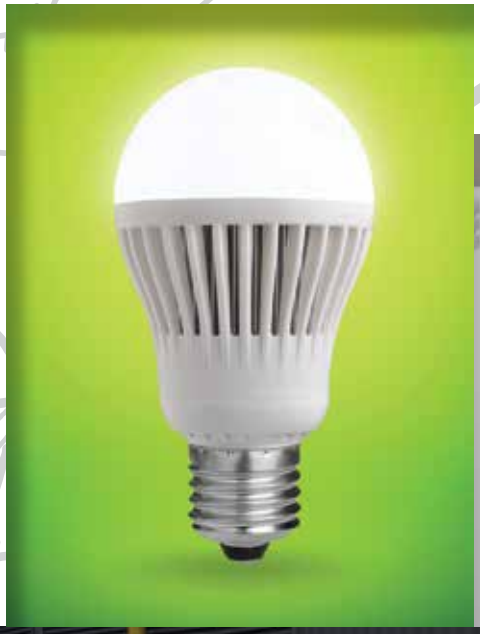
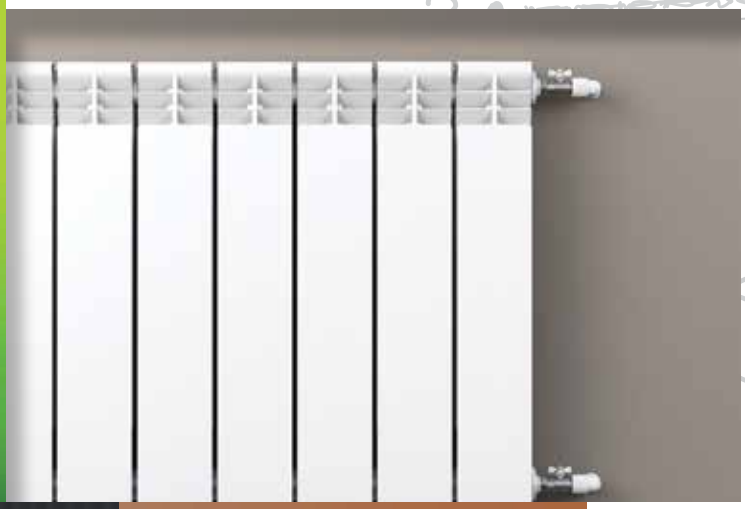
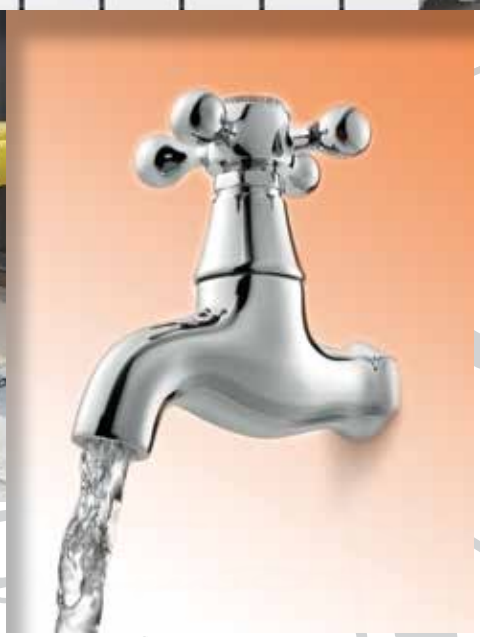






By James J. Sebesta, P.E.

UTILITY INFRASTRUCTURE

Operate It Like a Business

CFaR | Center for Facilities Research

Utility infrastructure has long been considered an overhead expense that can be arbitrarily maintained based on availability of funds after the academic and research portions of the university have been funded. However, the utility infrastructure, like the buildings and grounds of the university, requires strategic planning, vision, budgeting, and operational organization to function efficiently and effectively.

