

SHEDDING LIGHT ON THE INDIRECT COSTS AND BENEFITS OF COMMERCIAL ENERGY EFFICIENCY PROGRAMS

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Standard cost-benefit analyses of energy efficiency programs focus on a comparison of the direct savings achieved (whether kWh, kW, or environmental damages avoided) and the direct costs involved (equipment installation as well as program incentives, promotion, and administration). This strict accounting perspective may have some negative unintended consequences and fail to provide the perspective required to help market efficiency programs in the new utility environment.

First, the strict accounting perspective may reinforce and enshrine tendencies to discount the relevance to managers of critical, but less easily quantified factors in decisions to implement energy efficiency in new construction or retrofit situations. For example, it gives no weight to the fact that some companies may engage in lighting upgrades to position their corporation as an environmentally aware Green Lights partner. By the same token, it ignores the possibility that a company might hesitate to participate in a utility lighting program because they do not have the staff available to evaluate contractor bids. The failure to provide mechanisms for the recognition and analysis of these factors results in limits on program marketing. By considering only the direct costs and benefits of the program a manager or customer services representative may miss enrolling companies who would be willing to invest some of their own funds (or lower their incentive requirements) in promoting their environmental citizenship. Similarly, the utility and its agents may fail to consider the opportunity of helping to reduce the transaction costs associated with evaluating bids, in lieu of paying direct incentives to participants. Such failures are likely to be especially critical as the industry is pressed to lower program costs and to understand and utilize marketing appeals that incorporate the appeal of the "sizzle" as well as that of the steak.

Second, the strict accounting perspective may distort assessments of program cost-effectiveness by omitting from consideration the very costs and benefits that are the "deciders" for participants. If, for example, a retailer believes that improved and more efficient lighting is critical to sales, it would seem appropriate that some valuation of those benefits should and must be included in the benefit-cost analysis for that participant. In other words, it would seem appropriate to consider marketing energy efficiency programs in terms of *all* the benefits they can provide users, not only those that derive from the perspective of the advocate. In a parallel fashion, it is necessary to consider all the costs perceived by the user, for they limit program acceptance just as

do the direct costs of the program and the market barriers recognized by the advocate.

To our knowledge, however, the literature offers no systematic studies of the indirect costs and benefits associated with energy efficiency programs, nor any studies of their impact on either customer participation decisions or customer satisfaction with programs.

This paper describes a pilot effort to address these issues in the context of commercial lighting programs. The study included focus groups designed to identify the indirect costs and benefits to which customers attend when deciding whether to participate in those programs. It also included a telephone survey intended to provide some quantification of the frequency with which specific indirect costs and benefits (ICBs) are considered before participation as well as the frequency with which they are perceived as having been experienced during and after program implementation.^a

In presenting the results of this research, the paper addresses the following topics: When deciding whether to participate in a lighting efficiency program, (a) What ICBs do customers consider? (b) How do ICBs affect program participation? (c) Do customers monitor ICBs during and after program implementation? (d) To what degree do customers report actually experiencing ICBs? (e) Do perceived experiences with ICBs relate to customers' judgments of program value?

After briefly describing our methods, we will summarize the findings on each of the topics listed, and then suggest some of their implications for both marketing and evaluation of energy efficiency programs as the utility industry evolves.

Methods

In a broader study of which this is a part, we conducted a survey of commercial customers regarding energy efficient lighting programs offered by San Diego Gas & Electric. As a key part of that survey, we asked respondents about their consideration of each of a series of specific indirect costs and benefits (ICBs) when deciding whether to undertake lighting upgrades.

To develop the list of pertinent ICBs from the perspective of the customers themselves, we first conducted a set of focus groups designed to help identify those ICBs that might be of general interest.

^a The telephone survey deals with other issues, and is reported separately in this volume (see Reference 1).

Focus Groups

On the hypothesis that the ICBs of importance differ as a function of the business activities and needs of the companies, we drew two focus groups from different pools of program participants. One group was drawn from companies whose business activities involve sales and service to customers who use their facilities, such as hotels and retail stores. The other group was drawn from organizations whose facilities serve production workers, white collar staff, and students. Members of both groups were involved with lighting decisions for their companies and had taken advantage of a utility lighting retrofit program in addition to LED exit lamp installations during 1995.

To explore the possibility that customers who did not participate in lighting upgrade programs considered other ICBs, we also conducted a third group. This group was recruited from customers who had not participated in any recent lighting upgrade programs other than LED exit lamp retrofits since 1993 and was heterogeneous with respect to business type.

