

ORIGINAL

Decision 93741 NOV 13 1981

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Sharpe Solar Systems for exemption from certain checklist requirements of Decision Nos. 92251, 92501 and 92769.)

Application 60480 (Filed April 24, 1981)

O P I N I O N

On September 16, 1980 we issued Decision (D.) 92251 establishing demonstration solar financing programs for Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, and Southern California Gas Company. We subsequently modified this decision by D.92501, December 5, 1980, and D.92769, March 3, 1981. In these decisions we specified a checklist of requirements for domestic solar water heaters. Solar water heaters must meet all sizing and checklist requirements to be eligible for the solar financing program effective March 1, 1981.

By its letter to the Energy Conservation Branch (ECB) of April 14, 1981, which was docketed as Application 60480 on April 24, 1981, Sharpe Solar Systems (Sharpe) requested certain exemptions from the checklist requirements established by D.92251, 92501, and 92769. Certain system types having wide variations

in performance estimates such as the Sharpe integral storage-collector units must meet monitoring requirements established by the ECB staff on a case-by-case basis as directed in D.92501, page 6, paragraph 7.

Sharpe's Position

Sharpe markets an "integral storage-collector" or "passive" solar water heater. The system fully meets the requirements of the California solar income tax credit. Sharpe instructs its customers to keep their conventional water heater thermostat set low (or off) during the summer. The conventional tank thus becomes merely a storage tank for the solar-heated water. According to Sharpe, bypassing this tank would serve no purpose because the conventional tank is far better insulated than the solar tank and will better prevent overnight heat loss. Overnight heat loss from the solar tank is negligible if the customer uses an amount of hot water comparable to the tank capacity (i.e., 60 or 120 gallons). As hot water is used, it is replaced by fresh cold water through specially designed inlets which keep it segregated from the solar-heated water. The cold water ends up in the solar tanks and the solar-heated water will be retained in the insulated conventional water heater tank. Sharpe argues, therefore, that provision for the independent operation of the solar system is unnecessary.

The Sharpe system does not need complicated over-heating protection since the water in the tank will not boil even during a severe heat wave. Water temperature during extreme heat will not rise much above 160 degrees. (The system includes a pressure and temperature relief valve and line.)

Sharpe also maintains that when cold incoming water pushes solar-heated water forward from tank to tank, the hottest water mixes in the conventional water heater, moderating its temperature, so that a tempering valve is not needed.

Finally, Sharpe argues that the thermal mass of its system provides adequate freeze protection in warm or mild climates. Water in the 60-gallon storage-collector will not freeze in such climates.

Sharpe asks for checklist ^{1/} waivers on three items:

- a. Item A-6. Provision for independent operation of solar and conventional systems.
- b. Item A-34. Provision of a temperature limiting device to limit the exit temperature of the hot water.
- c. Item B-7c. Compliance with freeze protection requirements.

1/ Post-installation inspection checklist effective June 22, 1981.

Sharpe also requests the approval of the following sizing requirements:

<u>Number of Bedrooms</u>	<u>Size</u>
1-3	60-gallon Sharpe "Magic Box"
4-5	120-gallon Sharpe "Magic Box"

ECB Position

The ECB notes that when the valving of a solar system allows the independent operation of that system, there is a greater likelihood of displacing 60% of conventional energy because backup tank standby losses are thereby eliminated during the summer. As a corollary, valving that allows the independent operation of the conventional system assures the homeowner a hot water supply when the solar system needs repair. For these reasons, the ECB recommends that Sharpe not be granted an exemption to checklist item A-6, and that Sharpe be required with all others to provide valving allowing independent operation of both solar and conventional systems.

The ECB also maintains that safety considerations dictate that Sharpe provide tempering valves, as are required on all systems. Water temperature in the Sharpe storage tank can reach and exceed 160 degrees. Water in excess of 130 degrees can scald

an adult. Even lower temperature water can be hazardous to children. Hot water should not be allowed to exceed 140 degrees at any domestic faucet.

The ECB opposes use of nonrenewable resources either directly or indirectly for freeze protection in solar water heaters. Sharpe proposes to use thermal mass for this purpose. ECB staff believes that the use of thermal mass alone for freeze protection may be inadequate in some areas of California thus justifying an elevation ceiling for integral storage-collector systems. The ECB believes that thermal mass will provide effective freeze protection for the Sharpe system up to an elevation of 2,300 feet.

