# ACHIEVING COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY IN A MARKET ENVIRONMENT

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## ABSTRACT

This paper outlines the importance of the marketplace in which individual, commercial, and industrial energy users make decisions about energy management measures. These decisions are carried out with the support of an infrastructure composed of energy service providers and product manufacturers. The effectiveness with which this market operates in satisfying the needs of both energy users and profit-seeking energy service businesses determines the ultimate level of energy management activity.

Utilities, government policy makers and energy planners, or energy service industry representatives who seek to expand the size or range of energy management activities must understand these user decisions and their relation to energy management market activities. This paper summarizes important lessons learned in the last few years about energy management marketing and decision making, and offers several additional insights gained from recent research. Studies referenced address energy user decision-making processes, utility evaluations of participation in incentive programs, professional needs of energy managers, and marketing opportunities for energy service providers.

Specific suggestions are offered for:

1) roles manufacturers, energy service companies, energy managers, government agencies and utilities can play to make the current energy management market more effective, and

2) expanding the size of the energy management market with better technologies, targeted energy services marketing, changes in building service businesses, and building the demand for energy management.

Together these experiences provide a basis for the design of more successful utility, government, and business strategies to promote energy management. If successfully applied, these should help build a larger, supportive market for an increased level of energy management activities.

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## I. INTRODUCTION AND PROFILE OF THE ENERGY MANAGEMENT MARKET

Energy management among commercial and industrial energy users requires taking actions which will result in changed energy use. The actions are typically capital investments in buildings and equipment, or changes in operating and maintenance procedures. Accomplishing these changes requires complex interactions among the businesses providing energy services and the individual energy users. These interactions occur in a marketplace composed of many actors. More precisely, the size, scope, and content of this energy management marketplace will be determined by the knowledge and decision making of energy users, the offerings of energy service providers, and the relative profitability of the energy services industry.[1]

This paper suggests the importance of this marketplace in achieving higher levels of energy management activity. Utilities, government policy makers and energy planners, or energy service industry representatives who seek to expand the size or range of energy management activities should understand user decisions and their relation to market activities. This paper summarizes important lessons learned about energy management marketing and decision making. If successfully applied, these should help to build a larger, supportive market for increased energy management activities.

The paper is organized in four sections. Section I provides a description of the energy management market structure and indicates the dimensions in which market activities might be expanded. Section II describes the energy user's decision process about energy management opportunities, paying close attention to the characteristics of decisions. Section III discusses the lessons learned to date about energy management decisions and their implications for a successful energy management marketplace. Section IV offers several larger strategies by which government, utility, and private energy management businesses could build a larger and broader market for energy management.

The term market as used in this paper refers to the environment in which a combination of manufacturers, distributors, sales representatives, architects, engineers, contractors, lenders, and other intermediaries interact to enable an energy user to design, purchase, or apply energy management products and services to achieve energy management (and other) objectives. Figure 1 outlines how these market players may interact to achieve the energy user's desired energy management action.

There is a complex decision process in which a facility or energy manager considers the possible energy management measures he/she could propose to undertake. Decision factors include technological potential, organizational attitudes and behavior, economic attractiveness to energy

users, competitive pressures on the users' business and the related need (or not) to manage energy costs, and the status of market information on products and services available to help users manage their energy costs.

Imperfections in the natural operation of the energy management marketplace result in lower levels of energy management investments than are indicated by estimates of "economically justifiable potential". In turn, this lower level of energy management market activity may reduce the perceived profitability and attractiveness of business decisions to expand the range of energy management products, services, or providers in the market.

Initiatives by government, utilities, or the industry itself to increase the level of energy management activity could have several effects on the marketplace:

a) to stimulate the overall size of the market for (e.g.,) conservation measures, by increasing the knowledge and availability of measures, increasing the economic attractiveness of actions to energy users, or mandating standards;

b) to increase the applications of existing technologies in new ways (e.g., utility objectives to induce energy users to adopt energy management control strategies which shift the pattern of energy use);

c) to introduce and expand the range of technologies used by energy users to meet their energy needs (e.g., to stimulate gas-fired cogeneration, or industrial electrification when this offers production flexibility, quality control, reduced maintenance costs, etc.).

Regardless of which of these is the intended objective, attention should be paid to the energy user's decision process and the market conditions for profitable energy service businesses. The remainder of this paper discusses some of the lessons we can learn from past experience, and suggests techniques for building a larger market for energy management.

