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ETIP

A Survey of Manufacturers' Views on the ETIP Procurement Experiment Volume Two: Water Heaters

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Product Systems Analysis Division
Center for Consumer Product Technology
Institute for Applied Technology
National Bureau of Standards
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James A. Baker, III, *Under Secretary*
Dr. Betsy Ancker-Johnson, *Assistant Secretary for Science and Technology*
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Acting Director*



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A Survey of Manufacturers' Views on the ETIP Procurement Experiment
Volume Two: Water Heaters

ABSTRACT

This report describes the findings of a survey of seven water heater manufacturers by the Center for Consumer Product Technology. The survey was conducted for the Experimental Technology Incentives Program (ETIP) as part of its evaluation of a Federal Supply Service (FSS) procurement of water heaters. Survey questions were designed to obtain manufacturers' views on the use of Government procurement policies as a means of increasing the rate of introduction of new technologies into the consumer marketplace. The questions covered the following areas: (1) reasons for participation or nonparticipation of a manufacturer in the ETIP experiment; (2) problems that a manufacturer encounters with existing Federal procurement practices; (3) acceptability of using life-cycle costing in the bidding procedure; and (4) effect of the most recent Government procurement on present and future company operations, including support for engineering and investment in research, types of themes used in advertising campaigns, etc. Results of the survey are reported, and implications are drawn for future ETIP involvement in Government procurement activities.

Key words: Energy-efficient products; Experimental Technology Incentives Program; life-cycle costing; procurement experiments; water heaters.

A Survey of Manufacturers' Views on the ETIP Procurement Experiment
Volume Two: Water Heaters

1. Introduction

1.1 Background

The Experimental Technology Incentives Program (ETIP) of the National Bureau of Standards (NBS) is one part of the Federal Government's efforts to determine what steps can be taken to increase the rate at which new technologies are introduced into the marketplace. The ETIP is part of a continuing effort by the Federal Government to "work as a more effective partner with the private sector in the development and application of science and technology to strengthen the nation's economy and improve the quality of life." 1/

ETIP has selected Federal procurement practices as one of the areas in which it is performing special studies. Five procurement experiments currently underway have been designed to determine whether it is feasible to stimulate development, production, and marketing of energy-efficient products through the use of Government purchasing practices. Each experiment is planned to last three years in order to allow sufficient time for industry to introduce technological innovations.

These five procurements, all of which were performed in conjunction with the Federal Supply Service (FSS), a part of the General Services Administration (GSA), are intended to determine whether modifications in procurements, such as by the use of a modified life-cycle cost formula in a bidding procedure, could increase the availability and recognition of energy-efficient appliances in the marketplace.

The life-cycle cost (LCC) of an item is the total cost of the items' purchase, operation, maintenance and servicing, and disposal. An LCC program has been implemented by the Federal Supply Service. Procurements for the five products have included some partial form of LCC in their bid price. None of these LCC formulas considered all ownership costs, but they have included some costs other than initial costs.

The September, 1974 Invitation for Bid (IFB) for gas and electric water heaters 2/, sometimes referred to as a Request for Proposal (RFP), is one of five procurements performed jointly by ETIP and FSS.

1/ President's Science and Technology Message of March 16, 1972.

2/ "Two Step Formal Advertising for FSC-4520 -- Water Heaters" Solicitation No: FPG-A-FH-55515-A9-16-74. This document can be obtained by writing to: General Services Administration Federal Supply Service, IFB/RFP FPG-A-FH-55515-A-9-16-74 Washington, D. C. 20406

1.2 Factors to be Evaluated

In order to determine whether the Federal procurement process can be used to stimulate the marketing of energy-efficient products, ETIP has undertaken a program to evaluate its five procurement experiments. The Product Systems Analysis Division (PSAD) of NBS was asked by ETIP personnel to assist in its evaluation of the water heater procurement. PSAD's role in the evaluation was limited to conducting a survey of firms that manufacture water heaters. The survey was designed to include a sample of firms in the industry rather than just companies that bid on ETIP experiments. Information was sought on:

- (A) Reasons for participation or non-participation of a company in the most recent FSS procurements,
- (B) Problems that a manufacturer encountered with existing Federal procurement practices,
- (C) Acceptability of using life-cycle costing in the bidding procedure,
- (D) Effect of the most recent Government procurement on present and future company operations, including support for engineering and investment in research, types of themes used in advertising campaigns, etc.

The survey examined the outcome of the ETIP experiment as determined by the manufacturer responses and new product development in water heaters. The author was not involved in the design of the experiment and the particular experimental design and life-cycle cost formula used. No attempt was made to evaluate whether the particular experimental design and life-cycle cost formula utilized are the most effective mechanisms for bringing about increases in the energy efficiency of water heaters.

