



US Solar Thermal Market Outlook

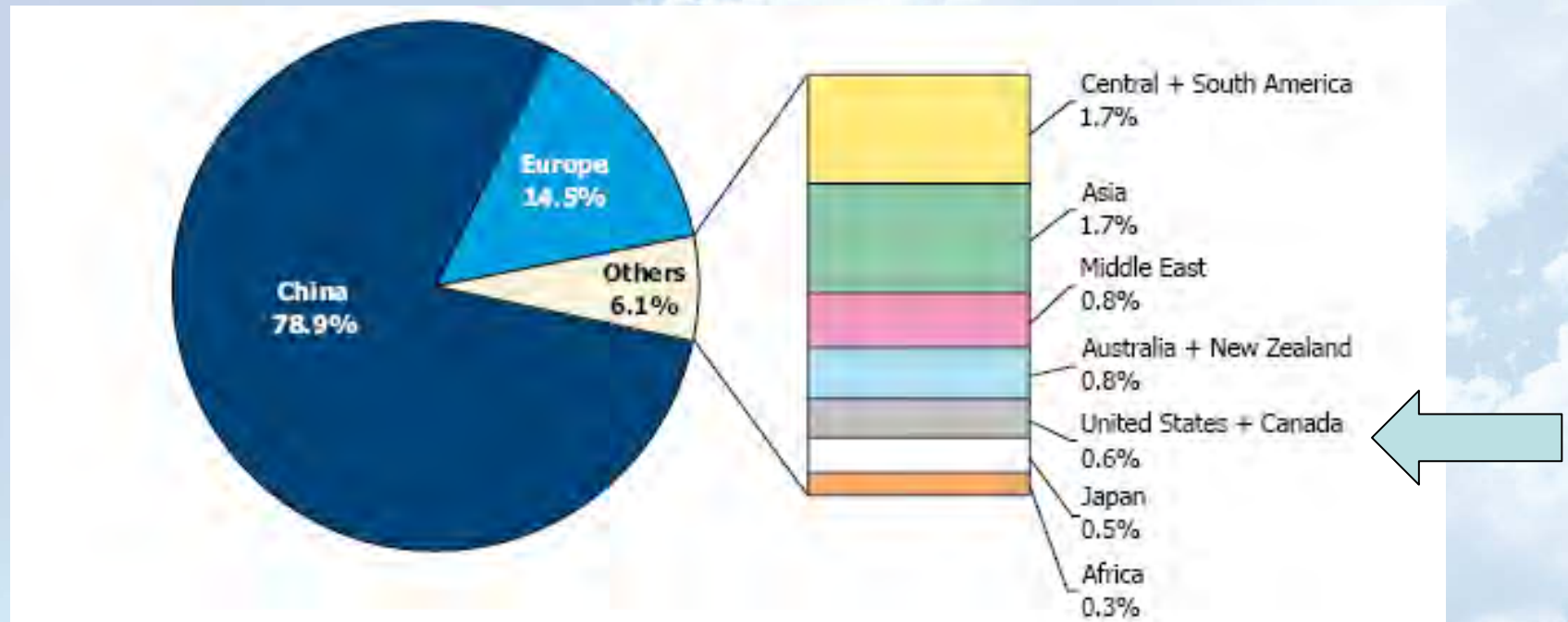
Ed Murray

California Solar Energy Industries Association

Aztec Solar Inc and ELM Distribution



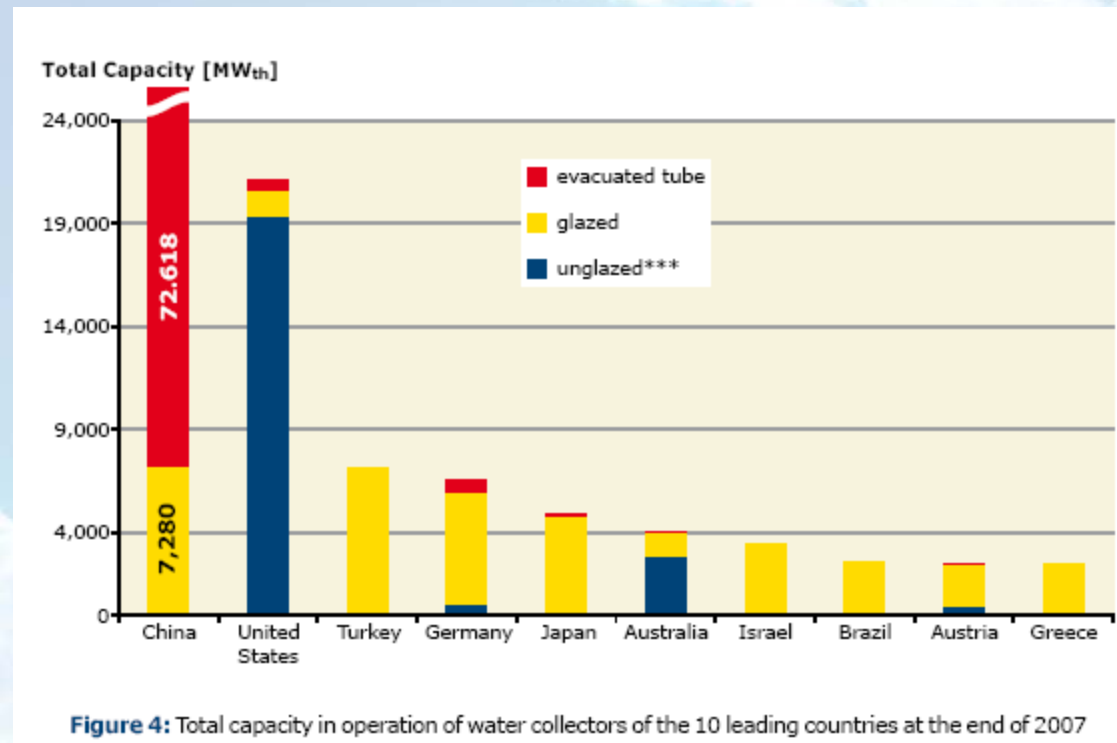
Global Solar Thermal Market 2008



Newly installed glazed collector capacity in 2008 worldwide:
 $29.1 \text{ GW}_{\text{th}} = 41.5 \text{ Million Meters}^2$
US Share: 249,000 Meters²

*Source: Solar Heating & Cooling
