Evaluations Help Demonstrate Impacts and Improve the Performance of the Federal Technical Assistance Programs:

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ABSTRACT

This paper presents selected results from Federal Energy Management Programs (FEMP) customer surveys in 1997 and 1998. The 1997 survey of FEMP workshop customers provided the platform for subsequent annual surveys of customers of all FEMP Technical Assistance programs. A set of core questions has been identified that serve two purposes: to demonstrate customer satisfaction and impact, and (2) to determine how best to continuously improve the programs. An overview of the survey methodology is presented as well as results for overall customer satisfaction and impact. Measures of impact include the adoption and diffusion of FEMP promoted technologies, the amount of sharing of FEMP information, and implementation of energy, water saving and environmentally sensitive technology projects. Including these questions in an annual customer survey, helps demonstrate the value of the programs to investors and the public.

Introduction to FEMP Technical Assistance Programs

The Federal Energy Management Program's (FEMP) Technical Assistance Team provides a wide range of energy and water conservation and renewable energy technology services to customers, primarily federal government employees. Each of these services is designed to support one or more of the following goals: 1) increase the energy efficiency of customer's facilities or processes, 2) reduce environmental emissions, or 3) provide cost-effective energy and water management. The FEMP Technical Assistance programs are two types - indirect and direct assistance programs. FEMP direct assistance programs provide technical assistance and in many cases funding to help identify, design, implement, or monitor and verify a project that will meet one of these three goals. Indirect assistance programs provide the information, tools, and skills needed for the customer to undertake projects on their own without FEMP funding or intervention. In the case of these indirect programs, the intermediate outcomes of increased knowledge, skills, and abilities are under FEMP control. Only if the persons receiving the assistance can overcome other barriers to technology adoption (such as convincing decision-makers and availability of funding), will a project be implemented. A brief description of the FEMP programs targeted in the two studies is provided below.

<u>Indirect Assistance (Workshop) Programs: The 1997 Study</u>

1. Federal Re-lighting Initiative (FRI) Workshop focuses on facility re-lighting or re-lamping to achieve energy savings and reduction in the cost of operating lighting systems.
2. Renewable Energy (REP) Workshop focuses on the use of renewable energy in a variety of projects in cost-effective situations.

3. Energy Services Performance Contracting (ESPC) Workshop focuses of the use of contracting mechanisms to acquire and maintain federal building and equipment energy efficiency improvements using private financing.
4. Federal Energy Decision Systems (FEDS) Workshop provides training in the use of decision support software and analytical tools for energy efficient materials, products and systems.
5. Life Cycle Costing (LCC) Workshop provides training in the area of total cost product acquisition, including the lifetime operating costs.
6. Operations and Maintenance (O&M) Workshop focuses on energy efficient monitoring, operation and maintenance practices for building systems.

Indirect Assistance Programs: The 1998 Study

1. New Technology Demonstrations (NTD) program demonstrates and distributes documentation on new energy efficient technologies to speed federal adoption of the technology.
2. Energy Efficient Procurement (EEP) program provides recommendations for identifying and purchasing the most cost-effective energy efficient systems and products for federal buildings.
3. Low Energy Building Designs (LEBD) Workshop provides information on designing and constructing buildings to be more energy efficient.
4. Water Resource Management Workshop (WRM) teaches water management techniques.
5. General Workshops (GW) category includes customers of all other FEMP workshops, including ESPCs, Energy Management, Life-Cycle Costing, Lighting, Operations and Maintenance Management, FEMP Motor Training, Implementing Renewable Energy Projects, Impacts of Utility Restructuring on Power Procurement, and Utility Deregulation Impacts and Financing.

Direct Assistance Programs: The 1998 Study

6. Basic Design Assistance (BDA) program provides technical advice and funding in planning and designing energy efficient federal buildings.
7. Renewable Energy Project Assistance (REPA) program provides technical advice and funding for placing renewable energy technologies and systems in federal facilities.
8. Greening Project Assistance (GPA) facilitates partnerships and provides technical assistance that enables highly visible federal facilities such as the White House to be more energy and environmentally friendly.
9. SAVEnergy Audits (SEA) provides energy audits of federal facilities and helps facilities find financing for recommended improvements.