1.3 Water Heater Procurement Methodology

Water Heaters were selected by ETIP to be one of their procurement experiments since:

- Water heaters are significant "end" users of energy;
- Improved energy efficiency is feasible in water heaters;
- Water heater energy costs are significant;
- Water heaters require little maintenance, and therefore maintenance need not be included in the life-cycle cost formula.
- Life-cycle costing evaluation utilizing only acquisition and operating costs is especially appropriate for water heaters. 3/

3/ "The Experimental Technology Incentives Program: Procurement Experiment Plan 4" Prepared by Booz, Allen & Hamilton, Inc., November 1973.

Previous FSS procurements of water heaters had been awarded solely to the lowest bids that met the specifications. The total cost of ownership was not included in these previous bids. The bids of the IFB being studied were evaluated in terms of a modified life-cycle cost formula.

Reduction in the consumption of energy by water heaters is feasible although estimates of the savings vary widely. With the large amount of energy that water heaters consume, even small increases in their efficiency will result in significant energy savings, provided the high efficiency models are broadly accepted. ^{4/}

The estimated number of residential-type gas and electric water heaters to be purchased for the September 1974 experimental procurement was 7,650. Bids in this procurement, were requested for each of 10 regions in the U.S. with the requirements shown in Table 1.

Table 1. Performance and Size Requirements

Type	Nominal size (Capacity gals. \pm 10%)	Power Input (Watts)		Recovery Capacity (Min.)
		Lower Unit	Upper Unit	
Electric	52	1000	1500	-----
Electric	80	1500	2500	-----
Gas	40	--	--	27.7 gals. per hr.
Gas	50	--	--	30.0 gals. per hr.

The above sizes were chosen for the ETIP procurement experiment since they were the water heaters with the largest dollar volume. Other size water heaters were purchased under separate procurements and not studied in the experiment.

In this type of procurement, the FSS does not purchase the items directly from the successful bidder, but only identifies the item and the potential contractor in an FSS supply schedule.

The procurement procedure is divided into two steps; step 1 -- submission and evaluation of technical proposals without prices, and step 2 -- submission and evaluation of bid prices. For the first ETIP water heater experiment two of the four technical proposals received were judged to be technically unacceptable. Price bids were then solicited from the remaining two bidders.

^{4/} Booz, Allen and Hamilton, Inc., "Stimulating Increased Efficiency in Residential Water Heaters Through Federal Government Procurement Action," November 1973.

2. Methodology

2.1 Questionnaire Development

A preliminary set of questions for the survey was derived from discussions with ETIP personnel on the desired areas of investigation, and from the experience gained from a previous ETIP evaluation of the Window Air Conditioner procurement. ^{5/} Suggestions for the survey were sought from the Appliance Labeling Section of PSAD as well as from representatives of FSS. Advice was also obtained from representatives of the Gas Appliance Manufacturers Association (GAMA) who reviewed and concurred with all of the survey questions. A final draft based on the results of these meetings was reviewed by ETIP and became the final version of the questionnaire as shown in Appendix A.

2.2 Sample Selection

Companies considered for participation in the survey were selected from a listing provided by GAMA of 95 percent of all known U.S. residential water heater manufacturers and the list of water heater bidders provided by FSS. Companies surveyed included the two firms that bid on the 1974 ETIP procurement and a representation of non-bidders. The sample included a geographic distribution of both large and small manufacturers. Seven manufacturers met the above criteria and were available during the survey period, August and September 1975 (Appendix B).

2.3 Data Collection

Prior to the first actual contact by a survey team member, each of the companies scheduled to be visited was sent the letter shown in Appendix C. The company official to whom the letter was addressed was designated by GAMA as the appropriate contact. Shortly after the letters were sent, telephone calls were placed to each of the officials to whom the letters had been addressed. The caller further described the purpose of the proposed meeting and requested that company representatives attend the meeting who were familiar with government procurement. In addition, officials from the marketing and engineering departments of the company were asked to attend, if possible. The number of executives interviewed at a session ranged from one to five individuals, depending on the complexity of the company's organization.

The interviews began with a brief account of the motivation for the modified procurement experiment and the purpose of the survey. A standard explanatory paragraph was read to all participants (Appendix D). Participants were also told that they would receive a copy of the final report after it was published.

^{5/} Unpublished manuscript, Charles Fried, Fran Bents, and Ted Fody, "Survey of Window Air Conditioner Manufacturers," June 1975.

The interviews were conducted in an open-ended manner, generally lasting from two to three hours. The interviewer read each question to all participants at the same time. All of the companies were cooperative and helpful.

