California's March Towards Sustainable Energy: Assessing the Record and Lessons for the Future

University of Texas - Austin
April 5, 2012

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About CCSE

- Independent non-profit 501 (c)(3) organization
- Core activities
  - **Program Administration:** State and utility programs promoting clean generation, energy efficiency, alternative fuel vehicles
    - CA Solar Initiative, Self-Gen Incentive Program – DG programs in SDG&E and Municipal service territories
    - Clean Vehicle Rebate Program – statewide, for the CA Air Resources Board
    - Whole-Home Retrofit / Energy Upgrade California – for DOE, CEC, SDG&E
  - **Clean energy technical assistance** for:
    - Smaller utilities, local governments, other public entities
    - Private entities: companies and non-profits
    - Market support: contractors, manufacturers and other industry stakeholders
  - **Policy Support:** regional planning; legislative & regulatory support
  - **Education:** efficiency, renewables, climate, green building, transportation
- Emphasis on serving local jurisdictions, market stakeholders, end users
- [www.energycenter.org](http://www.energycenter.org)
California Policy Context

- 33% RPS now law; discussion of 40% or more
- Feed-in Tariff under development
- Renewables Auction Mechanism in early stages (prices are low…)
- Very committed Governor: 12GW localized renewables challenge
- Regulatory processes enable broad stakeholder participation
- Importance placed on providing broad benefits while being mindful of ratepayer costs and cross-customer transfers
- “Least-cost, best fit” utility procurement guidance is not aligned with cost-based, technology-specific procurement
- AB1X looms over ratemaking – retail rates are (unevenly) distorted
- Energy Efficiency a good idea….and at top of the loading order
Distributed Solar: Growing, Evolving Markets
As Goes San Diego....
...So Goes California

CSI Installations by County (All Sectors, Installed Only)

Resource: CaliforniaSolarStatistics.com
Cost Reductions Ongoing

<table>
<thead>
<tr>
<th>Cost by Quarter</th>
<th>Global Filters</th>
<th>CEC-AC</th>
<th>DC (Nameplate)</th>
<th>CPI Adjusted</th>
<th>Non-CPI Adjusted</th>
</tr>
</thead>
</table>

### Program-Wide

Non-Res over 10kW
Lots of Stalled Non-Residential NEM Projects

Statewide: 263 Pending Installation (Comm / Gov / N-P)

~$300M in incentive funds committed to pending projects

<table>
<thead>
<tr>
<th>County</th>
<th>Megawatts</th>
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<tbody>
<tr>
<td>Los Angeles</td>
<td>60</td>
</tr>
<tr>
<td>San Diego</td>
<td>20</td>
</tr>
<tr>
<td>Riverside</td>
<td>15</td>
</tr>
<tr>
<td>Kern</td>
<td>10</td>
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<tr>
<td>Santa Clara</td>
<td>8</td>
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<td>Contra Costa</td>
<td>7</td>
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<tr>
<td>San Bernardino</td>
<td>5</td>
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<tr>
<td>Orange</td>
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<tr>
<td>Alameda</td>
<td>3</td>
</tr>
<tr>
<td>San Mateo</td>
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<tr>
<td>Ventura</td>
<td>2</td>
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<tr>
<td>Fresno</td>
<td>2</td>
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<tr>
<td>Tulare</td>
<td>2</td>
</tr>
<tr>
<td>Sonoma</td>
<td>2</td>
</tr>
<tr>
<td>Yolo</td>
<td>1</td>
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<tr>
<td>Solano</td>
<td>1</td>
</tr>
<tr>
<td>Kings</td>
<td>1</td>
</tr>
<tr>
<td>Santa Barbara</td>
<td>1</td>
</tr>
<tr>
<td>Napa</td>
<td>1</td>
</tr>
<tr>
<td>Yuba</td>
<td>1</td>
</tr>
</tbody>
</table>

- Margins are very thin for Commercial and Institutional installations (small IRR)
- Financing still an issue for many Non-residential projects
- Non-residential rates not particularly attractive for solar
- Opportunities to link Demand Response with self-generation (at additional cost)

Top 20 represents 91% of included applications

1,169 application(s) were included for the generation of this chart.
CA Renewables Procurement Programs