The ECB also notes that a 60-gallon Sharpe "Magic Box" weighs 680 lbs. when full or about 30 pounds per square foot. A roof must have the structural capability to support the weight of the Sharpe unit(s) to be installed. The ECB recommends that Sharpe systems be roof-mounted only where the roof is, or can be made, capable of bearing the additional weight. The checklist requires such analysis above 10 pounds per square foot. Furthermore, Sharpe should carefully comply with the requirement of securing building permits for its installations.

ECB is persuaded by Sharpe's contentions that its "Magic Box" model has the potential for meeting the program performance criteria. By restricting its sales to moderate climate locations, Sharpe units may, through proper sizing, save 60% of conventional energy. However, ECB proposes that Sharpe units be monitored in households using an average of 300 therms per year for water heating (or the electric use equivalent) in order to accurately judge their performance. Each installation must yield 60% net energy savings as established by a rigorous monitoring program in randomly selected installations. The installations selected will be at the sole discretion of the ECB. Based on existing performance data, and until the results of this monitoring program establish otherwise, the ECB recommends that the minimum sizing criteria be as follows:

<u>Number of Bedrooms</u>	<u>Number of "Magic Box" Units</u>
1	1
2	2
3	2
4	3
5	3

Discussion

In D.92251, we specifically directed ECB to evaluate, under a monitoring program, "the extent to which solar water heating can be relied upon to provide adequate and reliable supplies of

energy." In D.92501, we adopted a checklist of standards to assure the quality, safety, and proper sizing of solar systems in its demonstration program. We have revised this checklist in subsequent decisions based on the expertise of many persons knowledgeable in solar technology. The checklist requires that a system be sized to displace 60% of conventional energy. We recognize that our sizing methodology is applicable only to flat plate systems and have directed the ECB to approve alternate sizing guidelines for nonflat plate systems on a case-by-case basis. We also directed the ECB to grant exemptions to the quality and safety standards only if such exemptions in no way decrease system quality or safety.

ECB Monitoring

We direct ECB staff to evaluate Sharpe solar systems based on the monitoring objectives set forth below:

- a. Determine whether the systems are large enough to provide at least 60% of the metered usage of conventional energy for water heating including adjustments for amount of hot water consumed.
- b. Implement the monitoring program in households which the ECB considers likely to use 300 therms of natural gas per year (or an equivalent amount of electricity) for water heating.
- c. In households where less than 300 therms per year is actually used, determine whether Sharpe systems displace at least 60% of actual conventional energy use.

The ECB will evaluate the performance of Sharpe systems through the monitoring of eight systems randomly picked by the ECB, including four in warm climate areas and four in cold climate areas. Two systems in each climate area shall be served with natural gas and two with electric backup.

The system monitoring program will last a minimum of nine months with interim reviews. After six months of monitoring, if any of the eight solar systems is not displacing 60% of conventional energy use (according to data extrapolated over 12 months), then the ECB staff will discuss these results with Sharpe and allow Sharpe to recommend the upgrading of all future installations in similar locations to avoid disqualification from the program.

ECB and Sharpe agree that systems with electrical backup will be monitored with two meters: a water meter to determine the volume of hot water used and an electric meter to measure electricity consumption. (On natural gas backup systems, a gas flow meter will be used to measure conventional energy use.) This monitoring equipment will be used to estimate the energy consumption of the conventional water heater before the solar retrofit, and to determine whether the solar system is displacing 60% of that energy.

ECB staff has discussed with Sharpe these and other technical issues and performance monitoring questions. ECB is satisfied that Sharpe has provided reasonable supporting data to proceed as a participant in the Demonstration Solar Financing Program based on the following conditions (as used below, "Sharpe" refers to Sharpe Solar Systems and/or its installers):

- a. Sharpe's thermal mass freeze protection for its solar systems will be assumed effective only in locations below 2,300 feet elevation.
- b. Sharpe's standard warranty will cover system repair or replacement due to damage by freezing wherever installed.
- c. Sharpe will assure that functioning backup gas or electric water heaters are retained for monitoring purposes.
- d. Sharpe will instruct customers to turn off pilot lights on gas backup water heaters during summer months.
- e. Sharpe will instruct customers to turn off electric backup water heaters during summer months.
- f. Sharpe will recommend installation of time clocks on all electric backup water heaters.
- g. Sharpe will not install its units on any roof that is not capable of supporting the added weight. Sharpe will also secure all necessary building permits for any installation.