## II. THE ENERGY USER'S DECISION PROCESS FOR ENERGY MANAGEMENT

The commercial and industrial decision process for energy management is complex. Figure 2 summarizes the content of this decision process. Five aspects of this process are singled out for discussion in this paper. These five are:

Corporate/Organizational Objectives

Organizations' primary objectives are producing their goods or services, attaining market share, or achieving profitability targets. Energy management activities need to be promoted as means to achieve one or more of these objectives.

Technical Knowledge of Energy Management Opportunities
Identifying the "right" energy management solution for commercial/industrial facilities requires understanding technological potential, product availability, cost and performance of measures, and other features and effects.

Organizational Decision Process
Decisions about energy management investments may involve a hierarchy of individuals representing different functions in an organization, each having their own biases, agendas, and veto authority.

The Energy Manager's Personal Capabilities
A facility or energy manager needs to be able to assess those activities and projects which promise to achieve organizational objectives within the time and resources available.

Financial capabilities
Energy management projects must not only meet return on investment criteria, but also survive the capital allocation process within the organization.

Evidence for the importance of these decision factors is drawn from recent planning and analysis in the commercial/industrial (C/I) sector. Material draws heavily on three projects. The first is a survey and set of qualitative interviews with members of the Association of Professional Energy Managers (Clinton, 1985b). The survey obtained 45 responses or a 27% response rate. It should be noted most APEM members tend to represent large organizations, characterized as having energy bills exceeding $100,000 per year, having multiple facilities, and with 1000 or more employees. The second is an evaluation of the Palo Alto (CA) Utility's first year program experience for a peak load reduction incentive program for commercial/industrial energy users (Barakat Associates, 1985). The first year program targeted the utility's large C/I customers, defined as having peak demand of 300 kW or more. The third project is a market analysis and business strategy plan for a private energy service company (Clinton, 1985a).

## A. Corporate and Organizational Objectives

Organizational objectives. The objectives and messages of top management can greatly influence energy and facility managers' perception of organizational support for energy management. The APEM survey asked energy managers what it would take for their organization to increase the level of energy management activity. (Clinton, 1985b) Table 1 indicates that after higher energy prices, the next four responses referred to the organization's commitment to energy management. For top managers's decision criteria (Table 2), economics was a first concern, and product performance and acceptance concerns were second.

In the Palo Alto (CA) utility's incentive rebate program for electrical peak load measures, energy users' for were greatly attracted to window films

for non-energy reasons such as comfort, reduced maintenance expense, and replacement of failed equipment (Barakat Associates, 1985) (Note: the utility rebate effectively took care of the primary economic criterion by designing incentive payments to approximate a two year payback or less on the energy user's investment.) For other measures, product vendors cited top management support as the greatest possible barrier to program acceptance.

Economic Criteria. An energy manager must address an energy measure's cost, both in initial outlay and subsequent maintenance and operation; projected savings (energy savings, labor savings, etc.); estimated return on investment; and proof or guarantees of the reliability of economic benefits.

Among commercial and industrial energy users, a two year simple payback ceiling has emerged over the years as a good yardstick of likely adoption of energy management actions. Many studies have shown this to be the effective ceiling for investments, with a significant drop in penetrations as paybacks for measures decline from 1 to 2 years. (See for example, Clinton, 1985a; Michigan Pilot Study; and Train et. al.) This finding on energy user investment ceilings is corroborated by businesses marketing energy management products and services, as well (See California Energy Commission (CEC).) The actual return on investment ceilings vary by size or type of business, degree of competition, and form of ownership. (See Temple, Barker & Sloane)

## B. Degree of Technical Knowledge of Energy Management Opportunities

The energy manager's knowledge of energy management potential. The size and vigor of the energy management market depends on the availability of solutions to improve energy efficiency at acceptable costs. Knowledge regarding possible energy management measures varies considerably among energy users. APEM members (an audience of "professional" energy managers who presumably have a high degree of knowledge and authority to direct energy management projects) believed they could economically tap a 15-19% improvement in energy efficiency on top of the 20-24% they estimated they had achieved in the past 5 years. (Clinton, 1985b)

Knowledge of energy management opportunities seemed more limited among Palo Alto's large commercial/industrial energy managers. The primary reasons cited both by participants (for not increasing their participation in the utility's incentive program) and by non-participants was that they were not aware they had potential for additional (peak) load reduction. Some 54% of non-participants indicated they could not identify any additional actions which would enable them to improve their energy management. (Relevant responses were "had already installed all appropriate measures", "installation was not practical", or they "lacked knowledge on appropriate measures".) (See Table 4.) (Barakat Associates, 1985) A similar PG&E evaluation revealed the greatest reasons for not participating in the incentive program was insufficient need or opportunity to adopt or change equipment. (See Table 5) (Pacific Gas & Electric)

Availability of Adequate Technical Information in the Market Place. The energy manager's ability to obtain specific information on products and operating practices is determined, in part, by how well the market mechanisms and diffusion of information are functioning.

