INSTITUTIONAL BARRIERS TO DATA COLLECTION AND DEMAND-SIDE MANAGEMENT PROGRAM EVALUATION: PRACTICAL LESSONS IN POLITICAL ECONOMY

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ABSTRACT

In the planning, scheduling and implementation of both demand-side management programs and evaluations of same, perhaps the most important law to remember is the one most often forgotten: Murphy's Law - Whatever Can Go Wrong, Will Go Wrong. This paper offers some anecdotes that may be amusing and/or common to other utilities' experiences; however, they also give an important message. Whether due to regulatory pressures or other influences, program evaluations are often burdened with overly ambitious, perhaps unrealistic, expectations about the time, effort and resources required to ensure success. The result is compromises, some appropriate, others regrettable. The lessons learned from these experiences must be carefully considered and future expectations revised accordingly. This paper offers specific examples of appropriate and inappropriate compromises and suggests ways in which common approaches to programs and evaluation projects may be modified.

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INTRODUCTION

The practical experience of conservation program planning and evaluation at the City of Austin, which has one of the country's more advanced demand-side management (DSM) initiatives, may imply a pessimistic view of demand-side management as opposed to that offered by some of DSM's most ardent advocates. To be sure, there is a growing realization that DSM is a highly complex and variable resource about which we need to develop much more understanding. But, pessimism is not warranted. General agreement remains firm about the enormous potential for cost-effective demand-side management. However, a discussion of Murphy's Law and several of its corollaries as they relate to actual DSM program planning and evaluation may serve to modify expectations. A critical examination of some of the problems experienced with DSM program planning, implementation and evaluation, many of which characterize other disciplines, may help realize the enormous potential for cost-effective DSM.

MURPHY'S LAW - WHATEVER CAN GO WRONG WILL

People make mistakes. They inadvertently erase diskettes, misunderstand instructions, miss calculations, and reach improper conclusions. Project priorities and objectives change, often in response to the mishaps associated with a different project. Similarly, the subjects of our analyses defy simple classifications. Reliable equipment fails, programmable thermostats aren't always programmable, and observed patterns of consumer behavior do not conform to our best projections. Given our recent nuclear experience, those who would seem to be most apt to forgive and accommodate human error - utility management and policy makers - surprisingly often seem least able to recognize its inevitability. Demand-side management not only requires success in influencing consumers' demand for electricity, but also success in management - in problem resolution and in compromise.

Consider the Least-Cost Utility Planning project that an interdepartmental task force of the City of Austin Resource Management and Electric Utility Departments is conducting. In six short months, confusion over procurement procedures delayed execution of an important contract to provide LCUP assistance; reporting on progress simulated the Abbot and Costello "Who's on First?" routine; and collection and analysis of program data was placed on a wide range of "priority levels". Each of these mishaps occurred through a combination of unfortunate circumstances, miscommunications and daily crises that diverted effort from the important continuing tasks of the LCUP project. The former two problems may be corrected with relative ease, the latter will continue to threaten project schedules and accomplishment. None were planned; we may yet deal with each successfully.

There are also several technical obstacles to achievement of the City's ambitious goal of "integrated analysis" which are considerably more serious than the administrative inefficiencies which have punctuated the project. Data inadequacies plague the effective analysis of DSM options - particularly forecasts of future market penetration. Complicating these analyses is the recent volatility of the Austin economy and the unclear role for DSM in Austin, with its projections of excess generation capacity through 1994. The limited capabilities of available computer models reflect the relative infancy of the movement toward integrated analysis.

While project team members knew about these problems in abstract, a new appreciation of the complexity of the analyses provided by individual team members has been established through the LCUP initiative. Practical questions about how these individual analyses may be integrated have led to the recognition that development of a technically integrated resource optimization process will require considerable time and effort. Various forecast scenarios and iterations of model analyses will be employed as an interim approach. Most important, as was done at Puget Power[1], the project team has resolved to review and discuss the results of their analyses to develop an integrated resource plan based on the subjective views of project participants as well as objective analytical results. The LCUP project is viewed as an important first step in a multi-year effort that will require numerous additional steps. This is something

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[1] For a discussion of Puget Power's Least-Cost Utility Planning experience, see Eric Hirst and Corey Knutsen, "Developing an INtegrated Planning Process: An Electric Utility Case Study", Oak Ridge National Laboratory, Report # ORNL/CON-247, January 1988)

of a compromise since the project team is anxious to attain "integration". While this approach may not immunize the project from the vagaries of Murphy's Law, it offers a unifying mechanism for dealing with its force.

