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Decision No. 92501 DEC 5 - 1980

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ORIGINAL

Investigation on the Commission's own motion into the feasibility of establishing various methods of providing low-interest, long-term financing of solar energy systems for utility customers.	OII No. 42 (Filed April 24, 1979)

ORDER MODIFYING DECISION NO. 92251 AND GRANTING LIMITED REHEARING

Petitions for rehearing of Decision No. 92251 have been filed by the California Solar Energy Industries Association (Cal-SEIA), Toward Utility Rate Normalization (TURN), Public Solar Power Coalition (PSPC), Southern California Gas Company (SoCal), Southern California Edison Company (Edison), S. W. Hart & Co. Pty., Ltd. (Solahart), and E-Tech, Inc. (E-Tech). We have also received concerned letters from the Shell Chemical Company, Grumman Corporation, and several other manufacturers of solar water heating system components. We have considered each and every allegation raised in the petitions and letters, and are of the opinion that good cause for granting rehearing has been shown limited to further consideration of the five-year prorata portion of our adopted warranty requirements. The mechanism for submittal of evidence on this issue will be discussed more fully below.

With regard to all other allegations made in the petitions for rehearing, we are of the opinion that sufficient cause for rehearing has not been shown. However, upon further review of the record and decision in this proceeding, we recognize the necessity for making certain modifications to Decision No. 92251, primarily to remove ambiguities. These modifications are of two types: (1) more major clarifications and resolution of certain issues not discussed in Decision No. 92251 for which we will adopt proposed modifications herein and will invite comment by the parties; (2) straightforward, minor clarifications which we will adopt herein. All of these areas are discussed further below.

I. Limited Rehearing and Interim Suspension of Requirements

On page 54 of Decision No. 92251,*/ we required "a full five-year parts and labor warranty and an extended prorata parts warranty for an additional five years" to be eligible for participation in the demonstration program. After further reviewing the record, we are persuaded that no evidence supports the prorata portion of this requirement.

We will therefore at least temporarily suspend the prorata portion of our warranty requirement until further hearings have been held. All parties, including the Commission Staff, will have 45 days to submit written testimony on (1) whether either manufacturers' or installers' warranties should be extended an additional five years on a prorated basis, and (2) if so, how such warranties should be drawn. Those opposing an additional prorated five-year period should be prepared to present firm data on the impact of such a requirement on the costs of the systems covered by our program.

Further hearings will be held following submission of this testimony, and we will issue another decision on this matter expeditiously. In the interim, the prorata requirement is suspended.

II. Proposed Modifications

The areas discussed below were either not covered in Decision No. 92251 or were covered in an unclear or cursory manner. The following proposed modifications are therefore necessitated. Parties may submit written comments responding to these modifications within 30 days after the effective date of this decision. After consideration of the comments submitted, we will act expeditiously to bring these issues to a conclusion.

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*/ All page references are to the mimeographed version of Decision No. 92251.

1. Concerning the first five-year warranty requirement, we are of the opinion that the record clearly does support this requirement. However, as presently written, the five-year warranty requirement is ambiguous in several respects. We propose to solve this problem by taking official notice of and adopting in toto the California Energy Commission's (CEC) warranty requirements, as set forth in that Commission's Solar Energy Tax Credit Guidelines, 20 Cal. Admin. Code Section 2601(e).

In sum, in order to qualify for eligibility in the demonstration financing program, solar systems installed after March 1, 1981 must be accompanied by the following written warranties:

1) Manufacturers' Warranties. Each collector, tank, pump and control unit must be accompanied by a written five-year warranty by the manufacturer of the product conforming in all other respects to 20 Cal. Admin. Code Sections 2601(e)(2) and (e)(3).

2) Contractors' Warranties. Where the system is installed by a licensed contractor, the product must be accompanied by a written five-year warranty by the contractor conforming in all other respects to 20 Cal. Admin. Code Sections 2601(e)(2) and (e)(4).

2. On page 44 of Decision No. 92251, we discuss do-it-yourself installations. One problem which we do not consider is that of whether a utility should discontinue credit payments in the absence of a contractor's warranty. This possibility is obviously unacceptable, because of its negative impact on this segment of the market.

As a substitute for a contractor's warranty, we will require do-it-yourself installations to undergo the same one-year diagnostic inspection as required for other installations. If the do-it-yourself system does not pass this inspection, the customer will no longer be eligible for credit payments. Of course do-it-yourself systems must pass an inspection after installation in order to receive credits in the first instance. At that time, it will be determined whether or not the parts used satisfy our manufacturers' warranty requirements.

3. Concerning the standards for the one-year and five-year diagnostic inspections, SoCal has proposed that they be simplified and more clearly stated. We agree with SoCal's proposal.

Therefore, one- and five-year diagnostic inspections shall be limited to the following items:

1) Check condition of piping.

2) Check condition of coating on collectors to determine that it has not deteriorated.

3) Inspect glass or plastic collector for condition and cleanliness.

4) Inspect drain opening in collector frame.

5) Check valves, fittings, and pumps for leakage.

6) Inspect electrical connections for safety and security.

7) Check any water heater blanket for condition.

8) Determine that controls and pump operate.

9) On closed systems, check for presence of anti-freeze.

