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.

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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/measures which were accomplished, and the effects of increasing capital costs and fluctuating utility costs.

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

<table>
<thead>
<tr>
<th>ECRs</th>
<th>Annual Savings</th>
<th>M&amp;O</th>
<th>Annual Savings</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>15.5</td>
<td>8.3</td>
<td>0.1</td>
<td>24.3</td>
</tr>
<tr>
<td>1986</td>
<td>27.3</td>
<td>11.6</td>
<td>0.1</td>
<td>41.0</td>
</tr>
<tr>
<td>Total</td>
<td>42.8</td>
<td>19.9</td>
<td>1.4</td>
<td>72.1</td>
</tr>
</tbody>
</table>

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Proceedings of the Sixth Symposium on Improving Building Systems in Hot and Humid Climates, Dallas, TX, October 3-4, 1989
UPDATE PROCEDURE

Several steps were performed simultaneously during the update to accelerate the update process. These steps included: verifying facility energy contacts, verifying utility suppliers and rate schedules, and computing the appropriate constant avoided cost of energy (1). Identifying facility energy contacts was essential to determine which utility service was supplied. This was accomplished by contacting the agency contact person recorded 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 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 suppliers, 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) provide 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 generally 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. The U.S. Department of Energy has 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 (original report). The only major exception to this was the agencies which had switched to state-owned gas suppliers, although local distribution was generally provided by the same company as before.

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 or greater goal.

A building survey was also included to determine if the condition, use, or ownership of the building had changed. This could 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 or greater 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 cost 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 Producer Price Index, 1984 ECRM capital costs were estimated to have increased 7.3%.

Some state facilities purchase gas directly from the state. For these customers, the gas portion of the bill was increased by the controller's forecasted price increase (9.1%). The transportation charges, which were renegotiated on August 1, 1988, were not adjusted (4). 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 study. The executive summary lists all of the ECRMs originally recommended in the original energy audit report study. The executive summary lists all of the ECRMs recommended in the original energy audit report study.
Table 2: Status of ECRMs and M&Os Identified in TECCP Auditing

<table>
<thead>
<tr>
<th>ECRMs</th>
<th>Identified</th>
<th>Accomplished</th>
<th>Desiring</th>
<th>Funding Assistance</th>
<th>Other</th>
<th>Identified</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>331</td>
<td>106</td>
<td>157</td>
<td>74</td>
<td>121</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>419</td>
<td>73</td>
<td>258</td>
<td>82</td>
<td>170</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>750</td>
<td>179</td>
<td>415</td>
<td>156</td>
<td>291</td>
<td>201</td>
<td></td>
</tr>
</tbody>
</table>

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

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 that shifted focus from a larger number of smaller agencies to 46 larger agencies (1). At the same time, the 1986 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 unusual case of they were accomplished at various times. Declining energy prices and rising capital costs...

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). In addition to the 245 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.

REFERENCES


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