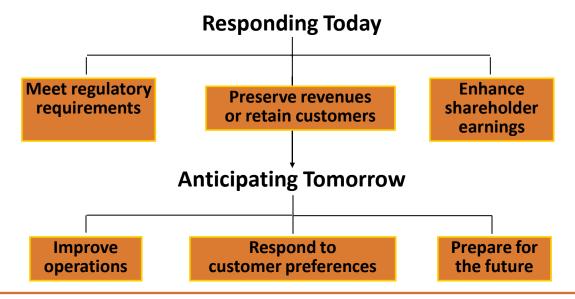
Centralized Procurement

- Generally through recurring or solicited RFPs
- Installed solar project growth:
 - 2009: two projects > 5 MW in two states
 - 2010: eight projects > 5 MW in six states
 - 2011: thirty-eight projects > 5 MW in 16 states (est.)
- Non-utility issues becoming primary barriers, i.e. creating utility 'demand' less of an issue:
 - Financing
 - State permitting
 - Federal siting



2. Utility Solar Business Models

- Absent special treatment, net metering, rebates,
 FITs, and PPAs offer no value to utilities
- Business models allow utilities to capture value in the solar marketplace:



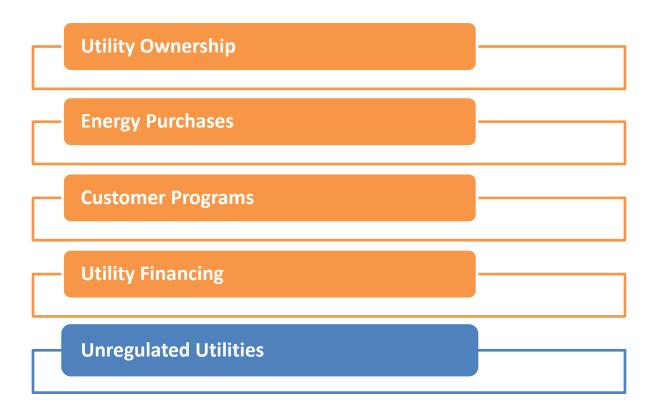


Business Model Tracking

2007 - 2010 Ellensburg 🔆 PGE WMECO Xcel-MN National Grid Con Ed APSE&G Vineland ▲ SMUD Pepco & Delmarva ★United Power Co-op PG&E St. George ▲ SCE Duke-NC* 🔆 PNM LADWP Early 2008 (Phase 1) <mark>⊁</mark>∡SDG&E**;** APS **☆**TEP Early 2010 (Phase 2) **HECO Utilities** FP&L Source: SEPA 2010

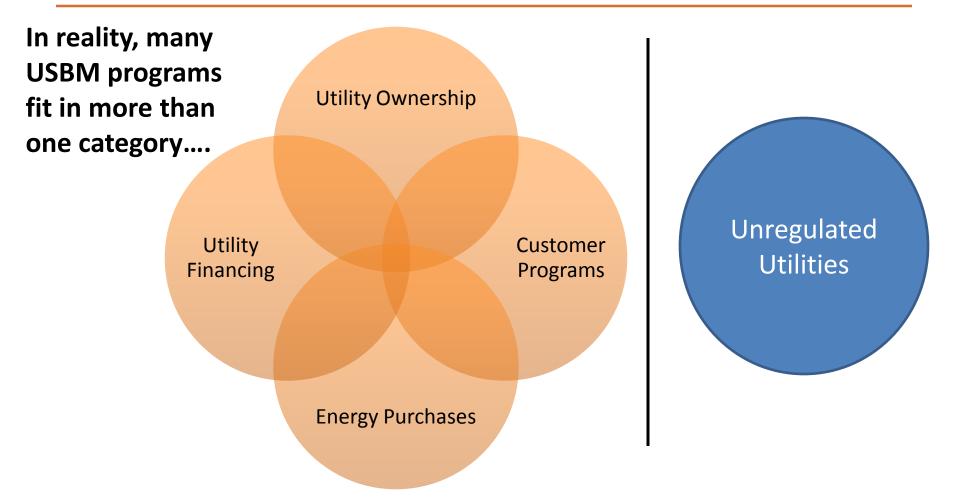


Business Model Types





Business Model Types





- Positive drivers
 - Shareholder return
 - Federal Tax Credit
 - Diversified RPS Compliance Risk
 - Large purchase lower costs
- Impacts the solar value chain differently
- Utility commissions ensure interest of ratepayers & fair competition