Over the past several decades, awareness of deferred maintenance and of needs for continual renewal and replacement funding for campus assets has improved dramatically. However, models for operating and funding the

utility infrastructure are not always considered with the same vigor and focus as the buildings themselves. It is not uncommon to hear that utility infrastructure is not the university's core business. Institutions should look inward and develop a program that maintains the sustainability of the infrastructure through sound business practices. After all, efficient, effective, and resilient utilities are core to the university's mission of education and research.

UNDERSTAND THE COST OF UTILITIES AND THE UTILITY INFRASTRUCTURE

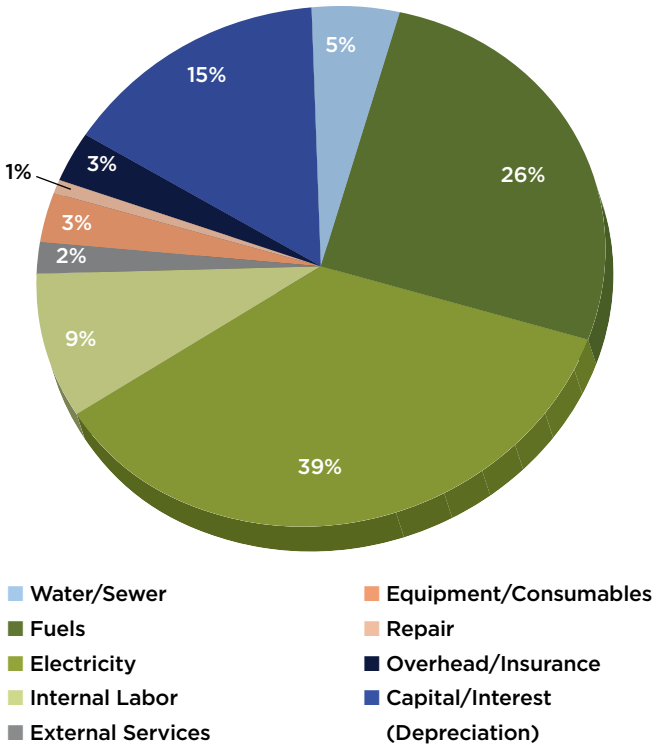
The cost of utilities at many institutions are hidden from the building users. Unlike the utility costs for our own homes, there is no correlation between the cost of tuition, or the department's budget, or the cost for energy-conserving improvements, or an academic's salary, and the users' behavior or efficiency in consuming the utility commodity (water, electricity, heating, cooling).

A first step when moving toward an effective business and funding model for the utility infrastructure is developing an awareness of the relative cost for the utilities on the campus. An important aspect of this review is to identify and document the *total* costs including debt, overhead costs, insurance, and other costs that are related to the utility systems. The analysis should result in a rate schedule that defines the revenue required to recover the total costs for each utility commodity and the cost for each utility. Examples of rate formats that could be developed for the institution are shown in the accompanying table. Each institution should review if there are any benefits for using rates that include both a demand and a commodity component to the rate structure, or if a simplified blended rate that is based on commodity is adequate.

For example, an institution I was involved in several years ago charged a flat rate for chilled water of approximately $0.20/ton hour, of which $0.13 was intended to pay for the capital and fixed costs of the central cooling system. To reduce costs, the departments began to implement free cooling modifications for their buildings that could reduce the use of the central cooling system in the winter and the utility cost to the building. As a result, the rate for chilled water had to increase for the remainder of the users, which drove additional users to install free cooling systems for the winter, accelerating the spiral. Eventually, the rate structure was changed to a fixed rate to accommodate the peak cooling demand in the winter and the associated fixed costs and capital required to meet that demand; and a variable rate to recognize the variable costs of producing the commodity throughout the year.

An institution may or may not actually charge the building, department, or entity for the costs of the utility; however, sharing the costs associated with utility consumption can be an important first step toward creating an awareness of the cost of the utility systems and relative impact to the institution's annual budget when consumption increases or decreases. Additional consideration should be given to understand the cost to connect new buildings and the impact on or contribution to future capital cost to increase capacity at the central plants.