We designed the discussion guide for each session to elicit group members' descriptions of their business needs, the users and visitors to their facilities, and the role of lighting in meeting their needs. Consideration of these issues led into discussions of the specific benefits of efficient lighting and the relative importance of those benefits; emphases varied according to the business type and program experience of the group members. Where possible, we also elicited information regarding what indicators the companies used to measure or track the degree to which the expected indirect benefits were actually obtained. We then carried out a similar process regarding the costs of lighting retrofit projects, focusing on the indirect costs of programs, barriers to success, and indicators of the costs involved.

Telephone Survey

Drawing from utility records of commercial customers who had participated in lighting retrofit programs other than LED installations, we reached 70 respondents who claimed to be knowledgeable about program-related activities.^b Once we had qualified the respondents, we administered a structured telephone survey of approximately 30 minutes duration.

Of relevance to this report, we asked respondents about their consideration of both the direct costs and benefits of lighting retrofits and related ICBs. First, we asked if they had considered the costs of new equipment, installation costs, equipment life, annual operating and maintenance savings, and energy cost savings. We also asked the most important reason for proceeding with the project. We then asked whether respondents had considered each of thirty ICBs derived from the focus groups when making their participation decision. Finally, we asked the degree to

^b We also surveyed 26 nonparticipants. Those data are not pertinent to the majority of the analyses presented here.

which ("a great deal," "somewhat," "slightly," or "not at all") their company had experienced those ICBs as a result of their participation in the program.^c

Results and Discussion

Both the focus group discussions and the survey data indicate quite clearly that customers do consider ICBs when deciding whether to participate in lighting efficiency programs. For example, focus group members maintained at length that lighting provides far more to their businesses involved than the ability to carry out core tasks. Perhaps most obviously on the positive side, lighting is used as a tool by retailers. On the negative side, hotel facilities managers noted that dim, unattractive lighting could cause guests to request room changes and to alter future patronage patterns. Lighting can also be used to create a sense of safety and security for employees or visitors of a facility, indoors as well as out. In addition, good lighting can convey a number of other messages to those who use a facility, such as "clean," "professional," "conducive to learning," "friendly," and "organized/efficient." For all these reasons, decision makers reported that they do attend to many aspects of lighting other than direct costs and benefits when considering retrofit projects.

The survey results confirm and expand upon those of the focus groups. Not only do at least 40% of the respondents report considering the energy cost savings and other direct benefits and costs associated with an upgrade project (see Figure 1), but similar percentages report considering a majority of the ICBs studied. On the average, the reported consideration of ICBs is no greater and no less than the reported consideration of more direct costs and benefits.

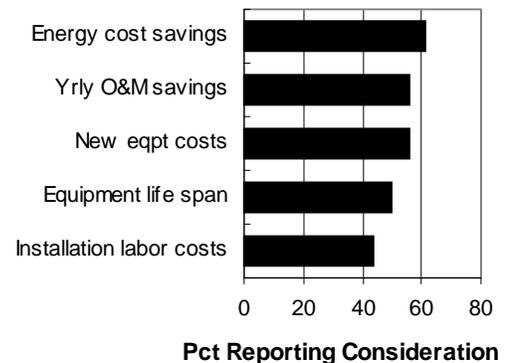


Figure 1. Reported Consideration of Direct Costs and Benefits

^c Other portions of the survey focused on such topics as the company's firmographics, risk acceptance, technology orientation, and investment criteria (hurdle rate, payback, or rate of return requirements), as well as the respondent's judgments as to the net benefits or costs of the project that was implemented. Another paper presented at this conference (Reference 1) provides an extensive analysis of issues related to the net benefits and costs.

What ICBs Do Customers Consider?

Customers attend to a wide variety of indirect benefits, ranging from corporate citizenship through enhanced internal functioning to improvements in meeting customer needs. They also consider indirect costs that may occur during project development and those that may occur immediately after implementation, as well as those that may threaten payback.

Indirect Benefits. Customers identify a number of benefits to their companies from lighting retrofits that are over and above the reduction in energy costs. A list of ten such benefits was included in the survey and is shown here as Figure 2; several are discussed briefly below.

- Reduced lighting maintenance, purchase, and warehousing
- Reduced equipment failure
- Improved visual comfort of users and guests
- Fulfilling management objectives and philosophy
- Productivity; improved working conditions
- Better fit of lighting to user or customer needs
- Reduced discomfort due to noise and glare
- Improved appearance of facilities
- Increased attractiveness of merchandise
- Increased safety or security and reduced vulnerability to lawsuits

Figure 2. Indirect Benefits of Lighting Efficiency Upgrades

Program participants place considerable emphasis on the savings in maintenance costs and the purchase of replacement lamps and ballasts—items they generally include in their own payback analyses. In addition, many believe that lighting upgrades enhance safety and security, or are perceived to do so, not only outdoors, but indoors as well.

