Trends in Utility Infrastructure Renewal and Operations Business Models

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Many institutions face the daunting question of how to fund large infrastructure renewal projects. Through survey information, this research project documents trends, processes, and methods used by public and private higher education facilities to invest in utility infrastructure renewal, deferred maintenance, capital expansion, and operations in order to maintain sustainable, efficient, and reliable utility systems for campus buildings.

RESEARCH PROJECT STATEMENT

Title: Trends in Utility Infrastructure Renewal and Operations Business Models

Statement of the problem: Many institutions face the daunting question of how to fund large utility infrastructure renewal projects.

Statement of purpose: Various utility infrastructure renewal solutions have been implemented at many institutions throughout the United States, Canada, and beyond. These solutions comprise projects that are self-developed, operated, and managed in various combinations utilizing public-private partnership (P3) agreements. But we also need to understand what are considered best practices and leading-edge processes that higher education institutions turn to when considering how to fund and structure large utility infrastructure operations, maintenance, and capital renewal. The questions that are likely to be asked when undertaking such projects include, "How has this been done?" "Have P3 agreements been developed as a source of financing?" "Was the implementation successful?" "What lessons were learned?" or "What could have been done differently to improve the project?" This research project will help APPA member institutions understand the basic operating and financing structures of infrastructure renewal projects across a variety of similar institutions.

Null hypothesis: Institutions rely on annual budgeting models for utility infrastructure operations and renewal, which makes utility systems compete for annual funding with the academic mission. This system leads to significant annual cost and funding swings that could disrupt academic programs and interfere with efficient, levelized utility economic modeling and effective full cost recovery from various campus constituents.

Research questions: How have institutions handled funding renewal of utility and energy infrastructure, what are the current trends, and what are the pros and cons associated with the various practices?

Methodology: The project is expected to be undertaken through a combination of survey mechanisms and follow-up, one-on-one interviews for a sampling of U.S. institutions that have implemented various forms of insourced and outsourced procurement and operations agreements related to campus utility infrastructure renewal and operations. A single survey was sent out to the APPA membership, and participation was voluntary.

Anticipated results of the study: The results of the study are anticipated to provide centralized reference material for APPA institutions when considering alternative ownership, operations, and funding programs for large utility and energy infrastructure renewal projects on their campuses.

Benefits to education/facilities management/APPA: The project will result in a snapshot of the current state of the industry and best practices for operating and funding utility and energy infrastructure systems on higher education campuses, and will document lessons learned and factors critical to success for utility infrastructure renewal projects undertaken by APPA members over the past 5 to 15 years.

Preamble

Higher education has been challenged with funding mechanisms for deferred maintenance, utility system renewal and expansion, energy conservation, and building operations for many years. In the late 1990s, APPA, DOE-EPA, and NACUBO (the National Association of College and University Business Officers) partnered to present nationwide conferences titled “RR-USA” (Resource Reallocation), which promoted the concept of diverting the funds from energy and utility saving programs to finance deferred maintenance for campus facilities. Rod Rose published a book through APPA titled *Charting a New Course for Campus Renewal: Lessons from the New Mexico Higher Symposium on Capital Renewal and Deferred Maintenance,* further discussing the importance of using cost savings from energy and utility consumption reduction programs to fund capital renewal for the decaying facility and building system infrastructure on America’s campuses.

Since that time, many institutions use this model for implementing utility and energy savings projects, which now include a significant amount of avoided operating and maintenance costs to fund deferred maintenance on the campus. These projects have longer payback periods—up to 20 years—resulting in a greater amount of savings estimated from maintenance and operations costs that are not energy- or utility-reduction related, and thus are less measurable and verifiable in conventional energy service company (ESCO)-type models. Many institutions, however, are still facing the daunting task of funding utility infrastructure renewal and expansion on campuses where utility and energy savings is far from adequate to fund even a small portion of the capital required for these projects. Another challenge to utility infrastructure renewal and expansion projects is that they are not conducive to small financial bites, usually costing tens or hundreds of millions of dollars at a time.

