DOE Electricity Advisory Committee
Electricity Delivery for the 21St Century

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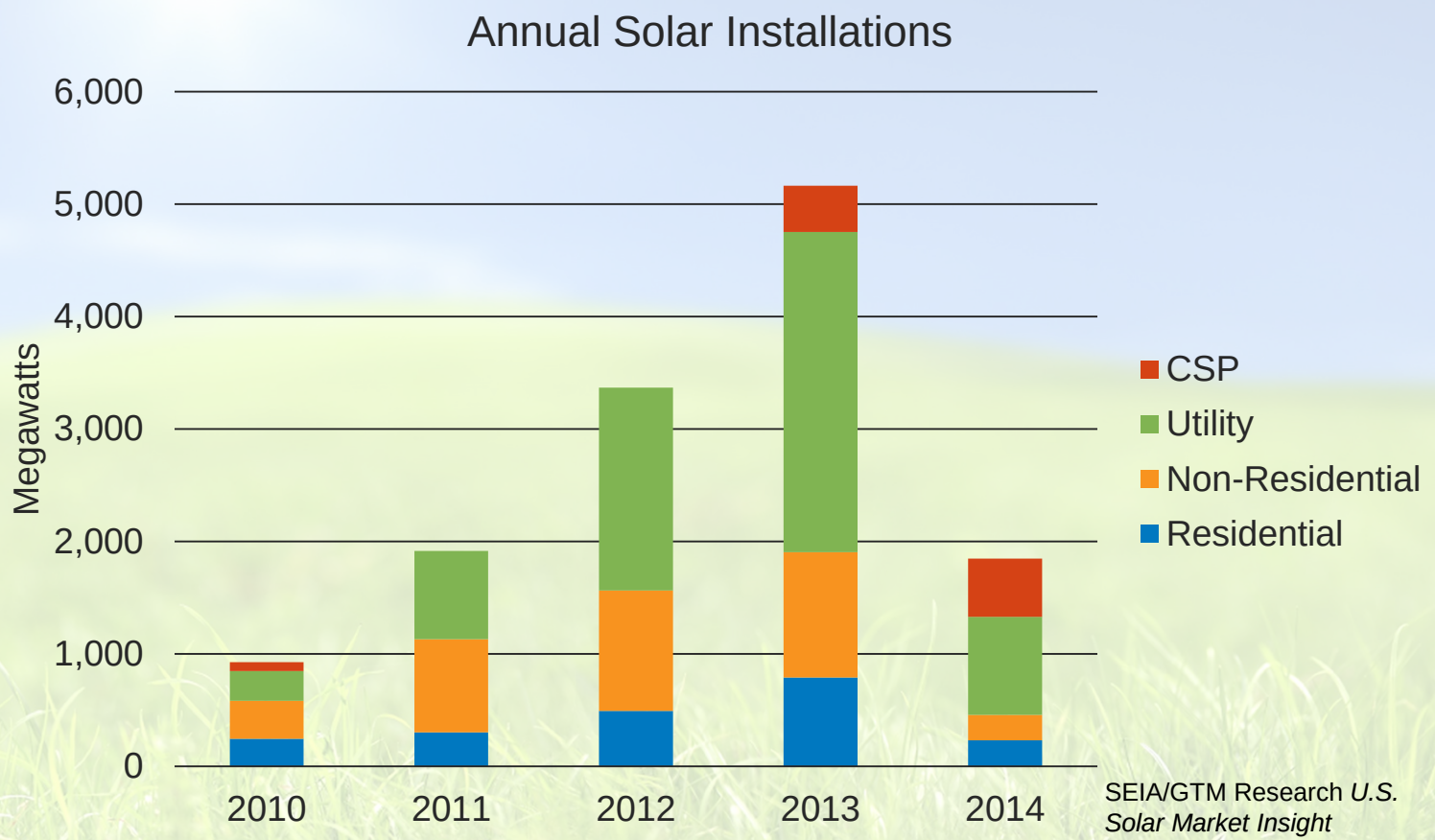
SVP, State Affairs SEIA

About SEIA

- Founded in 1974
- U.S. National Trade Association for Solar Energy
  - 1,000 member companies from around the world
  - Members from across 50 states
  - Largest companies in the world as well as small installers
- Our Mission: Build a strong solar industry to power America
- Our Goal: 10 gigawatts (GW) of annual installed solar capacity in the U.S. by 2015

