Report

of the

Energy Task Force

October 28, 2009

Table of Contents

Introduction

In September 2006, President White commissioned the University's Energy Task Force (ETF). A complete copy of the charge to the ETF is included as Appendix A. While recognizing improvements to the University's large scale production and distribution systems, the President identified the need to "...shift our focus to management of the 'demand' side of the equation and toward slowing the increase in demand for energy, reducing consumption where possible, and changing management processes in ways that take energy conservation into account." The ETF was also directed to review and revise a comprehensive proposal to the Illinois Clean Energy Foundation.

Since inception of the ETF numerous improvements in energy system organization and processes have been implemented. Those actions, when perfected by implementing the recommendations provided herein, will address all elements of the President's charge and result in improved energy management and accountability.

Background

Between 1993 and 2009, commodity prices for natural gas skyrocketed as shown in Figure 1.

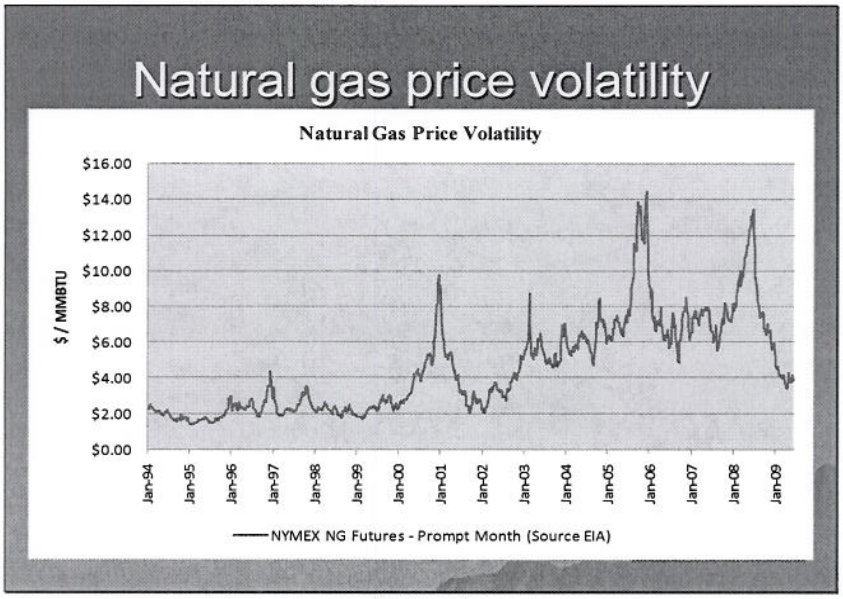

Figure 1

The University was acutely vulnerable to these price increases for four primary reasons. First, the University did not have a fuel hedging program for purchasing contracts in advance. Second, for two decades, the University focused on much needed production and distribution improvements. The intention was to provide efficient production plants and use the savings to fund improvements in plant reliability and ultimately conservation projects. Third, the University has a well documented deferred maintenance problem, which contributes to significant inefficiencies in energy use. Estimates of 20% to 25% of the energy used in buildings

could be saved through regular, prudent investment in conservation measures. Fourth, energy usage at the unit level was treated as a free commodity. The University had no established comprehensive system for metering or billing, and there was no accountability for energy consumption at the college/unit level. To address these issues, the President charged the Task Force with the nine actions listed in Appendix A.

The ETF first met on October 17, 2006 and has met regularly to address the elements of the charge. Appendix B identifies the Task Force members and contributors who have worked diligently to understand and guide improvements in management of the utility systems. The early meetings were largely devoted to editing the Illinois Clean Energy Foundation proposal and developing a format for data collection. It was decided that the committee would require the assistance of an energy consultant and Science Application International Corporation (SAIC) was selected through a competitive "request for proposal" process. SAIC's scope of work was focused on a condition assessment of the production and distribution assets, evaluating production vs. purchase options, identifying opportunities for energy conservation and providing approximations of investment requirements for both supply and demand. A copy of their final report is provided as Appendix C.