Over the past several years, I have advocated that college and university campuses should operate their utility infrastructure as a self-sustaining business unit. Maintenance and replacement costs are not predictable over a long-term period, however, and are not conducive to annual budgeting and “use-it-or-lose it” funding policies. Total cost of ownership recovery models, which levelize utility rates through long-term forward forecasting, work well to move the utility infrastructure from an unpredictable expense to a strategic asset being operated as a business within an institution's governance structure.

Most institutions continue to face questions about the high cost of tuition and changing trends in student counts, which when combined with significant capital needs for utility infrastructure capacity increases and deferred maintenance, result in increased visibility and concern for annual costs for the utility infrastructure systems. How that funding will be provided and who will be responsible for paying for those utility services must be determined in order to lay the foundation for a sustainable, cost-effective, and reliable utility infrastructure on a nation's college campuses.

Based on the results of the APPA CFaR project institutional survey, as well as the author's past experience, one can summarize best practices for utility infrastructure funding and operation as follows:

- *A structure that is based on a long-term strategy for funding and operation of the utility infrastructure based on total cost of ownership costs and the stability and predictability of annual costs*
- *A structure that is built around an auxiliary-based function that provides stable and predictable year-on-year operational costs and revenue generation*
- *A system that encourages and rewards operational excellence and energy conservation at the building and department level*
- *A structure that does not directly compete for annual capital funding with the academic mission of the institution*
- *An operational structure for the utility infrastructure that can be measured and compared with peer institutions relative to costs, reliability, efficiency, and operational excellence.*

Best practices are demonstrated when the utility infrastructure is funded and maintained to provide long-term, cost-effective, and reliable utility delivery for the campus. The challenge is how to provide that funding in a manner that does not detract from the annual funding and operations of the campus's academic activities. At a majority of institutions, infrastructure operation, capital renewal, and maintenance are dictated by the funding allocated to utility infrastructure during each budget cycle. “Use-it-or-lose-it” and “repair-vs.-replace” decisions are made based on the cash on hand for each budget year and not necessarily on a long-term, lowest-cost-of-ownership and operating-cost basis.

APPA Institutions Utility Infrastructure Survey Summary

In March 2015, as part of the information-gathering process for a utility infrastructure financial analysis for Colorado State University, we conducted the APPA-sponsored CFaR project, in which the membership was sent a survey to ascertain the state of higher education relative to utility infrastructure ownership, operation, and funding models. The entire survey response is included as Appendix I at the end of this report.

A total of 80 institutions responded to the survey, comprising 49 public-nonprofit, 30 private-nonprofit, and 1 for-profit institution. Respondents included 46 institutions with less than 10,000 full-time equivalent (FTE) students, 15 with 10,000–20,000 FTE students, and 19 large campuses with more than 20,000 students. A majority of the institutions, 77 percent, independently make all decisions relative to energy and utility infrastructure projects and financing. Due to the fact that each institution provided a varying level of detail in its responses, it is misleading to use a simplified chart with percentages. Key points from the responses are summarized as follows:

- *More institutions own, operate, and maintain central plants for heating and chilled water than primarily building-distributed systems.*
- *4 of 80 institutions indicated using P3 agreements for 13 different instances of capital renewal projects for steam, hot water, electric cogeneration, and/or chilled water systems, with 2 instances where the institutions would not do it again, one for chilled water and one for heating water.*
- *5 of 80 institutions indicated using P3 agreements for 11 instances of operations and maintenance of energy systems infrastructure, with only 4 instances where they would do this again.*
- *20 of 80 institutions indicated that they meter and charge buildings for some or all of the energy use for a building. Only 9 institutions use a full-cost-recovery rate for some part of the energy use for academic buildings. 19 institutions do some form of full cost recovery for energy utilities for the nonsupport or auxiliary buildings.*
- *48 of 80 institutions own some or all of their electric, gas, water, or sewer distribution systems, with gas being the least likely utility distribution system to be owned by the institution. Only 1 instance of P3 agreements for capital renewal of these 4 systems was reported.*

