

UPDATING TEXAS ENERGY COST CONTAINMENT AUDIT REPORTS

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ABSTRACT

In 1984 and 1986, 35.3 million square feet of state owned buildings were audited to identify cost saving retrofit projects. Originally intended for direct legislative funding or bond sales, funding became available in 1989 through oil overcharge moneys in a program known as LoanSTAR. Due to the time between the audits and availability of funds, update of the reports for current energy and equipment cost, and for accomplishment of projects was necessary.

Audits in 1984 and 1986 identified total savings of \$21.3 million per year and investment costs of \$42.3 million per year. The 1989 update revealed retrofit projects remaining worth \$10.9 million per year in savings and costing \$30.5 million. The reduction in savings and costs is primarily due to changes in prices and accomplishment of projects. The methodology for updating prices and surveying facility energy contacts to determine accomplishment will be discussed. Both the accomplishment of maintenance and operation (M&O) type projects and capital-intensive retrofit/measurements will be discussed. For example, the surveys revealed that 69% of 291 M&O's have already been accomplished, along with 24% of the 750 retrofit/measurements.

INTRODUCTION

In 1988, a comprehensive update was performed for 117 energy audit reports prepared in 1984 and 1986 for the Texas Energy Cost Containment Program (1). The update incorporated the effects of individual retrofit/measurements which were accomplished, and the effects of increasing capital costs and fluctuating utility costs.

Sponsored by the state agencies division of the Governor's Energy Management Center, the update was completed in anticipation of increased funding availability for installation of energy-saving retrofit projects (2). This statewide program, currently referred to as LoanSTAR, to reduce energy costs in state-owned facilities in Texas was initiated in 1984. This effort, coordinated by the Energy Efficiency Division of the Public Utility Commission, later the Governor's Energy Management Center, sought to identify two broad groups of energy conservation projects which would reduce energy costs. The first group, referred to as Maintenance and Operation (M&O) changes are performed by regular building staff at little or no cost. Energy cost reduction measures (ECRMs) are more complex and generally require significant capital expenditure. Contract services frequently are required for installation of ECRMs. Table 1 summarizes the results of this auditing work (3,4).

UPDATE OBJECTIVES

The 1988 update program had the following objectives: 1) Correct implementation costs for inflation over the two to four years which had passed since the original reports had been prepared; 2) Verify the suppliers and rates for utilities serving the 102 state agencies audited; 3) Ascertain which of the original retrofits had been accomplished and which were still desired by the affected agency; 4) Recompute the paybacks, independently for the individual measures and interdependently for all desirable measures at a given facility combined (1).

Table 1

Investment Costs and Savings in Millions of Dollars for ECRMs and M&Os Identified in TECCP Auditing

	ECRMs		M&Os		Combined	
	Investment Cost	Annual Savings	Investment Cost	Annual Savings	Investment Cost	Annual Savings
1984	15.5	8.3	0.1	1.0	15.6	9.3
1986	27.3	11.6	0	0.4	27.3	12.0
Total	42.8	19.9	0.1	1.4	42.9	21.3

UPDATE PROCEDURE

Several steps were performed simultaneously during the update to accelerate the update process. These steps include: verifying facility energy contacts, verifying utility suppliers and rate schedules, and computing the appropriate consumer avoided cost of energy (1). Identifying facility energy contacts was essential to determine the correct utility service suppliers. This was accomplished by contacting the agency contact of record when the original report was completed, then determining whether that person was still the contact. In a majority of the agencies, the contact person was the same.

The facility energy contact was asked to verify whether the facility was still receiving the same utility services as when the original audit report was prepared.

Following confirmation of utility supplier, forty-two utilities were contacted to obtain rate schedules. Most facilities were still receiving the same utility service identified in the original report. The only major exception to this was the agencies which had switched to state-owned gas supplies, although local distribution was generally provided by the same company as before.

Once identified, the electric rate schedules applicable to each facility were obtained, as were utility forecasts for fuel factors. The extent to which a utility forecasts its fuel cost varies significantly based on its size and ownership. The eight largest investor-owned utilities (IOUs) provided forecasts extending at least 8-9 months in advance. The larger municipal utilities (Austin and San Antonio) provided some forecasts over their fiscal years. These estimates were for a period of a year to a year and a half into the future. The smaller municipal electric utilities and cooperatives did not provide any forecasts for future rates or fuel costs. Cooperative utilities generally do not generate their own power, usually purchasing from some larger company on a wholesale basis. For these cases we simply used a recent twelve month history of fuel factors as an estimate for future costs (5,6). After these data were collected, the relevant incremental consumer avoided cost for electrical energy was computed for each electric utility rate schedule. Depending on the fuel factor data, these forecasts generally extended eight or nine months into the future, with several extending as much as 18 months ahead.

Natural gas rates were calculated similarly to those for electric rates with a few exceptions. Natural gas rates are regulated by a different state agency than electric rates; subsequently, different rules apply. Natural gas companies generally do not offer any forecasts for their gas cost adjustments, which vary monthly. As a result, a recent twelve month price history was averaged (5), and a gas price increase forecast from the state comptroller's office was added to this. For most gas suppliers, the comptroller's forecast of a \$0.14/MCF increase in gas prices was used. Transportation charges were assumed to remain constant (1).

Some state facilities purchase gas directly from the state. For these customers, charges are explicitly separated into gas and transportation charges. For these customers, the gas portion of the bill was increased by the comptroller's forecasted price increase (9.1%). The transportation charges, which were renegotiated on August 1, 1988, were not adjusted (1). This value was used as the consumer avoided cost of natural gas (6).