4. Decision No. 92251 does not discuss eligibility rules for duplexes, triplexes, condominiums, mobile homes, and customers of municipal utilities. The following eligibility rules will apply to those categories:

a. Duplexes - if one system is installed for both units, the duplex will be treated as a single family residence, eligible for a single family loan or credit. If two systems are installed, each unit will be treated as a single family residence, each eligible for a single family loan or credit.

b. Triplexes and condominiums - if a central system serving all units is installed, the building will be considered a multi-family residence, eligible for an $8 credit per unit served. In the case of

condominiums, the credit will be applied individually to each of the participating owners. If a single system is installed per unit, each unit will be considered a single family residence, eligible for a single family loan or credit.

c. Mobile homes

1) Those mobile home owners paying vehicle tax will be considered to be travelling and will not be eligible for the program; those paying property tax will be eligible.

2) For mobile home customers paying property tax and located in mobile home parks, with or without master metering, those customers will be eligible to participate in the program if the rates they are paying directly to the utility or through the park owner are in a category of rates which have been designated to help pay for the program.

d. Customers of municipal utilities - the municipal utility will have the opportunity to decide whether to participate in the program. Once it decides to do so, its customers will be paying rates which help to pay for the program, and will be eligible to participate.

5. Given the limited market penetration objectives of this demonstration program, only one rebate will be allowed for an owner of one or more single family dwellings. This means that if the same person owns two single family residences, he/she will only be eligible for credit on one of those residences.

6. Decision No. 92251 establishes that tax credit eligibility standards for system purchases after January 29, 1980 and before January 15, 1981 are appropriate for retroactive certification. SoCal agrees with this, but requests clarification of the role of the utilities in such certification.

We agree that this area needs clarification, and propose the adoption of SoCal's recommendation. Therefore, the minimum standards sufficient to qualify purchasers of "grandfathered" systems to receive utility credit will be the following:

a. utility inspection to determine that there is a solar water heater system installed and operational; and,

b. written certification by the installing contractor that the solar water heater system installed by him meets the standards of the California Energy Commission's Solar Energy Tax Credit Guidelines required for the purchaser to qualify for the state income tax solar tax credit.

7. Solahart objects to Decision No. 92251's requirement concerning freeze protection, maintaining that its system differs significantly from those systems for which the standard was written. We recognize that our requirement, as stated in item C-19 on page B-4, may not be appropriate for certain systems. Consequently, those manufacturers and/or installers who believe this requirement should not be applied to them may formally file for an exception to it. Everyone filing for such relief will be required to demonstrate to the Staff's satisfaction that if an exception is granted, its system will still be able to fully meet the 60 percent solar energy contribution. Those dissatisfied with the Staff's resolution of their filing may file a formal complaint with the Commission.

III. Adopted Modifications

1. SoCal seeks clarification and modification of the language on page 38, which states that "... the utility security shall be subordinated to all other liens until one day prior to sale or transfer of the property." SoCal fears this language may make it difficult for homeowners to receive additional secured financing.

We agree that the quoted language should be modified slightly; we hereby delete it and adopt the following substitute language:

"... The utility security shall be subordinated to all other voluntary liens until one day prior to sale or transfer of the property."

2. The Advisory Committee, in its letter of November 5, 1980 to Commissioner Grimes, recommends that the most appropriate method of sizing is 20 gallons per bedroom per day. It further recommends the establishment of sixteen separate climate zones, with one simple nomograph per zone. Finally the Committee recommends a special sizing system for certain systems such as thermo-syphons. We shall adopt the sizing recommendations of the Advisory Committee.

We intend to carefully monitor the performance of installations pursuant to this sizing methodology. Should a substantial number of systems fail to meet the standard of 60% displacement of conventional energy, we will reconsider the modification. Any changes that may result will apply prospectively.

3. SoCal also contends it is necessary to consolidate certain items on the installation checklists to remove redundancies. We agree. We are of the opinion that the Advisory Committee's revisions accomplish this. The Advisory Committee recommendations were, however, adopted expressly subject to later approval by the Commission Staff. The Staff has reviewed the checklists and has approved them with several modifications. We therefore adopt the Advisory Committee's revised checklists as modified by the Staff. They are attached as Appendix A to this decision, in lieu of Appendices B and D to Decision No. 92251.

4. Pursuant to recommendations of the Advisory Committee contained in a letter to Commissioner Grimes dated November 5, 1980, we adopt the following clarifications to Appendix D of Decision No. 92251, which are reflected in the checklists adopted above:

a. Page B-2, item B.1 - language is deleted, and the following language substituted:

"Valving must be provided to isolate the solar system so that hot water interruption does not occur due to solar system repair of modifications."

b. Page B-2, item B.8 - to conform to the Uniform Building Code, the first sentence is changed to read:

"A minimum roof clearance of two and one-half inches must be supplied"

c. Page B-3, item C.1 - The third line is changed to read:

"utility. Unglazed collectors are not acceptable."

d. Page B-4, item C.14 - to conform to the Uniform Building Code, the specification is changed to read:

"The solar system piping must be at least 3/4 inch (inside diameter) copper pipe. Type "L" copper pipe is the preferred product. Type "M" copper pipe may be used where permitted by local codes."

e. Page B-5, item D.2 - in the third sentence, the words "through a report on record with the utility." are deleted.