- *The respondents showed similar trends regarding the thermal energy infrastructure—18 of 80 institutions reported metering at building level for some or all of the electric, gas, water, or sewer utilities. Only 8 institutions reported full-cost recovery rates for these utilities at academic buildings, while 17 institutions charge full-cost recovery rates to nonsupport auxiliary buildings for the same utilities. In all cases, electric meters were the most common.*
- *17 of 80 institutions reported using P3 (through ESCOs) for energy projects, while only 7 reported doing the same for capital renewal projects. In most all instances, the state or the institution provided the financing for the projects. More than 50 percent indicated they would do this type of project and financial vehicle again.*
- *For institutions that have internally financed their own energy reduction programs, there are a nearly equal amount that use general obligation bonds, internal financing repaid through future savings, and annual capital renewal allocations. In all cases, these institutions indicated they would continue with similar financing programs in the future.*
- *5 of 80 institutions indicated they are using self-supporting-enterprise or 501(c)(3) status for operating utility infrastructure systems. Steam, chilled water, and electric systems were the most common utilities operated in this manner. One institution is using this structure for water also.*
- *23 of 80 institutions indicated that they allow reserves in their budgets to reduce volatility in future years; natural gas and electricity were the primary areas where this was applied.*
- *Deferred maintenance value ranged from less than $5 million to as high as $90 million. Deferred maintenance as a percentage of total replacement value ranged from less than 10 percent to as high as 80 percent.*

Follow-up phone conversations were made with some of the participating universities. These conversations resulted in the following details and clarifications that were not evident in the survey form:

Brigham Young University **(BYU)** ***Idaho*** has operated its utility infrastructure in a consistent manner for many years. All general annual operating costs are funded through tuition allocations, while all capital renewal and expansion projects are funded through institutional capital programs. BYU has little to no deferred maintenance for its utility infrastructure. All assets from new or renewal projects are tracked through an asset management database where the normal expected life is identified and annual capital renewal funding is established based on the requirements for systems that have exceeded their normal expected useful life. Project priorities are then established annually based on maintenance cost records and trends compared to the cost to replace or renew. All operating costs, including annual maintenance and utility costs, are provided through tuition revenue and are budgeted for using an annual- and short-term budgeting process. Annual costs are benchmarked with the International Facility Management Association and other building and operating benchmarks. The cost effectiveness of the program is also driven by setting limits to excess building inventory. The campus buildings are scheduled and space is provided when needed to achieve a 70 percent utilization factor for the buildings. The program's success is the result of a long-term view to managing and operating the facility assets and of the culture of the boards of directors, visitors, or trustees, which is dedicated to the preservation and sustainability of the physical plant of the campus.

Washington State University receives funding for utility operations, maintenance, and capital renewal through the campus general funds. The Budget Office pays directly for purchasing utility services, i.e., electricity, sewer, and natural gas. Steam is provided to heat a majority of the buildings from a central steam plant and distributed to the buildings. Water production and distribution is a university-provided utility. Electricity is purchased from the local utility at primary meters and distributed throughout the campus to individual buildings and load centers. Auxiliaries such as housing and other nonacademic structures are charged for utilities based on a full-cost recovery model. Other auxiliaries, such as athletics, pay energy and utility rates based on operation costs and pass-through utility purchase costs. Some ESCO projects have been implemented on the campus, and payments have been structured around calculated savings in lieu of fully metered and verified savings programs. ESCOs may be considered in the future where funding for projects with a payback is not available.

The University of Colorado Boulder operates its utility infrastructure as an auxiliary. Utilities are charged for the buildings, departments, or users at a rate adequate to fully cover all direct costs, including administrative charges, capital recovery, and debt service for the respective utilities. Capital renewal requirements for deferred maintenance for the campus academic, auxiliary (sports, student life), and administrative buildings do not include any costs associated with the utility infrastructure. Current programs to implement large-scale energy reduction programs through the State's approved ESCO contractors are completely independent of the utility infrastructure and utility rate systems.