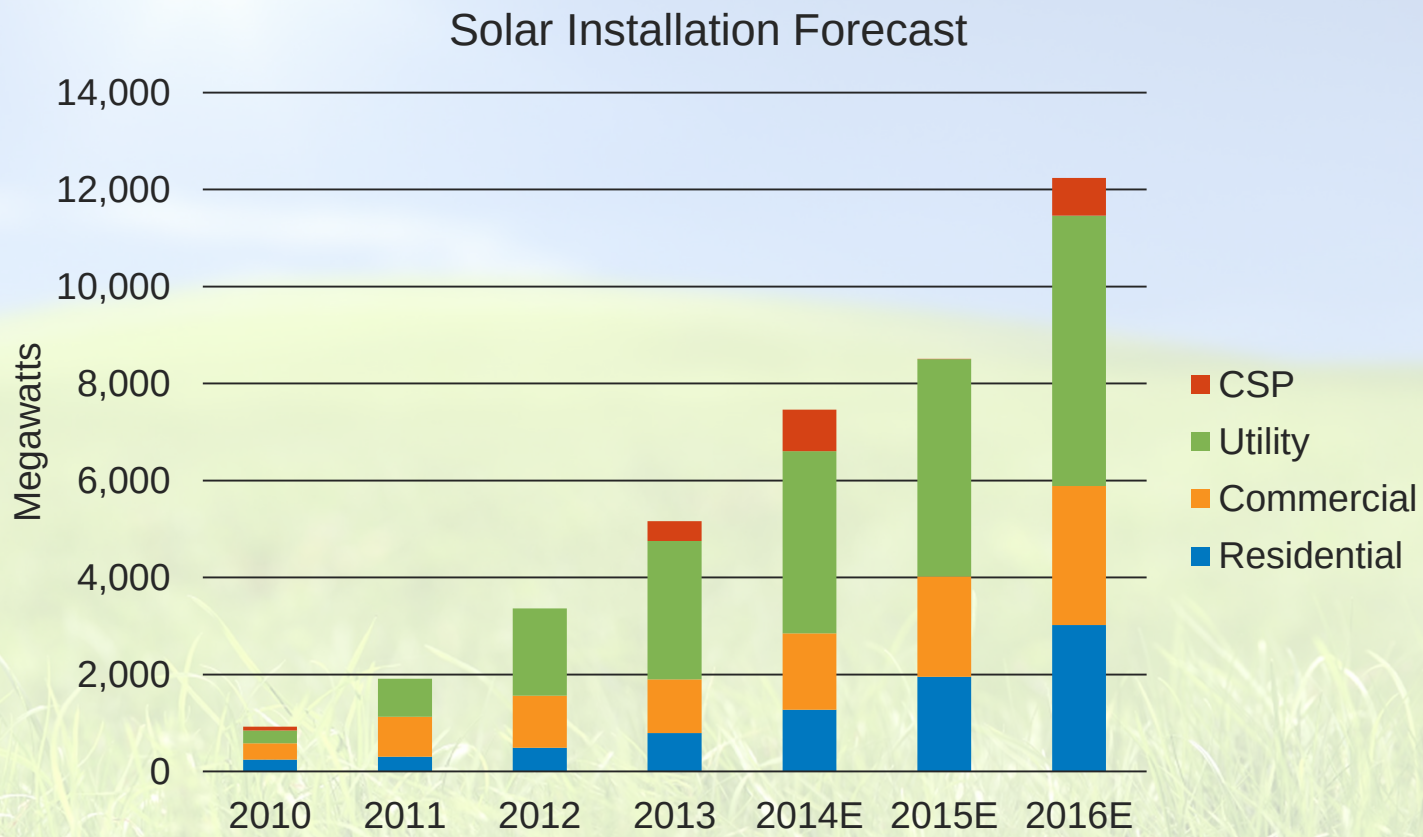
Year to Date Solar Installations



SEIA/GTM Research *U.S. Solar Market Insight*

Solar Installation Forecast

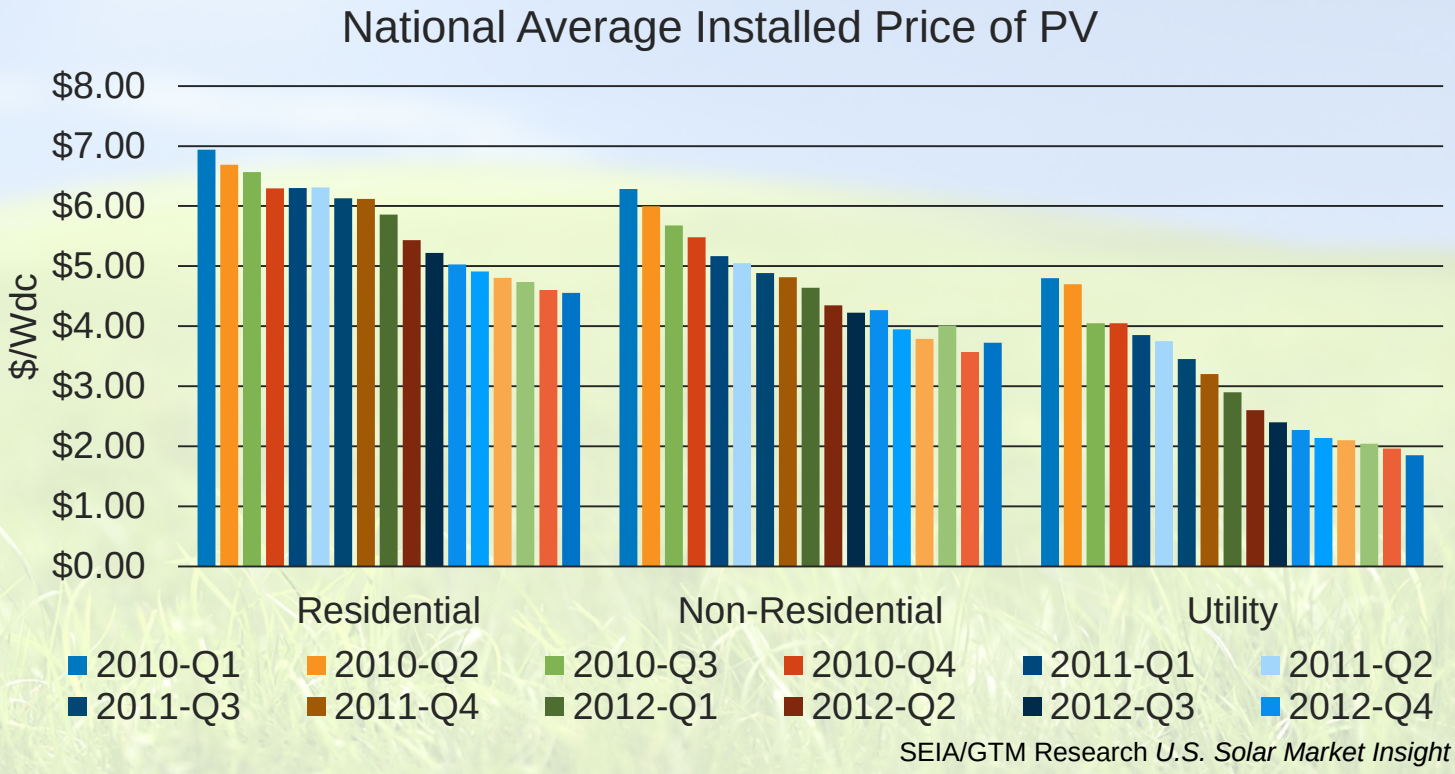
- Nearly 20 GW_{dc} of PV and 2.1 GW_{ac} of CSP expected to be online by the end of 2016.