3. Survey Results

3.1 Background: The Water Heater Industry

According to GAMA, there are approximately 25 water heater manufacturers in the United States. Six manufacturers produce over 90 percent of the water heaters sold in the U.S.. These firms sell their products primarily to wholesalers who in turn sell them to plumbers or to building contractors. Both of these trades are extremely price conscious. As a result the industry is very price (initial cost) competitive.

Several manufacturers mentioned that product changes in the past were usually directed towards reducing costs, or increasing the amount of hot water which a given size heater could provide per unit time. These trends have had an effect on the character of the water heater industry. Large plants, with substantial production economies, characterize the majority of today's water heater industry.

Water heaters are sold mostly through distributors. Generally distributors do not bid on Government procurements. One reason for this is that some manufacturers bid directly (without going through their distributors) and therefore, the distributors are not in a good competitive situation when their bid prices are compared with those originating from manufacturers.

As shown in Table 2, Government purchases do not represent a large market share for any of the surveyed manufacturers.

Table 2. What percentage of your overall operations is Federal Government business?

	Number of Responses
None (or practically none)	2
Approximately 1%	2
Approximately 2%	2
More than 2%, but less than 5%	1

The percentages given above include all Federal Government purchases and are not limited to those made through the FSS contracts. FSS is not the only procurement office for Government water heaters, since the Department of Housing and Urban Development (HUD) has its own procurement mechanism. An attempt was made to determine the percentage of Federal water heater purchases represented by this FSS procurement, but this information was not available.

Of the seven firms studied, three obtained information about Government procurements by several methods, two obtained information from only one source while the remaining two obtained very little information of any kind. These results are shown in Table 3.

<u>Table 3.</u> How do you find out about specific Government procurements?	
	Number of Responses*
FSS bidders list	3
Other Mailing lists (HUD etc.)	4
Commerce Business Daily	1
Personal Contacts and Information Sources	3
Don't find out	2
*The total number of replies exceeds seven when one or more companies provide more than one response.	

3.2 The Government Procurement Mechanism

3.2.1 Industry Problems

All seven companies indicated that there were difficulties in doing business with the Government that were attributable to the Government's purchasing procedures. Table 4 summarizes some of these problems as perceived by the firms.

The companies that bid on past FSS procurements indicated that their first bids were usually a learning experience about Government procurements. These bids were much more time consuming and required the services of a larger number of staff than later bids.

Table 4. Do you think Government purchasing procedures make it difficult, or actually discourage, doing business with the Government? All respondents replied "yes". They were then asked for more details and an account of their past experiences.

	Number of Responses*
1. Specification Problems	
Non-standard specifications	3
Specifications are difficult to meet	2
References made to specifications not included in IFB (RFP)	1
2. Paperwork and Manpower Problems	
Too much paperwork (for too little profit)	2
Hard to understand wording of RFP	2
Too many different people and departments must get involved in answering an IFB (RFP)	1
Concerned with the legal ramifications of breaking rules contained in RFP	1
Too much additional testing	1
Government requires other than usual packaging	1
Government inspector was not familiar with water heaters, thus requiring additional time from company's officials.	2

*The total number of replies exceeds seven when one or more companies provide more than one response.

After speaking to all seven companies it was clear that the types of problems varied widely. Each company's complaints were specific. There was not one common problem cited by a majority of the firms.

The majority of companies participating in the survey indicated that they do not seek Government business. This is indicated in Table 5.

<u>Table 5.</u> Do you actively seek Government business?	
	Number of Responses
Yes	3
No	4

Five companies that were visited did not bid on the FSS procurement, so these respondents were requested to describe the factors that had dissuaded them from bidding. Only four of the five non-bidders were able to answer the question since one company did not know about the ETIP procurement experiment until after it was awarded. Again, it became obvious that each firm had different problems, since no two companies cited the same reason for not bidding. The reasons given for not bidding on the procurement are shown in Table 6.

Table 6. When you don't bid, what factor(s) usually dissuades you from bidding?

	Number of Responses
Specifications are non-standard	1
Distributors are responsible for any bidding	1
Unrealistic deadlines	1
Quantity is not large enough to compensate for the extra trouble	1
Meaningless tests are required	1
The life-cycle costing formula changed the type of water heater that is likely to win.	1
A "decent" <u>profit</u> does not appear possible because of paperwork, markings, and extra Government requirements	1

The testing of water heaters was identified as a problem by one respondent. This company felt that Government testing hindered the submission of its bid. Several companies mentioned that testing for the Government was usually more expensive than for other customers. A number of suggestions for reducing the cost of testing Government water heaters were made by the various companies. These are shown in Table 7.