Annual Utility Plant Costs



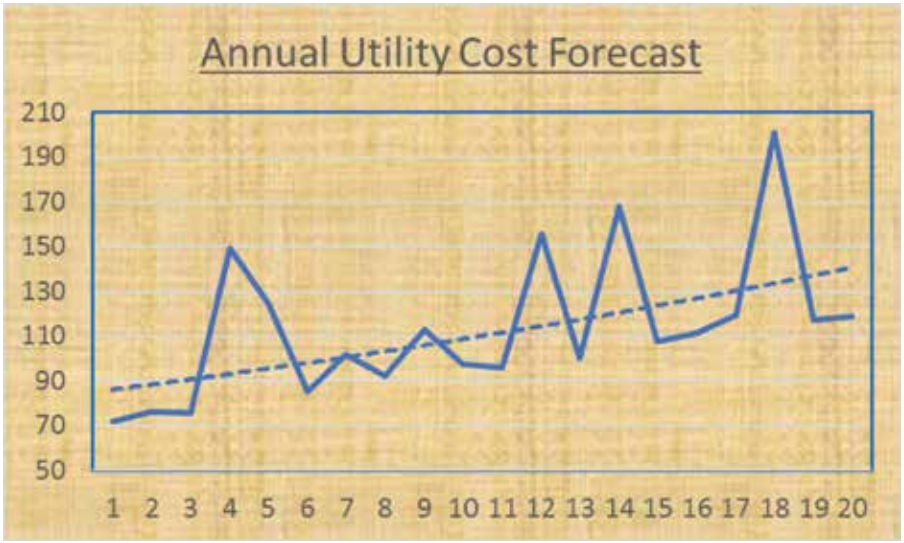
Rate Structure Components

Utility	Demand Charge (fixed charge each month)	Consumption Charge
Electricity	$/KW/Month	$0.xx/KWh
Steam	$/KPound/Month	$/Mlbor $/MMBTU Surcharge for loss of condensate return
Heating Water	$/Peak MMBTU demand	$/MMBTU Surcharge for low delta T
Chilled Water	$/Peak Tons cooling demand	$/MMBTU Surcharge for low delta T
Water/Sewer	N/A	$/100 cubic feet or $/1,000 gal.

PLAN FOR THE LONG TERM

Utility infrastructure investment is intended to last for several decades. Distribu-

Annual Utility Cost Volatility



tion systems can last 40 to 60 years or longer with high-quality installation and proper treatment and maintenance. Large capital items such as transformers, substations, boilers, chillers, and auxiliary systems are published with a normal expected life of 25 to 35 years. Yet with proper operation, equipment cycling, and proper preventive maintenance, it is not uncommon to exceed life expectancy by 25 percent or more.

Matt Adams further discussed the benefits of usage-based maintenance in the July/August 2016 issue of *Facilities Manager*. The challenge with planning utility capital expenditures is that the exact date when something should be replaced is not easily predicted, and "run to failure" is usually not a good option for the institution. Institutions prefer predictability over volatility when forecasting and planning annual, biennial, and five-year capital plans. Can the university operate with reasonable reserves and specific debt payment schedules to levelize the annual costs for each utility system? Are the resulting costs competitive with the local or peer institution's rates for similar utilities?

CLARIFY ALTERNATIVE BUSINESS MODELS

Once you know your up-front costs and then incorporate your total owning and operating cost—including capital requirements forecast forward for several years—the institution can research and identify the business model that will work best to meet your goals and objectives. Will the business model include both building energy consumption and utility plant and distribution system production and delivery systems? Consider and structure leadership or board oversight to manage annual utility rate adjustments, reserve account management, debt and bonding for capital improvements, and overall governance of the utility enterprise.

There are several different business models to consider for operating the utility infrastructure. The most prevalent forms for the utility infrastructure business entity used by both public and private nonprofit higher education institutions include:

- **Auxiliary Enterprise 501(c)3**, which is fully funded through utility rates and functions with its own bonding process and governance oversight.
- **Quasi-Auxiliary Enterprise**, which is not set up as a 501(c)3, but functions in a similar manner where capital bonds could be issued as general obligation for the institution or as revenue bonds funded through utility rate structures.
- **Self-funded through operating or capital funds**, which may compete with academics for capital.
- **Funded through capital campaigns/endowment proceeds**.
- **Institutionally funded through other means,** including internal loans, grants, or utility rebate programs.
- **Public-Private Partnerships** (P3s).