SEIA/GTM Research *U.S. Solar Market Insight*

System Prices Continue to Decline

- Typical residential system now about $3.73/$W_{dc}$
- Typical commercial system now about $2.53/$W_{dc}$
- Utility system now $1.77/$W_{dc}$



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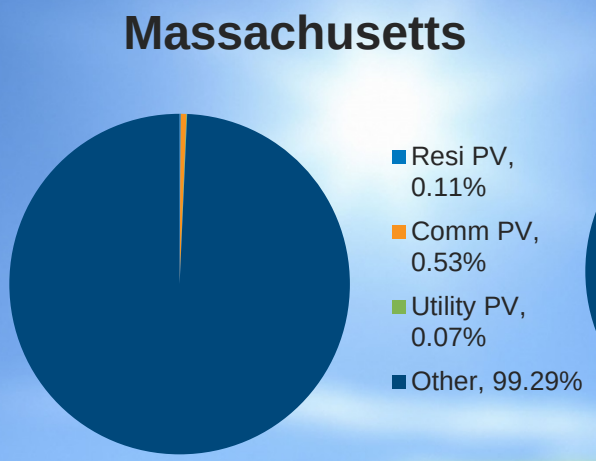
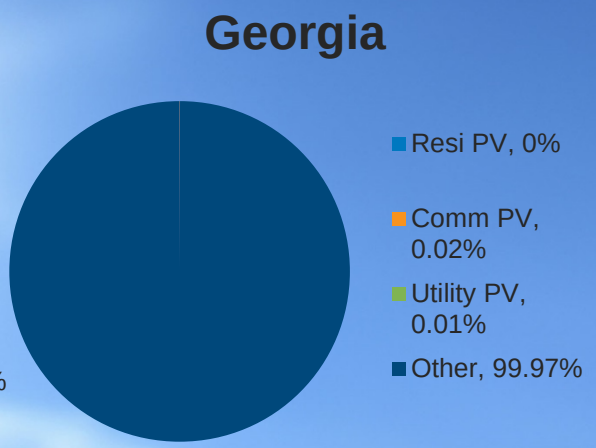
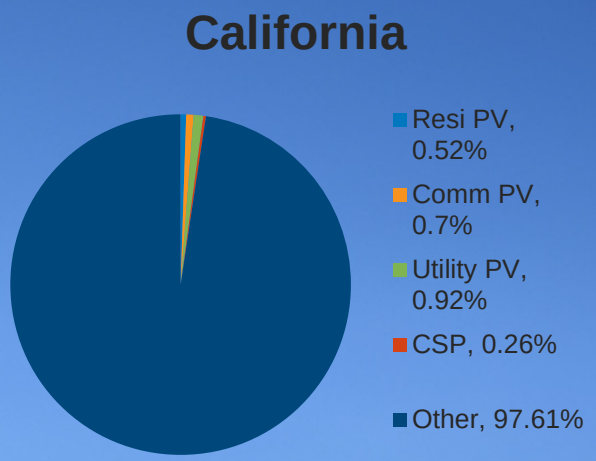
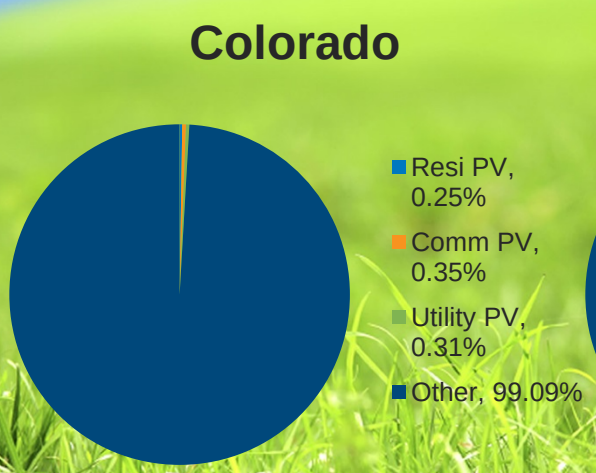
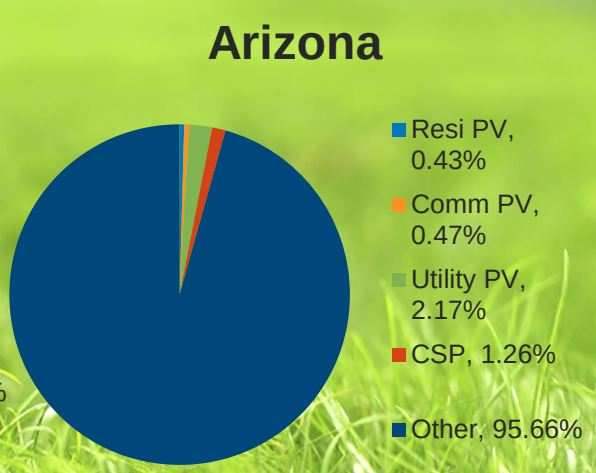
Solar *Generation* as Fraction of Total *Consumption*