Discussants in the “desk work” group also emphasize general productivity gains resulting from lighting upgrades, as well as more specific process-related outcomes such as an increased ability to match colors correctly.

Members of all groups report benefits in the perceived comfort, cleanliness, aesthetics, and promotional value of their facilities. Several in the education segment also say that lighting retrofits help make their facility conducive to learning and make it look easy to use. Hotel facility managers regard lighting as a critical element in guest satisfaction, and thus, in achieving high occupancy rates. Some discussants also note that investment in lighting upgrades is consistent with their company’s corporate philosophy and helps to demonstrate its environmental awareness.

Indirect Costs. Customers also identify a number of indirect and unanticipated costs of energy efficiency projects. It is possible to group these in terms of information-related risks, other risks, and hassle. In turn, the information-related problems of lighting retrofit projects can be

divided into those that surround the initial decision to proceed and those that complicate the process of implementation. In the first category lies the concern that projected savings (whether estimated by contractors or by utility representatives) are exaggerated. Customers express some frustration with their perceived inability to search out and obtain independent sources of information against which to test what others tell them. In the absence of other information, those who can do so rely on peer advice.

Several group members noted additional uncertainties that limit their willingness to invest in lighting retrofits. Pertinent issues include concerns about future energy costs and the future costs of lighting equipment, new regulatory requirements, and the fact that utility assistance programs are not completely predictable.

Other upfront information needs relate to such technical considerations as the appropriateness of the lighting system to the specific application involved, the beam spread, and possible wiring constraints. Interestingly enough, a number of the focus group members evidence a strongly experimentalist position with regard to making changes in their facilities. Several report having tried out fluorescent lamps with different color temperatures before settling on a standard for the facility, for example. Some also report such other tests as using different lighting systems on different floors of their facility.

The second type of information cost is that associated with project implementation. These include the perceived difficulties of finding trustworthy contractors and project managers, planning, developing contracts, and monitoring compliance.

Other risks include concerns with equipment performance, the possibility that the retrofit will require reinspection of their premises, and the need to dispose of hazardous waste (mercury or PCBs).

Some group members cite the hassle of having facilities unavailable during the renovation period as a potential cost. However, while this is a matter of concern, several—including those who manage properties for others—suggest that this is essentially a matter of providing prior notice and scheduling sensibly.

The survey included a set of twenty indirect costs, organized with respect to project-related time periods: those experienced during planning or implementation; those experienced immediately after implementation; threats to payback; and threats of unanticipated consequences of completed projects. This list is shown here as Figure 3.

How Do ICBs Affect Program Participation?

Despite the ready identification of ICBs and the acknowledgment of their importance on the part of focus group members, they also report that ICBs play no explicit, quantitative part in helping their company decide to engage

Grouping	Item
Barriers (leading to costs) experienced during project planning or implementation	<ul style="list-style-type: none"> • Making proposals to senior management • Obtaining or setting aside required funds • Setting aside other organizational needs • Staff time for planning renovations or retrofits • Staff time for setting up contracts • Finding trustworthy contractors • Staff time managing retrofits or renovations • Inconvenience during retrofits
Costs experienced immediately after implementation	<ul style="list-style-type: none"> • Occupant or tenant complaints about the new lighting • Cannot use existing inventory • Need to redecorate or rewire • Vulnerability to code inspections • Need to add task lighting
Threats to payback	<ul style="list-style-type: none"> • Technology may not perform as expected • Use of the space may change • Energy costs or equipment costs may come down • Newer, better equipment may become available
Threats of unanticipated consequences	<ul style="list-style-type: none"> • Need for increased staff maintenance or attention • More sophisticated staff may be needed to service and replace • Increased responsibilities for disposal of hazardous wastes (e.g., mercury, PCBs)

Figure 3. Indirect Costs of Lighting Efficiency Projects

in lighting retrofit projects.^d To some degree, at least, these results appear to reflect the present absence of standard methods to quantify most ICBs in customer decisions.

Most group members report payback as being the critical decision issue for their companies. In this respect, lighting program participants note the importance of utility rebates in convincing their management to move forward on projects.

For the majority of discussants, the focus on short-term paybacks is a critical aspect of the decision. Many companies appear to require paybacks of two years, eighteen months, or even less, regardless of the actual cost of funds. In justifying these perspectives, discussants point out that their own customers have only short-term relations with them. For example, law students remain at a facility for no more than three years. Few tenants take leases of five years or more, and most tenants have already made decisions about moving or renovation a year or more before their lease expires. In this context, group members believe it makes little sense for them to invest in upgrades that require continued relationships to achieve payback.