Worldwide - 2010 Edition*

Solar Collectors Types in Operation by Country, 2007



Source: *Solar Heating & Cooling Worldwide*
- 2010 Edition

Current Trends

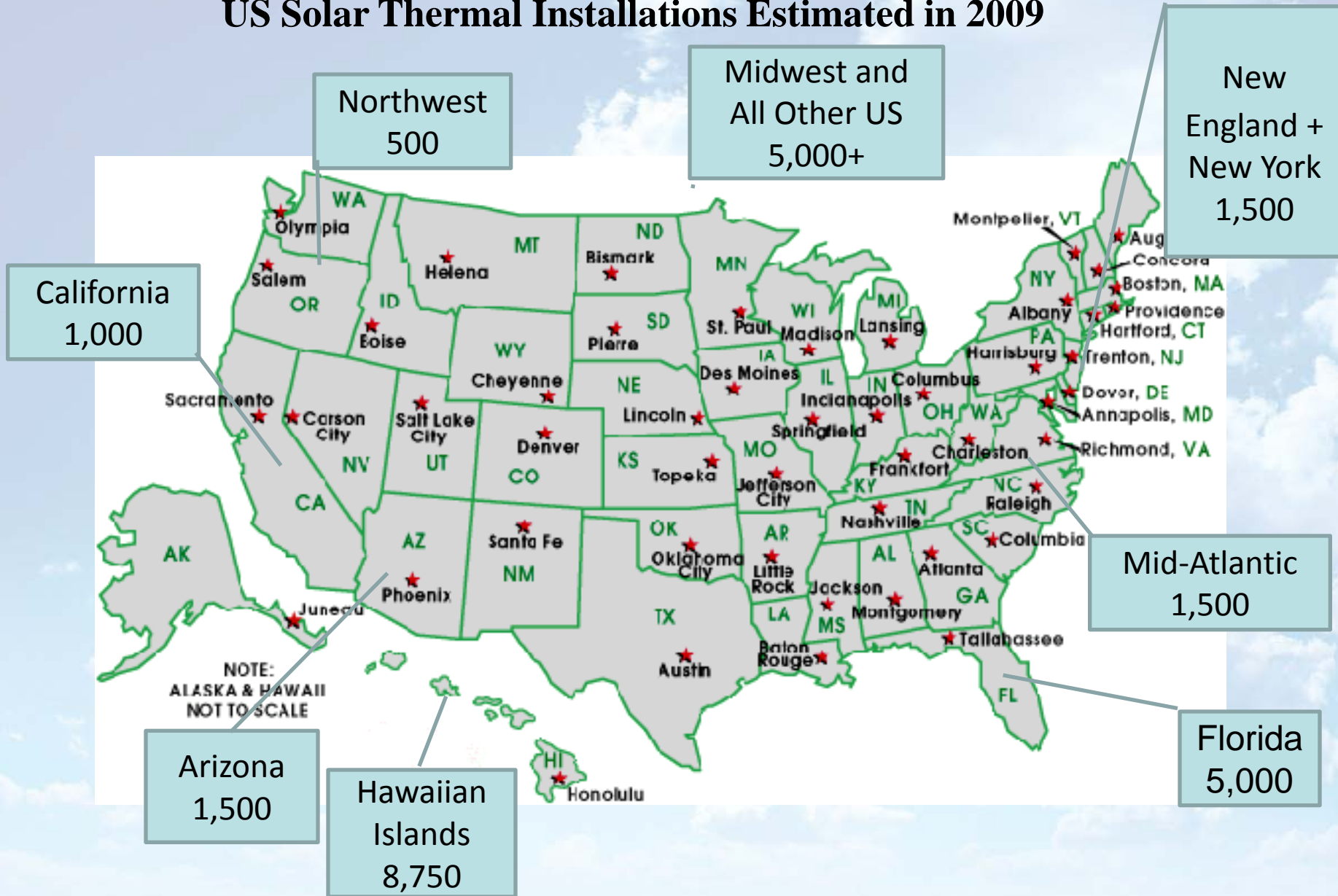
- **Solar Water Heating**
 - Rapid Increase of Imported Products
 - Substantial Increase in Evacuated Tube Collector Models
 - General Consensus: 2010 Installations picking up significantly over 2009, particularly commercial projects