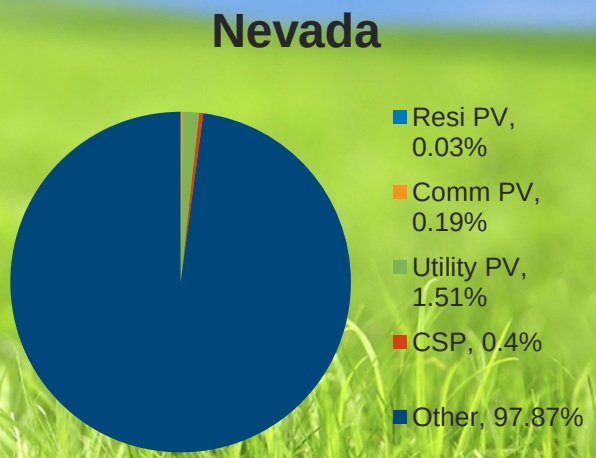






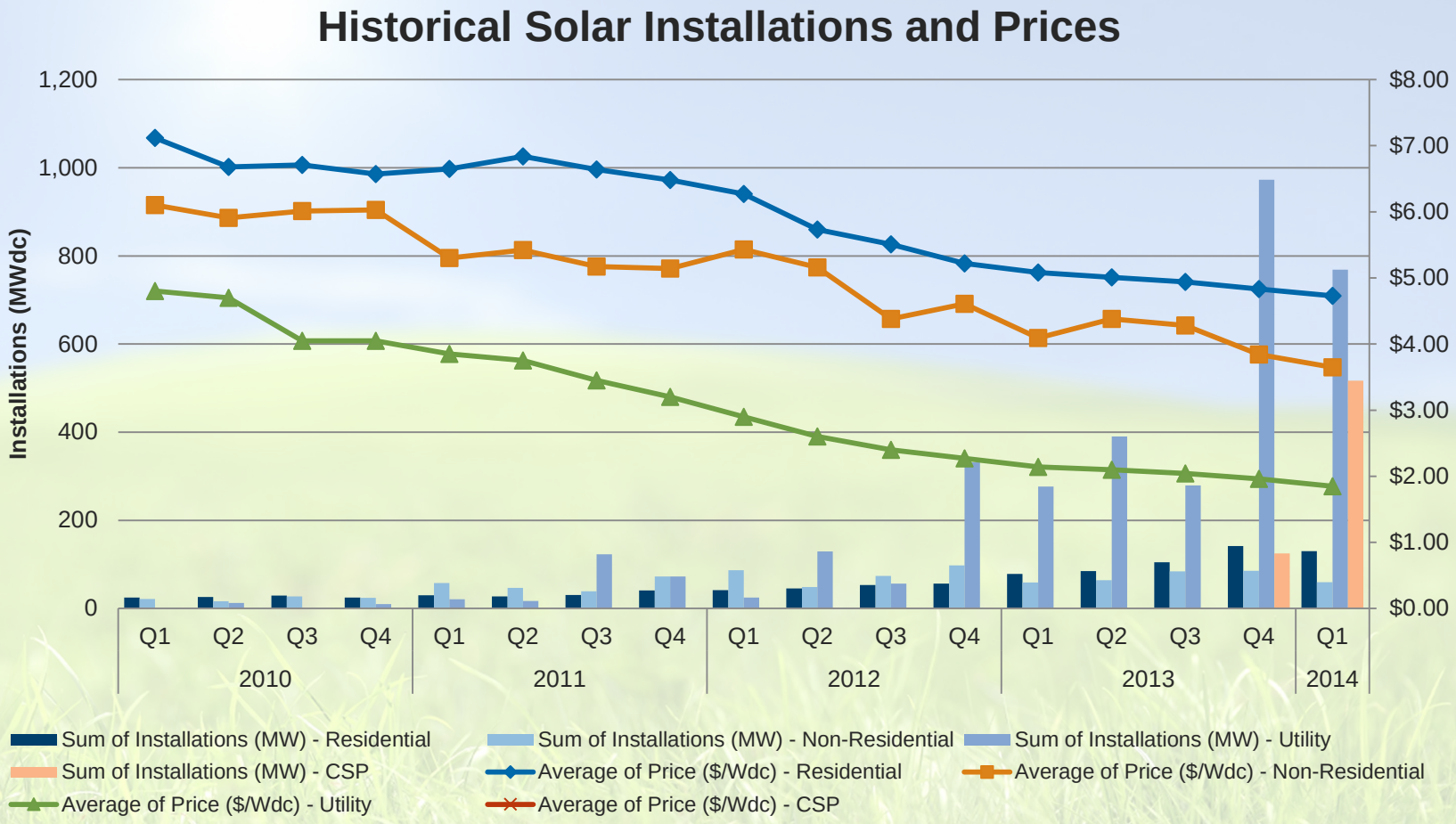






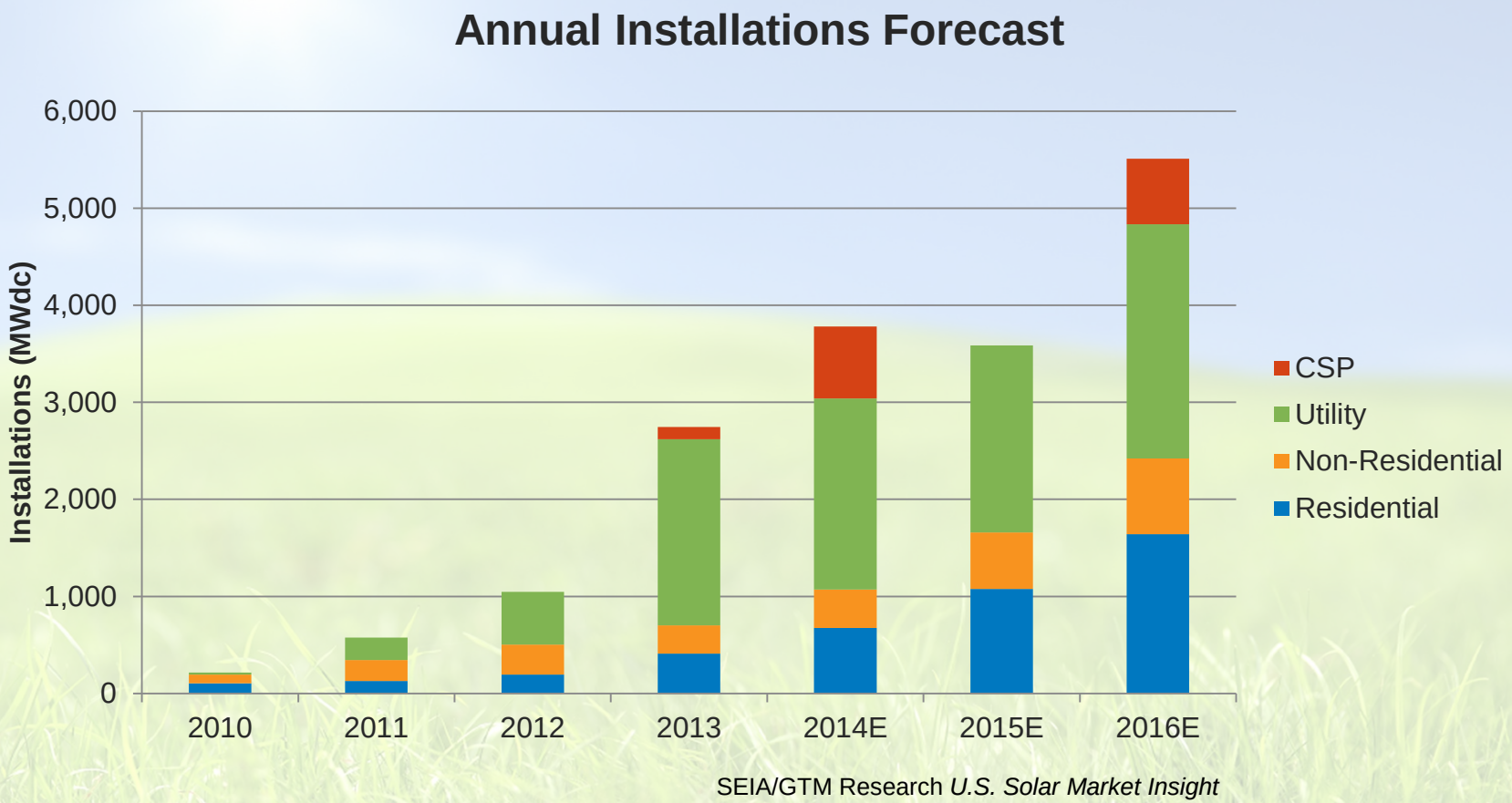
California Trends