The adequacy of available information varies between commercial and industrial energy managers. Qualitative interviews with California firms indicated commercial energy users cited lack of performance information as the most critical limitation in starting or expanding an energy conservation program. (California Energy Commission) The Palo Alto evaluation revealed that large manufacturers were fairly knowledgeable about their options. Yet medium-sized manufacturers and office buildings below 300 kW demand admitted they lacked access to information on effective products and services, to the point they did not know if they could benefit from utility incentives. This finding was confirmed by vendors and suppliers, nearly half of whom reported facility managers were insufficiently familiar with conservation to determine the measures right for specific facilities. (Barakat Associates, 1985)

Other studies have made similar findings about user concerns and information on the performance of conservation equipment. (Temple, Barker & Sloane, and Clinton, 1985b)[2] Some of the more knowledgeable energy managers indicated they also sought more communication with manufacturers on new product development, as a means to ensure products met users' needs.

## C. Organizational Decision Process

Many steps exist in the review and approval process. In large, multi-facility organizations there may be as many as four individuals who participate in an energy management decision. Individuals may include the facility manager, engineering or operations executive, product or divisional executive, and the financial manager. In smaller organizations these functions may be combined.

In the Palo Alto Utilities' incentive program, the mean number of decision makers among program participants was 2.8. (Barakat Associates, 1985) Among small energy users (under 300 kw demand) 40-50% of decisions involved only one person. Among the largest energy users (over 1000 kw demand) over half of the energy users required approval from 3-5 individuals in their organizations. The complexity of decision-making also varied by type of facility or organization.[3]

In large organizations the timing and steps of the decision process become critical. A typical approval process was characterized as "we need a year's advance notice to get funds into the budget process, and then 5-6 months to get specific projects designed, approved, and contracted." (Barakat Associates, 1985) The steps involved considering possible measures, investigating available products, obtaining sufficient information on performance, and soliciting bids from qualified installers or suppliers. There were many ways this process could become sidetracked.

To ensure participation in the incentive program, Palo Alto staff found they had to explain product literature and fill out program applications for energy users. This helped to avoid inaccurate plans, minimize time delays caused by non-energy tasks of the energy manager, and reduce the number of steps the manager had to worry about. Still, despite staff help and sizeable incentive payments, many businesses chose not to go forward with "cost-effective" measures. Product and service suppliers indicated that for serious leads for energy conservation measures having paybacks of 2 years or less they could successfully close a sale only 16% of the time. (Assuming up to 2-3 firms may have been invited to submit bids or price quotes, this still would result in a "sale" only 32-48% of the time.)

Risk avoidance is a key criterion. Perhaps one of the most important criteria for energy management decisions are the sources of possible risks. Examples include employee or client discomfort, work productivity, disruptions to normal business activities, quality control, uniformity of facility operations, and peer or public image. Some of these may have measurable economic effects, while others are more qualitative aspects of a decision. It is important that researchers and utility program planners recognize that decisions go beyond optimizing technical efficiency.

The significant importance of risk aversion among smaller energy users, was established in a study for Bonneville Power Administration (Temple, Barker & Sloane). Risks of product performance, energy user comfort and business disruption were identified as some of the strongest (and negative) attributes of an energy user's attitudes towards energy management activities.

There also may be anticipated benefits which influence energy management decisions, such as the availability of a utility incentive payment or bonus for taking certain actions now rather than later. The existence of this added benefit (rather than the cash value of the incentive itself) can have a positive influence on the actions of energy users. This was the case in both the PG&E and Palo Alto incentive program evaluations.

The tolerance limits for risk aversion will depend on the degree of competition in certain industries, the personality of individuals in the firms, and organizational norms for innovation or experimentation. The Temple, Barker & Sloane report identified types of commercial businesses which believed they would not remain cost-competitive unless they adopted energy saving devices. Surprisingly, "competitive" types of businesses differed significantly between the Northwest and the San Diego areas, suggesting motivations for energy management may vary across geographic market areas.