Table 7. Suggestions for reducing the cost of testing a product.

	Number of Responses
Eliminate additional testing especially for the Government	4
Reduce the number of times a company must test its water heaters for the Government	1
Remove the few obsolete tests included in the specifications	1
No suggestions	1

Most of the companies felt that at least some of the problems described in Tables 4 and 6 could be reduced or eliminated. The firms interviewed generally agreed that by reducing the number of difficulties or problems involved one would increase the number of FSS procurement bidders. Table 8 includes suggestions that the firms felt would increase the number of future bidders.

Table 8. What do you think the Government could do to increase the number of responses to its RFPs?

	Number of Responses*
Conform with AGA, ANSI, and UL standards and specifications	3
Reduce paperwork	3
Improve incentive by insuring sufficient quantities purchased	1
"Convince industry that it is worth the time and effort involved to participate in Government procurements"	2
Centralize purchasing within the Federal Government to eliminate duplication of effort on the part of the manufacturer to respond	1
No answer, Government should not seek to encourage participation	1

*The total number of replies exceeds seven when one or more companies provide more than one response.

3.2.2 Factors in the Decision to Bid on IFB

The decision to respond to an IFB was reported to be based on one or more of the factors shown in Table 9.

Table 9. If you bid on a given contract, what are the prime factors in the decision? (What made you bid on this contract -- if applicable?)

	Number of Responses*
Confidence in meeting the specifications or requirements	2
Making acceptable profit	3
Existence of product that they can bid and possibly win with	2
Life-cycle costing fits the company's marketing philosophy	2
Quantity to be purchased	1
Geographic destinations of the water heaters	1
No answer	2

*The total number of replies exceeds seven when one or more companies provide more than one response.

All firms surveyed were asked to state what criteria they would recommend that FSS use in the selection of water heaters in future procurements.

Table 10. If you were in Federal Procurement, how would you purchase water heaters? What factors would you use?

	Number of Responses*
Life-cycle costing	2
Price (Purchase price independent of LCC)	2
Quality of product	1
Efficiency of product	1
Reputation of supplier (will they stay in business)	2
Warranty and service record	1
Centralized purchasing	1
AGA, UL or ANSI approval	4
Rely on GAMA to assist in writing specifications, etc.	1
Standard delivery rate	1

*The total number of replies exceeds seven when one or more companies provide more than one response.

Two respondents stated that they would use life-cycle costing as a criterion for purchasing water heaters. Several others indicated that they would use factors that might be included in a life-cycle costing formula, such as price, efficiency, or service record. Very few firms agreed on the factors that the FSS should follow in purchasing water heaters.

3.3 Life-cycle Costing (LCC)

3.3.1 The LCC Formula

The determination of the life-cycle cost as part of the IFB for water heaters was computed by a formula. The formula was designed specifically to be part of the ETIP experiment and was not taken to represent a complete formulation including all ownership costs. In fact, the LCC formulation consisted of initial purchase price plus a discounted cost of energy to operate the heaters for an assumed life of ten years. As quoted from the IFB, the LCC formula is $L = X + Y$

"where: L = Life-cycle (present value dollars)
cost of product

X = Initial cost of product according to
price submitted

Y = Present value of annual operating costs
(y) of the product over assumed expected life.

Operating cost, y , for both types of water heaters will be computed through the methods described herein. Taking " y " and the ten (10) year product life, the present value of the sum of operating costs, Y , will be computed as:

$Y = (\text{sum of discount factors for years } 1 \text{ through } 10) y.$

The discount factor sum for years 1 through 10, at a rate of 10 percent, is 6.14. Therefore,

$Y = (6.14)y$

where $y = irt$

and i = Heat input per day expressed in "Therms."
(1 Therm = 100,000 BTU; 1KWH = 3412 BTU)

r = cost per Therm (see rates for computing
LCC in the IFB)

t = time of operation (365 days)." 6/

The heat input per day (i) for water heaters is computed as shown in Appendix E.

6/ "Two Step Formal Advertising for FSC - 4520 -- Water Heaters",
Solicitation No: FPG A-FH-55515-A, September 16, 1974.

After the survey was completed it was apparent that only some of the seven firms interviewed understood the LCC formula as it appeared in the water heater procurement. Only three firms had spent considerable time reading and working with the formula. Some firms had read the LCC formula, but were unsure as to how to calculate the life-cycle cost of any of their models. At least one firm had not even read the LCC formula prior to the survey.