5. Decision No. 92251 discusses standards for contractor eligibility on page 43. That discussion incorrectly indicates that contractors merely eligible for the RCS referral list shall be eligible for our program. To indicate our intent that only contractors <u>on</u> the list are eligible to participate, the last sentence in the second full paragraph is modified to read:

"Thus, any contractor who is included on an RCS referral list for solar water heater installation shall be eligible to install systems which can be financed pursuant to this demonstration."

6. We failed to address the eligibility for our program of consumers using propane or butane for water heating, rather than electricity or natural gas. These consumers will be eligible for participation in the program if their residence had a bottled gas or electric water heater served by one of the respondent electric utilities as of January 29, 1980. Customers served through a piped propane or butane system serving a development, a neighborhood, or a community will <u>not</u> be able to participate.

7. For clarification purposes, on page 35 of Decision No. 92251, the first sentence of the first full paragraph is modified to read:

> "Another reasonable approach would be to provide a low interest loan only up to a prescribed limit, but to offer any additional amounts necessary to complete the purchase at the utility's pretax weighted cost of money."

8. Decision No. 92251 states that as of January 15, 1981, a set of system and installation requirements more detailed than those for the solar tax credit must be met. Because of the modifications made in today's decision, we will extend that date to March 1, 1981.

9. Ordering Paragraph No. 9 on page 97 of Decision No. 92251 states that eligibility standards for any installation for which a contract was executed between January 29, 1980 and January 15, 1981 shall be the eligibility standards for the state solar tax credit. To avoid any possible abuse of this provision, and to ensure that our program will get underway rapidly, we hereby modify Ordering Paragraph No. 9 as follows:

> "Eligibility standards for the state solar tax credit shall be the standards for eligibility for financing for any installation for which a contract was executed after January 29, 1980 and for which an installation was completed prior to March 1, 1981."

IV. Remaining Issues

1. Edison argues that the decision is ambiguous on the issue of whether Edison can employ its proposed system for low-income financing in lieu of the direct financing plan which we have adopted for SoCal. Edison had proposed that low-income customers would acquire their financing through a conventional lending institution, and Edison would guarantee the loan. Edison requests clarification of this issue and, if the Commission allows Edison to implement its own program, waiver of the requirement on page 37 of Decision No.

92251 that all the respondent utilities set aside 10% of all funds authorized for the demonstration program for the low-income market.

We have no evidence to indicate that Edison's programs will not be an effective way to reach the low-income market. We therefore approve the proposal and waive the 10% set-aside requirement for Edison. We may reconsider this modification should evidence become available that Edison's programs are not adequately reaching its low-income customers.

2. In correspondence with George Amaroli of our Energy Conservation Branch, Shell Chemical Company has requested that the Commission include polybutylene piping in its list of acceptable piping materials. We note that the State Housing and Community Development Commission (HCDC) is currently holding hearings to consider the extent to which polybutylene and other plastic piping materials should be allowed to be used in residential buildings. Because this is a controversial issue, we will defer any action on the use of all plastic piping materials in domestic solar water heating systems until the HCDC has established rules and regulations for their use.

3. Both SoCal and Edison raise questions concerning our market penetration data. Our market penetration goals are stated in number of residences to be served. The percentages of market noted in the decision are approximation only. We have, for SoCal, adjusted the number of single-family gas retrofits slightly downward, and, for Edison, the number of electric retrofits slightly upward. Since gas retrofits cost much more than electric retrofits, we deemed these adjustments necessary to equalize the cost of the program to gas and electric ratepayers. These adjustments are minor. Because they come close to our stated goals, and in view of the discussion which follows, we will not alter them.

With regard to SoCal's concern with our multi-family retrofit figures, we first remind SoCal that our extrapolation was based on numbers which SoCal itself supplied in the course of the proceeding. We are not persuaded by its arguments that we should modify this extrapolation.

We perceive SoCal's concern to be one of fearing a penalty in a future rate case, should it fail to achieve the market penetration goals we have established. We reiterate that these figures represent goals, not firm requirements which must be met. We expect all the utilities to pursue this program in good faith. However, we recognize that there may be various reasons why the goals we have set might not be fully realized. Consequently, we see no reason to change our figures on multi-family retrofits for SoCal.

4. E-Tech has petitioned for rehearing on the issue of whether heat pumps should be included or excluded from the demonstration program. We reject E-Tech's characterization of the evidence received in this proceeding. As we stated in Decision No. 92251, it is uncontroverted that virtually no record of experience with this technology in California has been presented, and that heat pumps do indeed have certain technological limitations. The record also indicates uncertainty as to the extent of the retrofit market in this State. Moreover, no evidence was presented by E-Tech or any other party regarding the proper incentives to adopt, should heat pump water heaters be included in the program.

Secondly, concerning E-Tech's attachment to its petition for rehearing of a field study of heat pumps done by the Tennessee Valley Authority, we note two facts: (1) this is an interim study, and (2) it identifies as unanswered some of the same critical questions about this technology with which the Commission itself is concerned. After reconsideration of the record, we are still of the opinion that at the present time, we do not have sufficient information to warrant including heat pump water heaters in our solar water heater demonstration program.