In a case study for Arkansas Power and Light, the Alliance to Save Energy applied an "innovation index" to the likelihood of industrial sector adoption of energy efficiency actions. They found the "high technology" industries -- aircraft, missiles, electrical machinery, communications, and to a lesser extent chemical facilities -- to be more inclined to exhibit innovative decision-making practices. (Alliance to Save Energy)

The report for the Association of Professional Energy Managers (Clinton, 1985b) revealed that perceived risk of energy management actions could be minimized with sufficient organizational infrastructure to support energy management decisions. These included adoption of a formal energy plan or program; commitment of time, resources, and funds to energy management; and empowering of individual decision-makers in the organization.

## D. Energy Manager's Personal Capabilities

The effective demand for energy management greatly depends on the personal skills and resources of the energy manager. Palo Alto firms revealed energy managers must skillfully navigate the power bases and veto holders within their organizations in order to successfully manage an energy improvement. Managers indicated they had to do their "homework to prove the economic benefits and performance of measures to upper management. ... (and address) complex organizational concerns such as:

- budget cycles
- economic investment criteria
- anticipating the non-energy benefits or obstacles to a measure." (Barakat Associates, 1985)

The APEM survey revealed a similar set of needed skills, including investment analysis, and amassing sufficient time, resources, and funds to carry out energy management plans. (Clinton, 1985b) There emerged a view of the background and needed skills for a successful energy manager.[4] Energy managers' backgrounds are primarily technical. Technically trained managers stated that they needed to improve their skills in working within their organizations -- selling projects to upper management on a financial basis, and paying attention to potential risk or negative effects. Non-technically trained managers identified that they needed skills to sort out technologies and products on the market. All managers indicated the need for public relations and internal sales skills to elevate the visibility and profile of energy management in the eyes of top management. (As one person asked rhetorically, "why is it easier to get management attention on cost savings for janitorial and building security services, than it is for energy management?")

Complicating the wide range of skills an energy manager needs, is the fact that energy management is rarely a full-time responsibility. This is true even among members of APEM, who by definition consider themselves to be "professional energy managers", and who work in very large organizations. Some 40% spent less than 25% of their time on energy management, and another 16% spent only 25-39% time. (See Table 6 for details.)

## E. Financial capabilities

The ability of an energy user to execute desired energy management actions may depend on the availability of capital or the established capital

allocation procedure for selecting among alternative investments. Selection criteria may include return on investment hurdle rates, contribution to the organization's strategic direction, and target debt-to-equity or capitalization ratios.

Capital availability does not appear to be a significant problem among larger energy users. In the APEM survey, 53% indicated this was not a problem, 36% indicated it was a problem, and 11% declined to answer. (Clinton, 1985b) In the Palo Alto evaluation, among non-participants who recalled the incentive program and read the program literature, only 24% cited their reason for not joining the program as a lack of capital or budget. (Barakat Associates, 1985) Financing capability is more likely to be a problem for smaller organizations.

## III. IMPLICATIONS FOR ACHIEVING A MORE EFFECTIVE ENERGY MANAGEMENT MARKET

The experience gained with C/I energy management activities points to a number of techniques which can enhance the acceptance and penetration of energy management opportunities, the current energy management market more effective. Section IV suggests strategies for building a larger market.

1. Manufacturers and suppliers of energy management products and services must demonstrate the non-energy advantages of their products, such as positive effects on occupants, employee comfort, energy users, productivity, and improved building operation. From here energy or facility managers can "package" their energy activities for more effective presentations to upper management. Promoting non-energy benefits may help integrate energy management into an organization's strategic objectives regarding their business activity, profitability, and image.

2. Energy services providers need to ensure their sales and marketing people are trained to solve energy user problems, and not just to sell the particular line of products or services the company currently provides. Successful problem solving will go further toward building confidence between energy users and suppliers than expensive advertising and promotional efforts. The energy management industry should look at the level of knowledge and experience its marketing personnel have, and identify areas where increased training will increase the value of services offered to clients.

3. Energy management marketers could simultaneously direct marketing activities to top management and technical personnel in an organization. Top level support can provide a clear signal to those several layers down in the organization that good energy management projects are welcome and encouraged. A marketing strategy to top managers and financial managers could focus on issues of risk, performance, and non-energy benefits. This could help overcome potential barriers to a positive decision.