The perception of P3 arrangements and what they offer to an institution is better understood today than when they were started in the 1980s and '90s. Wikipedia describes P3 operation today as follows:

- The private party provides a public service or project and assumes substantial financial, technical, and operational risk
- The cost of using the service is borne by the users and not by the taxpayer
- Capital investment is made by the private sector
- Government contributions may be at no cost but for the transfer of existing assets
- P3s harness the expertise and efficiencies of the private sector
- The public body does not incur any borrowing
- Higher financing costs are offset by private-sector efficiency and better risk allocation

However, a deeper dive is required to fully understand and appreciate the positives and negatives associated with any P3 arrangement. Currently one can find institutions using a variety of different P3 agreements. These include **P3 Energy Services Contracts** (ESCO (Energy Service Company) Models), which capitalize on guarantees, expertise, and external funding using existing energy and operational budgets to fund the renewal and replacement activity; **P3 Build-Operate-Transfer Agreements** (similar to various forms of lease agreements), which bring external expertise to design, build, and guarantee certain aspects of utility renewal and operation while maintaining institutional ownership and tax structure; **P3 Concessionary Agreements**,

which attempt to monetize the utility asset and integrate a new financing and operating partner with long-term price stability, operating responsibility, and guarantees and risk reallocation, while retaining ownership, tax advantages, and reporting and governance approval and oversight responsibility; and **P3 Build-Own-Operate Agreements** (may also be considered as a sale of infrastructure to monetize those assets), which essentially convert the utility infrastructure to an external utility operation that may or may not have any governance and oversight from the institution.

Compare the P3 alternatives with internal options that essentially consist of running the utilities as an internal operating expense, using year-to-year budgeting and operation; paying what is required and funding capital requirements as they arise; or operating using a Full Cost Recovery Revenue Enterprise Entity, which allows the institution to function more like a utility, levelize annual payments, build reserves, and issue and pay debt.

UNDERSTAND LEADERSHIPS' CRITICAL ITEMS

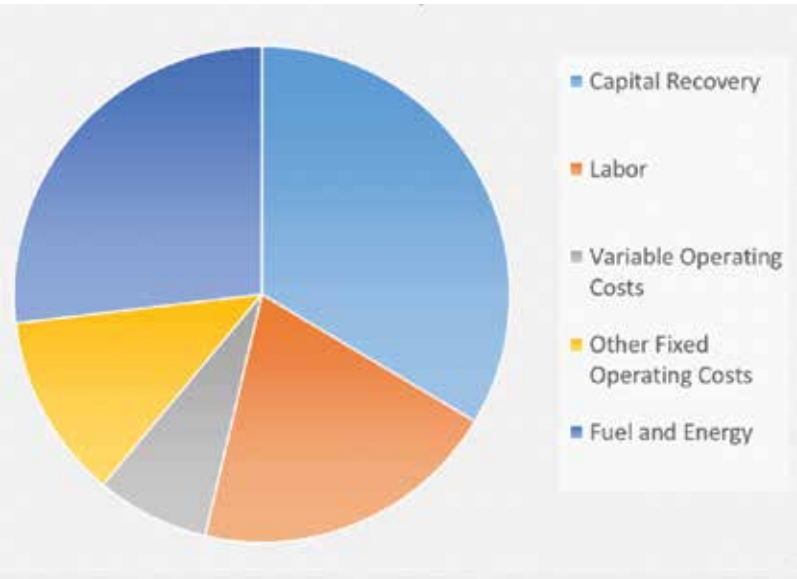
Leadership will be intimately involved in any utility infrastructure restructuring and business model development. It is important that the utility and infrastructure management and operations team fully understand leadership's critical issues and concerns related to operation of the utility infrastructure and the impact or contribution to the institution's long-term mission and vision. Simply put, is the utility infrastructure an expense or an asset?