However, we do possess enough knowledge of this technology to recognize its potential viability. In order to develop further understanding of its applicability in California and to provide a first step in encouraging its use in appropriate situations, we hereby order the electric utilities to file an amendment to their December 1, 1980 conservation program filings to include a reason-

able demonstration program for heat pump water heaters. In our judgment, a reasonable program for Edison and Pacific Gas and Electric Company would involve approximately 300 installations at a cost of approximately $100,000 for each company. The figures for San Diego Gas and Electric Company would be somewhat smaller. Funds should be allocated from the conservation contingency fund, or by deferral of any equivalent level of program effort of a lower priority based on conservation energy yield. Subsidies will be set on a percentage of retail cost basis equivalent to the subsidies established for the solar program for electric water heater retrofit. All heat pump water heater manufacturers selling production model products in California will be able to participate equally in this demonstration program. The electric utilities' amended filings should be submitted by January 5, 1981.

5. Finally, we note that we have received numerous inquiries from all over the country concerning the underlying assumptions used in developing our demonstration program. To assist efforts to establish similar programs elsewhere, and to clarify our decision, we hereby attach as Appendix B to this order a list of the assumptions we used in formulating our program.

Findings of Fact

1. The record in this proceeding contains no evidence on a five-year prorated warranty extending beyond the first five years.

2. The record in this proceeding does contain evidence on a basic five-year warranty as a general proposition.

3. The Energy Commission warranty requirements as set forth in Cal. Admin. Code Section 2601(e) provide a model for the specific terms of a five-year warranty requirement.

4. Several areas of importance in this proceeding were either not addressed in Decision No. 92251 or were addressed in very cursory fashion, among them: eligibility of do-it-yourself installations; standards for diagnostic inspections; eligibility rules for duplexes, triplexes, condominiums, mobile homes, and

municipal utility customers; number of rebates per single family dwelling owners; standards for certification of "grandfathered" systems; and freeze protection.

5. Our review of Decision No. 92251 has identified several other areas which require minor modifications, i.e., the security lien language, the sizing standards, the installation checklists, RCS listing for contractor eligibility, eligibility of propane or butane customers, the effective date on which our adopted standards will be effective, and the eligibility standards for "grandfathered" systems.

6. Our market penetration data represent goals, not absolute requirements.

7. The record does not support the inclusion of heat pump water heaters in the solar demonstration programs.

8. The record does support a limited demonstration program for heat pump water heaters, to be integrated into the electric utilities' ongoing conservation programs.

Conclusions of Law

1. The record is not sufficient at this time to require a prorated second five-year warranty on parts.

2. Rehearing should be granted on the prorated second five-year warranty.

3. The record is sufficient to support a basic five-year warranty requirement for manufacturers (major components) and installers.

4. The specific terms of the above five-year warranty should conform in all another respects to the warranty requirements of the California Energy Commission, as set forth in Cal. Admin. Code Section 2601(e).

5. Modifications should be made in the areas enumerated in Finding No. 4 above.

6. All parties should have a 30-day period in which to submit written comments on the modifications to the basic five-year

warranty requirement referred to in Conclusion 2 above, and the modifications referred to in Conclusion 5 above.

7. Certain additional minor modifications should be made in the areas enumerated in Finding No. 5 above.

IT IS HEREBY ORDERED that:

1. Decision No. 92251 is modified as specified herein.

2. All parties will have approximately 30 days to file written comments to the modifications proposed in Section II of this Order. All such comments must be filed in the Commission's Docket Office by Monday, January 5, 1981.

3. Rehearing is granted to further consider the issues relating to a second five-year prorated warranty requirement.

Parties will have approximately 45 days to file written testimony on whether either manufacturers' or installers' warranties should be extended an additional five years on a prorata basis, and if so, how they should be drawn. All written testimony must be filed by Friday, January 16, 1981.

Rehearing will commence on Tuesday, February 5, 1981, in the Commission Courtroom, State Building, 107 South Broadway, Los Angeles, California at 10:00 a.m., before Administrative Law Judge Orville Wright.

4. By January 5, 1981, the electric utilities shall file an amendment to their December 1, 1980 filings with this Commission of conservation programs to include a reasonable demonstration program for heat pump water heaters.

5. The date as of which the Commission's adopted system and installation requirements must be met is changed from January 15, 1981, to March 1, 1981.

6. Except as specified herein, the petitions for rehearing of Decision No. 92251 as modified in this order are hereby denied.

The effective date of this order is the date hereof.
Dated DEC 5 - 1980, at San Francisco, California.

President

Commissioner

Commissioner Vernon L. Sturgeon, being necessarily absent, did not participate in the disposition of this proceeding.