A subcommittee was formed on March 20, 2009 to address the organizational and management issues, paragraph 3, item 4 of Appendix A. The recommendations of the subcommittee were received and endorsed by the ETF on August 20, 2009 and can be found as Appendix D.

The work of the ETF reflects the first time the University of Illinois has conducted a system-wide, comprehensive review of energy policy, management, infrastructure condition and operations. It was anticipated that the findings and recommendations found in this report will be provided to the Board of Trustees prior to their September 2009 meeting, now deferred to a later meeting. A copy of the presentation which has been prepared for that purpose is attached as Appendix E.

Findings and Recommendations/Actions

The elements of the President's charge fall into five basic areas: Efficient Energy Use, Reliability of Supply, Cost Control, Facility Investment, and Organization. Each of these is addressed below.

Efficient Use – Findings

Energy use at all three campuses has increased between fiscal years 2003-2008, as shown in Figure 2.

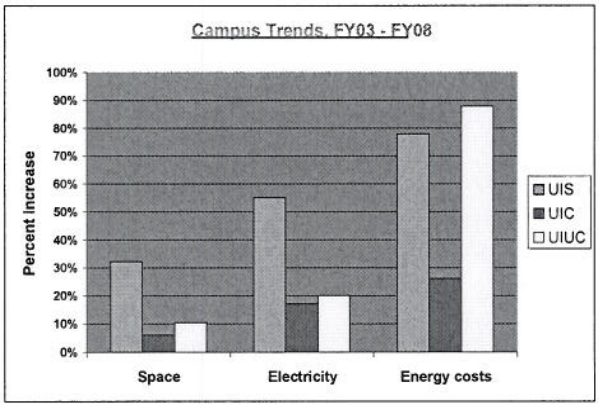

Figure 2

While some increase in energy usage is attributable to increased square footage and new programs, it must be recognized that the continued growth in energy consumption was primarily driven by a system that treated utilities as a free commodity. With no responsibility for cost, campus administrators had no incentive to actively manage energy consumption at the unit levels. Nor did it make sense for facility managers to spend limited deferred maintenance dollars on heating, ventilating or air conditioning efficiency *per se*, when there would be no monetary return on their investment. Both issues are compounded by the fact that production and usage have been separated organizationally since 2003, which caused each organization to optimize their performance without consideration, and often inducing inefficiencies, for the other.

Recommendations/Actions

The ETF has been very successful in bringing focus to energy conservation. Metering has been, or soon will be, installed so that energy consumption can be monitored at the building level. A single utility rate structure is being developed for each commodity on each campus, which when coupled with the metered consumption will pinpoint where the energy dollars are being spent. A "shadow billing" system has been in place at the Urbana campus for a year which provides units with accurate usage and cost information; a similar system is to be established this year at the Chicago campus. It is anticipated that similar systems will be available throughout the University in the near future.

With accurate cost data and a billing system in place, the next steps will be to incentivize energy conservation and provide Deans and Department Heads with the ability to conserve. First, to create an incentive to conserve, campus budget officers are developing formulas to define how savings will be shared. Second, in addition to the management tools currently available to Deans and Department Heads, specific support via Retro-commissioning (RCx) and Energy Service Contractors (ESCO) are under way and/or planned. Third, accountability and responsibility will be established through a bottom-up planning, budgeting and

reporting system for energy consumed at all levels of the University – campuses, colleges and departments. The system will include a small UA group, drawn from existing UA staff and chaired by the University President, that will review plans and budgets and monitor performance.

Reliability of Supply – Findings

A major part of the scope of work for SAIC was to evaluate the condition of the physical assets. In Chicago, installed plant capacity requires that they must run their most expensive equipment, the gas-turbines, during the periods of maximum steam demand. When these conditions exist there is little redundancy thereby placing campus steam supply at risk. In Urbana, not only do the boiler assets need significant repairs, but the steam distribution and condensate lines are old and also require repair and/or replacement. SAIC reported that the magnitude of the investment required to ensure reliability at the three campuses over the next 15 years is estimated to be between $305M-$413M for energy production and $78M-$106M for distribution systems.

