Can Greed, Accuracy and Fairness be Mixed for the Public Good? The Case of the California Shareholder Incentive Experiment for Utility DSM Programs

Michael Messenger, California Energy Commission

The introduction of shareholder incentives in California has stimulated more installations of energy efficiency measures, energy savings and a shift towards more cost-effective programs. However, regulatory desires for a more "equitable" distribution of DSM program benefits threatens the basis of the experiment while conflicts of interest in the measurement field have still not been resolved.

Introduction

This paper examines the theoretical basis behind recent proposals to change the utility demand-side management (DSM) or conservation business from a cost recovery basis to a payment for performance approach. The payment for performance or incentives system adopted for DSM programs in California assumes utilities will seek to profit maximize (be greedy), estimate the energy savings from DSM programs (be accurate) and achieve energy savings in all sectors simultaneously (be fair). Tensions between the drive to maximize profits and at the same time to meet regulator's fairness or equity goals across sectors have begun to surface in rate case proceedings. This paper also explores the tensions between profit maximizing utilities seeking to install conservation measures at a rapid pace and the same utilities accurately measuring the energy savings from their programs.

In the second section of the paper, we explore how well the guiding concepts behind the shared savings experiment in California have worked in practice. In particular, have shareholder incentives affected the total energy savings achieved and the cost effectiveness of the programs in California from 1987 to 1991? Finally, we examine the recent regulatory activity to dismantle shared savings approaches in favor of an approach that rewards the achievement of forecasted net benefits and effectively caps earnings by using a rate of return to be applied to forecasted program expenses.

The Role of Greed in DSM Planning

Advocates of least-cost planning have for many years suggested utilities should pursue conservation programs because they are cheaper than supply-side alternatives (Praul 1980). However, from a utility perspective, cheaper is not necessarily better, unless it leads to more profits. It took over a decade for many regulators to realize that utilities will not pursue the cheapest resource unless it is also at least as profitable, if not more so, than alternative supply-side options (Messenger 1989; Moskovitz 1988).

Would-be reformers of utility ratemaking sought to give utilities a direct incentive to invest in cheaper DSM resources by making profits from DSM programs directly proportional to the net value (benefits less costs) created by the programs. Utilities would earn a fixed percentage share of the difference between program costs and benefits. Thus, the profits from achieving conservation at a cost of $.02 per kWh would be larger than the profits from achieving conservation at a cost of $.04 per kWh.

Shared savings incentives represent a big step away from the traditional utility ratemaking paradigm that focuses on the "reasonableness" of program expenditures and not the benefits generated by the programs. For example, utilities in California simply expensed all conservation expenditures for over a decade without regard to the value created by these expenditures. Advocates of shared savings hoped the desire to make more profits would overcome the utilities' tendency to overinvest in programs or "goldplate" DSM investments. Hence, the focus is on using value created, not total dollars invested, as a determinant of the level of performance incentives.

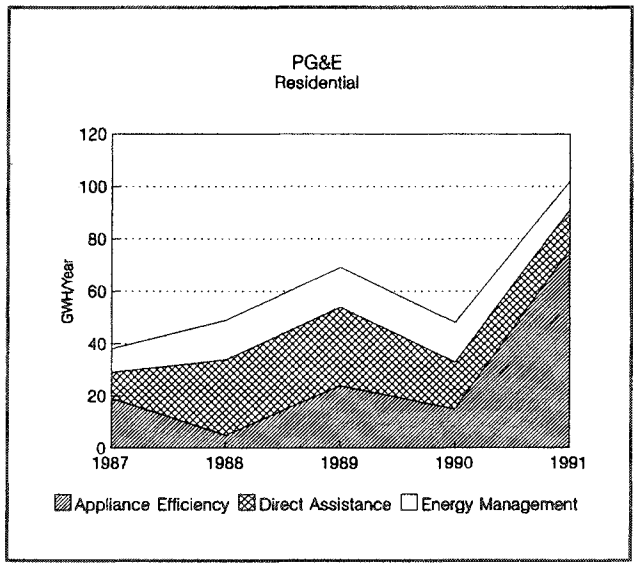
Greed may have also played an important role in motivating utility field personnel to seek out those projects which maximized net value to the ratepayers while simultaneously increasing shareholder earnings. Some utilities in California have translated the incentive system into a metric of shareholder earnings per conservation measure installed for use in the field. This gave DSM salespeople the price signals they had needed for years to prioritize