After all the utility service and price information was developed, all facility energy contacts were sent a copy of the executive summary from the original energy audit report. The executive summary lists all of the ECRMs originally recommended in the energy audit report, along with total savings values for all recommendations combined. Figure 1 is a copy of an executive summary.

A survey to determine the status of each M&O and ECRM was enclosed with the executive summary (6). The M&O survey identified each M&O by applicable building and audit year (1984 or 1986). It asked two survey questions to determine the status of the M&Os. The first was, "Has M&O been accomplished?" If the answer was "yes," the respondent was asked to give the year of accomplishment. The second question was, "If yes, is this an ongoing M&O activity?" The ECRM survey also listed the building and audit year, and asked the following questions:

- Has ECRM been accomplished? (Yes/No - if yes give year)
- Is ECRM Scheduled for accomplishment from your existing funds? (Yes/No - if yes, give year and source of funds)
- If the answer to the first two questions is no, is project funding still desirable? (Yes/No)

A building survey was also included to determine if the condition, use, or ownership of the building had changed in a way that would affect the ECRM savings and cost projections. Table 2 summarizes the results of the ECRMs and M&Os in the surveys (1).

The ECRM category "other" includes ECRMs which are in the process of being completed, have been budgeted and are scheduled for completion, or have been superseded by some other retrofit achieving the same goal.

About 85% of the surveys were returned by the due date. The remaining survey responses were delayed in the mail, lost, or delayed at the agency. About one month after the deadline, all 102 surveys had been completed and returned. Combining the survey results with the new consumer avoided costs of energy, resulted in new savings values for each ECRM. Capital costs associated with installing the ECRMs were assumed to have risen uniformly for all ECRMs. This facilitated the use of a single value obtained from the U.S. Government Producer Price Index to update all capital costs. Based on the Producers Price Index, 1984 ECRM capital costs were estimated to have increased 7.3%. Retrofits recommended in

Table 2
Status of ECRMs and M&Os Identified in TECCP Auditing

	ECRMs			Other	M&Os	
	Identified	Accomplished	Desiring Funding Assistance		Identified	Accomplished
1984	331	106	157	74	121	98
1986	419	73	258	82	170	103
Total	750	179	415	156	291	201

1986 were forecast to have increased 3.1% in cost (7).

M&Os were not updated since most involved little or no capital outlay to accomplished and represent a small portion (about 3% in 1984 and 1986 dollars) of the total savings (1). Also, they were accomplished at various times.

RESULTS OF ORIGINAL AUDITS

In 1984, the audit program consisted of 68 facilities with proposals for \$15.5 million worth of retrofits representing \$8.3 million worth of savings in 1984 dollars. M&Os forecast \$1 million in savings from a \$130 thousand dollar outlay (3). The 1986 results of \$12 million worth of annual savings from \$27.3 million worth of projects (4) reflects a program which shifted focus from a larger number of smaller agencies to 46 larger agencies (1). At the same time, the 1988 payback period increased to 2.3 years. It appears that this lengthening of payback is due to a decline in energy prices and "skimming" of the best projects in the 1984 program (6). Table 1 depicts the dollar values of the original audit reports.

1988 UPDATE RESULTS

Of the 750 total retrofit measures identified in 1984 and 1986, 106 of the 1984 measures and 73 of the 1986 measures had been completed by the July 1988 survey deadline (1,6). In addition to the 24% of the measures installed, 41 measures are scheduled to be completed from funding sources already identified, 415 need funding to be completed, and 84 are either not desired or have been superseded by another retrofit or a change in building operations (1).

M&Os achieved a higher accomplishment rate, primarily due to the lack of need for large capital outlays. For 1984 M&Os, 81% of the 121 recommendations have been implemented, while 61% of the 170 1986 M&Os were done by the July 1988 survey date. Together, these M&Os account for \$1.4 million in annual savings, based on the original energy costs (1). Overall, M&Os were accomplished at a rate of 69% based on the total number of M&Os, and 72% based on dollars saved. The data suggests that it takes some time to actually schedule M&Os, even when little or no funding is required.

CONCLUSION

An update of energy audit reports is necessary when several years have passed between the audit and installation of retrofits. This update is especially valuable in the unusual case of declining energy prices and rising capital costs. Prior to the mid 1980's, energy costs generally only rose over time (4). Then they began to drop, and projects recommended before the decline began to lose some of their financial incentive. Determining the extent of this decline was the purpose of this project. After the goals of the project were defined, the update was fairly straightforward, although it was still quite time consuming.

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Figure 1

I. EXECUTIVE SUMMARY

This study was performed under the Texas Energy Cost Containment Program as administered by the Public Utility Commission of Texas Energy Conservation Division. Its intention is to identify energy cost reduction measures (ECRMs) which, when implemented, will result in cost savings in the energy bills of State of Texas agency facilities. The savings calculations are made using sound, accepted fundamentals of engineering, and the most recent utility rate schedules in effect.

This report identifies capital intensive projects which, if implemented in the form recommended, will result in the following savings and costs:

Electricity savings:	519,476 Kwh/yr
Electricity demand savings:	566 Kw/yr
Natural gas savings:	223 MCF/yr
Annual cost savings:	\$34,527/yr
Cost of implementation:	\$118,044
Simple payback:	3.4 years

The savings for the recommended composite project listed above account for interdependence of savings for individual ECRMs. Costs for the project likewise account for savings which accrue for installing several ECRMs at once. The recommended ECRMs which are included in the savings/cost figures above are as follows:

1. Replace Chillers
2. Light Fixture Reflectors
3. Control Kitchen Exhaust Fan
4. Modify Selected Air Handlers
5. Variable Speed Pump Drive