^d Some indirect support for this report may be seen in the fact that program participants and nonparticipants did not appear to differ from one another either in the focus group discussions of ICBs or in their reported consideration of them when deciding whether to carry out upgrades. However, this report should not be taken as evidence that such costs do not, in fact, influence customer decisions.

Indeed, this focus on virtually immediate payback highlights an important perceived risk for many customers: Regardless of whether the technology performs as predicted, the use of the facility may change in such a way as to eliminate the payback they anticipated.

An example of the importance of the customer's time perspective may be seen in the disagreement about the value of lighting upgrades between two property managers. Both acknowledged the split incentive problem, agreeing that it is not economically justified to upgrade the lighting for spaces in which the tenant is directly responsible for utility costs. However, they disagreed as to the value of upgrades for common area maintenance (CAM; e.g., entrances and hallways, for which all tenants pay a pro rata share of utility costs). One manager noted that, over time, upgrades lower CAM costs and thus keep total rental costs down, increasing the attractiveness of the property. The second manager focused on the immediate costs of the upgrade, which would be passed on in the rental fee.^e

It may be argued that many of the "quality" benefits of lighting upgrades flow to staff members, guests, and visitors to a facility. The benefits accrue only indirectly to those who make the decisions about lighting upgrades, in the form of increased patronage, longer leases, etc. More-

^e The interest in lighting upgrades on the part of facility managers of hotels—where customer decisions are constant and repeated and where room rates can be adjusted more rapidly—seems consistent with this perspective.

over, the causal relationship between the lighting upgrades and benefits to the decision makers is usually clouded by the numerous other factors that influence the actions of staff members and others, and do so over relatively long time periods.

Nonetheless, and despite the strong focus on early payback, some group members report that their companies have done retrofit projects prior to or without the benefit of rebate programs. In at least one instance, the reason for proceeding involved the company's inability to replace certain equipment that had been banned by EPA. In other cases, customers reported installing lighting control systems without utility incentives in order to reap savings based on increased ability to manage energy use. In addition, as noted earlier, some companies view investments in lighting upgrades as an opportunity to demonstrate their corporate citizenship philosophy and environmental awareness.

When asked whether the discussion of indirect benefits might modify future decision making, group members reflected their concern with having their recommendations approved at higher levels in their organizations, rather than their personal preferences. It is likely that some of their reticence to include indirect costs and—particularly—benefits in their recommendations stems from their inability to produce hard evidence of the presence or magnitude of those benefits. To certain decision makers, it may be a matter of philosophy: "You know [the indirect benefits are] important; you know it's going to happen; and so you put [the improvement] in there." For others, it may be a tiebreaker: "Most of the time, [those benefits are] just one more thing that goes on the [evidentiary] pile; that makes the balance go in [the positive] direction."

Do Customers Monitor ICBs During and After Program Implementation?

For the most part, focus group members did not report systematic efforts to review or monitor indirect costs and benefits of lighting retrofits either as part of their planning process or as a way of validating their decisions. Overall, discussants are reticent to attach specific values to the indirect benefits provided by lighting upgrades. For example, property managers suggested that efficient lighting contributes to high occupancy rates. But they were hesitant to attach a specific value per square foot to the lighting despite their ability to identify the costs of putting a new tenant in a building (including lost rental fees, leasing commission, and tenant improvements). Similarly, customers resisted placing a value on the risk involved in upgrading to achieve energy and maintenance savings. Some argued that the risk was equivalent to the entire investment. Only after extensive debate would a few acknowledge that one might consider some sort of hedge insurance as a way of valuing the risk.

Only one group member spontaneously tied an ICB directly to monetary figures: He noted that, by reducing glare on computer screens, the lighting upgrade at his facility eliminated the need to purchase costly add-on equipment.

After some probing, nonetheless, discussants did suggest several other potential indicators of indirect benefits as opportunities for monitoring (and subsequent monetization). A sample of these indicators is shown in Table 1.

Table 1. Suggested Indirect Benefits and Sample Indicators

Benefit	Indicator
Productivity	<ul style="list-style-type: none"> Maintenance receives fewer complaints
Aesthetics	<ul style="list-style-type: none"> Building is considered A-class space Occupancy rate is high Tenants sign long-term leases
Maintenance costs	<ul style="list-style-type: none"> Less overtime required Less time required for normal work Less hassling of the maintenance staff by tenants
Contrast/glare	<ul style="list-style-type: none"> Fewer complaints Less money spent for computer screen fixes
Noise	<ul style="list-style-type: none"> Better ability to concentrate

To some extent, these results may reflect the fact that the members of the focus groups were, for the most part, those who manage their company facilities. It is possible that personnel managers or others with different management responsibilities may be more attuned to indirect benefits. For example, if noise reduction greatly reduces headaches and related complaints, productivity may rise and absenteeism may fall—but these indicators may not be ones that facilities managers monitor.