the pursuit of high value markets and customers based on their value to both the company and society.

Figure 1 illustrates the impact of the new shared savings incentive systems on the energy savings achieved by PG&E for its residential and nonresidential programs between 1987 and 1991. The trend in energy savings is closely correlated to major milestones within the collaborative process. The California collaborative began in July of 1989, proposed an incentive system in March of 1990 which was adopted by the CPUC in September of 1990. The graph shows that overall program energy savings began to pick up in 1989 (the year the collaborative started) and steadily grew to a maximum in 1991.

Further analysis of the data shows a large shift towards obtaining more energy savings from the commercial and industrial sectors after the collaborative negotiations began in mid 1989. Energy savings from PG&E's commercial programs have increased by over 400 percent between 1989 and 1991, while energy savings from residential programs have been roughly constant over the last five years. This shift to the commercial sector is consistent with the hypothesis that profit maximizing utilities would shift toward programs with higher TRC benefit cost ratios (more net benefits) because they create more value to be shared with shareholders.

Since the accuracy of these energy savings estimates varies substantially over time, the reader is cautioned to use these figures only as indicative of trends in general program activity. Most of these energy savings estimates were derived using engineering estimates that are currently being verified through measurement and evaluation plans. Moreover, these savings estimates come from annual reports that are published by utilities with a direct incentive to put their program accomplishments in the best light possible. Nevertheless, the general patterns of a shift towards more cost-effective programs is encouraging from an efficiency perspective.



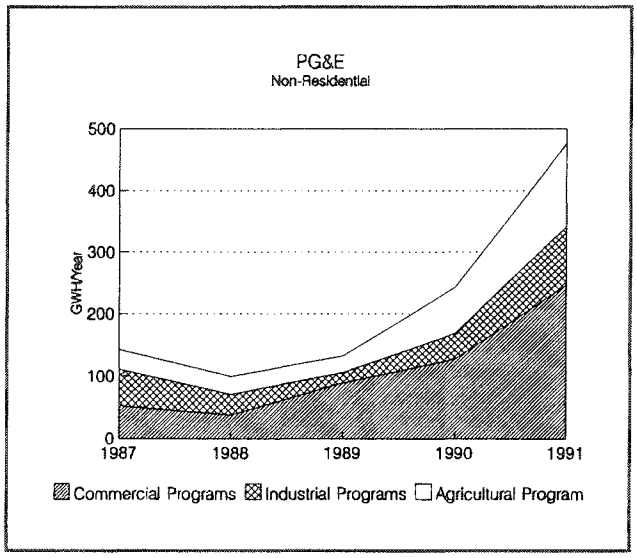


Figure 1. Annual Energy Savings from PG&E DSM Programs in GWH. Sources: PG&E, Annual Summary Reports on DSM Programs (March 31 Reports) for Calendar Years 1987 through 1991.

Greed Versus Accuracy

Does greed create a conflict of interest for utilities in accurately measuring energy savings?

In the California Collaborative experiment, utilities were given the responsibility to accurately measure the energy and peak impacts of their programmatic activity because they were the only parties with sufficient resources to fund measurement studies and easy access to customer billing data. Due to the potential conflicts of interest for utility evaluation teams, who might overestimate energy savings to insure higher shareholder earnings, regulators were given an important responsibility to review both the ex ante and ex post estimates of program energy savings and the resulting estimates of shareholder earnings.