APPENDIX A

CHECK LIST FOR SOLAR WATER HEATER SYSTEMS INSTALLED AFTER JANUARY 15, 1981

	Yes	No	Not Applicable
*1. Does the system have a building permit? (If required)	____	____	____
*2. Has the system been inspected by the local building department	____	____	____
*3. Unless electricity is presently being used for water heating and if natural gas is available, is natural gas used for the backup system?	____	____	____
*4. Does the system have a back flow preventer for any connections to the non-potable side of the system.	____	____	____
*5. On a closed loop system has valving for flushing and draining system been installed unless prohibited by manufacturers specifications.	____	____	____
*6. On a closed loop system using anti-freeze, has a sampling or drain value been provided in the collector loop?	____	____	____
*7. Has valving been arranged so that both solar and conventional systems can operate independently?	____	____	____
*8. Are flow directions indicated?	____	____	____
*9. Is all plumbing in the solar system insulated? (all potable and non-potable hot water pipes must be insulated. All cold water pipes must be insulated at a distance of 2 linear feet from connection to hot water sources). ½" wall thickness indoors, 3/4" wall thickness outdoors.	____	____	____
*10. Is insulation which is exposed to the weather protected from a solar degradation and weathering?	____	____	____
*11. Are joints in insulation either taped or glued? According to manufacturers specifications	____	____	____
*12. Are exposed components other than solar collectors protected from freeze damage?	____	____	____
*a) Air vent	____	____	____
*b) Vacuum breaker	____	____	____
*c) Temperature and pressure relief value	____	____	____
*d) Expansion tank	____	____	____
e) Other	____	____	____

NOTE: All answers of this check list that have an * must be answered by YES or N/A if system was installed after January 15, 1981.

	Yes	No	Not Applicable
13. ITEM - if the system is closed loop system, go on to the following questions. If it is a pressure system, skip the following section.	____	____	____
Item 1 - Does the system contain a non-toxic fluid?	____	____	____
Item 2 - If the system contains a non-toxic fluid, does it have a single wall heat enxchanger?	____	____	____
*Item 3 - If the system is filled with a toxic fluid, does the system have a double-walled heat exchanger?	____	____	____
*Item 5 - On non-toxic fluid system, are closed loop ports labeled with a warning to prevent the use of toxic fluids in this system?	____	____	____
*Item 6 - On toxic fluid systems, are fluid lines marked with a clear warning label "Danger, Water Not Drinkable" - "Poison".	____	____	____
Item 7 - If on the data sheet under "anti-freezes used" "other" has been checked off, at this point record the type of heat exchanger fluid being used.			
_____			
_____			
_____			
*14. Is plumbing 3/4 inch type M copper or better?			
*15. Has piping been installed so that all freeze-protected plumbing slopes to drain?	____	____	____
*16. Have dielectric unions been properly installed at all copper-ferrous joints?	____	____	____
*17. Are all pipe runs vertical and horizontal adequately supported? (fasteners at no greater than 5-foot intervals)	____	____	____
*18. Are temperature and pressure relief valves installed on the system in the proper places? (on pressurized systems this is on the tank. On closed loop systems, this is on the tank and on the collector loop).	____	____	____
*19. Are the pressure and temperature relief valves discharged to an outside drain in a direction to eliminate any possible scalding or property damage?	____	____	____

NOTE: All answers of this check list that have an * must be answered by YES or N/A is system was installed after January 15, 1981

	Yes	No	Not Applicabl
*20. Are temperature and pressure relief valves from closed loop systems installed in such a manner to prevent damage to health and property? (Caution should be taken that these fluids are sometimes poisonous and proper disposal should be accounted for).	____	____	____
*21. Has a vacuum relief valve been installed in the system?	____	____	____
*22. Have automatic air bleeds been provided at the high point in the system?	____	____	____
*23. Are the collectors mainfolded in a reverse return, parrallel manner? Unless other flow balancing techniques are employed.	____	____	____
*24. Has the circulator pump been installed according to mfgrs. spec.	____	____	____
*25. Has the expansion tank been located on the suction side of the pump?	____	____	____
*26. Are the following components located in such a manner as to allow access for cleaning, adjusting, servicing, examination, replacement, or repair?	____	____	____
*a. Storage Tank	____	____	____
*b. Pump	____	____	____
*c. Heat Exchanger	____	____	____
*d. Controller	____	____	____
*e. Other components	____	____	____
*27. Has the check valve for reverse flow prevention been installed in a proper manner?	____	____	____
*28. Is the check valve of the proper material for the type of fluid in the sytem?	____	____	____
*29. Is the storage tank properly connected to the conventional water heater?	____	____	____
*30. If supply water pressure is in excess of 80 pounds per square inch or the working pre-sure rating of any ststem component, has an approved pressure requlator preceded by an adequate strainer been installed?	____	____	____

NOTE: All answers on this check list that have an * must be answered by YES or N/A if system was installed after January 15, 1981.

	Yes	No	Not Applicable
*31. Has the completed system been installed in a neat and orderly fashion?	____	____	____
*32. a) Is a device which indicates that the system is operating installed.	____	____	____
*b) Does the storage tank have a minimum insulation of R12?	____	____	____
*c) Does the conventional water heater have an extra insulation blanket or a minimum insulation of R12?	____	____	____
*33. Have the plumbing connections from the storage tank to the solar collectors been installed in a manner to promote thermal stratification?	____	____	____
*34.a) If the storage tank is located outside, is its insulation material protected from weather and solar degradation?	____	____	____
*b) Has a tempering valve or other temperature limiting device been installed to limit the exit temperature of the hot water?	____	____	____
*35. If the storage tank is buried, is it anchored to prevent flotation?	____	____	____
*36. If the storage tank is installed in an attic, is it provided with a drip pan and an outlet to an adequate drain?	____	____	____
*37.a) If the solar collector is a tank type and exceeds a weight of 10 pounds per square foot, has an engineering roof load report been approved.	____	____	____
*38. Do flat plate collectors exceed 10 pounds per square foot (if yes, has an engineering roof load report been provided?	____	____	____
*39. Have collectors been mounted with WEEP holes - if any, at the lowest end of the collector?	____	____	____
*40. a) Is adequate drainage available in the collector array for leaks that may occur?	____	____	____
*b) Has access to gutters, downspouts, and caulking been allowed for?	____	____	____
*41. Are minor repairs and preventive maintenance allowed for in the collector installation?	____	____	____
*42. Has flashing or a roof jack been installed to prevent water leakage at any piping penetration through the roof?	____	____	____