There are several corollaries to Murphy's Law that seem to be particularly relevant for conservation program planning and evaluation. For most of them, simple improvements in communications and more realistic expectations from analysis work would make the examples given in this paper less familiar.

COROLLARY NO. 1 - THERE IS NEVER TIME (OR RESOURCES) TO DO IT RIGHT, THERE IS ALWAYS TIME TO DO IT OVER

Perhaps the most familiar frustration of program planners and evaluators stems from the imposition of inappropriate deadlines. Some of this frustration may be due to a lack of appreciation among those who impose deadlines of the work required to accomplish tasks, leading planners to categorize themselves among the "overworked and underpaid". But a unique feature about program planning and evaluation is that it places responsibility for program success on planners, often without giving them mechanisms necessary to ensure that success. Instead, administrators often see planners and evaluators as necessary to "certify" the appropriateness of a program design or approach. Since the result of the requested analysis is a given, conservation being so clearly "cost-effective", why should the process take so long?

The answer is clear. The process should take so long because a determination of "cost-effectiveness" involves much more than the mere calculation of such simple performance measures as benefit/cost ratios. In fact, a program design determined to achieve a benefit/cost ratio greater than one is necessarily cost-effective only when unlimited resources exist to fund all programs whose benefit/cost ratios are greater than or equal to one. In other words, cost-effectiveness can only be assured by examining and rejecting alternative program design options that might have achieved the same objectives as the program selected, but would do so at higher cost. Opportunities to provide this more comprehensive certification of cost-effectiveness are often not available to program planners and evaluators; thus they are confined to routinization of the program analysis process.

Conflict between program analysis and implementation priorities is natural and often productive. Many of the problems in programs can not be anticipated and no amount of planning can prevent their occurrence.

However, programs are often implemented without the benefit of an appropriate level of planning, and maintained without essential critical evaluations. Usually the neglect of program analysis is not intended but rather is the result of management and political priorities that impose inappropriate deadlines for program implementation. But, as with buildings, program retrofits are more costly than designing for efficiency in the first place.

Consider the following "hypothetical" example. A conservation program is scheduled for implementation in two months, following a negotiated agreement between a utility and its regulators. Program planning ensues including the scheduling of program advertising, preparation of contractor guidelines, and the development of administrative procedures. Concurrently, a technical review of the program proposal is conducted by planning and evaluation (as opposed to program implementation) staff.

Suppose this review raises questions about the level of proposed rebates, the demand and energy savings anticipated from program operation, or the appropriateness of specific technologies to be promoted. Further suppose that benefit/cost analysis or other program screening mechanisms indicate that the program, as it is designed, meets established minimum performance levels. In other words, responding to the questions raised by the technical review may improve program performance, but is not necessary to pass regulatory or political muster. Can or will the program implementation schedule be pushed back? Clearly, this is an unpleasant and consequently unlikely alternative. A more pleasant response is to try improving the program "on the fly" - with the administrative improvements that come with program implementation. While this compromise is sometimes appropriate, particularly if the required program changes may be executed without extensive disruptions or undue cost, the role of technical evaluation of programs is clearly compromised under these circumstances. Moreover, the perception of technical analysts may be that they are blocking program implementation, rather than working as a basic part of the program development process.