Overview of Survey Methodology

Anne Sprunt-Crawley, Manager of FEMP's Technical Assistance Team served as the USDOE Project Director for both surveys. Both survey projects were managed and directed by Gretchen Jordan of Sandia National Laboratories with technical assistance and support by Nick Hall of TecMRKT Works. The 1997 survey was completed by TecMRKT Works, an energy research and evaluation firm located in Wisconsin and Virginia. The 1998 survey was completed by McNeil Technologies of Springfield, Virginia.

The development and implementation of both surveys followed similar procedures. First, FEMP identified the workshops and programs to be targeted in each evaluation. The first evaluation targeted only workshops, while the second targeted both direct and indirect assistance programs.

Second, FEMP provided lists and contact information for customers who have taken part in one or more of the targeted programs. The lists were segregated by targeted program and each contact was assigned to one of the survey groups targeted by the FEMP managers. Each individual included on the targeted list was assigned a random number and the list was sorted by the random number. The survey team cycled through the list until the survey target goals for each project were met or the list was exhausted. At least five attempts to survey each individual were made prior to dropping a survey contact from the list.

Third, at the same time that the contact lists are developed, the evaluation team worked with the FEMP technical assistance managers to develop and finalize the questions that were to be asked on the survey instruments. The purpose of the evaluations was twofold: (1) to demonstrate customer satisfaction and impact, and (2) to determine how best to continuously improve the programs. Developing the questions to meet these evaluation requirements was an iterative process involving the FEMP Technical Assistance manager and staff, the program managers, the evaluation project director and the evaluation contractors. In both the 1997 and 1998 studies an innovative set of questions was developed to assess the FEMP programs' impact on moving energy technologies through the technology adoption cycle, from increased awareness, to seeking and confirming knowledge and to making and implementing a decision adopting the technology. In 1998 the Logic Modeling process (McLaughlin and Jordan, 1999) was used to clarify the performance expectations for each of nine program groups. Both the technology diffusion and logic modeling approaches help describe and clarify the logical linkages between FEMP resources and activities and the expected short, intermediate and longer term outcomes of those activities. Both help identify what to look for when assessing impacts and assumptions about customer needs and actions.

Once the team agreed to a final survey instrument, it was provided to the evaluation contractors for implementation. The topics addressed in the surveys included: customer demographics and job responsibilities, overall satisfaction and satisfaction with aspects of staff and materials, benefits and value of participation, other services needed, and impacts. Impacts included the diffusion of FEMP recommended technologies and techniques in federal facilities, sharing of FEMP assistance, types of projects implemented, and energy and environmental impacts. The 1998 study used a survey instrument consisting of core questions from the 1997 study. This allowed the survey to be reduced from over 50 minutes to about 15 minutes. This technique worked well. Although much detail was lost in the 1998 study, the study was able to quantify much of the information needed by the FEMP managers.

Fourth, the survey instrument was coded into an automated survey research program and targeted customers were assigned to specific survey staff. The staff then contacted the customer and completed the survey or recorded why a contact could not be made or survey completed. For the 1997, survey 173 surveys were completed. For the 1998 survey 291 surveys were completed. Following the completion of the targeted number of surveys, or running out of program-specific survey contact points, the survey data was complied, analyzed and reported. Reports were provided in draft format to allow FEMP staff to complete a technical review. Following the technical reviews the reports were revised into final reports.

Findings

The findings from these two studies are too numerous to present here and thus only the

findings related to the purpose of demonstrating customer satisfaction and impact are discussed. Findings related to determining how best to continuously improve the programs are available in the evaluation reports (Hall and Jordan, 1998, 1999).