- Largest State Market by Far



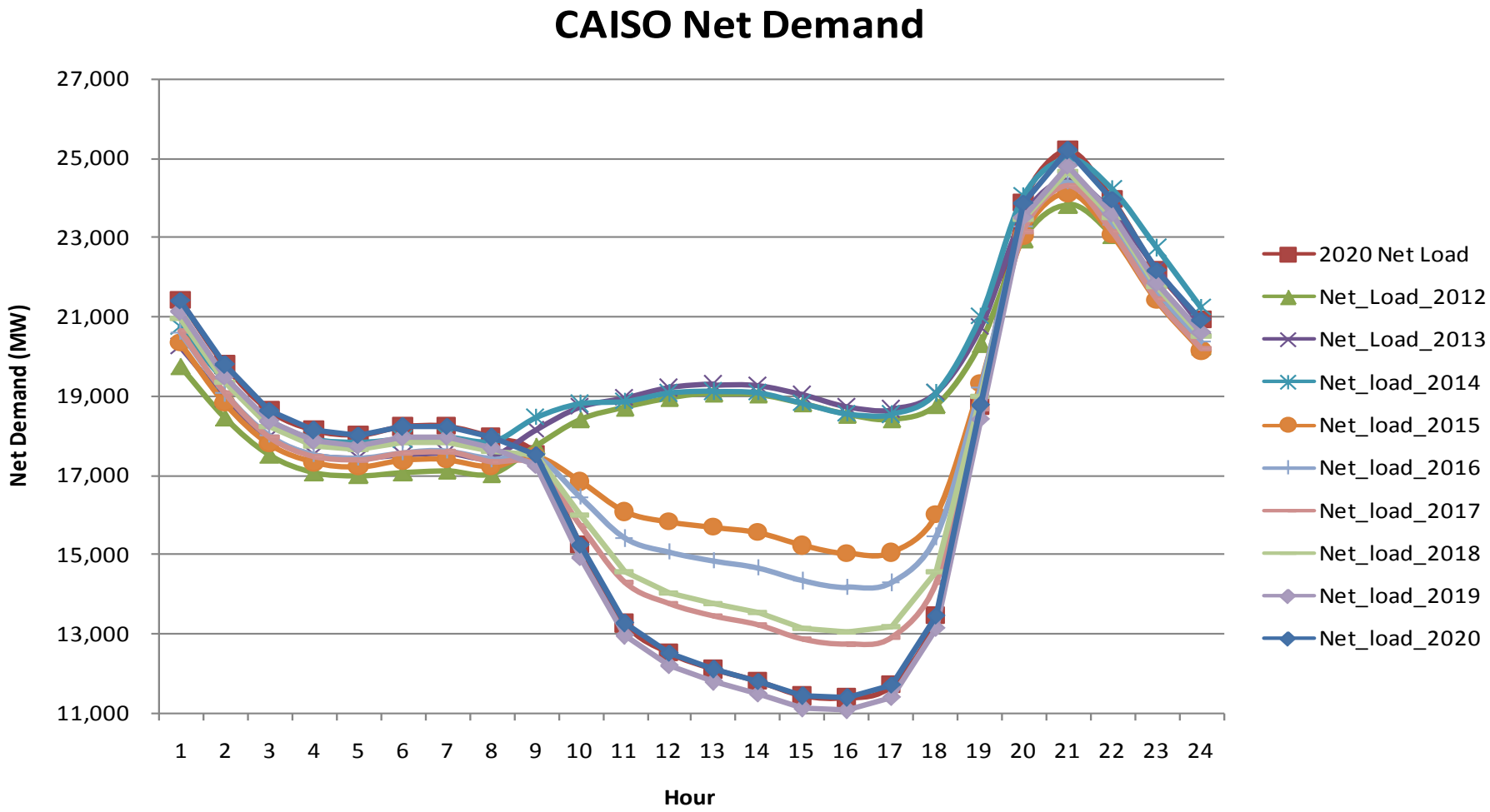
SEIA/GTM Research *U.S. Solar Market Insight*.(Utility pricing reflects national average, not state specific

