CALIFORNIA SOLAR ENERGY INDUSTRIES ASSOCIATION
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March 18, 2010

Mr. Damon Franz
Regulatory Analyst, Energy Division
California Public Utilities Commission
505 Van Ness Ave
San Francisco, CA 94102
Damon.franz@cpuc.ca.gov

Dear Mr. Franz:

The California Solar Energy Industries Association (CALSEIA) appreciates the California Public Utilities Commission staff's and CSI-Thermal Program Administrators' efforts to design and implement a solar-thermal incentive program, which ensures quality products and workmanship and delivers long-lasting benefits to customers, ratepayers, and the general public.

CALSEIA also appreciates the substantial progress being made to address issues and set priorities regarding eligibility of non-water heating and process-heating to the CSI-Thermal Program. The purpose of this letter is to recommend priorities and suggest what types of non-water heating projects (technologies and applications) should be allowed to qualify for participation in the CSI Thermal program and to respond to the Commission's information requests.

Solar thermal technologies deserve recognition for their cost-effectiveness, ability to displace electricity and natural gas consumption, and reduce California's greenhouse gas emissions and criteria pollutants. Now is the time to deploy solar thermal technologies in every sector of the California economy.

CALSEIA recommends the following priorities:

- Give priority to establishing CSI-Thermal program eligibility criteria and incentive levels for the following non-water heating solar-thermal applications:
  - Residential water-heating and space-heating systems (also called combination systems)
  - Commercial, industrial and agricultural process-heating <u>and</u> solar-thermal chilling and cooling applications

- Consider preserving a portion of the budget for process-heating and solar-thermal chilling systems from the commercial budget to ensure that steady funding remains available for both commercial solar water heating, process heating, and chilling systems throughout the life of the program.

- Clarify that only solar thermal technologies are eligible to receive incentives from the CSI-Thermal Program.

  Note: Solar manufacturers are now offering hybrid systems that combine solar thermal and photovoltaic technologies. (For example, one company offers a solar energy technology which circulates water behind a linear array of PV modules to remove heat, thereby improving electricity-generating efficiency. The solar-heated water is then used for process hot-water applications.) For these types of combined technologies, qualified products should be allowed to participate in both the CSI General Market program (for electricity production) and the CSI Thermal program (for the project's thermal output).

- Develop and implement a funding mechanism through incentives and/or the RD&D program for deploying residential and small-commercial solar air-conditioning systems.

With respect to rebates for residential combinations systems, CALSEIA recommends that the incentive for combination systems be limited to the incentive cap in effect for solar water-heating systems. The incentive should not be increase for combination systems.

CALSEIA requests the Commission's help in identifying alternative policy support for solar thermal technologies. For example, at the staff workshop, Mr. Fralick of CCSE mentioned the peak-clipping and load-shifting benefits of selected solar thermal applications. These terms refer to load-shape objectives set for electric utilities' demand-side management programs.[i] If California's investor-owned electric and natural gas utility still conduct demand-side management programs, solar thermal technologies could be deployed at customer sites through these programs as well. CALSEIA requests information about any energy efficiency and demand response programs that potentially would provide marketing and/or financial support for solar thermal applications that reduce electricity or natural gas consumption during a utility's peak demand.

In addition to energy-efficiency and demand-response programs, another potential source of policy support for solar thermal applications is California's cap and trade program to reduce greenhouse gas emissions. CALSEIA requests the CPUC's assistance in identifying the proceedings in which revenues from the sale of allowances will be allocated to energy efficiency and renewable energy projects.

CALSEIA provides additional detailed comments in an attachment to this letter to address other issues raised at the February 23, 2011 workshop and in the Energy Division's *Request for Post-Workshop Comments*, distributed after the workshop.

Thank you in advance for your consideration. Please contact me if you have any questions.

Best regards,

Mignon Marks
Policy Director
policy@calseia.org

cc: R0808009 Service List

Attachment

Stand-Alone Space-Heating Systems

CALSEIA does not foresee a need to create an incentive for stand-alone solar space-heating systems for the commercial/multi-family sector.

CALSEIA is aware, however, of a residential solar space-heating and dehumidification system, which should be included among the eligible technologies for CSI-Thermal incentives. These small systems may be effective in displacing electric resistance heating used to "chase chills" from individual rooms, such as unconditioned garages.

Residential Air-Conditioning Systems

Some solar companies in California offer solar photovoltaic-powered air-conditioning systems. These systems should not be eligible for CSI-Thermal incentives.

Instead, CALSEIA recommends the CSI-Thermal program establish a pilot program to demonstrate residential and small-commercial solar-thermal air-conditioning systems, which pair solar concentrating collectors with UL-listed small-capacity chillers.[ii]

Funding for this technology-demonstration program would be provided from the CSI-Thermal budget, the CSI Research, Development, Demonstration and Deployment (RD&D) program, or other sources. The purpose of this pilot program would be to field-test residential solar thermal air-conditioning systems to determine their durability, performance, and levelized cost of energy.

Eligible systems should have thermal-storage capacity so that these systems displace typical residential occupants' late-afternoon and evening air-conditioning electrical loads.