Recommendations/Actions

There are three actions required to improve and ensure utility reliability. First, utility rates must include significant amounts for annual repair and replacement (R&R) of generation and distribution assets. SAIC suggests that $25-$35 million/year be provided for this purpose. Second, establishment of reserve accounts inside each campus utility budget to be made available for large capital R&R items or system emergencies. Finally, capital allocation for energy generation/distribution projects should be handled separately from programmatic capital projects -- submitted separately for integration by the Office of Planning and Budgeting. In each case the ETF believes that a strong oversight role must be exercised by University Administration. Figure 3 depicts the organizational relationship and responsibilities envisioned. The capital planning and approval process shown is intended to address decades of under-investment in energy, supply and conservation, while providing an organizational structure to ensure it is not repeated. The intention is to establish utility rate structures sufficient to fund routine operations and maintenance, major repairs and life cycle replacement of installed equipment. Rate structures will be sufficient to fund energy conservation projects which meet a predetermined rate of return. An annual operating plan which includes maintenance and capital needs will be prepared by each campus and submitted to University Administration for approval. Annual operating plans will include projections of capital needs for a minimum of three years, thereby providing context for annual plans. However, building programmatic improvements, capital renewal, deferred maintenance and new construction will be funded through the current budgeting process. The ETF recognizes that with the exception of new construction, investments in buildings have not met needs. And, while not a specific element of its charter, the ETF strongly recommends that a dedicated funding source for energy-related

programmatic improvements, capital renewal and deferred maintenance be identified for those projects which will reduce energy consumption.

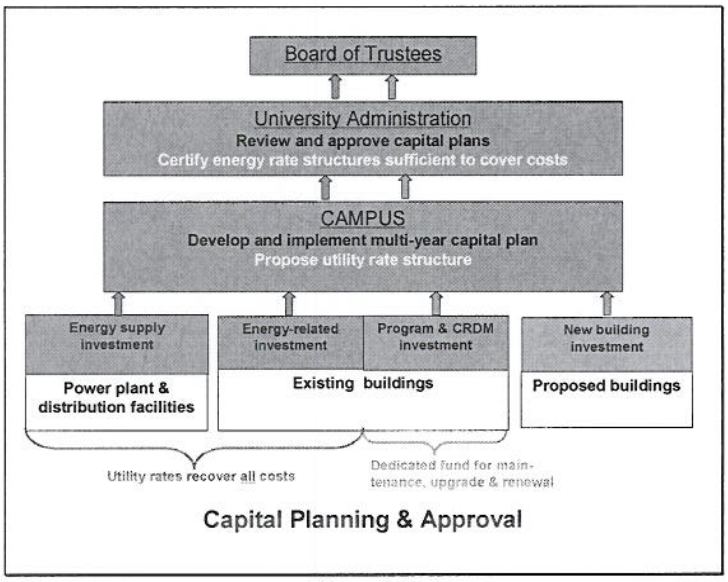

Figure 3

Cost Control – Findings

As suggested by Figure 2, utility costs went up dramatically between 2003 and 2008, creating an accumulated operating deficit of $120 million. Many factors contributed to the deficit, not the least of which was the run-up in the natural gas market (Figure 1). The University was buying on the spot market and was exceptionally vulnerable to these increases. Other factors which contributed to the increased cost was the addition of new space, the aforementioned lack of conservation, availability of equipment (deteriorated plant condition) and limited alternative sources.

The financial burden caused the administration to question whether the University was operating the plants efficiently, and more fundamentally, should the University be in the business of operating utility plants? SAIC's report recommended that the University retain ownership and control of the utility assets. Further, they suggested that there would be little interest from commercial firms given the capital improvements necessary to ensure efficient and reliable operations. SAIC noted that while power generation as a byproduct of steam (cogeneration) was economical, power generation for the purpose of selling on the grid generally was not. This led SAIC to question current operating procedures governing purchase/generation of electricity when it could be purchased significantly more cheaply from the local power provider. Their analysis shows that the results do not change even with anticipated changes in regulations, such as cap-and-trade or carbon limits.