Regulators faced some hard choices because of the many roles they were trying to fill as independent reviewers of utility program measurement reports. Regulatory staffs were faced with the difficult chore of maintaining their desire to minimize utility profits and program funding while at the same time increasing measurement accuracy which invariably requires more spending. At the same time, the regulators were trying to support increased

utility responsibility for their performance by minimizing regulatory "micromanagement" of program decisions even though regulatory oversight might be necessary to gain the necessary program data to perform a competent impact evaluation.

It is difficult to evaluate if the Collaborative experiment has stimulated better or more accurate measurement of utility program impacts. Two potential indicators of increased accuracy were examined: yearly spending on program evaluations and the reported cost effectiveness of utility programs.

Total measurement and evaluation expenditures for the two major California utilities over the last five years are presented in Figure 2. Expenditures on program impact evaluation have increased roughly three fold from 1987 to 1991. The largest jump occurred between 1990 and 1991 in response to the measurement protocols that were adopted by the CPUC in September of 1990. These protocols required validation of measure impact (energy and peak) estimates and net-to-gross ratios within three years. These results would be used to prospectively adjust energy savings and the resulting incentives for current and future DSM programs.

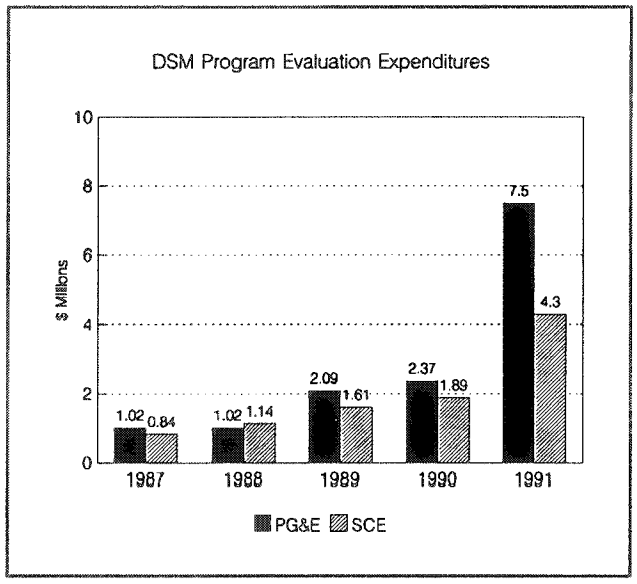


Figure 2. Trends in DSM Program Evaluation Expenditures ($ Millions)

Utilities in California have continued to request more dollars for program evaluation, particularly in light of the CPUC's commitment to move to ex post verification of all programs by January 1, 1994. In 1993, PG&E is requesting $11 million for program evaluation out of a total M&E budget of $27 million. Whether this additional funding has improved the overall accuracy of measurement can not yet be determined but it has certainly increased the scope of programs being covered by intensive measurement projects.

Many experts expect that increased spending on program evaluation will lead to lower energy savings estimates and lower benefit cost ratios as the inputs to engineering models were refined. However, the actual total resource cost (TRC) ratios for programs run between 1988 and 1991 have increased substantially. This is primarily due to the "discovery" of many new measures with substantially higher energy savings and the use of higher avoided costs for capacity as California's surplus has begun to dwindle.

Most of these benefit cost ratios do not yet reflect the results of extensive measurement and evaluation reports. The first results reported by utilities in late 1991 and early 1992 showed slight reductions in energy savings for some measures but increased savings for others. However, most of these studies have not yet included billing analyses from non-participant groups to obtain "true" net energy savings estimates.