St. Francis Xavier University, Nova Scotia is a small, residential college that is transitioning its utility infrastructure system toward a self-funded auxiliary. Significant capital projects are being undertaken through a P3 partnership with a large ECSO, which incorporates utility system projects and building deferred maintenance projects. The program is facilitated by the desire and need to move an aged central steam plant from the middle of the campus to its fringes. The projects are being funded through guaranteed savings in energy and operating costs from current budgets. The relocation of the central steam plant to smaller, regional heating water systems will also reduce labor needs by $600,000 annually, which is part of the savings equation for the project. Off-balance sheet structure and financing is not being used for this program. The campus considers the P3 partnership critical for two reasons, the first being that the innovation and solutions provided were for a full turnkey solution that was not offered through any conventional engineering design/bid/build-type program. Second, since the program is being paid for through current operating budgets, the performance guarantees were critical to limiting risk for the university.

Algonquin College, Ottawa is in the second phase of a multiyear/multiphase project to move the utility infrastructure to a self-supported auxiliary system, where the charges to the buildings consuming energy will be adequate to fully fund the utility and building maintenance and operating costs (including current deferred maintenance liabilities) in the future. The P3 partnership includes a 20-year agreement and term with off-balance sheet financing for the project, arranged through a life insurance company that offered a low-interest investment fund for the $49 million program. Currently, the institution is beginning the process of providing "shadow budget and building invoicing" for the next two years to prepare all stakeholders with the new cost and cost recovery system for each individual building. Going forward, savings from energy conservation will transfer back to the individual departments based on actual utility meter data at the building. An additional innovation for the institution is that the campus is disconnecting from the local electric utility grid and the institution's partnerships with industry that links the new utility system and academic programs as a training tool for students in the energy, facility, and sustainability programs.

The University of Oklahoma Norman was challenged with significant capital needs for the utility infrastructure concurrently with decreasing funding from both internal and external sources. The university leadership was interested in monetizing some of the institution's assets through various forms of sale and leaseback. The utility infrastructure was identified as an asset that the university does not have expertise in and that should not be operated as part of their core mission. Initially, the program was defined as "selling the asset" to a private entity and buying utilities as delivered to individual metered buildings. The university would use the money received from the sale for facility deferred maintenance and energy reduction programs in the remaining facility buildings. During the lengthy request for proposal (RFP) and contracting process, an unforeseen cost was identified where the infrastructure would be subject to property and sales tax when it was not owned by the university. As a result, the partnership was modified and contracted to a third party who paid a concession fee for the right to operate the utility infrastructure over a 50-year term. The partner recovers the fee and operates the system based on very detailed contract terms that are meant to maintain alignment of the university's need to receive reliable and cost-effective utilities, while allowing the private party to recover the concession fee and reasonable maintenance and operating costs, as well as a profit based on annually audited and agreed-to rates during the 50-year term. The program has met its objectives, with the one caveat that the university has to make a significant effort to manage and audit the contract on an annual basis.

The University of Oregon implemented a large ($112 million) utility infrastructure project in 2008 with cogeneration, a steam plant, and a central chilled water system. The project was funded through bonds that are being repaid through utility rates billed based on usage at the campus buildings. The university charges buildings full cost recovery, including building a reserve for another 10 years that will allow the utility enterprise to function without significant bonding for future projects. The transition and this period of essentially "double" costs, (i.e., both debt recovery plus building a reserve) has been difficult to sell and explain. New buildings, such as housing, strongly pursue the direct connect option to the local utilities due to reduced utility costs. Rates have been set up on unit sales only, not based on demand and commodity—which also adds to the difficulty in perceptions of costs and savings opportunities. Additionally, the steam and electric loads are not well aligned in the summer. The project costs exceeded estimates, and steam-driven cooling was not implemented for the project. This has also led to higher costs for system operations because the steam and electric load are not matched during the summer.