None of the companies was completely satisfied with the LCC formula. One company felt that the costs per Therm were unfairly calculated by FSS. A second company felt that the 10 percent discount factor was unnecessary, or it should at least be a smaller amount.* A third company thought that a standard delivery rate should be included. The remaining firms were unsure as to the value of any life-cycle costing formula that does not allow for the probabilistic length of life of a water heater. The geographic location of a water heater and the type of water used in it will affect its length of life. Hard water, for example, is extremely corrosive. Only one firm, however, indicated that in its opinion the LCC formula was of no value.

If the Government plans to continue using a LCC formula, this will be a factor in future decisions on whether or not a company bids. One company indicated that it did not bid because it felt that it could not compete with other companies when the LCC formula was used. Another company claimed it will continue to bid, but they are likely to change the model that they bid with. Still another company contended that it would bid only if a LCC formula was used.

The FSS LCC formula assumes a ten year product life. An ideal formulation for life-cycle costing would have made the expected product life a variable in the formula. This would probably have led to difficulties that FSS was not prepared to deal with at this time. The respondents varied on what they felt is a good estimate of the average life expectancy of a water heater. Four companies felt that the average expected life was about 7-9 years, two believed it was 10-12, and one felt it should be over 12 years.

Three respondents said they would be interested in having FSS give a presentation on the LCC formula. The remaining four felt that such a presentation would be unnecessary.

3.3.2 Maintenance Data

More data than is currently available would be needed if FSS were to include some form of maintenance or service costs in the LCC formula. The next question attempted to find out if such data is collected.

*This suggests an incomplete or inadequate understanding of the correct concept of discount factor.

Table 11. Does your company determine maintenance data for water heaters?

	Number of Responses
No (or very little)	1
Yes, during the warranty period only	6

The data collected was often limited to a record of failure rates, during the warranty period. Some firms collected data only for those models sold with their own brand name. In most cases the firms indicated that information such as failure rates or service calls would not be available to FSS. One company stated that they would be willing to develop values which could be used by ETIP for a LCC formula.

3.3.3 Warranty Information

All seven companies indicated that, for a price, the Government could obtain whatever warranty it desired. In most cases, warranties provided to the Government were similar to those offered to the private consumer.

When asked if the Government makes use of its warranty, one company indicated that it does not, while the remaining firms were unsure or had no experience. The records of most companies did not allow a comparison to be made between consumer and Government warranty usage data.

The percentage of the total water heater price that reflected the cost of a warranty depended on the length of the warranty offered. However, it usually was 1 - 2 percent of the total price. When asked if their company would lower its bid price, if the Government waived the warranty, four companies said they would, while the remaining three said they would not.

3.4 Bidders Conferences

A Pre-bidding Conference was convened for the first ETIP experiment of water heaters. The purpose of this type of meeting was to discuss the required specifications, to answer industry's questions, and to explain the bidding process and the LCC formula.

All of the companies that were interviewed felt that the industry would not openly discuss its ideas at such a conference. Several interviewees indicated that they would be very hesitant as to what they said in front of their competitors. Two companies felt that bidders conferences would not be beneficial because the FSS would not respond to suggestions made by industry.

All of the interviewees preferred individual sessions over group meetings. Two firms said that a group meeting should be held only for extremely large bids. One respondent said that to be effective the meeting must be held far enough in advance of the IFB (RFP) to allow retooling time.

3.5 Advertising

The discussion on advertising elicited a variety of responses. Several firms were unsure of their answers or changed them as the discussion progressed. At present, a GSA regulation (given in Appendix F) prohibits a firm from advertising a Government procurement if the advertisement suggests that the Government endorses or prefers the product or considers it to be superior to other products.

<u>Table 12.</u> If you were awarded a contract by FSS for a product containing a new technology, would you want the Government to advertise this fact?	
	Number of Responses
Yes	5
No	2

One company felt strongly that FSS should advertise the ETIP award to all Government customers. Another respondent took the opposite stance and said it was not the business of the Government to advertise. Another company argued against Government advertising because it felt that it would be unfair to those manufacturers who did not bid.

<u>Table 13.</u> If a successful bidder were able to advertise a FSS Procurement, would this be an added incentive to bid?	
	Number of Responses
Yes	2
Possibly, but incentive probably lies elsewhere	1
No	4

One company felt that the public should be educated on the FSS procurement procedures. Another company said consumer advertising would not assist them because their product is geared for distributors and not for direct sale to consumers.

3.6 Engineering Considerations

All but one of the manufacturers said the capability currently exists to produce more energy-efficient water heaters. The levels of energy efficiency technology appeared to vary among the engineering departments of the different firms.

Most companies agreed that substantial changes would be expensive. Some opportunities exist, but as one manufacturer stated, "It comes down to whether they can accept the necessary capital investment." The highly efficient water heater, according to one respondent, would not be competitive unless a larger market existed for such models. One manufacturer summarized by saying the industry will produce more energy-efficient water heaters as they become economical.