COROLLARY NO. 2 - IF IT JAMS, FORCE IT; IF IT BREAKS, IT NEEDED REPLACING ANYWAY

DSM programs are not always unambiguously superior to available generation technologies, particularly in the current environment of declining marginal generation costs. This is often difficult to accept for those who have expended considerable effort in securing consideration of DSM as a legitimate energy planning resource. Similarly, program implementation staff often have difficulty understanding and accepting evaluation results that are critical of them. With all the uncertainties that cloud the analyses of energy resources, particularly DSM, program analysis can become more an exercise in assumption selection than program evaluation. Some of this is useful in that sensitivity analyses may clarify the conditions under which programs reach cost-effectiveness. But there are limits. Revising assumptions rather than programs is not what program analysis is about. In addition to the calculations and analyses that are the tasks of program planners and evaluators, there is a need for effective communication.

Criticisms can become constructive only if the recipients view them so. It is therefore important that analyses be conducted with program implementation staff, not on programs. From the outset, care must be taken to review, with all affected interests, program evaluation objectives, methods of analysis and performance criteria. Ample opportunities must be available for revision of project deliverables based on input from program staff. The DSM technical audit performed on the City of Austin's programs and completed in June 1986 serves as a useful example. This project required almost a year to complete, largely because new information on the City's program experience was being incorporated up until the very last month of the project. The additional time and effort was worth it. The audit report has been accepted by program staff with few qualifications, has certified the merit of the City's programs to potential detractors, and is the basis for the City's current Least-Cost Utility Planning project.

COROLLARY NO. 3 - STANDARD PROCEDURES AREN'T

Standard procedures are, by definition, static. More often than not, they are too inflexible and address only "typical" circumstances. What is notable about many of the most successful DSM programs is their dynamism and innovative nature. For example, we designed a small project planned to augment a low-income weatherization program, specifically, to test the impacts of replacing extremely inefficient window air conditioners found in low-income residences with energy-efficient units. Difficulties arising out of the departure from normal practice delayed this project for over a year. The cost in salaries alone of those involved in the various legal entanglements associated with the project are virtually as large as the non-equipment costs anticipated for its implementation.

This is not an isolated instance. A program designed to ensure energy efficiency in municipal facilities has been unable to put high efficiency lighting improvements into these facilities. The job of lighting maintenance belongs to another city department; and, there are bond covenants restricting the use of the funds used to support the program. These roadblocks to implementation may be resolved after over a year of work - or several months longer than the payback we expect from the proposed installations of efficient lighting.

Standard administrative procedures are not intentionally obstructionist - it only seems that way. Generally they provide important protections. However, standard procedures should protect rather than preclude innovation and efficiency. Bureaucratic incentive structures that punish innovative approaches and encourage strict compliance with established procedures sometimes also put efficiency second and convenience first.

COROLLARY NO. 4 - UNSCHEDULED DELAYS SHOULD BE

The prevalence of administrative problems as well as inevitable shifts in priorities often cause project schedules to slip, sometimes dramatically. Specific causes of delays may be unforeseen but the frequency of "unscheduled delays" suggests that project schedules are not compiled with the objective of listing realistic task completion dates. If they were, the inevitable occurrence of "unscheduled delays" would be part of the schedule. Rather, scheduling provides a guideline for project management, and a useful device for selling projects.

But why isn't Murphy's Law accounted for in project scheduling? There are some clear, if not compelling, answers. First, how is one to insert the unknown but inevitable Murphyism in a project schedule one must submit to management for approval? Second, is not conceding the inevitability of a Murphyism tantamount to admitting a certain lack of control? A tight project schedule not only conveys a sense of control but also a degree of rigor and enthusiasm all too comforting to be foregone for the sake of realism. After all, is it not easier to ask forgiveness than to get permission?

Project schedules can be followed and <u>are</u> useful tools. Even when a Murphyism occurs, one can make up for delays in finishing one task by the accelerated completion of another. Meeting a schedule gives project participants a sense of accomplishment. Even when they are behind schedule, the existence of timelines provides easy measures of progress to date and what remains to do. While it is important not to lose sight of the usefulness of project schedules, too often a concern for meeting them overrides the concern for project quality. Perhaps "unscheduled delays" are inevitable and should be scheduled, but alternatively project schedules should not prevail over project quality.