Customer Satisfaction

In general, FEMP customers are very satisfied to extremely satisfied with the FEMP services they have received. In the 1997 study overall satisfaction with FEMP workshops averaged 8.2 on a 10-point scale where "10" is "very satisfied". In the 1998 study, satisfaction with direct assistance programs averaged 8.5, satisfaction with workshops in general averaged 7.7, satisfaction with New Technology Demonstrations averaged 8.2 and satisfaction with the Energy Efficient Procurement Program averaged 8.1. These are good satisfaction scores that indicate FEMP services are well received by customers. However, about 20% of the customers in the 1997 and 1998 studies scored overall workshop satisfaction at 7 or less indicating that there is some level of dissatisfaction in a small portion of the participating population. Table 1 presents these scores for the 1997 and 1998 studies.

Workshop	Overall satisfaction
1997 study	
O&M	8.7
FRI	8.4
ESPC	8.4
FEDS	8.2
LCC	8.1
REP	7.9
Average	8.2
1998 study	
NTD	8.2
EEP	8.1
Direct asst.	8.5
Workshops	7.7
Average	8.2

Table 1. Overall Workshop Satisfaction Scores: 1997 and 1998 studies

While Table 1 presents the mean satisfaction scores, these scores are not very meaningful until specific characteristics of the workshop are examined. Both the 1997 and 1998 studies examined satisfaction scores for individual components of the workshops and other technical assistance. Both the 1997 and 1998 studies also used statistical analysis to examine the components of services that drive overall satisfaction; that is, the components of service for which changes to satisfaction scores directly track with overall satisfaction. Improvements to the drivers of satisfaction would lead to higher overall satisfaction scores if program characteristics have not changed. The information on respondents' satisfaction with individual components of the individual FEMP program combined with the information on the drivers of overall satisfaction provide powerful tools for prioritizing and focusing program improvements.

Value to FEMP Customers

More than half of customers surveyed in the 1997 study (60%) said the workshops have monetary value and that they would pay for the workshops. The price attendees said they would pay range from a low of $150-$200 to a high of $451-$500 depending on the workshop. However, a very large group of customers (40%) said they did not know what they would be willing to pay. In the 1998 study, customers were asked more generally if the benefits received outweighed the costs. Seventy-four percent of those responding thought that benefits exceeded costs and another 15

percent thought benefits were about the same as costs. Customers were also asked to compare the FEMP technical assistance to similar programs. Over all programs, more than two-thirds rated the FEMP technical assistance as much or somewhat better than their experiences with other providers of similar services.

Adoption of FEMP Technologies and Practices

The stages of technology adoption describe the logical steps from FEMP activities to the achievement of FEMP goals well. Documenting these steps along the way to implementing energy projects provides important information to confirm or modify program services to make project implementation more likely. It also serves as documentation that progress toward implementing projects is being achieved due to the FEMP assistance.

The Stages of Technology Adoption. The literature on product diffusion explains a great deal about how new ideas and practices spread in the market. Figure 1 illustrates a widely accepted model of the diffusion of innovations (Rogers, 1995). This model is based on a long research tradition and defines a process by which market actors, in this case government employees and others, adopt a new innovation.

The model identifies the stages through which actors pass in adopting a new technology. First, actors must become aware of the innovation. Once aware, the actor enters a persuasion or information seeking stage. In this stage the actor gathers and processes information in order to decide whether to adopt the innovation. How quickly the actor moves from the awareness stage to the information gathering stage varies with the circumstances. In some cases the movement is hours, in other cases it may take many years. At some point following the persuasion stage, the market actor moves from information seeking to a decision. That decision might be to adopt the new technology, to postpone adoption, to continue the search for information, or to adopt the new technology. The decision to adopt and the implementation of the decision are separate acts and may also be separated in time. Finally, actors constantly reevaluate or confirm their decisions. This may result in continuance or discontinuance of the adoption.