- **Solar Swimming Pool Heating**
 - 2010 Sales improving over 2009, still a fraction of pre-2008 years
 - Approx 35,000 system equivalents installed (@ 350 feet²/system)

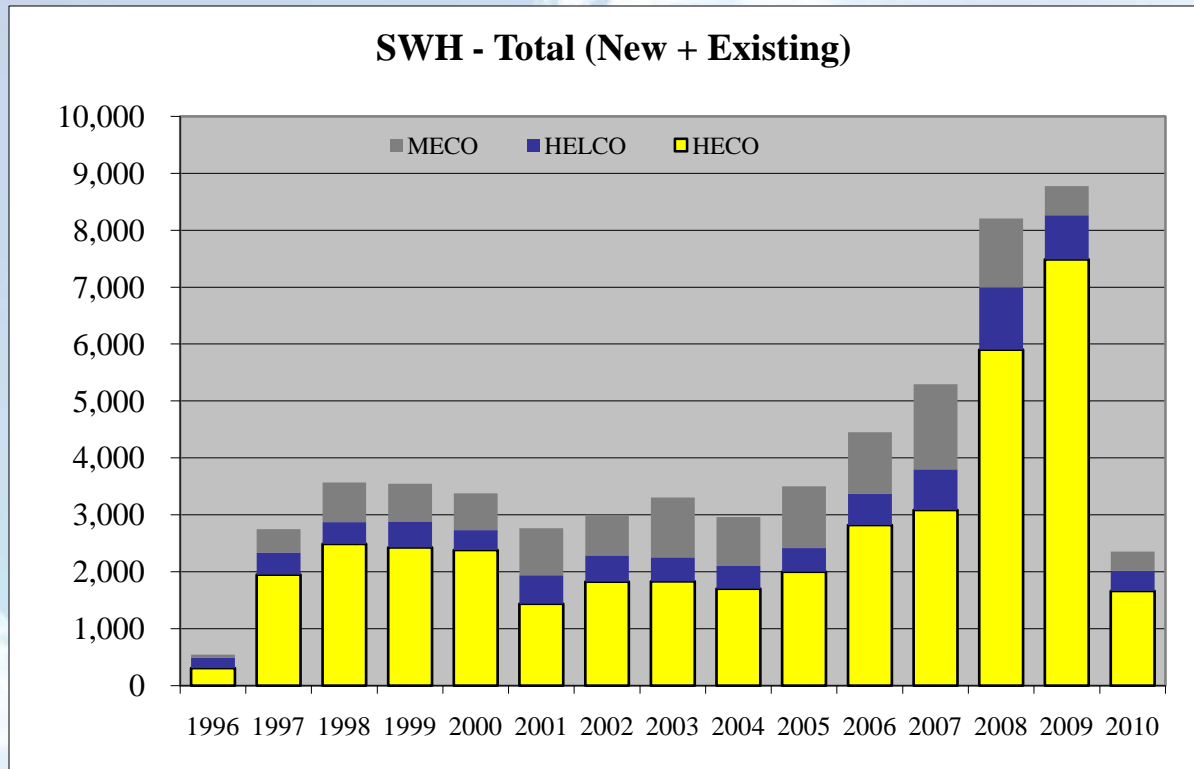
- **Solar Space Heating**
 - “Combi-system” (space and water heating) interest grows
 - Air heating collector-based system interest grows substantially