COROLLARY NO. 5 - "PRECISE ESTIMATES" AREN'T (OR, TO ERR IS HUMAN, TO REALLY SCREW THINGS UP, YOU NEED A COMPUTER)

Use of computers and computer modeling may impart a sense of accuracy to analyses that also should not prevail. How often are "estimates" carried out to 3 and 4 significant digits when the data used to generate these estimates may be off by large orders of magnitude? DSM savings forecasts at the City of Austin are a good example. It takes considerable time and effort to develop 24 load reduction estimates for a set of "typical" conservation program participants. We need to make numerous engineering calculations, billing analyses and runs of the DOE-2 building simulation model to derive the estimates. The resulting load reduction curves may then be combined with forecasts of program participation over a 10 year time horizon to generate a DSM savings forecast. This forecast subsequently goes into load forecasting and generation planning models. The estimates of savings per participant may be relatively precise, but forecasts of program participation may be based on little more than program manager's judgment, vague information about future budget allocations and ball park estimates of market penetration to date. Combining the relatively accurate per participant savings estimates with these tenuous forecasts of program participation will yield tenuous results - often stated with exacting precision.

Generally, we find little fault with this process. The best available information is used in the best possible manner currently available to program analysts. While there might be better techniques, deficiencies will be frequent - if not in the manner of analysis then in availability of data. It is important simply to differentiate between what is known, what is estimated, and what is merely conviction or assumption.

COROLLARY NO. 6 - FORECASTS AND ASSUMPTIONS ARE ALWAYS WRONG; RESULTS ARE ALWAYS BASED ON FORECASTS AND ASSUMPTIONS.

Since nearly all analyses are inaccurate in the strictest sense of the word, it is also important to understand which inaccuracies make a difference. Consider two common areas of uncertainty associated with DSM analysis. First, estimations of demand and energy savings associated with building retrofits are subject to substantial error. Occupant behavior patterns can vary widely from what is deemed "typical"; actual building characteristics may not be well represented in simulation models; and energy consuming equipment may not perform as expected.[2] Forecasts of program participation and market penetration are also steeped in considerable uncertainty. Economic conditions may make unforeseen changes that deter participation; program designs or advertising may be unattractive; and methods for projecting penetration may simply not properly account for the forces affecting customer responses. The uncertainty associated with just these two problem areas help illustrate a point.

Consider three forecasts of program participation, and three estimates of average demand savings per program participant identified in Table 1.

Table 1

	2.0kW/Part.	2.5kW/Part.	3.0kW/Part.
20,000 Participants	40 MW	50 MW	60 MW
25,000 Participants	50 MW	62.5 MW	75 MW
30,000 Participants	60 MW	75 MW	90 MW

Assume that a change in forecasted demand of 15 MW or more is required to impact materially the generation expansion schedule. If the correct forecast turns out to be 62.5 MW, for all but two combinations the resource allocation decision would be correct. These cases are where savings and participation estimates were both over or underestimated. If

[2] While some of these sources of error may be "averaged out" across a large population, many may not. Also, the distribution of errors around a given sample mean for a program participant population may very well not replicate that of the general population.)

either the savings or participation estimate is correct, over <u>or</u> underestimation of the other variable will not affect the resource allocation decision; neither will an overestimate of one variable when combined with the underestimation of the other.

The inaccuracies that make a difference are those that could affect decisions. In this example, the relative accuracy of the forecasted total savings number is important. Whether we arrive at a close approximation through analytical precision or through countervailing errors is of less importance than arriving at the correct decision.

In conducting the extensive analyses that are applied to DSM program analysis and integrated resource planning, it is relatively easy to find oneself mired in details which will not significantly alter overall results. It is also relatively easy to compound rather than counteract inaccuracies in conducting complex analyses. However, there are also some relatively easy ways to ensure that the decisions that rest on invariably wrong assumptions are correct.

The City of Austin's Least-Cost Utility Planning project offers some useful examples. First, the project team, during the time that administrative delays provide, is conducting a careful review of the components of the City's resource planning process. The purpose of this review is to identify the variables that drive the results of individual analyses, and to assess the impact of changes in these variables on overall results. We are developing alternative resource allocation scenarios that will allow for use of assumptions that balance the impacts of driving variables. We are careful to ensure consistency in the assumptions we make in performing various analyses. Most important, the process will include extensive reviews of analysis results and their implications by all the project participants collectively, including City management. This will allow decisions to incorporate factors not fully addressed in the integrated planning process and for reexamination of, critical assumptions.