California Forecast



SEIA/GTM Research *U.S. Solar Market Insight*

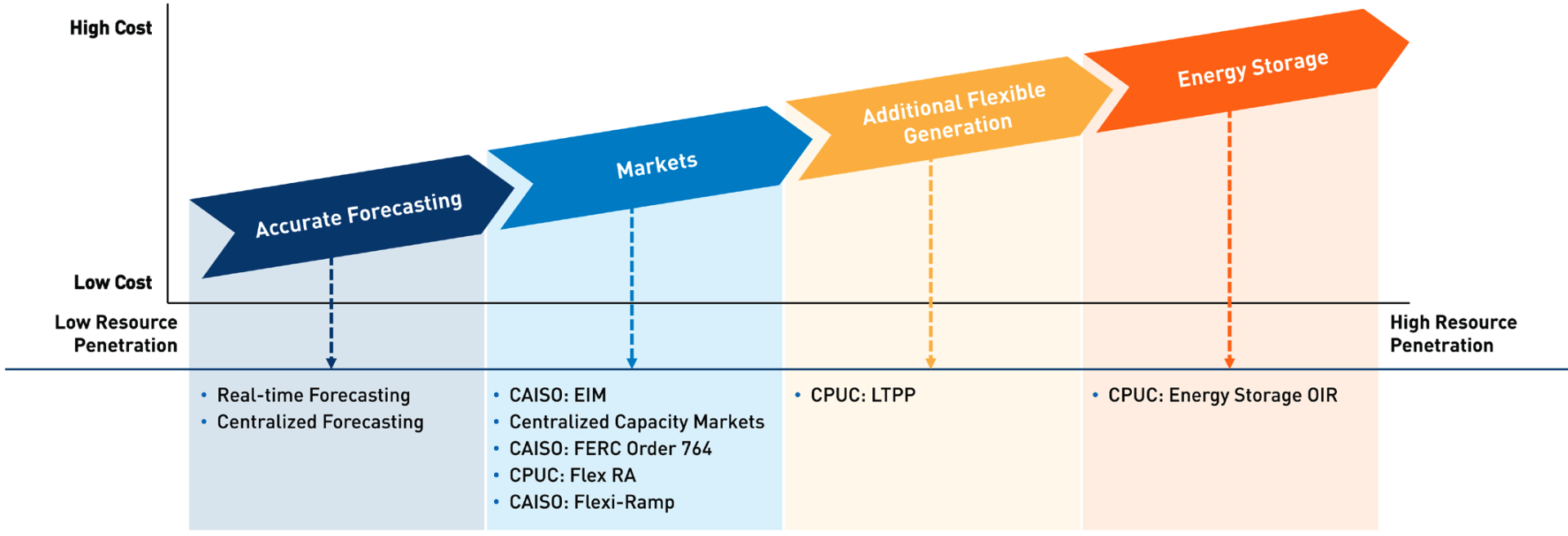
The CA Duck Curve Issue Incorporates Many Grid IX issues