- **Solar Air Conditioning**
 - Interest growing as an electricity consumption reduction measure
 - Southern California Gas testing side -by-side commercial systems

US Solar Thermal Installations Estimated in 2009



Hawaii Market Activity



Solar water heating system sales via year-by-year
1996 through Q1 and Q2 2010

HI Residential Energy Efficient Water Heater Program

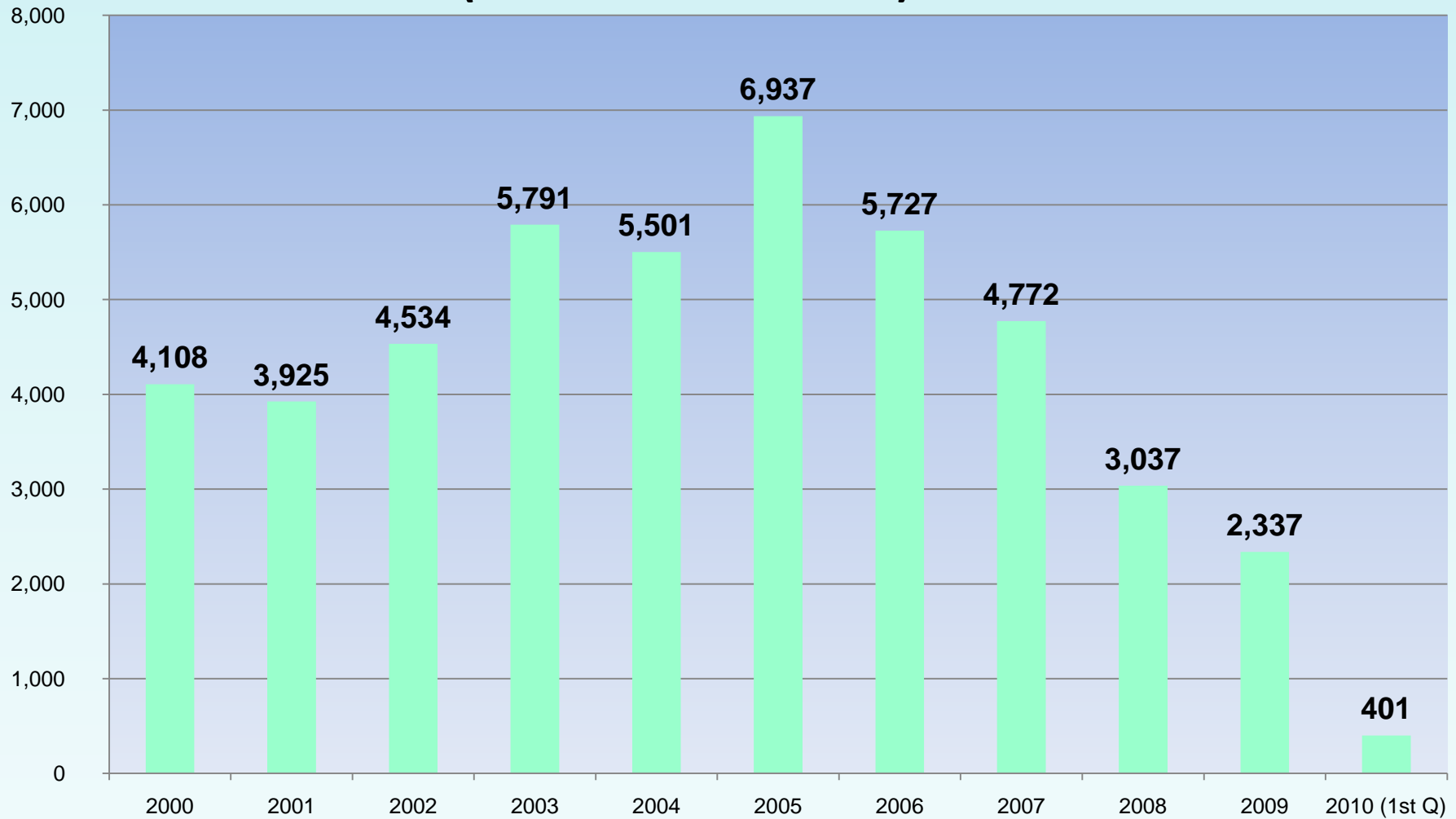
Source: Hawaii Utility Administrators

Hawaii SB 644 SWH Mandate Legislation

Beware of “Unintended Consequences”

- Requires SWH on all new homes EXCEPT for variances granted (20% of new homes have been granted variances in 2010)
- Variances result in installation of instantaneous water heaters utilizing gas fuel “manufactured” from oil
- Current price of manufactured gas fuel ~ \$3.50/therm (100K BTU)
- Current price of natural gas in S. California is ~ \$0.75/therm
- Original solar program was “dynamic,” changes made as needed
- New mandate regulation changes require opening a PUC “docket” (public noticing, hearings, testimony from any interested party)
- System design oversight compromised
- 100% post-installation inspection requirement compromised
- New homes not eligible for utility rebate or state tax credit
- SWH market now tied to new residential construction market

Hawaii New Single Family Dwellings (2000 - 2010 1st Qtr.)



Source: Hawaii Department of Business, Economic Development, and Tourism

California Solar Initiative

CSI-Thermal Program – A Model for State-based Support

- Authorized by California Assembly Bill 1470
- Administrative regulations crafted with extensive industry input
- Administered by California Center for Sustainable Energy (CCSE) and IOUs
- Funded through consumption-based surcharge; \$350.8 million through 2016
- Residential reservations accepted beginning May 1, 2010
- Commercial reservations expected October 1, 2010
- Reservation activity as of September 11, 2010:

<u>Utility</u>	<u>Reservations</u>
• Pacific Gas & Electric	35
• Southern California Gas	4
• Southern California Edison	3
• San Diego Gas & Electric	22

