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Decision 92992 MAY 5 1981

ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of the SOLAR GROUP of )  
the REYNOLDS METALS COMPANY for )  
exemption from certain exemptions )  
from the checklist requirements of )  
Decision No. 92251 pursuant to )  
Decision 92501 (page 6, Item 7) )

Application 60348  
(Filed March 12, 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. 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 checklist requirements to be eligible for the solar financing program effective March 1, 1981.

By letter dated March 6, 1981 to George A. Amaroli, Chief of our Energy Conservation Branch, the Solar Group of Reynolds Metals Company (Reynolds) requested exemption from Appendix B, Item C-14 of D.92251, and Appendix A, Item 22 of D.92501. This letter has been docketed as Application 60348.

By D.92769 we deleted Appendix A, Item 22 of D.92501. Therefore, this part of Reynolds' application requires no further consideration.

In Appendix B, Item C-14 of D.92251 we specified as follows:

"The solar system piping must be at least three-quarter inch Type 'L' copper pipe or CPVC or PVDF plastic tubing where permitted by local codes."

In D.92769, Appendix A, Item 14, the language was changed to read (in the checklist):

"14. Is plumbing 3/4 inch type M copper or better?"

Reynolds requests an exemption from this requirement to use aluminum piping instead of copper. It believes that, in a maintained fluid environment, the corrosion rates of aluminum and copper are approximately the same. Therefore, it believes that aluminum piping will perform as well as copper piping.

#### REYNOLDS' POSITION

##### Aluminum Piping (Fluid Passage Ways and Transport Tubes)

Reynolds contends that the performance of its aluminum fluid passageways has been excellent. Extensive testing by both Reynolds and Union Carbide has shown that the corrosion rates of aluminum and copper, in a maintained fluid environment, are nearly the same.

Reynolds solar systems utilize a double-wall heat exchanger for complete protection of the consumer from any toxic or nonpotable materials that may be in the solar loop. Through design, Reynolds has provided protection for the aluminum in the collector loop. This has been done by providing extra thick, smooth walls for the solar collector transport lines. The aluminum tubing in a Reynolds solar collector is approximately 50% thicker than the copper required by Item 14.

Reynolds recognizes that one key to the successful usage and performance of solar systems with aluminum fluid passageways (as with any other material), is proper installation and maintenance. To ensure this, Reynolds plans to have its own installers and service personnel available at a local branch office.

Reynolds' history with in-service systems has been most satisfactory. Both system performance and customer acceptance have been excellent. Beginning in 1976, they installed thousands of aluminum solar panels with aluminum transport lines throughout the country. Further, they have installed approximately 2,500 complete Reynolds Aluminum Solar Systems since 1977. To date, there have been very few problems with the performance, reliability or durability with any of these systems.

Reynolds solar systems, using aluminum transport tubing, have been approved in a program sponsored by TVA. In fact, TVA has found their system to be one of the most cost-effective systems tested.

Based on Reynolds' expertise and success with aluminum and aluminum fluid passageways, it feels justified in asking for an exception to the exclusion of aluminum tubing outlined in Item C-14 of Appendix B of D.92251. Reynolds feels that it has adequately demonstrated in the marketplace that aluminum fluid passageways are viable, cost-effective and technically sound for use in a closed-loop system.

#### STAFF POSITION

ECB opposes the substitution of aluminum piping for copper piping because of the potential problems of system efficiency deterioration due to corrosion or deposits in the fluid passageways. ECB recognizes the relative cost savings in using aluminum fluid passageways.

ECB is persuaded by Reynolds' analyses that its systems have the potential of meeting the program performance criteria. ECB believes that this is possible if customers receive a free periodic service of flushing, removing of deposits, and complete changing of fluids in the heat exchangers by Reynolds' dealer-installers. Reynolds' units may, with proper sizing and service, reliably save 60% as required for program eligibility. For monitoring, ECB proposes that the Reynolds' units which are monitored serve households using 300 therms of natural gas per year for water heating, or the electric equivalent use, to best establish their practical application in California. Each Reynolds' installation must yield 60% net energy savings established by a rigorous monitoring program in randomly selected installations. The installations will be selected at the sole discretion of ECB.

#### DISCUSSION

In D.92251 we specifically directed staff 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 by which the installer of each system must certify that the system will deliver a net 60% solar fraction (emphasis added). We also required our staff to evaluate applications for exemptions to the rules.

ECB Monitoring

ECB evaluations of Reynolds' equipment should be based on the monitoring objectives set forth in Table 1.

ECB has established its method for monitoring of eight systems to include as a minimum four picked at random by it in a warm climate area and four picked at random by it in the colder climate areas. Two systems in each area shall be served with natural gas and two with electric backup.

Reynolds contends that its aluminum closed-loop solar systems are large enough to meet the 60% net solar contribution criteria. ECB, however, believes that periodic service of flushing, removing of deposits, and complete changing of heat exchanger fluid by Reynolds is necessary to continue meeting the 60% criteria.

Reynolds agrees that where its system do not meet the 60% solar contribution criteria, it will upgrade prospectively all similar non-complying systems in that area and all future similarly situated installations. If proven effective in upgrading the solar system performance, this upgrading will include the addition of a third or fourth collector panel, or a larger storage tank, and biennial service of flushing, removing of deposits from its aluminum piping systems, and complete changing of heat exchanger fluid.