Several suggestions were made as to how to make water heaters more efficient. Some of the more frequently mentioned were more insulation, improve grades of insulation, and reduce heat loss (Standby Loss).

Four firms said that their engineering staff was of sufficient size and competence to respond to most requirements for more efficient water heaters. Three companies said that they would need additional manpower. A few of the engineering departments were involved in research and development (R&D), but most of their efforts were oriented towards product development. None of the firms had a separate engineering effort for Government contracts.

Two firms felt that the industry as a whole did not need to become more energy-conscious in its design philosophy. Two firms felt that new specifications or standards would probably be an effective and fair method to influence industry to produce more efficient water heaters.

4.0 Discussion

The FSS/ETIP procurement succeeded in bringing about the introduction of more energy-efficient units into the marketplace. The water heater models that were selected in the 1974 Federal procurement had not previously competed in the domestic market.* According to ETIP, these water heaters use 11 percent less energy than the other heaters offered to FSS during the procurement. These models, while not new, were tailored for the FSS/ETIP procurement, and subsequently placed in the U.S. consumer market. The manufacturer of these models stated that it is likely that without ETIP these water heaters would not have been made available to U.S. consumers at this time.

It should be pointed out that other factors might subsequently have brought about the introduction of a more energy-efficient water heater into the consumer market. Other Government programs, such as the energy efficiency program and the appliance labeling program can also bring about the introduction of more energy-efficient products. These other programs though, did not have such an immediate impact as the ETIP/FSS program did.

*The firm had been marketing its product in Europe.

The companies, however, differed on their opinions of the procurement. Some questioned whether it is the Government's responsibility to stimulate the development, production, and marketing of energy-efficient products, and whether this would be of any consequential effect. This is illustrated in Table 14.

<u>Table 14.</u> Do you feel that the production of appliances in fulfillment of Government contracts will have a substantial effect on what is subsequently offered in the consumer market?	
	Number of Responses
Yes	2
No	5

The company that won the 1974 procurement felt that the Federal Government indirectly paid for the costs to produce such a model. Once the models were ready for Government purchasing, it was fairly simple to offer U.S. consumers the same models.

One company was extremely pleased with the LCC formula. They maintained that they wouldn't participate in the bidding process without it. However, other companies felt LCC was over-emphasized. The companies were not in agreement as to whether it was possible to make a profit in doing business with the Government. Some felt Government business was profitable while others claimed it was difficult to make a reasonable profit. All firms spoke of problems in dealing with Government procurements, but they felt that most of the problems could be reduced or eliminated.

Part of the industry is beginning to realize that there is a market for energy-efficient models. At least three companies are presently motivated to develop more efficient appliances. It appears that ETIP is partially responsible for redirecting competition among products to be an energy efficiency orientation rather than a total (electrical) power orientation.

APPENDIX A

ETIP Evaluation Questionnaire - Water Heaters

Date _____ Interviewer _____

Name of Firm _____

Address _____

Persons Interviewed:	Name	Title
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

Total Length of Interview _____

Comments of Interviewee(s):

Comments of Interviewer:

I. Sales and Market

1. What is the total sales of water heaters (in units) in the U.S.? Do you have it for this year and the two previous years? If not, where can I obtain this data?

(Note: Only ask this question of one company.)
2. To what market is your sales effort mainly directed?
3. What percentage of your overall operation is Government business?
4. Do you actively seek Government business?
5. How do you find out about specific Government procurements (i.e., Commerce Business Daily; trade association newsletters, etc.)?
6. WINNING BIDDERS ONLY: Will the appliance produced in fulfillment of this contract get into the consumer market? Is it already in the consumer market?

NON-WINNING BIDDERS ONLY: Did you intend to enter the appliance which would have satisfied the contract into the consumer market? Was it already in the consumer market?

7. Do you feel that the production of appliances in fulfillment of Government contracts will have a substantial effect on what is subsequently offered in the consumer market? Why/Why not? How?

II. Procurement Mechanism

1. Have you previously bid on a Government contract?
IF YES: Gas or electric water heater?
2. Do you think Government purchasing procedures make it difficult, or actually discourage, doing business with the Government? IF YES, ASK FOR DETAILS AND SPECIFIC PAST EXPERIENCES.
3. If you do bid on a given contract, what are the prime factors in the decision?

4. If you don't bid, what factor usually dissuades you from bidding? IF ANSWER IS PAPERWORK, What specifically about the paperwork: number of copies, specific forms, etc.?

ASK FOR DETAILS.