System Type

31 systems displacing electricity

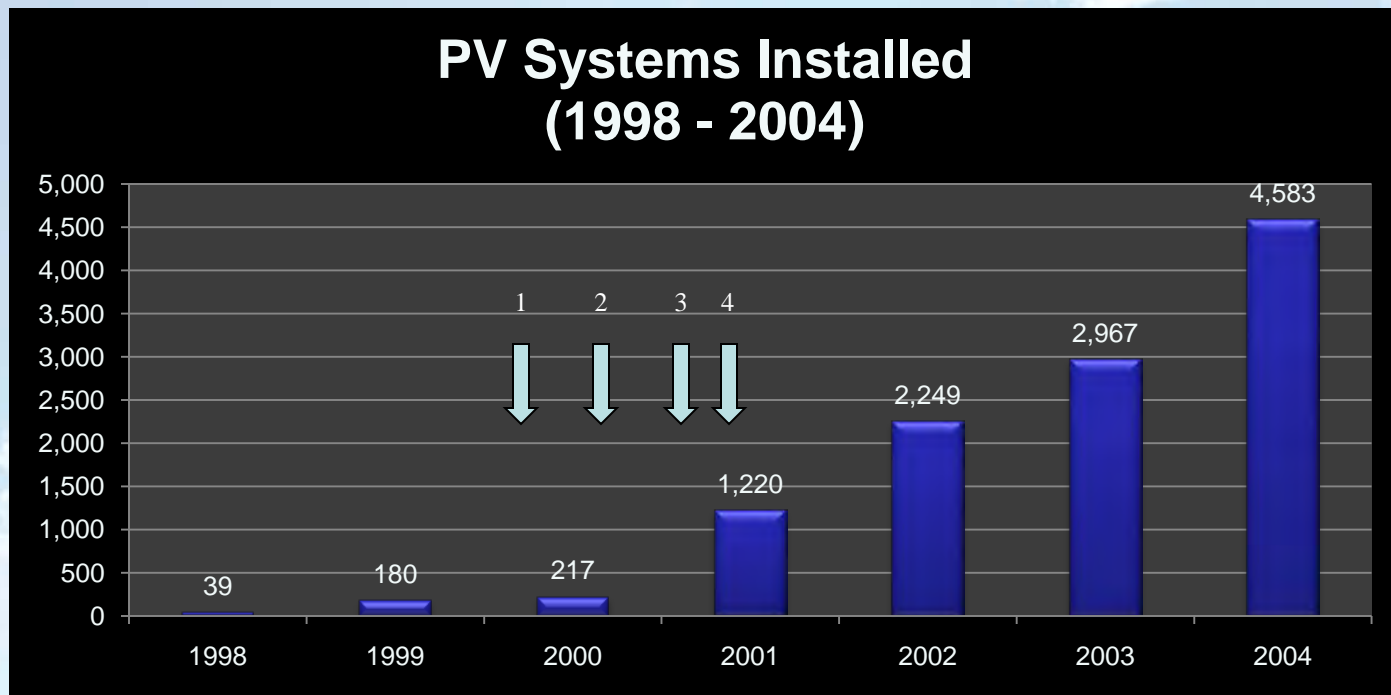
23 systems displacing natural gas

Note: Approximately 90% of all residential water heaters in California are natural gas-fired