St. Mary's College of Maryland is a residential campus located a fair distance from any population centers. The campus has distributed systems with some building loops from oversized boilers and chillers. The university has turned the electric distribution system over to the local utility to own and operate. This was advantageous from a reliability position—the university was not large enough to maintain its own high-voltage staff or a stockpile of transformers for use when a unit failed. Both of these elements meant that a building could be down for days or weeks in the case of a failure. Since the distribution system was state property, it took considerable effort to transfer it to the utility. However, the benefit was improved turnaround from an equipment failure standpoint, as well as a short-term infusion of significant dollars to renew the system and meter all buildings in exchange for higher electric costs per building. Water and sewer systems are operated and maintained by a quasi-state entity that spreads costs over a large user base in the state, which keeps rates low. The institution is partnering with students and experimenting with the use of student fees for energy-efficiency projects that directly impact the students. Initially these funds were used to buy Green Renewable Energy Credits for carbon offset. However, through the partnership, the university demonstrated that energy conservation programs have a greater impact on the environment and the campus.

Other Noteworthy Institutions

In addition to the findings of this APPA CFaR survey, other examples of utility infrastructure operations and funding structures for a few institutions are listed below. Solutions vary from simple annual budgeting programs to complex off-balance sheet financing and operating structures, and include the following:

- ***The University of Maryland College Park****: Off-balance sheet energy utility infrastructure renewal transferred ownership of the utility infrastructure to a state development entity to maintain tax-exempt status and to use state ownership of the critical infrastructure system as a contracting vehicle to engage a third party to renew, expand, and operate the utility infrastructure over a 20-year period. The university pays for utilities based on agreed-upon rate structures developed as part of the partnership contracting process.*

- ***Harvard Medical Campus*** *is buying steam and chilled water from a third-party owned and operated district energy company.*

- ***Eastern Illinois University*** *contracted with an ESCO to build and operate a new biomass steam plant based on energy and operational savings from campus energy conservation programs.*

- ***The University of Missouri Columbia*** *is operating the utility as a separate enterprise system, which charges utilities delivered to each building and funds its operations through revenue bonding, reserves, and income from utility sales.*

- ***The University of Minnesota*** *contracted with a third party to build and operate new utility infrastructure funded through institution-issued general obligation (GO) bonds.*

- ***Purdue University****, when approached by third-party providers, developed an internal plan to compete with the third-party proposals. Ultimately the internal plan became the guiding document for operating and funding continued infrastructure renewal and operations.*

- ***The University of New Mexico*** *developed a 501(c)(3) nonprofit entity, Lobo Energy Incorporated (LEI), whose original mission statement was to provide assistance to the university as requested, for management and supervision of planning, design, engineering, contracting, energy conservation, and commissioning services for assigned projects; equipment and service procurement for project implementation; and review of regulatory issues while monitoring long-term technological innovation and sustainable practices. LEI was set up to fund and operate the utility infrastructure with separate financing (on balance sheet) and operating boards to control reserves and set utility rates for the campus's metered buildings. Today, LEI's services focus on financing and strategic regulatory and legislative issues related to energy and the university's energy utility services infrastructure.*

- ***The University of Michigan*** *operates the Utility Services Enterprise, which recovers full costs for the operation, maintenance, and capital renewal and expansion of the steam, chilled water, electric, water and sewer, and gas systems. Surcharges are also used to recover capital for extensive renewal or replacement of aged infrastructure, specifically in the water and sewer utility systems.*

Conclusion

Overall, it is difficult to draw any absolute conclusions from the survey results and the information received from the phone interviews; however, the following trends and similarities can be stated, and some pros and cons identified as follows:

1. *There is no clear industry standard when it comes to funding and operating the utility infrastructure as a business within the university and higher education market sector.*
2. *Those campuses that operate the utility system as an enterprise or auxiliary system that is self-supported with full cost recovery from rates charged to buildings, departments, or the general fund, have less concerns relative to future utility and deferred maintenance funding.*
3. *Institutions that do not take a long-term view with the utility infrastructure have larger deferred maintenance and greater annual cost volatility risk associated with their utility infrastructure system.*
4. *Utilities are an inevitable cost to the university, and adapting business practices to achieve the lowest total cost of ownership (long-term view) for the institution will be critical as the debate continues over the cost of higher education.*
5. *While utility operation is not a core mission for universities, it is critical to understand that achieving a balance between reliability, efficiency, and stability will have a positive impact on the future cost of education for the students.*
6. *Innovations relative to utility infrastructure operation and funding generally lead an institution to alternatives that work best for the individual college.*