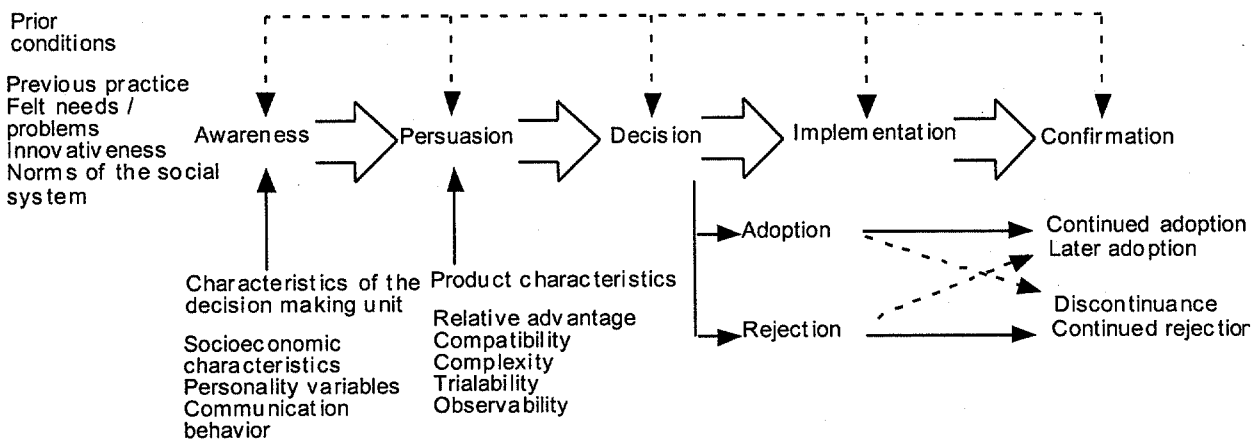


Figure 1 Diffusion of Innovation Path. Rogers, 1995

Questions to Measure Adoption of FEMP Technologies. In order to measure the influence of FEMP programs on customer adoption rates, a battery of questions was asked pertaining to the customer's knowledge and use of FEMP recommended practices or technologies prior to their participation in FEMP programs and then at the time of the survey. Analysis of the responses to these questions can be mapped to show where customers were in the product diffusion cycle prior to their participation compared to their position in the cycle at the time of the survey.

In the 1997 study questions related to the individual and the characteristics of each stage were asked with a "yes," "no," or "don't know" response. If the respondent answered "yes" to any question assigned to a specific stage of adoption, that respondent was assumed to have reached that stage of adoption and was assigned a "yes" for that stage. Each person was then scored for the most advanced stage of adoption that they had reached. A similar procedure was used for assigning stages for the time following the workshop.

In the 1998 study a different set of questions were developed that asked about the number of projects in each phase of the adoption cycle. A customer's position was ranked in each phase on the adoption path in a similar way to the 1997 study. However for the 1998 study customers were placed in the last stage in which they had projects. The methodology was changed because of a need to condense the questions to 5 minutes compared to the 12 minutes used for the 1997 study. In retrospect the 1997 method worked better than the 1998 method for classifying customers because customers can answer questions about what they knew about the progress of their work, but could not always place their projects into stages. Figure 2 provides the overall results from the 1997 study and demonstrates the movement of most customers into the implementation stage regardless of which stage they were in prior to the workshops.

In the 1998 study a similar movement of customers from the pre-implementation stages to the implementation stage is seen. However the movement is not as dramatic as in the 1997 study. One reason for the reduction in movement shown in the 1998 study may be that customers of other indirect assistance need more time or authority to make decisions than do workshop customers. Another is that the time period between participation and the survey for the 1997 study was 1 to 2.5 years while the 1998 study interviewed customers who participated in FEMP programs in 1997 and 1998, halfing the period of time allowed for implementation activities. Because FEMP recommended projects take time to plan and implement one would expect to see a significant drop in the implementation rates as a result of the time reduction between participation and the survey. Figure 3 presents the pre and post-program technology adoption stages for the indirect programs in the 1998 study.