However, CA "problem" was not as bad as it appeared….

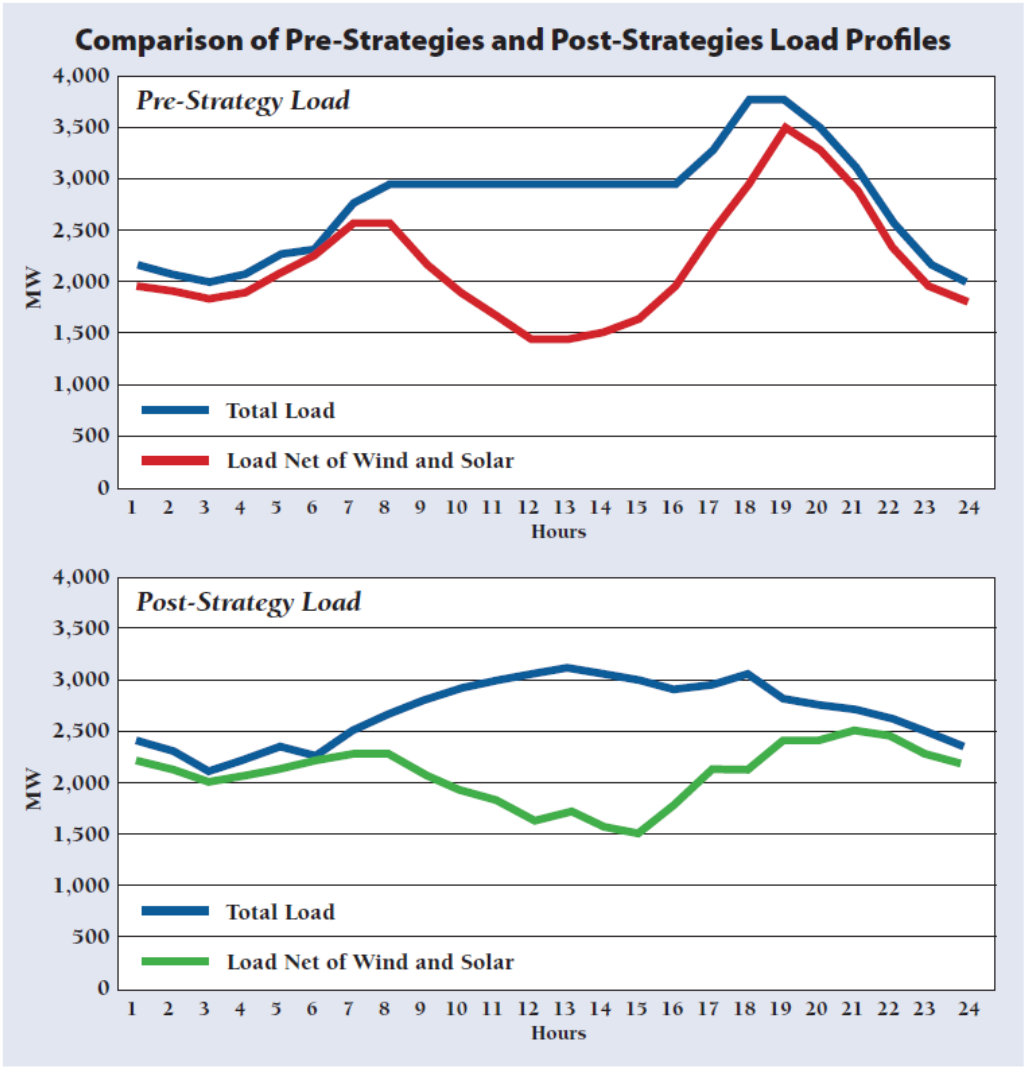
- Ramping issue is less severe than first analysis showed, still an issue in CA and elsewhere.
- Flexible gas dispatch.
- Regional cooperation helps smooth ramping issues.
- Ramps are 100% predictable.

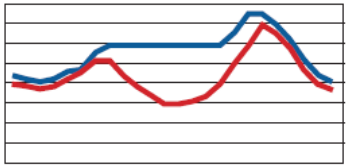
….and There Are Solutions.



