ABSTRACT

The Texas Southern University case study describes an innovative conceptual approach to comprehensive energy management involving an agreement with a qualified energy services company to install a building automation system (BAS) and energy conservation measures (ECMs) campus wide and provide staff training, supplementary maintenance and guarantees of savings achieved. This is accomplished through a three-stage process of qualification, preliminary selection, and contract negotiation. TSU’s approach relies on the service company to provide the engineering, but uses an oversight engineer to provide project integrity. In TSU’s case, financing was not required and supplementary maintenance has been rebid. The university was able to capitalize on Federal funding and renovation monies to help make the approach an initial success.

INTRODUCTION

Texas Southern University, established in 1947, is one of two institutions in Texas predominantly serving the educational needs of Black Americans. The University offers baccalaureate degrees in fifty (50) fields and houses graduate schools in pharmacy and law. The graduate school currently offers twenty-six (26) masters and six doctoral degrees.

The university serves 7,300 students and employs 940 faculty and staff. It is housed in forty-one (41) buildings on an urban campus of 118 acres. Rapid growth in enrollments during the late 1960s and 70s fueled by increased opportunities for Black and other minorities led to the impetus for major additions to the TSU’s physical plant since 1975. By 1981, however, the U.S. Civil Rights Commission required Texas to examine the affects of three decades of underfunding, and ensuing facilities studies by independent engineers found the condition of the existing campus buildings to be "deplorable".

During the period of underfunding, regard for energy conservation was minimal because regardless of the size of TSU’s utility bills, the Legislative always expected the University to pay them. Energy efficiency of buildings was largely the result of the skill of the architects and engineers who designed the building, and supervision of the contractors who constructed them. Preventative maintenance suffered from a lack of funding and supervision. A huge backlog of deferred maintenance developed, renovations, often done to provide more comfort than efficiency, tended to compound the energy problems caused by ineffective maintenance.

The problem

In 1983 when energy costs of the University peaked at $2,713,000, TSU was approached by companies who promised to reduce our energy costs for a 52% share of the savings. This idea had two flaws: 1) There was no precedent or legislation for "paying back" expenditures for equipment or services from "future" funds as yet not appropriated, and 2) The idea that 50% of all benefits (however large) would go to a company who would largely determine their own fee.

At the same time, the Texas Public Utility Commission (PUC) funded studies of the campus which conservatively estimated that TSU could realistically save $800,000 of a yearly $2,600,000 energy bill by establishing good maintenance practices and installing energy conservation measures in buildings.

Texas Southern has a central heating and cooling system, established in 1962 when the central plant and tunnel system was constructed. Recently the heating and cooling capacity of the plant has been nearly doubled through complete

The cost of TSU’s energy use peaked in 1983. Reductions since have been partly the result of lower fossil fuel costs. The same benefits have caused extreme hardship to Texas’ ability to raise funds for higher education, leading to deep cuts in the operating funds of the University. Texas Southern has a brief period of capital funding to be innovative and reduce consumption, to accelerate preventive maintenance, and to establish a conservation attitude before energy costs rise again. This paper outlines a way to achieve these ends, using a concept called an "Energy Services Agreement."
The University learned of an approach developed in Michigan to use savings to finance the installation and maintenance of measures campuswide. The process involved soliciting energy service companies with an RFP, then selecting one of the companies to conduct a detailed audit of all facilities and negotiate a final agreement. The agreement would be multi-year and involve a third party to finance installation cost. The agreement could also include guarantees by the service company to "pay the difference" if savings were not achieved. This guarantee was sometimes provided by an insurance company.

Like the earlier "savings-sharing" approaches, this process had flaws: 1) The "guarantees" were subject to the inherent risk of the service company. 2) The potential for excess profits to the service company via (implicit) control of the audit and the measures to be installed, their determination of the actual savings, and their control of financing. 3) The total amount of funding TSU would ultimately have to accomplish the work and pay for it was uncertain. 4) The service needed to be identified.

A SOLUTION: THE COMPREHENSIVE APPROACH

The University chose a revised approach:

1. Oversight Engineers. TSU used a competition to select an engineering firm to conduct eight (8) tasks so ensure that the service company would engineer and install all systems in the best interest of the University. Seven (7) firms competed via RFP for a contract to conduct eight (8) specific tasks.

2. Scope of Work. TSU defined the scope of work to include an automated building control system for 36 buildings, the funded ECMs under the DOE/ICP program, extension of the Identified measures on the fifteen (15) buildings which had been technically analyzed (TAed) to an additional 5 buildings, staff organization and training, supplementary maintenance and other measures and services (identified as cost-effective by the proposing company).