At the same time that facilities managers report that their companies do not appear to monitor the ongoing costs and benefits of lighting retrofits, however, they lament the fact that the majority of such retrofits are not "visible" to senior management. As several expressed the point, management seems concerned only that the lights "work." Given management's perceived low level of awareness of the effects of differences in lighting quality, facilities managers see the task of championing upgrades as one of little urgency to senior decision makers and one yielding little reward except in the realm of cost savings. In other words, facilities managers believe that savings and payback are necessarily the decision issues for senior management because that is all they are able to observe.

The reaction to lighting retrofits by employees is often in stark contrast to the perceived disinterest of senior management, according to several facilities managers. They report that those directly affected often have immediate reactions, and that many changes (however they are evaluated) require several months before employees "get used to" them. There is some potential cost in reacting to complaints about perceptions of reduced lighting levels, etc., but most facilities managers report handling such concerns with little difficulty.

To What Degree Do Customers Report Actually Experiencing ICBs?

Although customers tend not to monitor ICBs systematically, they do report having experienced them when entering into lighting efficiency programs, implementing those programs, and assessing their results. Depending upon the specific item involved, between about 20% and 55% of customers surveyed report experiencing each of the indirect costs included in this study at some level; between one in five and two in five report experiencing each “a great deal” or “somewhat.” At the high end, 44% of participants say their company experienced the cost of staff managing retrofits or renovations “a great deal” or “somewhat.” At the low end, 19% report similar levels of experienced indirect costs resulting from changes in the use of the space in which the new equipment was installed.

The reported experience with indirect benefits is both somewhat more frequent and somewhat less variable across the range of items considered. The percentages of customers who report relevant experiences at the level of “a great deal” or “somewhat” range from a high of 53% (for improved visual comfort) to a low of 40% (for increased safety and for increased attractiveness of merchandise).

These overall results mask interesting differences in the responses of individual participants. Tables 2 and 3 recast the results in terms of comparisons between considered and experienced ICBs. For each cost or benefit, the relevant table first shows the percentage of participants who both considered that cost or benefit and reported experiencing it at any level (“a great deal,” “somewhat,” or “slightly”). It then shows the percentage of respondents who considered it, but did not report experiencing it at all. (For costs, these constitute what might be labeled “unfounded fears”; for benefits, they might be labeled “disappointments.”) The next column shows either costs or bene-

fits that had not been considered but were reported as experienced at some level. (Such costs might be labeled “pitfalls”; such benefits might be labeled “serendipities.”) The final column shows costs or benefits that were neither considered nor reported as experienced at all.

It should also be noted that tendencies toward reporting cost and benefit experiences appear to differ from one business segment to another. For example, members of the retail segment are consistently less likely than members of other segments to report having experienced any of the costs or benefits considered. Conversely, members of the lodging segment are more likely than members of other segments to report experiencing the majority of costs and benefits considered. Figure 4 shows the percentage of each of four key segments reporting experience with selected indirect benefits of lighting upgrades. Among the differences of interest are the relatively high percentage of those in the office segment who report value in fulfilling management objectives and reducing costs for maintenance, purchasing, and warehousing; the relatively high percentage of those in education who report improved appearance of facilities, increased visual comfort, and the better fit of lighting to needs.

Do Perceived Experiences With ICBs Relate to Customers’ Judgments of Program Value?

As described more fully elsewhere (Reference 1), we asked participants to assess the likelihood that their companies had realized net benefits from their lighting upgrade project, and the likelihood that they would have achieved net benefits if they had been required to include additional costs, either initially or as part of an annualized fee. We had hypothesized that more reported benefits would be correlated with higher rated likelihood of net benefits and that more reported costs would be correlated with lower rated likelihood of net benefits.