4. A government agency, utility or energy management business can appeal to the energy user organization's desire for a favorable public image. This can be done by promoting a firm's energy management achievements (including

special emphasis on innovation or environmental concerns) through community or business forums.

5. It will be important to build a professional energy manager support organization to provide continuity of personal contacts and information transfer. This is important in view of the tendency of energy managers to rotate in and out of their functional responsibilities, as well as the trend to decentralize energy management responsibilities within facility management and operation units. Alternatively, energy management information exchange can be better integrated into the other, stronger professional and trade organizations that facility energy managers belong to.

This exchange can be accomplished in a number of ways. One example is the Association of Professional Energy Managers, a national organization with multiple local chapters organized primarily for professional exchange. These organizations can be fostered by utilities, energy users, and the energy service industry. In the APEM survey the three highest rated sources of information were professional or trade meetings, monthly magazines, and utility representatives. Product or service vendors were mentioned least frequently. (Clinton, 1985b) This may reflect the traditional focus of vendors on sales, rather than professional development. Government support is unlikely to be a sustaining factor. Although utility interest in promoting conservation or energy management may fluctuate, utilities need to maintain forums for energy user exchange. For example, utilities want contacts with knowledgeable facility managers to solicit input on and promote demand side management services, adoption of new rate strategies, and acceptance of new technologies such as thermal energy storage or fuel cells.

6. Energy users show strong interest in technical assistance and project management services. These can be provided by utilities, vendors, and professional organizations. Examples include published data on product performance, greater use of case studies, central source books or reference guides on energy management technology and equipment. This information would be most helpful if offered by peer or professional groups, and utilities, as discussed above. One noteworthy example is an effort by the Association of Professional Energy Managers in the Los Angeles area to develop an "electronic bulletin board and data base" service where members contribute their experience with performance of specific energy management products.

7. Technical assistance also could be offered in the form of "pre-packaged" recommendations of products and measures for specific types and sizes of facilities. For example, there could be targeted marketing of proven technologies applicable to specific types of facilities or situations. This cuts down the time a facility manager needs to spend investigating a wide array of products and operating practices. By reducing the range of information, pre-packaging services, and cutting down the number of steps in a deliberation process, the energy management decision becomes simpler, easier, and therefore more likely.

8. Carefully crafted financial incentives can be used to stimulate accelerated energy management investments. If energy management actions have longer thana 2 year simple payback, they are far less likely to be adopted. They may be achieved if tied to other organizational considerations, or if direct financial incentives are offered. The availability of a limited term incentive payment (or a temporary reduction in product price) can offer a facility manager a means to grab top management attention for projects which may have been "languishing on the drawing tables" for years. (Barakat Associates, 1985)

9. Professional organizations and energy service providers may want to encourage facility mangers to adopt written energy management plans to guide expenditures over a multi-year time frame. By selling the plan, and no teach project, it may be easier to gain and retain top management support. For example, viewing energy management as individual cost avoidance measures may handicap the progress of capital projects. As "discretionary" items, these can easily be postponed to a later year (an action which may be repeated every year). The availability (but not necessarily the eventual use of) incentives, low cost loans, or third-party financing can help projects to overcome the "wait 'til next year" syndrome. Then as projects proceed through internal approval stages, internal capital frequently will be substituted as confidence builds over the sizeable savings which can be captured.

## IV. BUILDING THE SIZE AND STRENGTH OF THE ENERGY MANAGEMENT MARKET

The market supplies products or services for which there is a proven demand and expected profit. Many service businesses may have a short time horizon for profitability, but some may take a longer view of building long-term client relationships. Manufacturers, however, need to see more concrete evidence of market demand for energy products to warrant the design changes or production retooling associated with manufacturing products and equipment.

Past experience with the energy management market suggests several techniques to build both a) the demand (size) of the energy management market, and b) the qualities, capabilities, and services offered by this market delivery system. These include:

1. new and better technologies and equipment features to meet user needs,
2. more astute business planning for target markets and packages of services,
3. incorporating energy management products and services into the existing facility equipment and service business, and
4. development of increased market demand for energy services.

1. New and better technologies and equipment features must be developed to meet user needs. This can be accomplished by greater collaboration among researchers, product designers, and energy users. Successful development and commercialization of energy management technologies requires that:

- researchers convey their knowledge of technology potential to the product designers employed by manufacturers;
- designers verify that products will perform consistently, and within the expectations for equipment operation, maintenance, and repair;
- energy users evaluate their needs and willingness to pay for products and services which solve problems or save money in facilities. (These same requirements hold true for all energy industry professionals including architects, engineers, and accountants, and not just product manufacturers.)