- h. Sharpe will install valves on all systems for flushing purposes. If the accumulation of hard water deposits in the system causes a serious loss of system efficiency, Sharpe agrees to assist customers purchasing its open loop systems in flushing and removing hard water deposits from the system. No charge will be made for such service during the first five years.
- i. Sharpe retains the right to examine, on a monthly basis, the data gathered from the monitoring of its systems.
- j. Sharpe retains the right to ask the PUC to adjust system performance results if needed to account for deviations from expected solar insolation levels and expected hot water consumption during the monitoring period.
- k. In no case shall gas backup energy be converted to electric backup energy.

Sharpe and its installers will meet the minimum quality and sizing criteria as contained in D.92251, 92501, and 92769 and all subsequent decisions (including checklist items A-6 and A-34 regarding independent operation and tempering valves), and will meet the standards of the California Energy Commission's Solar Energy Tax Credit Guidelines when installing the "Magic Box" units. Sharpe and its installers will size systems according to the chart on page 6.

Sharpe also agrees that any reference to this order in its correspondence, marketing literature, or media advertising must contain the following full text of this Disclaimer of Product Endorsement:

"The California Public Utilities Commission in no way endorses, recommends, or warrants the durability, suitability, or the reliability, or the short- or long-term energy savings performance of this or any other brand of system or component for domestic water heating or any other application".

While this disclaimer is applicable to any system under our demonstration program, we must be certain that this order is not viewed by the public as an implied endorsement.

We grant this application ex parte. We believe that public hearings would serve no useful purpose.

Findings of Fact

1. Sharpe systems need to comply with checklist standards regarding independent operation and tempering valves in order to maintain high levels of quality and safety.

2. The thermal mass of the Sharpe system provides adequate freeze protection up to an elevation of 2,300 feet.

3. Sharpe systems may reasonably be expected to displace 60% of conventional energy use as previously discussed.

Conclusions of Law

1. The exemptions requested by Sharpe regarding independent operation and tempering valves are not reasonable and, if granted, would result in systems of lower quality and lesser safety.

2. The exemption requested by Sharpe regarding freeze protection is reasonable and should be granted subject to the agreements between ECB and Sharpe as previously discussed.

3. The following order should be effective the date of signature in order to allow Sharpe to participate in the solar financing program at the earliest time.

O R D E R

IT IS ORDERED that:

1. The Sharpe Solar Systems (Sharpe) requested exemptions to checklist requirement A-6 and A-34 are denied. Thus, Sharpe shall be required to provide valving allowing the independent operation of both solar and conventional systems and a temperature-limiting device to limit the exit temperature of hot water.

2. Sharpe shall be granted its requested exemption to checklist requirement 3-7c regarding freeze protection subject to the conditions set forth.

3. The exemption requested shall be granted subject to Sharpe's full acceptance and compliance with the conditions specified including the use of the Disclaimer of Product Endorsement.

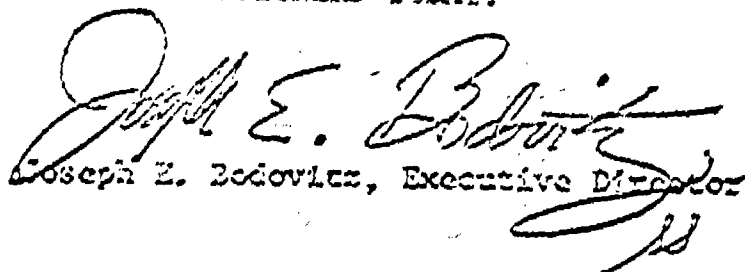
4. Except as granted and provided, Sharpe and its contractors shall adhere to all other currently effective installation requirements set forth in D.92251, 92501, and 92769 or subsequent orders in this proceeding.

This order is effective today.

Dated NOV 13 1981, at San Francisco, California.

JOHN E. BRYSON
President
RICHARD D. CRAVELLE
LEONARD M. GRIMES, JR.
VICTOR CALVO
PRISCILLA C. GREW
Commissioners

I CERTIFY THAT THIS DECISION
WAS APPROVED BY THE ABOVE
COMMISSIONERS TODAY.


Joseph E. Bodovitz, Executive Director