5. What do you think the Government could do to increase the number of responses to its RFP's?
6. Does your company treat Government business as a separate market from consumer business? How? In what way?
7. If the type of procurement used in this RFP continues to be used, will it change your policies vis-a-vis Government business?
8. Do you feel that the cost of testing your product has hindered submission of a bid?
9. What suggestions do you have for reducing the cost of testing water heaters?
10. What company policies, if any, will be affected by the procurement procedures used in the ETIP experiment? What effect? How, if at all, will the following areas be affected?

Research & Development	Related Product Lines
Design & Marketing	Other
Marketing	
Advertising	
11. If you were in Federal Procurement, how would you purchase water heaters? What factors would you use?
12. How would you like to see the Government construct a life-cycle cost formula?
13. Would you be interested in receiving a Government presentation on LCC?
14. What is the life expectancy of water heaters?
15. Does your company determine maintenance cost data for its products? IF YES, ASK FOR DETAILS.
16. Is this data available to the Government?

17. If you were dealing with the Government, would they get the same warranty as the consumer?
18. What percentage of your Government business makes use of its warranty?
19. How does this compare with your consumer business?
20. What percentage of your unit cost represents a warranty?
21. If the Government didn't want a warranty, would this be reflected as a lower initial bid?

III. Prebid Discussion

1. How successful do you think Bidders Conferences would be to obtain industry inputs regarding Government specifications?
2. Do you think industry would openly discuss its ideas at such a conference? What are your ideas on the topic of Bidders Conferences in general?

IV. Advertising

1. If you were awarded a contract by the Government for a product containing new technology, would you want the Government to advertise this fact? IF YES: How would you prefer it to be done? IF NO: Why not?
2. If a successful bidder were able to advertise an ETIP/FSS procurement, would this be an added incentive to bid?

V. Engineering

1. Do you feel that the capability exists now to produce a more energy-efficient appliance without the need for major engineering innovations? IF YES, What do you think is holding it back? IF NO, Do you think there is an adequate industry-wide engineering effort toward that end? IF NO, What do you think is the reason?
2. How can water heaters be made more energy-efficient?

3. Is your engineering staff of sufficient size and professional level to be able to respond to efficiency programs utilizing current state-of-the-art technology?
4. Is there a separate engineering effort for Government contracts?
5. Are you engaged in any R & D effort? IF YES, do you have a separate R & D staff? How large? Or is R & D an additional duty of the engineering staff?
6. What do you think can be done to encourage the industry as a whole to adopt a new energy-conscious ethic in its design philosophy?

APPENDIX B

The following firms participated in this survey effort.

American Appliance Manufacturing Company
2341 Michigan Avenue
Santa Monica, California 90404

A.O. Smith Corporation
P. O. Box 28
Kankakee, Illinois 60901

Bradford White Corporation
2400 Ellsworth Street
Philadelphia, Pennsylvania 19146

Mor-Flo Industries, Inc.
18450 South Miles Road
Cleveland, Ohio 44128

National Steel Construction Company
P. O. Box 524
Neward, California 94560

Rheem Manufacturing Company
7600 South Kedzie Avenue
Chicago, Illinois 60652

State Stove and Manufacturing Company, Inc.
P. O. Box 307
Ashland, Tennessee 37015

APPENDIX C

August 7, 1975

Dear :

In August of last year, the Federal Supply Service requested technical proposals and bids for water heaters. This procurement was initiated under the Experimental Technology Incentives Program (ETIP), and was one of several experiments designed to investigate the efficacy of stimulating the rate of entry of new technology into the marketplace via Government procurement procedures.

These experimental procurements conducted by the Federal Supply Service have not yet been evaluated to determine their effect on future product development; consequently, ETIP and the Federal Supply Service are seeking to collect information to help evaluate the program. Specifically, we would like to visit your firm and speak with one or more people in order to collect basic information.

The type of information we are concerned with relates to the reasons your firm did or did not participate in this procurement. Your organization's views on the suitability and utility of achieving accelerated product development through this experimental mechanism will also be discussed. More sensitive information, such as your firm's future design and production plans, current R & D effort, or marketing and advertising strategies may be discussed if it appears that this information might provide quantifiable evidence or program impact. Because of the range of topics, discussions with a member of both engineering and market research departments would probably be desirable.

All information collected from participating firms will be controlled by the National Bureau of Standards and not released in its basic form within NBS or elsewhere. The information will be summarized and presented in a form that will not disclose the views, opinions or market profile of individual participants. Participating organizations will receive copies of the report after printing.

I hope that your firm will be able to participate in the evaluative phase of this program. A minimum of time should be involved and the results on the analysis could be of value to all of us. I would appreciate hearing from you at your convenience concerning who should be contacted in regard to the data collection aspect of the evaluation.