NOTE: All answers on this check list that have an * must be answered by YES or N/A if system was installed after January 15, 1981.

	Yes	No	Not Applicable
*43. Are joints between the framework and the rest of the building calked and/or flashed to prevent water leakage?	____	____	____
*44. Are the collectors installled so as not to contribute to moisture buildup, rotting, or degradation of the roof or wall of the building?	____	____	____
*45. Are collectors installed so that water flowing off of the collector surfaces cannot freeze and cause damage to roof or wall surfaces?	____	____	____
*46. Using a solar sighter, do the collectors have a clear unobstructed view of the sun between the hours of 10:00 and 3:00 in December?	____	____	____
*47. Is the rack constructed in s solid manner?	____	____	____
*47. a) Has a minimum roof clearance of 2½ inch been allowed between the collectors and the roof? (This does not apply when the collectors are integrated into the roof)	____	____	____
*48. Are control sensors located within 1 inch of and near the bottom of the storage tank?	____	____	____
*49. Are control sensors located within 1 inch of and at the top of the solar collectors outlet or within the collector box according to manufacturers specifications.	____	____	____
*50. a) Are sensors for collectors and storage tank attached tightly for the best possible thermal transfer.	____	____	____
*b) Is the system controller properly grounded?	____	____	____
*c) Has the control circuit wiring been color-coded or otherwise labeled so that wires are readily traceable?	____	____	____
*51. Has a qualified person in both solar and conventional water systems put the system through at least one startup cycle, including all modes of operation?			
*52. Do plumbing connections provide equal flow path lengths through all collectors or include flow balancing devices?			
*53. Has a timeclock been installed on the electric water heater?			

NOTE: All answers on this check list that have an * must be answered by YES or N/A if system was installed after January 15, 1981.

NOTE: All answers on this check list that have an * must be answered by YES or N/A if system was installed after January 15, 1981.

REQUIRED INSTRUCTION AND DOCUMENTATION IN THE SYSTEM MANUAL

	YES	NO	N/A
*1. Does the System Manual provide the customer with information on eliminating all backup energy use during summer months?	___	___	___
*2. Have fill weights, pressure ratings, temperature ratings and other useful information for servicing and routine maintenance of the system been included in the manual?	___	___	___
*3. If hazardous fluids are used in the system, have proper procedures for their use, including first aid handling and safe disposal instructions, been supplied in the manual?	___	___	___
*4. If roof mounted solar components exceed 10 pounds per square foot, has the structural integrity of the roof and mounting been approved by a registered structural engineer?	___	___	___
*5. If the collector rack is of a commercial type, has the general design been approved by a registered structural engineer?	___	___	___
6. Is a complete system diagram part of the owner's manual?	___	___	___
*7. Do operation instructions include provisions for the system if the owner leaves for a vacation and hot water use is nil?	___	___	___
*8. Does manual provide instruction on valving off different sections of the system in emergency situations?	___	___	___
*9. Has the contractor certified that --			
a. The warranty provided with the installation is a copy of the warranty submitted for program acceptance?	___	___	___
b. The system complies with the program sizing requirements for flat plate collectors which are rated by TIPSE or equal?	___	___	___
c. The system complies with program freeze protection requirements or has obtained a staff waiver?	___	___	___
d. The system will provide a minimum 60% annual solar contribution to the resource energy needs?	___	___	___
e. The installation complies with the currently published minimum standards of --	___	___	___

Title 24 - CEC Residential Energy Conservation Standards

SMACNA - Sheet Metal and Air Conditioning Contractor's National Association, Inc., Solar Installation Standards.

NSF - National Sanitation Foundation.

USEC - Uniform Solar Energy Code.

(CERTIFICATION OVER)

CUSTOMER SIGNATURE

CONTRACTOR SIGNATURE & LICENSE NUMBER

Financing assistance from the utility cannot be obtained until the utility has inspected the system and certified its eligibility for financing. The California Public Utilities Commission recommends that customers pay the contractor only 60 percent of the contract price until the utility representative certifies below that the system is eligible for financing assistance.