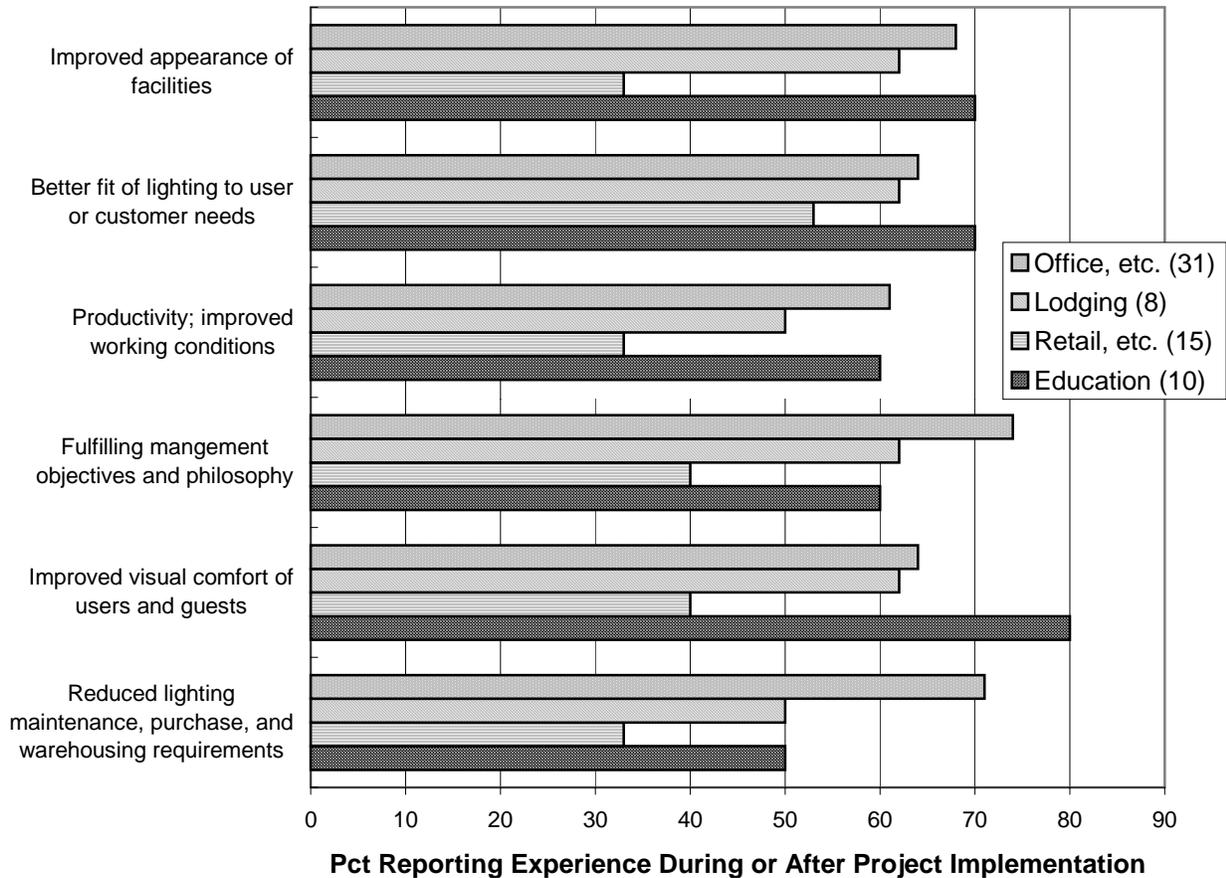
Table 2. Reported Consideration and Experience of Indirect Costs

Indirect Costs	Considered		Not considered	
	Experienced	Not experienced	Experienced	Not experienced
Making proposals to upper or senior management	31%	23%	11%	34%
Obtaining or setting aside funds	37%	10%	11%	41%
Setting aside other organizational needs	11%	9%	23%	57%
Staff time for planning renovations or retrofits	34%	9%	21%	36%
Staff time for setting up contracts	26%	9%	20%	46%
Finding trustworthy contractors	43%	10%	7%	40%
Staff time managing retrofits or renovations	47%	10%	13%	30%
Inconvenience during retrofits	39%	17%	10%	34%
Occupant or tenant complaints about the new lighting	24%	20%	16%	40%
Cannot use old stock	26%	14%	9%	51%
Need to redecorate or rewire	21%	10%	7%	61%
Vulnerability to code inspections	17%	17%	7%	59%
Need to add task lighting	21%	4%	6%	69%
The technology may not perform as expected	24%	29%	7%	40%
The use of the space may change	19%	14%	4%	63%
Energy costs or equipment costs may come down	30%	27%	9%	34%
Newer, better equipment may become available	26%	23%	6%	46%
Need for increased staff maintenance or attention	17%	11%	10%	61%
More sophisticated staff may be needed to service or replace	17%	4%	4%	74%
Increased responsibilities for disposal of hazardous wastes	23%	4%	3%	70%