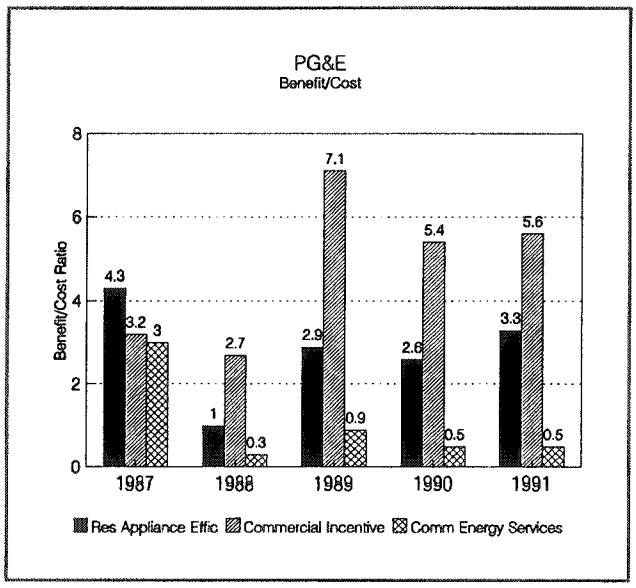
In fact, reported TRC ratios have gone up for most programs across the board for most major utilities in California. Figure 3 displays the TRC ratios for the largest utility, PG&E over the last five years. TRC ratios have increased fastest for incentive programs in the commercial and industrial sectors while TRC ratios for energy management (audit) programs have declined slightly.

The difficult questions of how much accuracy in program evaluation is enough and relative to what, have still not been answered but it is clear that the drive for more profits (greed) will definitely have an impact on the level of accuracy required within the California experiment. For example, the recent California Public Utilities Commission decision (CPUC, 1992) to shift from incentives based on ex ante agreement to incentives based on ex post measurement was driven primarily by a belief that current energy savings estimates were not accurate and would thus lead to over payments to utility shareholders.

Greed Versus Equity

Can shareholder incentive systems be tweaked to meet regulatory equity or fairness goals?

From the beginning of the California experiment, some regulators have been concerned with the consequences of letting greed dictate a market shift away from low value



	1987	1988	1989	1990	1991
Residential Programs					
Energy Management	2.01	1.91	2.53	1.18	0.99
Res Appliance Effic	4.27	1.03	2.93	2.58	3.34
New Construction				1.32	1.32
Direct Assistance	1.13	1.59	1.15	0.82	0.82
Non-Residential Programs					
Commercial Incentives	3.18	2.74	7.11	5.44	5.60
Industrial Incentives	3.17	3.36	4.47	4.12	6.19
Agricultural Incentives	2.25	4.46	2.87	3.48	4.14
Comm. Energy Services	2.97	0.26	0.85	0.51	0.47
Indust. Energy Services	2.96	1.01	0.72	0.52	0.60

Figure 3. Benefit Cost Ratios (Total Resource Cost) from PG&E DSM Programs Over Time. Sources: PG&E, Annual Summary Reports on DSM Programs (March 31 Reports) for Calendar Years 1987 Through 1991.

or less cost-effective markets (such as residential DSM programs) to high value markets in the commercial and industrial sector where potential shareholder earnings were higher. The California Public Utility Commission staff, Division of Rate Payers Advocates, has sought to limit utility flexibility in pursuing high value markets by defining minimum performance thresholds for each market sector and attaching penalties for failure to reach these thresholds (DRA 1991). Recently, this equity principle has been extended by awarding a higher marginal rate of incentive returns for programs with low benefit to cost ratios. (CPUC 1991) This was accomplished by setting target incentive levels for each program based on a forecast of total program expenditures rather than using a pure shared savings incentive system.

The results of this new incentive system on potential earnings from SCE's DSM programs are illustrated in Table 1. Note that the utility can earn more per marginal dollar invested in the least cost effective programs. As the table shows, investments in residential programs earns over ten times the marginal rate of return per dollar of benefits created.

This new incentives system can be seen as an attempt to use greed (utility pursuit of more earnings) to redirect effort away from the most efficient options for society towards a more "equitable" distribution of program funds that insures that program rebates are available to all voting segments of the market.