UTILITY FIELD REPRESENTATIVE

DATA SHEET

A. Customer name and address

B. Customer account number _____

C. Date system installed _____

D. Persons in household present _____

E. System installer _____ Salesperson _____

F. System cost (gross)

G. Customer's expected solar contribution _____ %

H. System

1) Collectors

Brand _____
Model _____
Number _____

Ft ^{2} (Aperature) _____

A. Glazings

	YES	NO
1. single glass		
2. double glass		
3. single glass low iron		
4. double glass low iron		
5. single lexan		
6. single figerglass		
7. Other		

B. Absorber

1. all copper		
2. copper, aluminium		
3. all aluminium		
4. steel		
5. other _____		

2) Tank

a. size _____
b. brand and model number _____
c. added insulation _____
e. number _____
d. type of backup _____

3) Control

a. brand and model number _____
b. differential on (ΔT) _____
c. differential off (ΔT) _____

4. Freeze protection

	YES	NO
a. recirculation		
b. pressurized drain down		
c. air head		
d. drain down (nonpressurized)		
e. drain back		
f. antifreeze		

1) Type

a. propylene glycol		
b. ethylene glycol		
c. oil		
d. other _____		

5. Heat exchanger

a. internal on pressurized tank single wall		
b. internal on pressurized tank double wall		
c. external on pressurized tank single wall		
d. external on pressurized tank double wall		
e. internal on nonpressurized tank		

6. Pump

a. brand and model number _____
b. watts _____
c. material _____

1. stainless		
2. brass		
3. cast iron		
4. other _____		

7. Collector angle from horizontal _____

8. Collector direction (in degrees with magnetic deviation compensated for) _____

APPENDIX B

OII 42
DEMONSTRATION SOLAR FINANCING
PROGRAM ASSUMPTIONS USED IN
PREPARING APPENDIX A OF
DECISION NO. 92251

The following is a list of key assumptions used in calculating annual and lifecycle costs and savings associated with the CPUC adopted "Solar Demonstration Program."

I. Electric Applications

Single Family Detached Homes (No multi-family) 1/

1. Annual Consumption of electricity for water heating 6000 Kwh.

2: Solar fraction or percent savings due to solar retrofit 60%.

3. Annual savings (60% x 6000 Kwh) = 3600 Kwh.

4. Cost of an average solar installation $3000.

5. Marginal cost of electricity 72 Mills/Kwh.

6. Average revenue (rate) 55 Mills/Kwh.

7. Escalation rate on both marginal cost and average revenue 15% for 5 years and 10% thereafter (January 29 interim decision in OII 42).

8. Discount rate (both customer and utility) 12%.

9. Single Family Electric Program Description

Incentives to participating ratepayers will be provided through a "utility credit program." There are two methods of providing credits. The first method, which is applicable to both PGandE and SDG&E, is a $20 per month payment, payable in quarterly installments, for 36 months. Southern California Edison has proposed a "rate

1/ The record developed in OII 42 establishes that the incidence of central electric water heating in multi-family residences is close to zero.

indexing" program of utility credits and this technique will be tested in S.C.E.'s service territory.

10. Program costs

For each electric utility participating in the solar demonstration program, its costs are equal to the revenue requirement. Requirements are equal to the "utility credits" plus administrative expenses.

Administrative expenses do not include Residential Conservation Service audit expense. The level of administrative expenses used in this analysis by the CPUC staff are only rough approximations of what those costs could be.

Since the "utility credit" program is assumed to be the least complex, from an administrative standpoint, its costs should be substantially less than the estimates provided by the utilities for a direct loan program. (The original concept.)

11. Basis for $20/month - 36-Month Utility Credit

The intent of any utility sponsored conservation program should be to elicit the greatest response with the least possible cost. However, we cannot look to the record in this case for specific guidance on "how much of an incentive is enough." Based on the 6% direct utility loan for single family gas customers who convert to solar water heating, we can calculate the "economic value" to the participating customers of receiving a 6% loan when the market rate is approximately 12%. Allowing for the fact that the direct utility loan is due and payable upon sale of home and the current turnover in homes is approximately 7 years, the net present value of the 6% subsidy (12% market rate - 6% utility rate) is $758.94.

In the single family gas credit program, the benefit of the credit is equal to the benefit of the 6% subsidized interest rate. This was accomplished by turning the Net Present Value of the interest subsidy ($758.94) into an annuity of 48 months at 12% or $19.99 per month. 48-month was chosen as a reasonable period because current rates and forecasted increases in natural gas prices over the next few years should lead to a positive cash flow position for the natural gas water heating customer who converts to solar water heating.

Because solar water heating retrofits are currently more cost effective to the ratepayer who currently uses electric resistance heating, a credit program for this customer should not require as large a subsidy as the natural gas customers receive to elicit the same degree of consumer interest. $20 a month for 36 months was chosen as an adequate level of credit subsidy.

12. Computing Utility Revenue Requirements and Savings For Electric Water Heating Retrofits

A. Annual Revenue Requirements for Utility Credits $20 per month - 36 months.

This approach affects PGandE and SDG&E, as Southern California Edison will use an indexing approach to calculate its credit level.

The basic equation for calculating revenue requirements is:

Rev. Requirement = average systems installed x $20 per month + annual administration and general expenses

B. Utility Savings

Utility savings are a function of the difference between the marginal cost of new supply and the average revenue or rate charged by

the utility for supplying an increment of electricity. O
supplied marginal cost values during the hearing process in
The 72 Mill per Kwh value is, according to PGandE's witness, mostly
avoided oil costs with a small amount of capacity credit. The 55
Mill per Kwh revenue or rate represents PGandE's TIER II residential
rate. These values are used to calculate the savings for S.C.E.,
SDG&E as well as PGandE since each utility is heavily dependent on oil
as the primary generator fuel. The 55 Mill/Kwh rate is representa-
tive of all three electric utility residential rate structures (PGandE,
SCE and SDG&E).