Teaching the Duck to Fly RAP

Figure 4



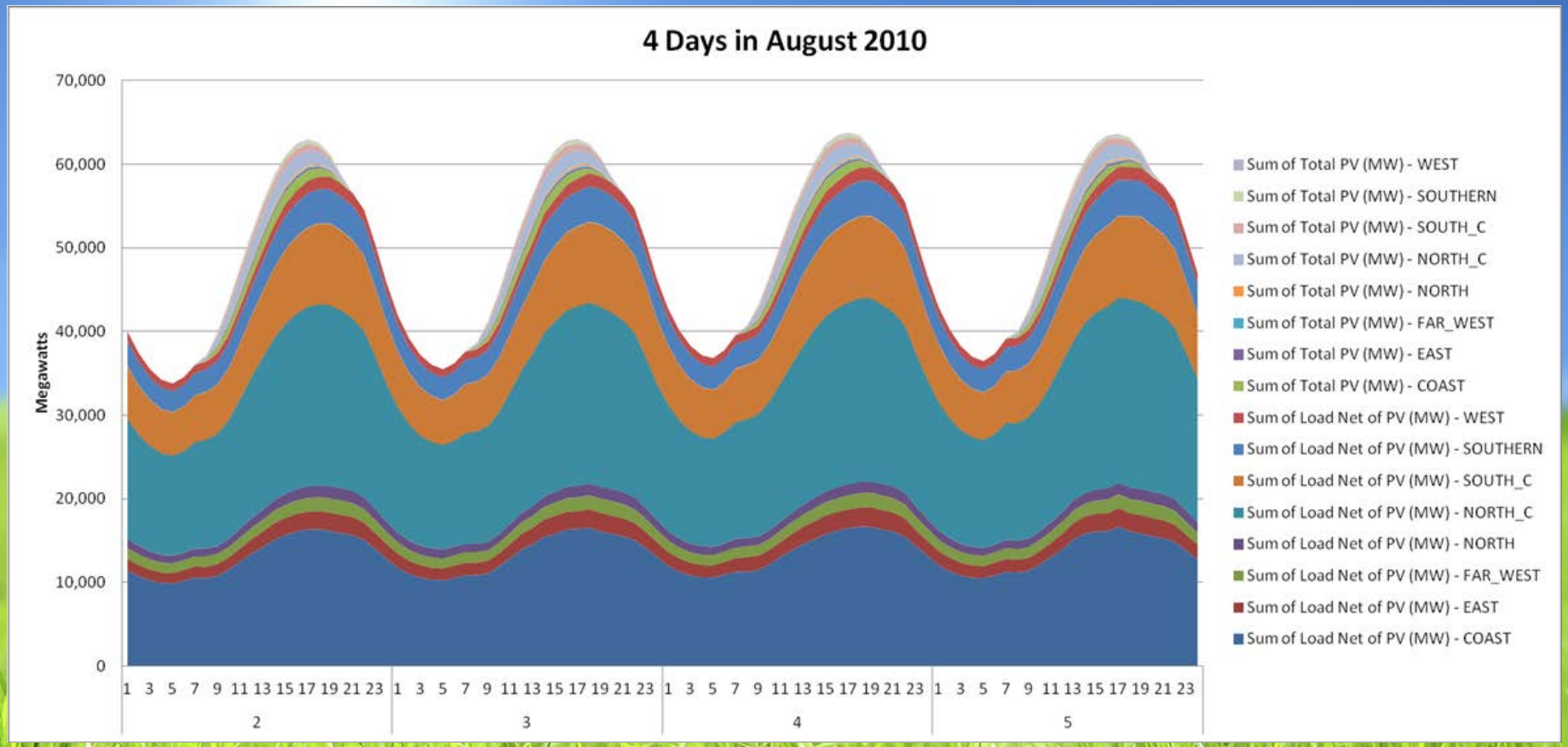


10 Strategies from RAP

- Strategy 1: Target energy efficiency to the hours when load ramps up sharply;
- Strategy 2: Orient fixed-axis solar panels to the west;
- Strategy 3: Substitute solar thermal with a few hours storage in place of some projected solar PV generation;
- Strategy 4: Implement service standards allowing the grid operator to manage electric water heating loads to shave peaks and optimize utilization of available resources;
- Strategy 5: Require new large air conditioners to include two hours of thermal storage capacity under grid operator control;
- Strategy 6: Retire inflexible generating plants with high off-peak must-run requirements;
- Strategy 7: Concentrate utility demand charges into the "ramping hours" to enable price induced changes in load;
- Strategy 8: Deploy electrical energy storage in targeted locations, including electric vehicle charging controls;
- Strategy 9: Implement aggressive demand-response programs; and
- Strategy 10: Use inter-regional power transactions to take advantage of diversity in loads and resources.*

*For a complete set of regional strategies consistent with this step, see: Schwartz, L., Porter, K., Mudd, C., Fink, S., Rogers, J., Hogan, M., Lamont, D., Kirby, B. (2012, June 10). Meeting renewable energy targets in the west at least cost: the integration challenge. Western Governors' Association. Available at: http://www.westgov.org/component/docman/doc_download/1610-meeting-renewable-energy-targets-in-the-west-at-leastcost-the-integration-challenge-full-report?Itemid.

Solar Can Be A Solution….
Matching Peak in Texas



SEIA Recommendations to ERCOT

- ERCOT should change how it calculates the capacity value of solar in its resource planning
- ERCOT should include utility-scale and distributed generation solar in its resource planning
- ERCOT should establish future ancillary service requirements that will enable solar generation to participate in ERCOT's ancillary services market