Recommendations/Actions

The University, with the assistance of Larry Altenbaumer (former CEO of Illinois Power) has developed and implemented a commodity purchasing process, which ensures a predictable price, mitigates the vagaries of the spot market, provides transparency and price stability. This energy cost management purchasing policy was approved by the BOT in September of 2008, revised by the BOT in March 2009, and is included as Appendix F.

Operating changes recommended by SAIC to reduce cost can be summarized as 'produce electricity mainly as a byproduct of steam and buy the remainder, except when purchase prices spike during periods of peak demand.'

Energy conservation will be a big part of the long-term solution to help absorb or avoid future commodity price escalations. SAIC has provided a macro-view of conservation opportunities. Energy plans have been completed and conservation projects identified. Investments should be made whenever lifecycle savings exceed lifecycle costs.

Energy Conservation Investments – Findings

The proceeding topics all point to the need to reduce energy use in order to enhance reliability, eliminate the need for expansion and lower operating costs. SAIC estimated that the deteriorated systems have resulted in 15-20% heat loss in distribution and 20% to 25% in the buildings. Equipment and systems to control the use of energy have made significant advances in the last twenty-five years. Buildings constructed in the last decade have been designed to meet the energy goals of ASHRAE 90.1, which is the standard for heating, ventilating and air conditioning systems. Unfortunately, as shown in Figure 4, the asset base for the University system predates most sophisticated energy control technologies.

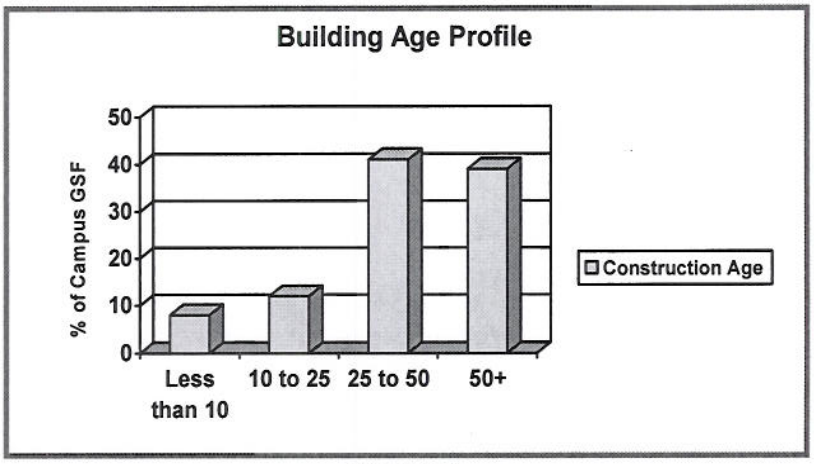

Figure 4

Recommendations/Actions

SAIC estimated as of spring of 2009 that system-wide there are conservation projects totaling at least $115 million where energy savings exceed the costs. Immediate access to capital is necessary to accrue the estimated $14 million annual savings resulting from investment in these projects. While access to ESCOs can provide the needed capital and guarantees the savings, many projects would benefit from internal University funding. At this time no internal funding source has been identified.

Organization – Findings

As indicated earlier, the energy supply-demand continuum has been bifurcated. Each organization was doing their best to execute their responsibilities, but they were not working in concert with one another. The absence of clarity regarding the respective roles did not foster trust and cooperation. The end result was a suboptimal outcome for the university as a whole.

Recommendations/Actions

Figure 5 presents graphically the ETF recommendations related to U of I organization for energy activities. It provides an organizational structure which ensures accountability at the campus level with strong oversight by University Administration. It takes advantage of centralized purchasing while creating incentives for efficient energy use by campus units. The utility rate structures provide a mechanism for general revenue funds to service the debt needed to maintain a modern, reliable and efficient energy infrastructure.