CALSEIA member companies provided individual responses to questions posed by Energy Division staff. Their comments are particularly germane to Energy Division staff's questions regarding use of TRNSYS, preferences regarding incentive design (up-front, 70/30, and PBI), and potential metering requirements.

Their responses are provided separately at the end of this attachment, but include the following:

- At this time, no applications produce steam in solar collectors, but "…we should expect to see field deployments [of direct steam generation in the collectors] in the next few years."

- Many standards already exist for non-water heating solar thermal applications, so the CSI-Thermal program should not initiate its own standard-development process.

  CALSEIA recommends using the CPUC's technical-support contractor to assist the Commission and Program Administrators to research and gather applicable American and international codes and standards applicable for solar thermal process-heating

applications. Existing standards include: ASHRAE solar heating guidelines, ASME pressure vessel code, NABCEP, National Electrical Code, Solar Rating and Certification Corporation, Uniform Plumbing Code, Underwriters Laboratory, and Unified Facilities Criteria for Active Solar Preheat Systems.

For example, a quick review of available information about solar process heating and cooling research produced the following references:

- The International Energy Agency's Solar Heating and Cooling Program published detailed papers on solar industrial process heating applications at http://www.iea-ship.org/documents/papersofnewsletterNo1.pdf. (See other publications from this multi-year effort by IEA at http://www.iea-shc.org/task33/publications/index.html)

- The European Solar Thermal Industry Federation published a paper describing the "state of the art" in solar industrial process heat at http://www.iea-ship.org/documents/papersofnewsletterNo1.pdf

- Design guidelines for solar space heating of factory buildings is provided by the IEA's Solar Heating and Cooling Program at http://www.iea-shc.org/publications/downloads/task33-Design_Guidelines-Solar_Space_Heating_of_Factory_Buildings.pdf

- A different European effort to promote solar industrial process heating applications is documented at http://www.solar-process-heat.eu/

- *Solar Engineering of Thermal Processes, 3rd Edition,* by John Duffie and William Beckman, published in 2006.

- ASTM International Technical Committee E44 describes its areas of interest as "…standards relating to methods and applications of solar and geothermal energy conversion. These methods and applications shall include the following: heating of domestic hot water; active and passive space heating and cooling; process heating; thermal conversion power generation; photovoltaic generation of electricity; and advanced energy conversion, including wind energy."[iii]

- The IAPMO Uniform Solar Energy Code (2009) and Uniform Plumbing Code (2009) are also potentially useful references.

Update Title 24 Energy Efficiency Compliance Software

The Energy Commission has approved three software programs for showing compliance with the Title 24 Residential Building Energy Efficiency Standards: MICROPAS, EnergyPro and CALRES. None of these software programs is capable of showing how adding a solar space-heating system or a combination solar water heating/space heating system would contribute to a new or remodeled house's compliance with these standards. The CPUC staff can overcome this barrier by working with the Energy Commission and funding development of algorithms for

current and future versions of MICROPAS and Energy Pro (privately developed software) and CALRES (public domain software).

CALSEIA requests that a portion of the CSI-Thermal program's R&D budget be invested in developing algorithms for Title 24 compliance software. CALSEIA also requests the CPUC staff to invite Energy Commission staff from the Building and Appliance Efficiency Standards program to collaborate in this effort, so that when the time comes for the Energy Commission to review and approve algorith-related modifications to these software programs, they will be familiar with the scope and breadth of the proposed changes.

Program Definitions

If CSI-Thermal incentives and eligibility criteria will differ by project size (for example, "large" projects), CALSEIA requests definitions for "small," "medium," and "large-sized" projects, such as those set for solar water-heating systems.

Professional Engineer Stamp Requirements

CALSEIA requests that the program define which types of solar-thermal projects will be required to have a Professional Engineer's stamp on incentive-reservation requests.

TRNSYS

The TRNSYS model is the industry standard for determining how much natural gas or electricity would be displaced by flat-plate solar thermal systems and should be used for determining CSI-Thermal incentive levels.

CALSEIA requests, however, that the CPUC confirm the TRNSYS model can be used for projects using concentrating solar thermal collectors as well. It is important that the TRNSYS model integrate quickly new concentrating collectors so that solar sales engineers need not rely on program administrators to estimate projects' incentive levels.

Direct Forced Circulation Systems

CALSEIA recommends direct forced circulation systems only receive CSI-Thermal incentives if they are installed in coastal climate zones and come with a manufacturer's warranty.

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[i] For all load-shape objectives, see figure at https://cp.tatapower.com/CP_REVAMP/save-energy/explore/difining-demand-side.aspx.

[ii] See http://www.solarnext.eu/pdf/ger/publications_presentations/jakob/080522_OTII%20Int_Seminar_SAC_Overview_Systems_DrJakob.pdf.

[iii] See E44 Technical Committee Fact Sheet at http://www.astm.org/COMMIT/E44_FactSheet_Eng.pdf. The staff manager to this committee is Christine DeJong (email: cdejong@astm.org, phone 610-832-9736) (See http://www.astm.org/COMMIT/SCOPES/E44.htm.)