PV Incentive Program Comparison

California Energy Commission

“Emerging Renewables Buydown Program” Activity

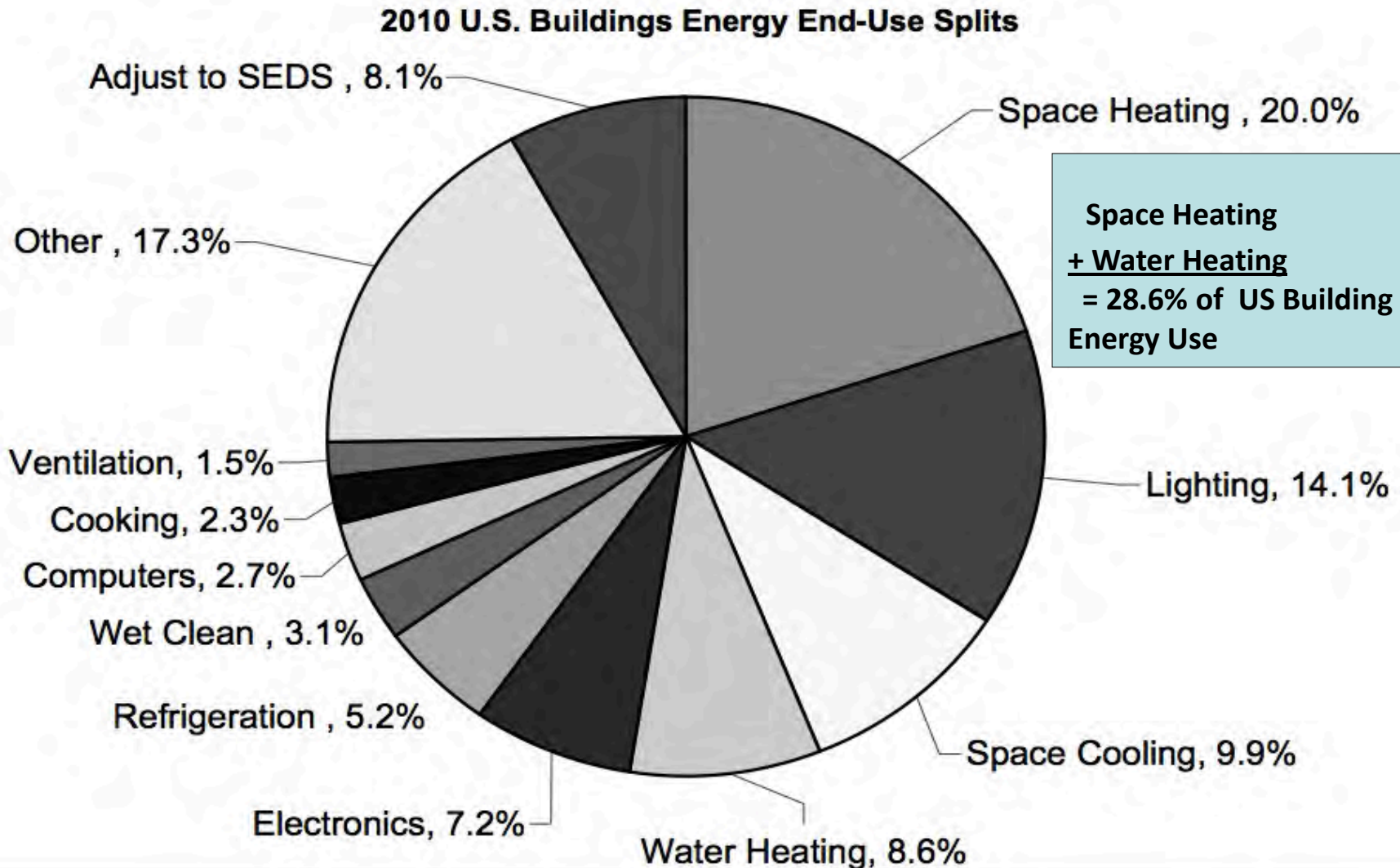


- 1) June 14, 2000 – 97,000 customers – San Francisco
- 2) January 17-18, 2001 – Rolling blackouts; several hundred thousand – SF and Central CA
- 3) March 19-20, 2001 – Blackouts; 1.5 million customers statewide
- 4) May 7-8, 2001 – Blackouts; 167,000 customers statewide

Opportunity Areas

- Arizona utilities (Salt River Project and Arizona Public Service currently operating SWH Programs)
- Florida Power & Light, Lakeland Electric currently planning/conducting SWH Programs (others in planning stages)
- Oregon has a long-running SWH Program – responsible for most installations in the Northwest
- SWH Program underway in Maryland

Thermal Loads – SH&C Technology Opportunity



Trade-Offs for Building Codes

California Title 24 – 2008 Residential Compliance Manual

Updated August 2009

5.1.5 Solar Water Heating Calculations

Solar water heating can be used as a tradeoff under the performance approach. So solar water heating is also required if prescriptive package C is used. Additionally, solar may be used in combination with an alternative water heater to show equivalency with the standard water heater requirement in the prescriptive packages. The building standards use solar fraction (SF) to determine the impact of the solar water heating systems. The SF is the percent of the total energy required by the water heating system that is provided by the solar system. Note that systems used for compliance must have received a rating by the Solar Rating and Certification Corporation (SRCC). To calculate this value two options have been provided. The first approach uses the Solar Energy Factor (SEF) OG300 rating determined by the SRCC to rate predesigned solar water heating systems. To convert this value into a SF use the calculator located at this website:

http://www.gosolarcalifornia.ca.gov/builders/swh_calc_systems.html

