Date: March 15, 2011

To: California Public Utilities Commission; df1@cpuc.ca.gov; Service List R. 10-05-044

Subject: Informal Post-Workshop Comments

FAFCO Inc. would like to provide the following informal comments to the questions posed by the CPUC regarding the CSI-Thermal Program. Additional comments that are not addressed by the questions follow.

Space Heating or Combination systems (space heat/Domestic Hot Water):

Under the current residential rules, systems are held to an incentive cap of $1,875. Many systems providing water heating plus additional thermal energy would exceed this cap.

Should the incentive cap be increased for combination systems?

First, we believe that the CPUC should focus exclusively on ensuring that the program works for solar water heating before moving to new technologies. The CSI Thermal program seems to be off to a slow start and we are concerned that taking the focus off of ensuring the deployment of 200,000 solar water heating systems in ten years in CA is a mistake. Until the solar water heating market is up and running well in CA, the CPUC should not spend any time working on other technologies.

When the CPUC is able to turn their attention to other technologies, combination systems may be worth evaluating and properly incentivizing. We also believe once the systems are properly characterized and modeled, providing incentives for the energy they deliver would be fine.

Under the current residential rules, most combination systems would not be eligible because SRCC does not certify systems that are intended to provide non-water heating thermal energy.

Would it be necessary for the Legislature to change the OG-300 requirement or for SRCC to change its certification practices in order to allow combination systems?

To ensure the reliability and cost effectiveness of these combination systems the SRCC or other recognized certification organizations should be used to develop standards and certify that these types of systems are ready for consumers. If the system design standards are not required then customers are left vulnerable to faulty system design and unreliable components.

What should be the method for calculating the incentive for combination systems? Options discussed at the workshop included 1) developing a TRNSYS template to model the energy savings; and 2) developing a standard "kicker" for additional savings based on the methodology described in Attachment A.

These systems should be handled separately from SDHW systems, and use TRNSYS for modeling. The inputs for the models should be coordinated with SRCC or other recognized certification bodies based on combination system standards.

Process Heat:

What types of process heat applications will you consider installing? Please describe the load and the system configuration, including temperature needs, storage needs, etc.

Nearly all process heating applications will benefit from the use of all types of solar water heating products. We have been evaluating systems that include large boilers with shell-in-tube heat exchangers as well as steam injection. Water use at these facilities is on the order of millions of gallons per year. Storage needs for these facilities are upwards of 10,000 gallons with expansion reservoirs in the hundreds of gallons.

Do you foresee applications that produce steam in the collector? If yes, please describe the application.

No.

Should we develop installation standards and system design requirements? If so, what should those standards be, or by what process should we develop them?

We advocate leaving system design and installation practices and standards up to the system designers while requiring a PE to sign off on designs. The commercial customer is much more capable of critically evaluating system designs to ensure they are getting the right system as opposed to the residential customer.

How should we calculate energy displacement for purposes of paying incentives? Payments can go to any parties involved. Options discussed at the workshop include:

-Up Front: Program Administrators create a simulation tool to predict system performance, and payment is made in one lump sum based on that estimate.

-Performance-Based Incentive: Pay incentive based on actual metered energy displacement over a number of years. The nominal value of the incentive would be increased to compensate the customer for time-value of money. Metering cost would be born by the applicant.

-70/30 true-up: A partial payment is made up front, and the balance paid after 1 year of metering.

Up Front or a 70/30 true-up with a kicker for systems that out deliver the calculated performance during the first year. For large scale commercial systems the upfront availability of cash used to cover the original cost of the system is of utmost importance to the customer. The delay in cash payments would negatively impact the financial attractiveness of these jobs.

Should project size determine the incentive calculation method?

Project size should determine the incentive calculation method since trying to develop a web interface that will cover all the needs of every potential commercial application will be cost prohibitive and take too much time. At some project size limit the system has to be custom engineered to tailor to the needs of the application.

Options for determining load profiles include: 1) Use data from pre-installation metering for a given period and extrapolate to create a load profile for 8760 hours of the year Professional Engineer stamp would likely be required); and 2) Use data from the California Commercial End Use Survey Data (link: http://www.energy.ca.gov/ceus/index.html)

If the incentive payment is based on a modeling simulation, how should we determine building load profiles? If there are options for determining load profiles other than those listed above, please provide them here.

The complexity and diversity of commercial process heating systems prohibits the use of standard building load profile. While 60 days of monitoring may not provide the most accurate picture of building load it is certainly better than trying to fit a predetermined building load to a dissimilar building. Seasonal load profiles variations are possible to calculate by monitoring water draw, energy used to heat the water, and comparing this data to historical monthly energy and water use.

General Comments:

To reiterate, we strongly support using all available resources in the program to support the development of the solar water heating market in CA and delaying any investment on other technologies until the original objectives of the program are well on their way to being satisfied. The current number of installed systems is low, market awareness in CA for solar water heating is almost non-existent, and the focus of the program should be to continue developing the solar water heating market in CA. With that said, once there is evidence that the solar water heating market is growing according to plan these technologies should be investigated and incentivized.

Additionally, we believe significant improvements must be made in the area of overheat protection for nearly all solar water heating systems. The majority of installed systems thus far under the CSI program are closed loop glycol with "Advanced Controller with a Vacation or Holiday Mode" overheat protection method. All solar collectors in these installed systems are capable of boiling or exceeding the maximum glycol temperatures. Although some glycols are specifically formulated to withstand thermal cycling, boiling, and high temperatures, systems are being installed with glycols that are not intended or designed for these high temperatures. This leaves these systems vulnerable to freeze damage and increased component degradation due to elevated acid levels. Systems that rely on large storage buffers are also susceptible to overheating if hot water draws unexpectedly decrease or stop. Additionally, if systems rely on grid power for their overheat protection a power outage leaves the system vulnerable to overheating. Finally, experience shows that any system that relies on the homeowner for intervention is likely to fail.

Overheat protection requirements can be improved as follows:

- Reevaluate "Advanced Controller with a Vacation or Holiday Mode" as an overheat protection method, and the glycol manufacturers' approval in these systems.
- Eliminate storage requirements for all passively overheat protected systems.
- Remove "Hartguard". This is a brand name and should be replaced with "Glycol with a maximum operating temperature/boiling point that exceeds the SWH system's maximum attainable temperature based on the highest recorded ambient temperature and irradiance at the location in California."
- Mandate that "Steamback" systems use glycol that is proven to maintain freeze point and pH regardless of boiling cycles.

Thank you for considering these comments and we look forward to your response.

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