The critical issues that affect leadership can be difficult to discuss. Internally, assess those items before approaching leadership about a new business model for the utility infrastructure. Consider the following:

- **Labor:** Are there labor issues that leadership believes could be resolved if the operations were conducted via a different business model including wage and benefit structure, cross-training restrictions, productivity concerns, turnover and training issues, worker shortages, and expertise?
- **Confidence:** Do you communicate clearly the challenges, successes, and needs of the utility team and listen to what your customers are saying about utility services? Is there a high level of trust and respect between leadership teams? Do you understand and communicate clearly the costs and impacts of regulatory and compliance issues impacting the utility infrastructure?
- **Overbuilding:** How are you balancing capacity expansion with programs to reduce utility demand and consumption on the campus? If N+1 is good, is N+2 better? What are the expectations for reliability: 99.9%, 99.9999%, or 100%? Are they reasonable, and what are the associated capital and operating costs to achieve them? Do the most critical buildings drive the costs of utilities for the entire campus?
- **Costs:** Are annual, short-term and long-term costs stable, predictable, and competitive with other benchmarks, or is the volatility and uncertainty of annual utility costs an issue affecting confidence in the institution's leadership? What are the total costs for utilities per student, and what percentage of base tuition does that represent?
- **Other inhibitors:** What other institutional constraints exist that might be improved with a different utility infrastructure business model, including procurement constraints, operational and performance guarantees, financing options, debt limitations, risk allocation, or operating reserves management?

Business Plan Elements

Cost Component



DOCUMENT THE BUSINESS MODEL

After the preferred business model is identified, develop the business plan. Colleges and universities are great at developing academic and facility master plans, campus use plans, sustainability plans and utility master plans. I would challenge institutions to expand beyond those and develop a *utility business plan*.

After decades of reviewing campus master plans, I am not sure I can identify even a few that gave the utility infrastructure more than an obligatory one or two paragraphs summarizing that "utilities should be extended to the new facilities." A campus master plan is not a utility business plan. Likewise, most campus utility master plans are not a utility business plan. They are focused on capacity requirements—including new equipment needs and anticipated timing for renewal of major equipment and distribution systems.

The utility master plan may identify, in round numbers, the capital required for capacity additions or for large capital equipment replacement. As shown previously, those costs are a small part of the overall total owning and operating costs for utility systems. Very seldom do they focus on the total owning costs of the systems, compare alternative systems, or compare the internal owning costs with those of peer institutions and similar local utility costs.

A question I like to ask early on during development of a utility business plan is, "If your electrical infrastructure were simply part of the local utility system, would the per kilowatt hour cost of electricity metered at each building be more or less expensive than the current total cost of ownership?" The answer should not be a surprise to anyone on the institution's utility system management team.

COMMUNICATE, COMMUNICATE, COMMUNICATE

A well-managed and operated utility system for the campus should exhibit the qualities of a world-class utility company. Many universities have utility budgets that rival a majority of the country's municipal utility systems. They deserve management and operational processes that represent those complexities and expectations for cost stability and system efficiency. Internal and external operating models, partnerships, and governance models will continue to evolve as utility costs increase and continue to impact the institution's tuition costs and sustainability goals and objectives.

Utility management must develop relationships with the institution's leadership and be comfortable communicating with the institution's business officer and trustees or governing board regarding infrastructure ROI, total owning cost recovery mechanisms, shared services, resilience, cost competitiveness, asset value, risk management, credit worthiness, financial instruments, and the cost of money.

It is recommended to develop business plans as if the utility is operated with a specific goal for net revenue or profit (even if the profit is zero) and operated within defined budgets with appropriate revenue streams, expenses, debt payments, and reserve allocation.

Operating the utilities in a manner that meets the institution's expectations and is cost-effective with other alternatives will result in leadership meeting their fiduciary duty to the stakeholders.

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