Table 3. Reported Consideration and Experience of Indirect Benefits

Indirect Benefits	Considered		Not considered	
	Experienced	Not experienced	Experienced	Not experienced
Reduced lighting maintenance, purchase, and warehousing	40%	16%	16%	29%
Reduced equipment failure	43%	17%	7%	33%
Improved visual comfort of users and guests	53%	20%	4%	23%
Fulfilling management objectives and philosophy	53%	10%	9%	29%
Productivity; improved working conditions	43%	14%	7%	36%
Better fit of lighting to user or customer needs	53%	17%	3%	27%
Reduced discomfort due to noise and glare	43%	11%	7%	39%
Improved appearance of facilities	54%	14%	4%	27%
Increased attractiveness of merchandise	36%	16%	10%	39%
Increased safety or security and reduced vulnerability to lawsuits	33%	11%	13%	43%

Figure 4. Indirect Benefits Reported as Experienced, by Customer Segment (Selected)



Since survey respondents reported a single-factor, “all or nothing” experience with ICBs, we investigated the relationship of overall sensitivity or attention to ICBs and the perceived likelihood of net benefits. The relationship is significantly positive ($p < .05$): The greater the attention or sensitivity to ICBs, the greater the rated likelihood of net benefits. In other words, either those participants who are carefully following the effects of their lighting upgrade on

their nonfinancial benefits and costs are more likely to agree that they are realizing net benefits from the project or those who are realizing larger net benefits are more likely to recognize the associated indirect costs and benefits. Furthermore, it would appear that the reported benefit experiences outweigh the reported cost experiences, at least perceptually. An associated finding is that participants who say that they are responsible for monitoring the costs and

benefits of their projects are both more likely to be sensitive or attentive to the ICBs and more likely to perceive net benefits to their company as a result of the lighting upgrade ($p < .05$).

More detailed examination of the data offers more specific indicators of participants' concerns and their relationships with perceived net benefits.^f The results are highly consistent with the argument that the indirect costs and benefits of efficient lighting programs are critical drivers of customer decision making and program satisfaction.

- Participants who perceive net benefits as probable are significantly more likely than others to consider and report experiencing certain indirect costs.
 - Occupant and tenant complaints
 - Inability to use old stock
 - The technology not performing as expected

Participants who perceive net benefits as improbable are significantly more likely than others to report these same three indirect costs as pitfalls (not considered initially, but experienced as a result of the project).

These findings suggest the importance of considering all relevant ICBs during the decision-making and planning for efficiency projects. It seems most likely that these indirect costs are not entirely negligible, or the second of these findings would not arise. Rather, it seems likely that participants who considered these costs made arrangements for dealing with them during their project planning and were thus not feeling “blindsided” by their appearance.

- Participants who perceive net benefits as probable are also significantly more likely than others to consider and report experiencing several other indirect costs.
 - Setting aside other organizational needs
 - The use of space may change
 - Need to increase staff maintenance or attention

Again, it seems important that satisfied participants have considered these indirect costs and developed plans for dealing with their occurrence.

- Participants who do not perceive net benefits as probable are also significantly less likely than others to fail to consider certain indirect benefits.

^f Recognizing the initial, exploratory nature of this study, we reviewed differences relating to specific ICBs, despite the unifactorial nature of the overall results. The differences discussed here relate to the entire sample of participants (sample sizes for specific business types were too small to support such detailed exploration), and reflect the results of individual *t*-tests differing at the level of $p < .10$ or better.

- Reduced discomfort due to noise and glare
- Productivity gains

They do report experiencing the first of these benefits considerably more often than others, but are less likely than others to report the second. To the degree that these findings are replicable, they suggest that these customers do not recognize the translation of reduced discomfort due to noise and glare into productivity gains or that it is not a large enough benefit so as to outweigh other project costs.

- Finally, participants who do not perceive net benefits as probable are far more likely than others to consider—but not report experiencing—certain other ICBs.
 - Energy or equipment costs coming down
 - Improved visual comfort
 - Better fit of lighting to their needs

As discussed earlier, the first of these constitutes an unfounded fear (of a threat to the validity of their payback analyses); the remaining two ICBs constitute disappointments. The results suggest that, while unfounded, the concern with the validity of payback analyses may signal a tenuous commitment to the project. Moreover, the observed disappointments may be particularly important to participants' judgments of the net benefits of lighting efficiency projects. Whether expectations were overblown or the projects failed to produce reasonable levels of those indirect benefits, the discrepancies seem important clues to customer skepticism about overall program benefits.

One final point is worthy of note here: Participants who perceive that their project is likely to provide overall net benefits to the company tend to be those who also report having completed additional lighting improvements beyond those included in the program studied ($p < .10$). In other words, those who appear satisfied with the program are somewhat more likely to be “repeat customers” for efficiency projects. They may also constitute the group whose attitudes and behavior have been altered in a lasting way, and be the group that is most willing to participate in future market-driven programs.