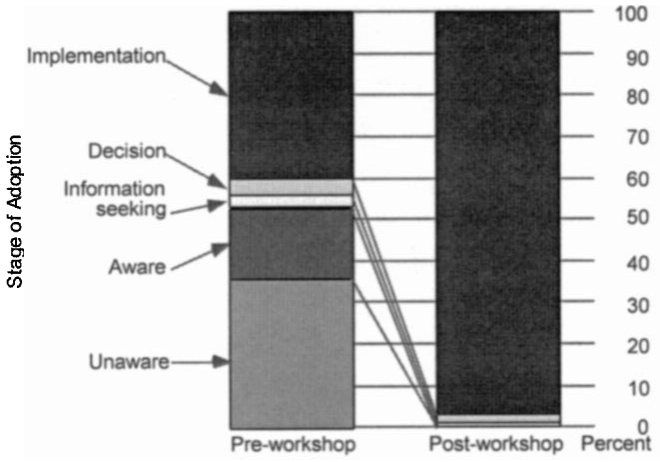
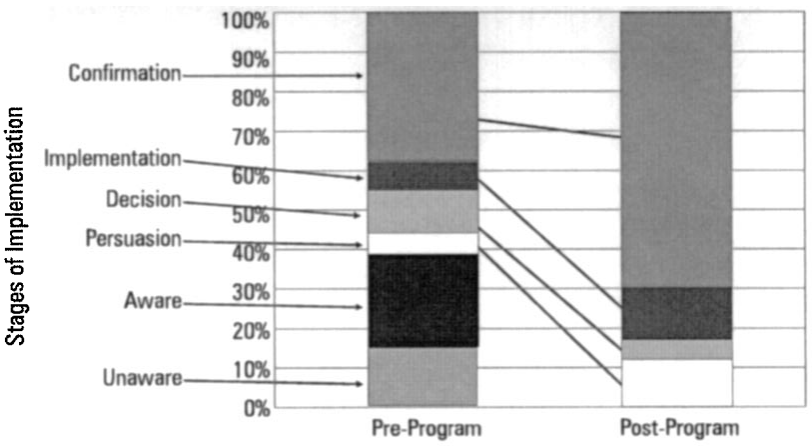


Figure 2 Stage of FEMP technology adoption: 1997 study

For the direct assistance programs a different set of adoption stages was used than those used for the indirect programs because the direct programs provide both technical and financial assistance and work with customers to bring them through the adoption cycle. In many cases it is the FEMP staff that are moving the customer through the stages rather than the customer moving themselves.



Movement of FEMP Indirect and SAVEnergy Audit customers through the technology adoption process

Figure 3 Movement of Indirect and SAVEnergy Audit customers through the adoption process

To compensate for this, adoption stages were assigned that are more descriptive of the way customers look at program progress: a pre-design stage, a design stage, an installation stage, and a verification stage. With FEMP assistance about 70% of all customers moved into the verification or installation stages between the time the FEMP service was initiated and the time of the survey.

Customers Sharing Information

The impact of the FEMP Technical Assistance program can also be measured by the degree to which customers share this information with others. A large majority of the customers surveyed in 1997 (80%) and 1998 (87%) are actively sharing FEMP information with others inside and outside of their organizations. Sharing practices include personally reviewing materials with others, copying and distributing materials, and asking others opinions about the material. Together these two surveys provide strong supporting evidence that FEMP programs are reaching more than just the customers interacting with FEMP programs. This sharing in the federal market place is compounding the impacts of the FEMP services. In the 1997 study respondents were asked if they thought that the information that was shared would be used in decision making. Approximately 64% of those who said they shared information indicated that they thought it was being used on projects. Thirty-eight percent said that they were familiar with the projects in which the information was being used.