COROLLARY NO. 7 - CONSENSUS MEANS UNIVERSAL DISSATISFACTION

Providing opportunities for extensive input and review carries with it the danger of "democratic paralysis" - the inability to resolve problems and make progress due to requirements to listen to address and evaluate every opinion on the subject. Participation brings with it a sense of ownership in project success (or failure). This is generally a positive influence in that it tends to motivate project participants to achieve the best possible results. However, there is often disagreement about what that "best possible" result is, and how to achieve it. In this instance, that sense of ownership can lead to problems, many of which can be resolved through mutual cooperation and an understanding of the need to compromise.

Final results of a project will almost never reflect precisely how any one of the project participants would have executed the project. Nevertheless, a project may be viewed with a sense of pride among all participants when there is also the sense that individual opinions were treated with respect and that compromises were fair. In the City of Austin's recent DSM technical audit experience offers an example. In several instances, of disagreement between program analysts and program managers over assumptions and analytical approaches existed. Program analysts thought some implementation staff assumptions were too optimistic and lacked substantiating data. On the other hand, implementation staff noted that the analysts did not work with the programs on a daily basis and could not possibly understand the aspects of program operations not reflected in program data. Negotiations ensued, many of which took several hours and required additional analyses. We reached compromises. Now, everyone involved in the project can point to some areas of disagreement, but there is general agreement that the project was well executed, achieved its original goals, and establishes the DSM programs' technical soundness.

COROLLARY NO. 8 - POLITICS MEANS NEVER HAVING TO SAY YOU'RE SORRY

Consensus building is an important skill for the successful politician. But political concerns often lead to compromises motivated by a host of considerations that have little or nothing to do with ensuring that analysis results fully and accurately represent program impacts, or with ensuring efficiency in program operations. Political considerations are those of perception rather than precision.

Politics impact both the internal machinations of program planning, implementation and evaluation and the sponsorship of DSM in the community and regulatory arenas. Internal politics impact program productivity, tend to be based on personal allegiances, and tend to be more volatile because impacts occur daily. Examples range from the simple mis-administration of a purchase requisition because "the guy over in purchasing doesn't like you" to the use of very optimistic assumptions because "if the program doesn't save enough, I'll look bad to my boss." Obviously, office politics are not unique to DSM programs. The same approaches to dealing with them that are successful elsewhere apply. What may be unique about DSM is the need to allow for program failures. DSM introduces so many new ideas and technologies that to demand success from every new approach is to restrict the innovation and creativity necessary for true achievement.

External politics impact program size, scope and direction and can be considerably more dangerous than internal politics. While internal politics impact the achievement of DSM goals, external politics can result in the trade of DSM support for support of an entirely unrelated issue. More specifically, external politics can result in a mandated DSM approach that is at variance with what program analysis indicates is appropriate.

For example, consider a community with strong support for DSM and an established aggressive DSM initiative. Incumbent politicians have made their reputations, in part, on their support for DSM and their opposition to the construction of generation facilities that have placed the local utility in conditions of excess capacity. Even if the implications of least-cost utility planning suggest a less aggressive, more deliberate DSM approach, it would not be surprising for a continuation of the aggressive DSM approach to be mandated. Similarly, consider a utility community whose established working relationships with incumbent regulators have been clouded by controversies over the use of DSM over generation options. It is not surprising that these established relationships seem compelling when normally dormant regulatory proceedings become controversial. This is the case particularly when the controversies revolve around the notion that a utility can effectively manage consumer behavior patterns in the same way that they construct a power plant.

In both of these cases, the machinations of external politics may not be surprising, just unfortunate.

ROTHSTEIN'S LAW - THINGS DON'T GO RIGHT BY ACCIDENT

For those directly involved in program analysis and administration, it may be comforting to know that someone else has tripped over the hurdles you are trying to leap over. For all those interested in DSM program implementation and analysis, it is important constantly to expect problems and to seek creative solutions for them.