Utility Ownership Structures

- Ratebase solar on customer sites
- Ratebase solar at utility facilities
- Own community solar equipment
- Own inverters on customer sites
- Acquire solar projects from developers
 - Sale Lease- Back Transaction
 - Partnership Flip (Wind Only)





www.tinyurl.com/SEPADataMap

- More than 900 MW of utility owned PV projects and announcements across multiple states and utilities
- Five Largest Utility Owned Portfolios
 - 1. PG&E (CA) 250 MW
 - 2. SCE(CA) 250 MW
 - 3. FP&L(FL) 175 MW
 - 4. APS (AZ) 120 MW
 - 5. PSEG (NJ) 80 MW
- Characteristics
 - Majority PV technologies
 - Majority distributed projects
 - Majority IOUs





Ratebase on Customer Sites

Southern California Edison

- Filed with CPUC 3/27/08; final decision issued 6/18/09.
- 250 MW utility owned on leased customer roofs
- \$3.85/W Avg capital cost + 1%ROR,
 (O&M, lease, etc CPUC review)
- IPP bids capped at \$260/MWh levelized cost of energy that SCE estimates for its utility-owned PV projects

Western Massachusetts Electric Company (WMECO)

- Proposed under Mass. Green Communities Act (GCA)
- 6 MW approved, landfill, brownfield, large commercial & government buildings, & public - high visibility sites.
- ~1% increase for all customer classes combined, initially about 65¢-88¢/month for
- Residential customers, declining thereafter



Ratebase on Utility Sites

Florida Power and Light

- Legislated 110 MW investment by any FL IOU
- DeSoto PV- 25MW, Martin ST-75MW, Space Ctr PV - 10MW
- Project costs reported to be \$173.5M for DeSoto; \$476.3M for Martin; \$78.9M for Space Center.
- Environmental Cost Recovery clause, 83¢/1,000 kWh initially, 31¢ over 25 years of operation.

National Grid

- Mass. Green Communities Act sets 20% by 2020 RPS goal; permits electric or distribution utility to build, own & operate
- 4.9 MW: MWAC: 1.3, .62, 1.0, 1.2, .75
- \$5.43-7.17 /W 25-35¢ /kWh over 25 year life
- Initial bill impact for typical 500kWh residential customer est. at 11.3¢/mo.; 5.7¢/mo. over 20 years.



Owning Community Solar Equipment
City of Ellensburg, WA

- First community solar initial capacity was 36 kW, to 180 kW over about five years.
- Utility invites local businesses & individuals to contribute to the cost of the panels in return for a credit on their electricity bill with "virtual net metering"
- Makes solar benefits available to all customers, including those whose buildings are not good PV candidates because of orientation, shading, etc., & renters who could not otherwise install solar.
 Voluntary subscribers –
 - avoid the need to assess feasibility, or to find a contract or with or oversee contractors
 - receive solar benefits without paying upfront capital cost, installation or O&M



Energy Purchases

- Power Purchase Agreement
 - Pass through to ratepayers, no ROR
- Valuing Solar Purchases to Avoid RPS Noncompliance
 - Possible value above noncompliance cost
- Equalizing Buying and Building, OR PUC Docket
 - Ratebase an equal amount of "capital"
 - Adder on the utility's forecasted PPA costs, excluding any fuel cost, with an annual true-up
- Feed-in-tariffs that offer utility value



Customer Programs

Community Solar

- Community scale plant that customers can participate in and receive proportional benefits through virtual net metering or a fixed price contract
- Expands solar option to additional customers at lower costs
- Voluntary subscribers, no upfront capital, portable within service territory
- Program design and costs need to offer compelling benefits to customers

Examples:

- Ellensburg Municipal (WA): Utility owned, customers contribute to costs, receive proportional net metering, 136 kW project
- Sacramento Municipal (CA): IPP owned, customer purchase 'share,' fixed price contract, 1 MW project
- Salt River Project (AZ): IPP owned, schools only, customer purchase 'share,' fixed price contract, 18 MW project
- Arizona Public Service (AZ): Utility owned, customer sited, host customers receive fixed price contract, 2 MW



Utility Financing

PSE&G (NJ)

Solar Loans

PSE&G is offering ~\$250MM in loans to finance solar system installations (totaling 81MW) on homes, businesses, Municipal buildings.

Solar 4 All.

PSE&G is also investing \$515MM to construct, own and operate 80MW in solar installations.

NJBPU Ruling

- The investment for which they can earn a return is the actual loan
- Cost recovery is allowed on administrative costs



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 NV Energy
- PSEG Solar: 12 MW for Ohio Power
- Exelon Generation 9 MW for ComEd
- Nextera (FPL): 10 MW for FP&L
- Duke Energy Generation: 17 MW in Texas for CPS Energy

2. Capital Investments

PG&E: \$60M financing SolarCity; \$100M financing SunRun



Summary

- Traditional net metering markets are important and utilities have an obvious role and influence, but...
- Utility-driven solar projects and markets are a significant new opportunity for market expansion
- Expansion occurring through a combination of utility procurement, which generally fulfills utility portfolio needs, and business models activities, which pulls the market through proactive utility programs





Helping Utilities Make Smart Solar Decisions