These objectives can be accomplished with technology transfer activities sponsored singly or collaboratively by federal and state governments, energy research organizations (national laboratories as well as gas, electric, and manufacturing organizations), and the energy management industry itself. Several projects are underway by the Department of Energy, Gas Research and Electric Power Research Institutes. These should be continued, expanded, and designed to ensure energy user involvement. Support efforts are needed to communicate developments and user needs in written forms.

2. There should be more astute business planning to serve target markets and provide service packages. Greater differentiation will be needed in the products and services offered to market segments. Differences will reflect type and size of business, investment or profitability criteria, and degree of risk acceptable for facility management decisions. Some energy users may want more detailed technical information, while others may want more project management assistance in getting through the multiple steps of identifying and carrying out facility improvements. Each set of services will have appropriate target audiences and associated profitability.

Energy service providers should pay greater attention to designing business strategies to profitably match services to segments of energy users. The future appears to favor an array of service providers addressing clearly defined market niches, each offering a menu of products and services from which a client can choose. The energy user is free to "trade-up" in the degree of services it procures from the provider over the course of a long term business relationship.[5]

For example, the Palo Alto evaluation revealed five groups of target audiences for future promotion of energy management:

1. large industrial/manufacturing facilities over 1000 kW demand
2. medium industrial/manufacturing facilities of 300-999 kW demand
3. office buildings over 100 kW demand
4. hospitals
5. lighting use by all other demand energy users (and perhaps all non-demand energy users as well)

Energy service providers might develop specially targeted promotional contacts, energy management literature, and support services on measures,

products, and services appropriate to the types of facilities and organizational circumstances. (Barakat Associates, 1985)

Market research support to accomplish better targeted business planning can be accomplished by large energy service companies with internal market research capabilities, professional or trade organizations (such as APEM or the National Association of Energy Service Companies), utilities as support for their programs (Southern California Edison, for example), and/or government and utility research projects (e.g. Bonneville, EPRI, GRI, DOE).

3. Energy management products and services should be incorporated into the existing facility equipment and service business in order to serve smaller users. This paper has shown that large users generally have better access to knowledge, information, and capital than small and medium-size energy users. A different form of energy management provider is needed to reach the smaller users. The most likely energy management providers will be non-specialized firms (i.e., those providing more than energy management services) which establish a good working relationship with their clients, build a track record of offering credible advice and solutions, can identify ways to recommend energy management solutions as part of routine sales and service calls for the primary business, and can do this with minimal extra marketing or overhead expenses.

For example, it may be profitable for an HVAC contractor and maintenance firm to train its technicians to be alert for inefficient operating practices or equipment when making routine service calls. Then at little extra cost, recommendations can be made to the client on ways to improve their dollar investment in air conditioning. This service might even be developed into a "premium" maintenance service, even going so far as to have an "energy savings guarantee". The Palo Alto evaluation concluded that the best vehicle to deliver energy management to office buildings and retail stores, for example, was through the normal suppliers of lighting and air conditioning services.

Experiments could be sponsored by state energy agencies, utilities, or trade associations of HVAC and lighting service companies to determine if this approach would be profitable. One example of such an idea is underway in California where the sheet metal and air conditioning contractors association is offering training and business services to help their members expand the energy management services they might offer.

4. Actions can be taken to develop increased market demand for energy services. Conventional business sense dictates that stimulating a stronger market demand for energy management can best be carried out by the market actors (outlined at the beginning of this paper) who have the potential for financial gain. The most effective way to accomplish this is to estimate and then promote the total value to C/I energy users of the energy savings and non-energy related benefits likely to be incurred.

Energy service companies need to ensure they apply sound economic and energy user value of service concepts to their business planning and pricing

decisions. Moreover, the marketing messages need to reinforce the value of solving problems or seizing attractive opportunities, rather than emphasizing dollar and kWh energy savings. Using this value-based approach, it will be easier to determine the potential size of the energy management market, and which target markets can profitably support this business. A corollary conclusion might also identify markets where private energy management businesses are unlikely to be profitable, and which could be evaluated for possible government or utility strategies.