1. **Net Energy Metering (NEM)**
   - Impacts can be complex, depend on tax liability and retail energy rates
   - Lucrative for adopters who are
     - Under rate structures with high energy charges
     - Have sufficient tax equity to capture ITC
   - Less directly lucrative for facilities with:
     - Small loads or heavy demand charges
     - Little or no tax liability
   - MACRS and ITC increase viability, variety of business models
   - RECs accrue to the System Owner (production does not automatically qualify for RPS)
   - NEM coming under pressure in CA

- **Problem**: Non-res project proposals often assume average (bundled) rates ➔ this overstates benefits and leads to unhappy customers
- **Remember**: Solar Thermal (non-electric) is also a key C reduction pathway
NEM: Ratemaking is Critical

- Customer benefit depends on marginal cost of energy
- Rate structures vary by customer class and level of consumption
- Rates change every 3 years – long-term value proposition not guaranteed

Determining project economics not a simple task for Customer/Contractor
Residential NEM Solar Economics

Life-Cycle Cost of Energy ($/kWh)
100-System Moving Averages
3/2007 - 12/2010

Tier 5
Tier 4
Tier 3
Tier 2
Tier 1

$2000 ITC cap lifted to full 30%

LCC Moving Ave (Total Cost)
LCC Moving Ave (After Incentive)
LCC Moving Ave (Incl. ITC)
No. of Installed Systems (right axis)
CA Renewables Procurement Programs

2. Feed-In Tariff: CA SB 32 (Negrete McCleod, 2009)
   • Still in implementation phase at the CPUC
   • Up to 5 MW per project; 750 MW statewide cap

3. IOU PV Programs: “In-basin” Utility and 3rd-party-Owned
   • 1100 MW statewide. Competitive bid w/ price cap
   • In SDG&E territory, for example, generally up to 5 MW per project; total of 100 MW (26 MW utility-owned, 76 MW 3rd-party)

4. Renewables Auction Mechanism (RAM)
   • up to 20 MW per project; 1000 MW statewide cap

5. RPS Requests for Offers
   • Annual procurements, large projects (20+ MW)

➢ Many options: all need to be well-coordinated to minimize distortions

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Challenge: Create a Rational Continuum

General Program context:

Central Issues:
1. Uncertainty
2. Transparency

Cost

Floors Uncertain

NEM
FIT
Utilities / RAM
RFO

MW

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Procurement Supports Evolving

- Existing small-scale project supports are eroding
  - 1603 Treasury grant program is over
  - State Incentives declining (now as low as $0.15/W)
  - NEM: 5% cap likely to be reached in ~2013
    - Expansion of NEM will likely come with NEM reforms
  - Federal Investment Tax Credit: Threats on the horizon?
- CA FIT: CPUC proposing a minimum price based on large systems, with adders to bring price to viability
  - Ruling 3/20/12 from CPUC: sets FIT price at the highest average RAM value in each IOU service territory = low: ~8-9 c/kWh (?)
  - Alternative pricing petition from clean energy advocates was not adopted by CPUC
Medium-Scale Solar (1-20MW) Coming Quickly?

- High rate of RPS project termination/delay:
  - Site Control
  - Project finance
  - Permitting (local, county, state)
  - Interconnection req’s, process, accountability
  - Equipment supply & procurement
  - Developer experience

- Progress on some of these factors; on others not so much…

- Some manufacturing located in CA to supply larger DG and utility-scale projects
Emerging Discontinuities for Small DG

Where things seem to stand currently:

Cost

Going Forward:
FIT terms to be set; RAM deals
CPUC: rate structure & NEM reform?
→ Downward price pressure
→ Solar Industry consolidation likely

What price will allow small (<1MW) DG to continue to grow?
# Utility and Solar Industry: Differing Perspectives