3. Request for Bid Proposal (RFP). TSU added the "bid" requirement to the RFP to ensure that competitive bidding would take place on these items and that the University would always get the best price for the work. The package was required to be within 10% of the original amount bid. This guarantee was sometimes provided by an insurance company.

4. Options for Payment. Because all sources of funding were uncertain, TSU required that the contract package be within 10% of the original amount bid. The University hoped to buy "up front" maintenance services (extended warranty) and avoid yearly maintenance contracts charged to operating budgets. The process described is underway. Bids were received in September, 1986. Funding uncertainties delayed selection of a firm until January, 1987.

The University selected a service company based on their qualifications and "engineered" savings in the 36 buildings. The University has now been advised how the service company will conduct eight (8) tasks to ensure the work is being installed over the next two (2) years (phased with on-going renovations) and is...
EVALUATING THE APPROACH

The following analysis describes how Texas Southern University's program met the evaluation criteria for a State Award in 1987 in the DOE's Energy Conservation Innovation Awards Program.

The Energy Services Agreement approach at Texas Southern University is innovative because it makes efficient use of a variety of resources to provide a comprehensive retrofit of campus facilities for energy conservation. Unlike most programs and funding sources which focus on individual buildings, TSU's program addresses all measures which are cost-effective campuswide. Each project in each building is evaluated for its benefits over the life of the installation rather than the simple payback.

The use of oversight engineers is unique for this type of project. Oversight engineers check the payback calculation, design, and installation of the project at a fraction of the cost of design engineers, yet provide the public with assurance that professional, qualified and licensed engineers are involved in the process. The University has also employed project managers to manage the coordination of the projects with many ongoing renovations underway and attend to details like inspections and change orders.

The use of a ten-year time frame and optional pricing for up-front buyout of cash flows for future maintenance and other services provides the University the option of purchasing all or part of the equipment with renovation monies, thereby guaranteeing the long-term performance of the equipment or service (i.e., scheduled preventive maintenance) without yearly bidding or service contracts and emergency repairs charged to limited operating budgets. For any part of the campus without up-front renovation funds (i.e., auxiliary) the process allows flexibility in the proportion of the project to be financed as a competitive rate with future yearly contributions from good, independently engineered energy savings clearly known in advance.

Staff development is an integral part of the changeover to energy awareness and facilities automation. The project contains an individually-tailored program of training for all persons at the University interacting with the automated system or the retrofits, as well as providing good HVAC and other maintenance skills essential to operate equipment efficiently.

Additional aspects of this particular project which do not have energy-saving value, but provide benefits include: 1) Building-by-building monitoring of energy consumption, 2) automatic security, failure, and condition monitoring, 3) automatic fire alarm system, 4) automatic door-locking, 5) PIR detection (light fixtures) and removal, and 6) improved working environment.

ENERGY SAVINGS

The current scope of wins puts savings on the order of $1,000,000 per year if energy costs remain constant, this figure is more than TSU's current building maintenance budget. If the State Legislature allows the University to spend these savings on programs currently underfunded, then other areas of the university will benefit from our efficiency.

TRANSFERABILITY

The approach used by TSU is available for use by other multi-use, multi-building institutions which cannot afford to do energy conservation on a piece-by-piece, measure-by-measure fashion. The potential user must have an administration committed to pay for the process, an individual willing to carry the project through long preparation and negotiation, and enough legal and technical assistance to avoid selecting the wrong service company or paying too much for its services.

ECONOMIC IMPACT

Texas is undergoing a period of severe cutbacks in operating funds to its institutions of higher education. Not only will the comprehensive approach described provide nearly one million dollars back to TSU each year for badly-needed services, but the process transferred to other state institutions could provide millions of more dollars, year-after-year statewide. Nationwide, the process could yield hundreds of millions of dollars in avoided costs. As electricity costs rise and oil and gas prices back to 1983 prices, the benefits of actions taken now will only increase.

CONCLUSION

Texas Southern University's experience that far indicates that the energy services agreement approach is an efficient way to achieve comprehensive savings in a multi-building facility. However, potential users of this approach must do a lot of preparation and specification of what they want to do prior to issuing the RFBP. There are many ways companies can steer their proposals into costly, but inefficient installations. Good, independent engineering audits will prevent this. The University's experience indicates that it is important to get the company to state its price in the bid proposal. TSU was unable to do that, and it prolonged negotiation for the contract and eliminated supplementary maintenance in the initial agreement.

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