Impact of FEMP on Project Implementation

Customers were asked to provide the number of energy or environmental projects that they have undertaken in which their FEMP skills or tools have been used. For the 1997 study the number of projects initiated by FEMP workshop customers averaged 30 per person. This included a high number of projects for customers in the Federal ReLighting Initiative(FRI) and Life Cycle Costing

(LCC) workshops, where customers typically implement several smaller dollar projects, and customers who had only a few projects such as the Renewable Energy, the Energy Saving Performance Contracting and the Operations and Maintenance workshops. In the 1997 study customers were asked about the amount of time they needed to plan and implement projects using the skills and tools obtained through the FEMP programs. On average, FRI, O&M and LCC related projects take the least amount of time and can be expected to show results within a year of workshop attendance. However, other projects, such as those associated with ESPC, REP and FEDS Workshops can take between 1 and 2 years to plan and implement.

The 1998 survey obtained similar results with customers reporting they have used their FEMP acquired skills, tools and assistance on an average of 18 projects between the time of the assistance and the survey. It is not surprising that the average number of projects is down from 30 in 1997 to 20 in 1998. Differences could be due to the types of technologies addressed in the non-workshop technical assistance, and again, because the time between the survey and the assistance was halved in the 1998 study. As with the 1997 study the spread of the number of projects across the different FEMP programs is consistent with the type of FEMP service provided. Table 2 presents the data obtained from the 1997 and 1998 studies.

Customers Volunteer Their Projects for FEMP Case Studies.

Both studies found customers who had documented energy savings from projects influenced by FEMP technical assistance willing to share their success stories and have their projects used for FEMP case studies. Together, about 130 customers said they would be willing to share this information, providing an indication of the impact of FEMP programs and an excellent opportunity for FEMP to obtain additional case stories that can be used to document that impact and to promote the technologies. In the 1997 study, respondents who answered that they had documented energy savings or emission reductions were asked to provide details on those project impacts via a form faxed to them. Very few provided that information. In the 1998 survey people who said they had documented energy savings were asked if they would mind being phoned by FEMP staff. When calling for the more detailed information, FEMP staff have available data on the programs the customer had participated in as well as the number and types of projects they had implemented.

1997 Study - Workshop	Number of projects per person on which attendees report using FEMP skills or tools	1998 Study - Program or Workshop	Number of projects per person on which attendees report using FEMP skills or tools
FRI	50	NTD	13
REP	7	EEP	44
ESPC	6	LEBD	26
FEDS	14	WRM	16
LCC	72	General Workshops	5
O&M	4	BDA	35
		REPA	11
		GPA	7
		SEA	9
Average	30	Average	18

Table 2. Number of projects on which FEMP skills were used

Lessons Learned from These Customer Surveys

The survey results showing that the FEMP indirect technical assistance programs were successful in moving customers along the technology adoption cycle were useful to FEMP managers for demonstrating the effectiveness of the programs. The evaluation team would recommend using the individual customer knowledge and decision classification method developed for the 1997 survey by TecMRKT Works, rather than the shorter "project counts" methods used to classify customers into stages of technology adoption in the 1998 study. While both accurately classified most customers, the 1997 method was more accurate and appeared easier for customers to answer.

The inability to contact FEMP customers was the single greatest barrier to conducting the 1997 and 1998 surveys. Both surveys found that many of the individuals on program lists and in the FEMP project management database could not be reached by phone. Many of FEMP's customers are military staff or federal employees who change jobs, locations, offices, and phone numbers on a routine basis. A systematic process to periodically collect and update customer records would facilitate the ability to contact FEMP customers.

Customer surveys always have the problem of potential self-reporting bias. However, evaluations that document the impacts of programs are often expensive and time consuming. Adding questions about impact to annual customer surveys that also have the purpose of continually improving the programs is cost effective. Because of the types of questions asked, these FEMP technical assistance customer surveys provided better information on the impacts of technical assistance programs than most customer surveys. The responses also provide the programs with the possibility of following up with customers to document energy savings and other impacts through case studies where customers have volunteered to be contacted for that information.

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