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<thead>
<tr>
<th>Utilities</th>
<th>Solar Industry</th>
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<tbody>
<tr>
<td>Grid Reliability</td>
<td>Market Stability &amp; Growth</td>
</tr>
<tr>
<td>Low Rates &amp; Fair Cost Allocation</td>
<td>Positive Economics for Solar Customers</td>
</tr>
<tr>
<td>Adaptability to Multiple Technologies</td>
<td>Simple Value Proposition for Solar</td>
</tr>
<tr>
<td>Long-term Tariff Stability</td>
<td>Long-term Compensation Stability</td>
</tr>
<tr>
<td>Accurate Price Signals</td>
<td>Fast Interconnection</td>
</tr>
<tr>
<td>Meeting RPS &amp; Other Mandates</td>
<td>Streamlined processes</td>
</tr>
</tbody>
</table>
A Few New Developments

- Proliferation of third-party ownership and hybrid financing models
- Property-Assessed Clean Energy (PACE) Redux
  - Commercial PACE financing gaining traction
    - Sacramento, Los Angeles, Riverside, others in development
  - Slow federal movement: PACE bill: H.R. 2599
- Utility on-bill repayment: PUC is considering
- Federal, state and local efforts to improve permitting processes
- Interconnection reform (Distribution – CA Rule 21)
Clean Vehicle Deployment
Statewide in CA

8,500 PEVs
Jan 2011 – Mar 2012
CLEAN VEHICLE REBATE PROJECT

- Funded through the California Air Resources Board (ARB) and the California Energy Commission (CEC) through 2015
- Funded through vehicle registration and smog abatement fees
- $26.1M in incentive uptake since 2009 (ARB & CEC)
California: CVRP and HVIP
-$1,000-$30,000 depending on vehicle type

ECOtality’s EV Project
-San Diego, San Francisco and Los Angeles
-Cost of charger, installation up to $1,200

Bay Area Air Quality Management District
-$700 Charging Unit Discount
-Incentive through the EV Project

San Joaquin Valley Remove II Program
-$1,000-$3,000 depending on vehicle emissions

City of Riverside Alternative Fuels Rebate
- Up to $2,000 depending on MPG
Other Incentives – HOV Stickers

- **White Clean Air Vehicle Stickers** are available to an unlimited number of qualifying Federal Inherently Low Emission Vehicles (ILEVs). Expires Jan 2015.

- **Green Clean Air Vehicle Stickers** available to first 40,000 applicants that purchase or lease cars that meet CA enhanced advanced technology partial zero emission vehicle (AT PZEV) requirements. Expires Jan 2015.

http://www.arb.ca.gov/msprog/carpool/carpool.htm
DOE/CEC PEV Readiness Projects

• $3 Million Statewide for 2012-2013
• Funded by the Department of Energy and CA Energy Commission
• Lead agencies include MPOs and AQMDs
• Goals:
  ✓ Align local and state PEV infrastructure planning approaches to support and expand the PEV market in California
  ✓ Create Regional PEV Infrastructure Working Groups
Project Manager:
PEV Collaborative & South Coast AQMD

Sacramento
SMUD ($75K)

Bay Area
BAAQMD ($300K)

Central Valley
SJV APCD ($75K)

Central Coast
SLO APCD ($50K)

Los Angeles
SCAG ($300K)

San Diego
CCSE ($100K)
CEC Regional PEV Planning Funds

- CEC $200K/region
- DOE $50-300K/region

Sacramento
Total Funding=$275K

Bay Area
Total Funding=$500K

Monterey Bay
Total Funding=$200K

Central Valley
Total Funding=$275K

Central Coast
Total Funding=$250K

Los Angeles
Total Funding=$500K

San Diego
Total Funding=$300K

Northern California
Total Funding=$200K
CA Priority: Existing Building Retrofits

• Policy leadership. Goal to retrofit 12M homes by 2020 (!)
  • Primary Focus on Energy Efficiency: #1 on the Loading Order
• Deep net consumption reductions required to meet climate goals
  • Impossible without EE and distributed renewables for electricity and heat
  • EE & DG are best integrated at the project level for optimal investment
  • Electricity Rate structures are an ongoing area of distortion and concern
• Accessible financing important for all project types
  • Currently: secured or unsecured project financing; solar leases; HUD Title 1; loan-loss reserves & other enhancements
  • Major coverage gaps for middle and lower-income families, small businesses.
  • Finance needed to cover gaps, achieve scale
  • Will Financing Programs include minimum cost-effectiveness criteria?
Thank You!

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