As a separate, but related issue, the ETF recommends that funds for addressing deferred maintenance and capital renewal in campus buildings should be provided from a separate and dedicated funding source structure, i.e., similar to the infrastructure fee presently charged to all students.

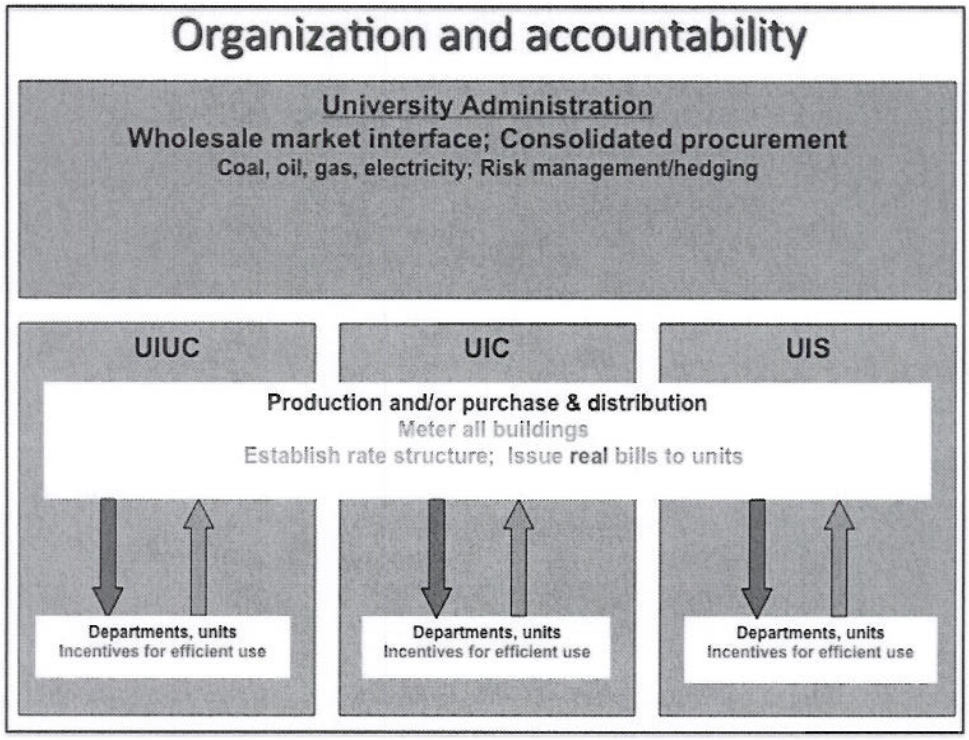

Figure 5

Summary of Recommendations

Conservation

1. Complete metering at all three campuses.
2. Establish utility rate structures at each campus.
3. Install billing system at each campus.
4. Develop and implement incentive systems.
5. Implement a retro-commissioning program.
6. Establish university-wide energy conservation goals.
7. Immediately fund conservation projects where annual savings exceed annual costs.
8. Ensure that each campus can capture energy savings and maintain a revolving account for energy conservation projects.
9. Install DDC controls to enhance system control and reduce energy consumption.
10. Complete ESCO contracting process.

Production

1. Establish utility rates that reflect the minimum R&R investment suggested by SAIC.
2. Create reserve accounts inside the energy budgets at each campus.
3. Develop a capital budgeting process for utility systems external to the existing process.
4. Continue to own and operate the production plants, generating electricity only when it is cheaper than purchasing it.

Organization

1. Assign energy production and distribution facilities to the campuses to promote responsibility and accountability.

2. Establish a strong reporting and oversight role at UA also to promote responsibility and accountability.

3. Require each campus to develop and submit to UA for review a multi-year capital investment plan for energy supply reliability, distribution efficiency and energy conservation, by May 30, 2010. The plans will quantify the capital needs, and the university as a whole must examine priorities to find the capital dictated by prudent planning.

It is intended that these recommendations provide the Chancellors, President and Board of Trustees a sound basis for action to ensure the long-term reliability of the utility infrastructure and a framework for reduced energy usage.