A sample strategy for reaching markets which are otherwise unprofitable for energy service companies might be smaller commercial facilities. The Palo Alto evaluation revealed strong interest among medium-sized office building managers for periodic meetings among peers to exchange information and experiences about facility management problems and solutions. These managers indicated they would discuss measures, products, performance experience, and names of good suppliers and installers. (Barakat Associates, 1985a)

Another example of ways the energy management industry (suppliers, consultants, and/or utilities) could increase market size is to boost the image of the firm and the individual facility manager who pursue energy management opportunities, applaud their "risk-taking" leadership, build top management support, and promote the non-energy benefits which may accrue.

## CONCLUSIONS

The private market for energy management transactions is creative, dynamic, and highly flexible. A strong demand for energy services will support a market structure which can endure for years in meeting the continually evolving needs and opportunities to improve the operation of buildings and equipment. There are a significant number of specific market support and market building techniques which can be employed to improve the effectiveness of the energy services market and, in the process, to increase the penetration of energy management actions. Utilities, government energy planners, and the energy management industry itself should pay heed to how the market works and how energy users make decisions in order to achieve a substantial gain in commercial/industrial energy management.

1. The basic framework for this paper was initially developed as part of a project for Pacific Gas and Electric Company's Energy Management Department (Barakat, Howard & Chamberlin, Inc., 1986a). This paper applies recent survey and evaluation data to this framework.

2. It should be noted that the sample selected for the Pacific Northwest group was deliberately biased toward smaller energy users.

3. For further discussion of organizational decision structures, see David M. Dornbusch & Co., Inc., "Program Analysis -- Task G: Market for a 'Centralized Decision-Maker' Commercial Subprogram" for the Bonneville Power Administration, September, 1984.

4. Another organizational need identified by managers, but not addressed in this paper, was for building technician and equipment operator training.

5. Some of this thinking was developed in an earlier report for a private energy service client regarding opportunities for expanding market in California. (Clinton, 1985a)