The savings to the electric utility are calculated according
to the following formula.

Utility Savings = (marginal cost - average revenue) x Kwh
SAVED

As an example, in year 1 of the program marginal cost equals
72 mills, i.e., it would cost an electric utility 72 mills to generate a
wh to supply a residential water heating customer with one more Kwh.
expected revenues to the utility would be approximately 55 mills.
7 mill per Kwh represents the savings to utility. In year 1 of the
ration program the savings to the utility is equal to the
electric homes which are retrofitted with solar water heaters
by the estimated number of Kwh displaced by each system
). The total Kwhs displaced are multiplied by the
(17 mills/Kwh in year 1). The first year value (17
lated at 15% per year for five years and 10% thereafter.
iat marginal cost and average rates are escalating at

CORRECTION

THIS DOCUMENT

HAS BEEN REPHOTOGRAPHED

TO ASSURE LEGIBILITY

the utility for supplying an increment of electricity. Only PGandE supplied marginal cost values during the hearing process in OII 42. The 72 Mill per Kwh value is, according to PGandE's witness, mostly avoided oil costs with a small amount of capacity credit. The 55 Mill per Kwh revenue or rate represents PGandE's TIER II residential rate. These values are used to calculate the savings for S.C.E., SDG&E as well as PGandE since each utility is heavily dependent on oil as the primary generator fuel. The 55 Mill/Kwh rate is representative of all three electric utility residential rate structures (PGandE, SCE and SDG&E).

The savings to the electric utility are calculated according to the following formula.

Utility Savings = (marginal cost - average revenue) x Kwh SAVED

As an example, in year 1 of the program marginal cost equals 72 mills, i.e., it would cost an electric utility 72 mills to generate a Kwh to supply a residential water heating customer with one more Kwh. The expected revenues to the utility would be approximately 55 mills. The 17 mill per Kwh represents the savings to utility. In year 1 of the demonstration program the savings to the utility is equal to the number of electric homes which are retrofitted with solar water heaters multiplied by the estimated number of Kwh displaced by each system (3600 Kwh/yr.). The total Kwhs displaced are multiplied by the savings value (17 mills/Kwh in year 1). The first year value (17 mills) is escalated at 15% per year for five years and 10% thereafter. This assumes that marginal cost and average rates are escalating at

the same rate.

Net Utility Revenue Requirements are defined as follows:

Net Revenue Requirement = Gross Revenue - Savings

13. Southern California Edison Rate Indexing Program

The basic mechanics of the rate indexing method of providing utility credits are as follows:

1. Determine the monthly payments a program participant will make to fully amortize the cost of his solar water heater, considering the going interest rate on consumer loans offered by banks and savings and loan companies, and the installed cost of his solar system.

2. Calculate the monthly savings a participant can expect due to the displacement of electricity by the solar system, based on current rate levels.

3. Rebate the difference between (1.) and (2.)

4. Periodically recalculate monthly savings (2.) and reduce the rebate accordingly.

II. Natural Gas Applications

A. Single Family Detached Homes

1. Annual Consumption of natural gas for water heating: 300 therms.

2. Solar Fraction or percent savings due to solar retrofit 60%.

3. Annual expected savings: 300 therms x 60% = 180 therms

4. Cost of installation $3000.00.

5. Marginal cost of gas 472 Mills per therm (PGandE).

6. Average rate (revenues) per therm 443 mills per therm (PGandE).

7. Escalation rate on both marginal cost and average rate:

   25% per year first 5 years
   15% per year thereafter (January 29, 1980 OII 42 Interim Decision).

8. Discount rate for utility and ratepayer 12%.

9. Single Family Gas Progam Description

The goal or objective is to stimulate 1% of the single family households who currently use natural gas to heat water to convert to solar water heaters. Two financial incentives will be used. First a 6% 20-year low-interest loan. The 6% low-interest loan is a direct utility loan and will be limited to the first 1/2% of the single family gas homes. The second available incentive is a 48-month $20 per month "utility credit" which is payable in quarterly installments by the gas utility. The 6% low-interest loan and the $20 per month credit are equivalent financial incentives. (SEE PREVIOUS DISCUSSION on derivation of electric utility credits).

B. Multi-Family Dwellings

1. Annual consumption of natural gas per dwelling unit: 200 therms.

2. Solar Fraction on percent savings: 60%.

3. Annual Expected Savings:
   60% x 200 therms = 120 therms

4. Installed cost $1000 per dwelling unit.

5. Marginal cost of new supplies; average revenue escalation rates and discount rates same as single family gas variables above.

6. Multi-Family Gas Program Description

The objective or goal of the program is to stimulate the retrofitting of approximately 10% of the multi-family units currently using natural gas to heat water.

7. Revenue Requirements, Utility Savings, and Net Revenue Requirements are calculated in the same manner as was explained in the electric case above.

The major difference is in the single family 6% direct loan case where the utility is allowed to "rate base" the loan until the home is sold. No depreciation is taken on any utility financial solar system.