The resulting uproar over the decision to give higher marginal shareholder incentives to lower value programs has not yet fully spent its course. However, it will be interesting to see if this decision persists in the long run given the CPUC's commitment to make the DSM program incentive system consistent with least cost procurement practices it has adopted on the supply side of the market.

The structure of shareholder incentive systems will have interesting implications for resource planning. Table 2 illustrates the differences related to how a utility will make critical resource planning decisions depending on the type of incentive system. In a system where incentives are directly linked to forecasted program expenditures, there will be significantly less flexibility to move dollars toward markets with more value and places a premium on accurate funding forecasts. In contrast, under a shared savings incentive system utilities will tend to move program dollars towards their most cost-effective programs and reduce effort in sectors with marginally cost effective programs.

Different incentive systems will also have important impacts on planning and research priorities for DSM. Under the forecasted program funding incentive systems, there will be a premium placed on generating conservation potential studies to justify expenditures at the sectoral level. This is particularly true since these forecasts of the need to spend program funds in different sectors are often litigated. More fundamentally, the use of regulator or utility equity goals to set program funding levels and penalties for not achieving them presumes a high level of market knowledge at the planning level.

Table 1. Relationship of Earnings to Societal Net Benefits

Programs	Societal Net Benefit ($ Millions)	Incentive Target ($ Millions)	Shareholder Incentive Per $1,000 of Benefit
Industrial	177.0	.87	5.0
Commercial	92.3	1.29	14.0
Residential	14.6	.88	191.0

Table 2. Implications for Integrated Resource Planning of Alternative Incentive Mechanisms

	Forecasted Funding: Incentives Based on Funding and Performance	Shared Savings: Incentives for Performance
Program Planning and Funding Decisions	Saturation Surveys Customer Participation Counts	Market Evaluations Benefit-Cost Analysis Load Impact Evaluations
Program Funding Implementation	Must Spend Dollars Mandated by CPUC to Avoid Penalties.	Spend Only Where Benefits Exceed Costs Movement of Funds OK
Critical Source of Market Knowledge	Conservation Potential Studies	Customer Feedback and Evaluation Studies
Motivation	Altruism	Greed

In the forecasted expenditures incentive system, utility program managers must make decisions based on negotiated altruism "quotas" (e.g., a minimum of 10,000 audits delivered) set during regulatory proceedings rather than using feedback from customers or simple greed to identify program areas with the highest value added for both ratepayers and shareholders. Unfortunately, the pursuit of altruism and the desire to spend the entire program budget has already proven to be a poor motivator of utility program managers in the 1980's (Messenger 1989). In the 1990's altruism coupled with the prospect of penalties for non performance may ensure regulatory goals are met but the quality of the energy conservation services delivered will almost certainly suffer.

Summary

Shared savings incentive systems based on the pursuit of profits have led to increased energy savings from DSM programs in California and the creation of more net benefits for society. However, the greed factor has also led to a shift of program activity from the residential to commercial sectors and stimulated regulators interested in equity to search for new incentive systems that encourage the simultaneous pursuit of all cost-effective resources by tilting incentive rewards to less cost-effective programs. The danger inherent in this tilt is that the measurement and evaluation studies may find that programs once thought to be marginally cost effective in the residential sector may actually yield no net societal benefits.

This will surface the politically sensitive issue of whether utility DSM programs pursued for customer equity reasons should be entitled to receive shareholder incentives. Most analysts assume that programs that do not create net benefits for society should not qualify for shareholder incentives. However, applying this rule may simply accelerate the utility's desire to shift program funds from the residential to the commercial sector. While this may be good from an efficiency perspective, it does not

produce desirable results from the perspective of regulators who have their own equity agenda. Thus, the forces of Greed and Equity can be expected to continue to struggle in their quest to influence or shape utility resource and DSM program planning for years to come.

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