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FIGURE 1

ENERGY MANAGEMENT MARKET PLAYERS

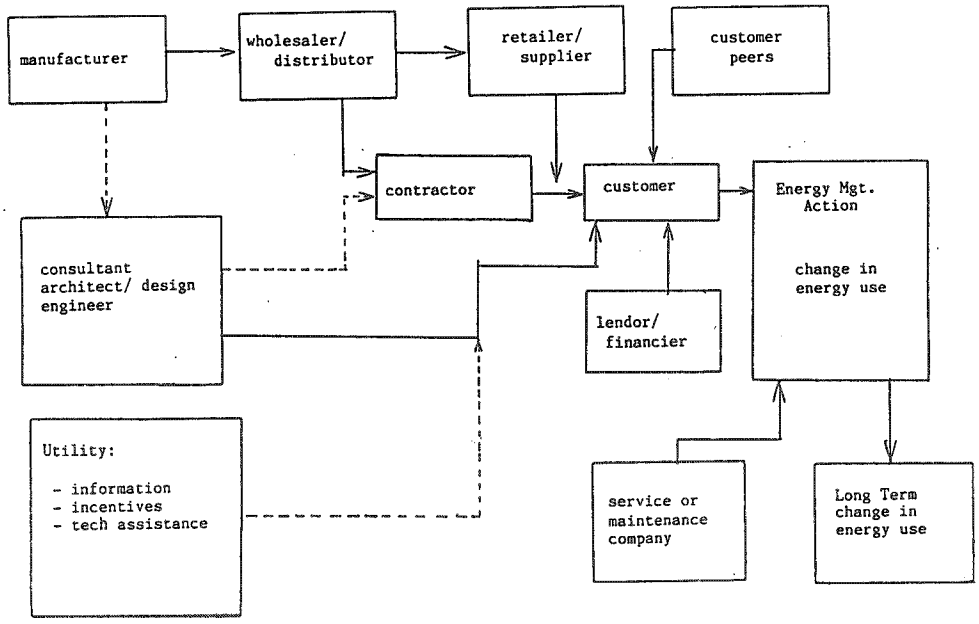


FIGURE 2

ENERGY MANAGEMENT DECISION ELEMENTS AND PROCESS

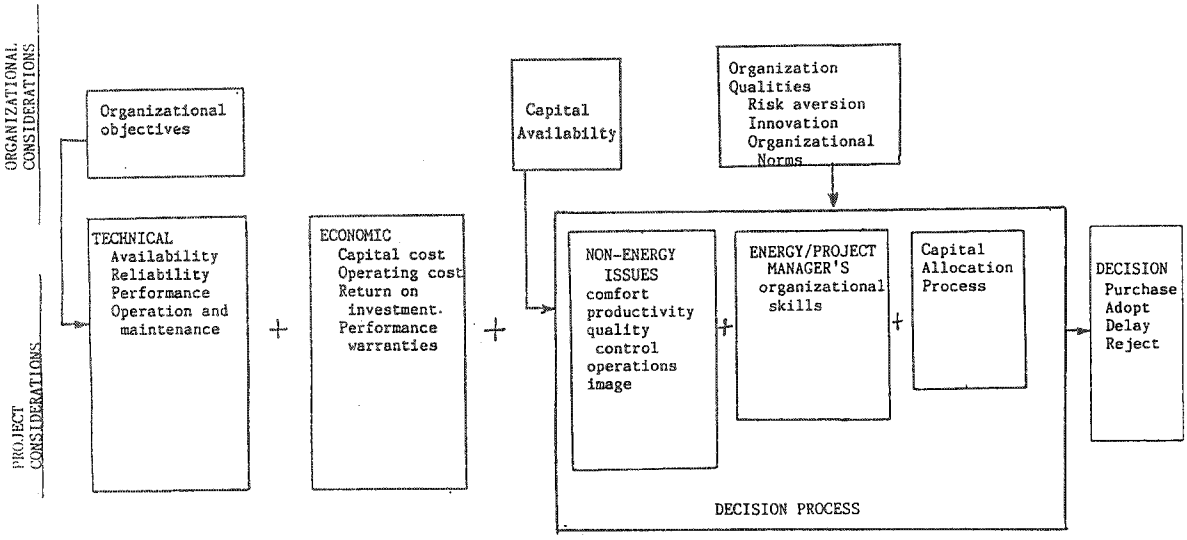

Table 1: Motivations to increase energy management.

Q: Overall, what would it take for your organizaion to increase its level of energy management activity? (N=45)

| Response | Percent |
|---|---|
| higher energy prices | 20% |
| more time/resources/funds | 20% |
| having a formal energy plan | 16% |
| internal organizational changes | 13% |
| top management support | 9% |
| strong gov't/policy & leadership | 7% |
| better financial/econ.climate | 7% |
| external subsidies | 4% |
| doing OK, nothing needed | 4% |
| no answer | 11% |
| other | 9% |

Source: Clinton, 1985a

Table 2: Decision criteria.

Q: For the top decision makers in your organization who review your energy management recommendations, what are the critical criteria they consider? (N=45)

| Response | Percent |
|---|---|
| payback | 53% |
| cost/outlay | 27% |
| return on investment | 20% |
| acceptance (to occupants) | 16% |
| product reliability/risk | 11% |
| image/external comparison | 9% |
| savings | 9% |
| other | 16% |

Source: Clinton, 1985a

Table 3: Vendor view of critical barriers.

Q: Do you feel any of the following issues are critical barriers to the success of the Partners program? (yes, no) (N=22)

| Response | Percent |
|---|---|
| top management support | 73% |
| financing | 59% |
| technical identification of possible projects | 54% |

Source: Barakat Associates, 1985

Table 4: Reasons for non-participation

Q: What were the reasons you decided not to (take part) (follow through) in the Partners program? (N=60)
(As % of those who recalled program)

| Response | Percent |
|---|---|
| had already installed appropriate measures | 26% |
| no capital or budget available | 24% |
| special circumstances, installation not practical | 19% |
| lacked time | 10% |
| deadline was too short or surprise | 10% |
| lacked knowledge on appropriate measures | 9% |

Source: Barakat Associates, 1985

Table 5: Reasons for not participating.

Q: (Please describe your) reasons for not participating in PG&E's programs. (N=615, of whom 72% were aware of programs)
(As % of non-Participants aware of programs they were eligible for)

| Response | Percent |
|---|---|
| mentioned one or more reasons: | 90% |
| no need for it/to change equipment | 23% |
| doesn't fit company needs | 17% |
| too expensive/initial cost | 12% |
| haven't implemented yet | 12% |
| didn't know/not aware of program | 10% |
| poor return/payback period/not cost-effective | 7% |
| need more in depth/specific info. | 6% |
| all others | 15% |

Source: Pacific Gas & Electric

Table 6: Time allocation to energy management.

Q: What percent of your time is devoted to energy management?

| % of time | Response rate |
|---|---|
| less than 25% | 40% |
| 25-39% | 16% |
| 40-59% | 20% |
| 60-79% | 2% |
| 80+% | 20% |

Source: Clinton, 1985a