ECB agrees to a system monitoring program lasting a minimum of nine months with interim reviews. If, after six months of system monitoring, the solar systems installed show noncompliance to Table 1 requirements, with data extrapolated over 12 months, ECB will discuss these results with Reynolds who will then upgrade all future similarly situated installations.

TABLE 1

OBJECTIVES OF PROGRAM TO MONITOR  
REYNOLDS SOLAR WATER HEATERS

- The system must be large enough to provide at least 60% of the actual usage of conventional energy for water heating.
- The monitoring system testing shall be carried out with households which have been determined by ECB to have used 300 therms of natural gas or a comparable amount of electricity per year for water heating.
- In households where less than 300 therms per year or equivalent is used, Reynolds' solar systems will be eligible for the program provided the solar contribution is at least 60%.

ECB and Reynolds agree that Reynolds Aluminum Closed-Loop Solar Systems will be fitted for monitoring with two energy meters and one water flow meter. The water meter will be used to determine family hot water use in gallons. One electric meter will be used to monitor circulator pump energy use and a second electric meter will be used to measure electric back-up energy use. The same monitoring equipment will be used to establish actual electric conventional hot water heating energy consumption. A 60% net savings over the actual measure consumption will be required of these solar systems for compliance.

On natural gas back-up systems a gas flow meter will be used for measurement of natural gas fuel use. Other metering will be the same as for the electric back-up systems.

On natural gas back-up systems each kilowatt-hour of electricity used for pumping will be charged against energy savings in a manner consistent with that adopted for all other systems monitored in the demonstration program.

ECB has discussed these and other technical issues as well as performance specification questions with Reynolds' representatives. ECB is satisfied that Reynolds has provided reasonable supporting data to proceed as a participant in the Demonstration Solar Financing Program based on the following conditions:

- a. Reynolds will meet the minimum sizing criteria contained in Table 1.
- b. Reynolds and its contractors will not remove functioning back-up water heaters.
- c. Reynolds and its contractors will encourage customers to retain electric back-up water heaters for conventional usage monitoring purposes.

- d. Reynolds and its contractors will instruct customers to turn off pilot lights on gas water heaters during summer months.
- e. To evaluate onsite hot water heating performance, Reynolds reserves the right to request monitoring results of base energy use when the solar system is monitored not to exceed one month at a time, including the option to do this in different seasons.
- f. Reynolds agrees to assist its customers biennially, or more often if necessary, in flushing and removing deposits from its systems, and will at the same time replace the heat exchanger fluid. No charge will be made for such service during the first five years.
- g. Reynolds reserves the right to adjust system performance results if needed to account for deviations from:
  1. expected insolation levels (unusual climate), and
  2. expected water consumption during the monitoring period.
- h. Except for the relief (exemptions) set forth herein Reynolds and its contractors will be expected to adhere to all other currently effective installation requirements set forth in D.92251, 92501 and 92769.
- i. Any reference by Reynolds to this order in correspondence, marketing literature or media advertising must contain the full text of the following disclaimer.



"Disclaimer of Product Endorsement

✓  
SS  
The California Public Utilities Commission

(~~Commission~~) in no way endorses, recommends or warrants the durability, suitability, reliability or the short- or long-term energy savings performance of this system or any other brand system or component for domestic water heating or any other application." While this disclaimer is applicable to any system under our demonstration program, it is important to set it out here because of the exemption being requested by Reynolds, to remove any doubts as to whether or not this order would constitute an implied endorsement.

- j. The Commission acknowledges that the Reynolds Aluminum Solar System has certain innovative features which may allow it to perform in a manner similar to other solar domestic water heating systems which regularly qualify for installation under the demonstration solar financing program.

We agree with ECB's position and the agreements it has reached with Reynolds as detailed herein.

ECB recommends that this application be granted on an ex parte basis. We believe that public hearings would serve no useful purpose.

Findings

1. Reynolds Aluminum Solar Systems may reasonably be expected to supply a 60% net energy savings over non-solar consumption as previously discussed.

2. The requirements specified by ECB and the agreements reached with Reynolds as discussed herein will insure the adequacy of Reynolds Aluminum Solar Systems, particularly because of Reynolds' agreement to provide a biennial service of flushing, removing deposits and completely replacing heat exchanger fluid at no charge to the customer for the first five years following installation.

Conclusion

The exemption requested by Reynolds to Appendix A, Item 14 of D.92769, is reasonable and should be granted subject to the requirements specified by ECB and the agreements reached with Reynolds as previously discussed.

O R D E R

IT IS ORDERED that:

1. Reynolds Metals Company (Reynolds) is granted the requested exemption, to Appendix A, Item 14 of D.92769, to use aluminum piping instead of copper piping.

2. The exemption requested is granted subject to Reynolds' full acceptance and compliance with the requirements specified by ECB and its agreement with ECB as specified herein, including the Disclaimer of Product Endorsement.

3. Except as granted and provided herein, Reynolds and its contractors will be expected to adhere to all other currently effective installation requirements set forth in D.92251, 92501, and 92769.

This order is effective today.

Dated     MAY 5 1981    , at San Francisco, California.

John E. Guyra  
President  
Michael D. ...  
Edward M. ...  
Victor ...  
Prudence C. ...  
Commissioners