- Maximum energy consumption per square foot = “budget”
- Budget can be achieved by any means desired
- SWH is one means of achieving energy budget

On the US Solar Thermal Horizon

- Legislation introduced in US Senate to allow for commercial swimming pool owners/operators to access 30% Federal Investment Tax Credit
- Federal activity on Renewable Energy Standard, large boiler emission rules
- The Solar Rating & Certification Corporation, by more than quadrupling the total of laboratory testing programs it has accredited, hopes to significantly lessen its testing backlog (2 laboratories offering testing in 2008, 15 today)
- The North American Board of Certified Energy Practitioners (NABCEP) plans to significantly improve and increase its question bank (questions for tests) and add an “entry level” exam program for those interested in entering the solar thermal business.
- Energy Star High Efficiency Water Heaters include Solar Water Heating - SWH beginning to appear in press
- Greenhouse gas mitigation (primarily CO₂) attributes of solar thermal recognized in some cases (California SB 32 Climate Change legislation)
- US Federal Government recognition of solar thermal importance (requirement for 30% of energy for water heating from solar on new federal construction)

International Energy Agency

Task 43: Solar Rating and Certification Procedures

- Work under the auspices of the Solar Heating & Cooling Section of the International Energy Agency
- Work goal is to harmonize solar thermal testing (and possibly certification) procedures worldwide
- US DOE worked to initiate Task
- International effort (8 countries active participants, at least 10 additional observing)
- November 2009 meeting in South Africa; February 2010 meeting in Stuttgart; June 2010 meeting in San Francisco
- Future meetings: Austria, 10/2010 – South Africa 11/2010

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Questions?

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Thank you!