Implications

The key substantive findings that emerge from this portion of the analysis and suggest future program modifications may be summarized as follows.

- Participants in utility commercial lighting programs are about as likely to consider various indirect costs and benefits (ICBs) associated

with suggested projects as they are to consider the more direct financial costs and benefits.

- However, participants appear not to experience to any significant degree many of the indirect costs and benefits that were considered.
- The pattern of ICBs considered and experienced indicates that participants are more likely to have unfounded fears of indirect costs than to experience the pitfalls of unanticipated costs.
- On the other side, participants are also more likely to experience disappointment regarding indirect benefits that do not accrue to the company than serendipities of unanticipated benefits. Nonetheless, the indirect benefits considered are more often considered *and* experienced than are the indirect costs considered.
- Some participants appear more likely to attend to or be sensitive to *all* the ICBs than others. Differences among participants may be related to their business types, at least to some degree.
- Participants who are responsible for monitoring the results of their lighting upgrades are also more likely to attend to or be sensitive to the ICBs.
- Those participants who are responsible for monitoring program results and who are attentive or sensitive to ICBs are also more likely than others to perceive their project as providing net benefits to their company.

These conclusions lead to suggestions for consideration in future promotion, program design, and evaluation, both for standard DSM programs and emerging approaches to market-driven programs and broader market transformation efforts.

Program Marketing

As a general rule, the marketing of energy efficiency programs should include recognition of customer concerns regarding ICBs as well as concerns regarding direct costs and benefits. The following suggestions are not intended as a replacement for discussions of savings and payback with potential program participants. Rather, they are intended as supplemental promotional points that may reduce the barriers perceived by customers and increase their interest in participation and their willingness to pay for some or all of the benefits received. These suggestions are based on the following points: (a) Customers do consider ICBs in their decision making. (b) Their expectations may often include unfounded fears, however. (c) Participants who attend to the results of lighting upgrades may be more satisfied than others (and perhaps better candidates for additional programs).

- Elicit customer concerns about barriers to participation and the possible costs these may im-

pose. Where the experience of other program participants indicates that such fears are likely to be unfounded, provide case-based reassurances and the opportunity for potential participants to contact those with pertinent experience. Where the barrier or cost is, in fact, frequently experienced, consider additional assistance to customers, with appropriate charges.

- Probe for anticipated indirect benefits. Use those that are likely to occur (based on similar completed projects) as additional promotional points. Manage expectations regarding those that have been observed to be disappointments in earlier projects. Again, provide the opportunity to contact earlier participants where possible.
- When discussing potential ICBs, tailor the discussion to factors that characterize the customer's business type wherever possible. For example, recognize that schools are particularly sensitive to the problems of freeing staff time for preparing proposals to management and planning renovations or retrofits. At the same time, take advantage of the fact that schools are more likely than other business types to report experiencing the benefits of improved visual comfort from lighting programs.
- Encourage participants to monitor the results of lighting upgrade projects with respect to experienced indirect costs and benefits, at least at a qualitative level.

Program Design

The degree to which customers consider various indirect costs in their decisions to participate in lighting efficiency programs offers clues to barriers and concerns that might be reduced by program modifications or design. For example, it may be noted that one of the most frequently considered indirect costs among all customers is the necessity of finding or allocating staff to the management of the renovation or retrofit project. As SDG&E has successfully demonstrated in its work with the U.S. Navy, it may be possible to offer assistance through utility staff that will mitigate that concern for many customers. Such assistance might also include arranging for trustworthy contractors and assisting with preparing proposals for senior management—other potential barriers that may be reducing customer participation in such programs.

This recommendation is not meant to increase utility administrative costs. Rather, based on anecdotal evidence from other programs, we hypothesize that the critical issues for many customers are the unavailability of staff and the perceived risk of having to devote unanticipated time and effort to these issues, not cost per se. If this is the case, then customers may be willing to pay reasonable fees for the inclusion of these services in the utility program.

Program Evaluation

The data indicate that the reported experiences of participants with ICBs are related to their satisfaction with lighting upgrade programs and their likelihood of carrying out other projects. Accordingly, program evaluations should include systematic efforts to determine which ICBs are experienced and the indicators from which participants draw their conclusions. These data should be quite useful as feedback to program designers and implementers. In addition, to the degree that reliable indicators can be identified and measured, more comprehensive benefit-cost analyses can be developed and conducted.

Reference

1. Herman, P., S. Feldman, & A. Besa, (1997), What Is Energy Efficiency Really Worth to the Customer? *Energy Program Evaluation: Uses, Methods, and Results. Proceedings of the 1997 Conference*. Chicago, National Energy Program Evaluation Conference.