Sincerely,

Theodore J. Fody
Chief, Procurement Policy Area
Experimental Technology Incentives Program

APPENDIX D

The Federal Supply Service is currently involved in a number of experiments to determine whether the rate of entry of new technologies into the consumer marketplace can be stimulated by means of Government procurements. As part of these experiments, bids for water heaters were recently solicited. (Show copy of RFP)

The National Bureau of Standards has been asked to evaluate these procurement experiments. As part of this evaluation, we are speaking with people from a number of firms in the industry. We are interested in finding out whether the procurement approach taken by the ETIP is practical and effective, and are particularly interested in learning industry's viewpoints on the matter. Your answers to the following questions will help us in the program evaluation. All the information you provide us will be controlled at NBS, and will remain anonymous as to company identification. The report generated by this evaluation will be in summary form, without individual companies being specifically identified; of course, your firm will receive a copy.

APPENDIX E

The heat input per day (i) for water heaters is computed for every model bid according to the following formula:

$$i = \frac{G \times 8.33 \times \Delta T}{E_s} \times \frac{1}{100,000}$$

where:

i = Heat consumed per day expressed in Therms.

G = Gallon daily quota of hot water (gallons/day) as determined in accordance with FSS.

8.33 = Conversion factor (8.33 pounds water = 1 gallon water)

ΔT = Average temperature rise of water ($^{\circ}F$)

E_s = Service efficiency (%). Service efficiency shall be computed as shown below.

"The overall service efficiency (E_s) of electric and gas water heaters shall be based on a temperature rise of $90^{\circ}F$, above room temperature, determined by the following equation:

$$E_s = \frac{\text{Energy required to heat the daily quota}}{\text{Energy required to supply the daily quota}} = \frac{\text{Output}}{\text{Input}}$$

Where: Energy required to heat the daily quota =

$$1.0 \text{ BTU} \times ^{\circ}F/\text{lb} \times 8.333 \text{ lb /gal} \times \text{Ggal/day} = 750 \text{ G BTU/day}$$

and

The energy required to supply the daily quota of water heated from room temperature through a temperature rise of $90^{\circ}F$ and further capable of maintaining the stored water at the ultimate temperature specified above for both electric and gas water heaters =

$$\frac{75,000 \text{ G}}{E_r} + 180 \text{VS} - 562,500 \frac{\text{VSG}}{q_r} = I$$

Where:

I = heat consumed per day (in BTU).

E_r = recovery efficiency, percent.

V = nominal volume of stored water, U.S. gallons (data plate rating).

S = stand-by loss, percent per hour, expressed as a percentage of the stored water above room temperature.

q = nominal manufacturer's input rating expressed in BTU per hour (1 KWH = 3412 BTU) and,

G = daily quota, U.S. gallons of water heated through a room temperature rise of 90°F, or

$$G = \frac{qV}{48.06B + 0.105 q\sqrt{V}} \quad \text{" } \frac{7}{\text{"/>$$

7/"Two Step Formal Advertising for FSC - 4520 -- Water Heaters",
Solicitation No: FPG A-FH-55515-A, September 16, 1974.

APPENDIX F

Current clause 44 of Form 1424: Advertising of Award

"44. The Contractor agrees not to refer to awards in commercial advertising in such a manner as to state or imply that the product or service provided is endorsed or preferred by the Federal Government or is considered by the Government to be superior to other products or services."

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12. Sponsoring Organization Name and Complete Address (Street, City, State, ZIP) Experimental Technology Incentives Program National Bureau of Standards Washington, D. C. 20234		13. Type of Report & Period Covered Final	14. Sponsoring Agency Code
15. SUPPLEMENTARY NOTES			
16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) This report describes the findings of a survey of seven water heater manufacturers by the Center for Consumer Product Technology. The survey was conducted for the Experimental Technology Incentives Program (ETIP) as part of its evaluation of a Federal Supply Service (FSS) procurement of water heaters. Survey questions were designed to obtain manufacturers' views on the use of Government procurement policies as a means of increasing the rate of introduction of new technologies into the consumer marketplace. The questions covered the following areas: (1) reasons for participation or non-participation of a manufacturer in the ETIP experiment; (2) problems that a manufacturer encounters with existing Federal procurement practices; (3) acceptability of using life-cycle costing in the bidding procedure; and (4) effect of the most recent Government procurement on present and future company operations, including support for engineering and investment in research, types of themes used in advertising campaigns, etc. Results of the survey are reported, and implications are drawn for future ETIP involvement in Government procurement activities.			
17. KEY WORDS (six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons) Energy-efficient products; Experimental Technology Incentives Program; life-cycle costing; procurement experiments; water heaters.			
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