One reviewer of this CFaR study offers the best summary of its results:

> *"This is a very interesting and relevant topic for higher education facilities officers; it is also a very complex topic. I was hoping the research would identify a clear path for utilities infrastructure renewal—perhaps based on institution size or some other characteristic.*
> *However, the research revealed that this is very difficult to accomplish due to two factors:*
> 1. *The uniqueness of colleges (no two institutions have the same utilities infrastructure)*
> 2. *The success or failure of a particular strategy may take years to determine and is often influenced by external forces (economy, energy prices, etc.)"*

General forms for the utility infrastructure business entity that an institution may consider include:

1. Auxiliary enterprise 501(c)3
2. Quasi-auxiliary enterprise—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.
3. Self-funded through operating or capital funds that may compete with academics for capital.
4. Funded through capital campaigns/endowment proceeds
5. Institutionally funded through other means including internal loans, grants, or utility rebate programs.
6. P3s described in Appendix I

My opinion of the survey and analysis is as follows:

1. Some institutions are taking on the issue of utility infrastructure renewal with programs to reduce the deferred maintenance and increase reliability, resiliency, and efficiency. These institutions are employing varying methods to fund these programs, which are open and transparent and do not rely on previous "business-as-usual" annual budget programs.
2. Institutions with large deferred maintenance and fewer energy and utility infrastructure renewal programs in place are generally reliant on annual budgeting and general fund economic resources. These institutions do not appear to be communicating or developing any form of innovative or modified cost recovery and capital renewal programs.
3. P3 approaches should be viewed in a positive light, and the degree to which they may be investigated or implemented at any specific campus will be directly related to how inefficiently or ineffectively the utility infrastructure is managed and operated.

The Table in Appendix I identifies pros and cons of basic funding and business arrangements based on the writer's experience and opinions, and on interpretation of the survey and the phone conversations. The comparisons are general in nature and are not intended to cover the multitude of combinations available in a microanalysis process. In all cases, whether using internal departments or external partnership agreements, the interests, goals, and objectives of all parties must be aligned so that the parties are not incentivized for the wrong reason or at the expense of only one party.

Based on the relatively small sample of institutions that participated in this survey, I recommend that APPA consider gathering further information on institutional use of P3 agreements through integration with APPA's Facilities Performance Indicators (FPI) survey sent out each year, or including questions on P3s as a periodic survey to its membership. Based on the phone interviews, there are some unique and innovative processes being developed at many institutions to resolve the deferred maintenance and capital needs of campus utility infrastructure systems.

Appendix I

P3 Program Pros and Cons Comparison

Business Approach	Pros	Cons
P3 Concessionary Agreement	Monetizes the asset with influx of capital to the institution. Can bring new best-practices operating procedures that reduce future costs. Can bring a level of expertise that may not be available to the institution. Can reduce costs through more efficient contracting and purchasing processes. Can provide efficiency and performance guarantees not available from internal operation staff. Maintains the tax-exempt status of the asset and operating costs with proper contracting and tolling vehicles. Utility operations is not considered a core competency or primary mission of the institution.	Requires additional level of institution's management to "manage" the contracts. May result in significant increases in annual costs depending on overhead and oversight associated with the contracts. May result in higher cost of capital than that available through the institution. Will result in costs where significant risk or operating guarantees are pushed to the partner in the agreement.
P3 Energy Services Contract (ESCO Models)	Can provide capital and energy savings performance guarantees not available to internal project execution processes. May lead to more efficient and quicker implementation through turnkey engineering, procurement, and construction contracting with a single entity. Can provide financing that does not impact balance sheet when structured properly. Can accelerate project implementation campus wide.	Contracts and cash flow may be negatively impacted if energy costs drop significantly during the payback period. May result in a higher cost due to cost of capital and partner's required profit and return on equity (ROE). Costs to provide annual measurement and verification for payments can increase the initial and ongoing costs substantially. Internal charge-out rates that do not differentiate between fixed and variable costs can result in inadequate cost recovery for the contract.

Business Approach	Pros	Cons
P3 Partnership—Build-Operate-Transfer Agreements (similar to various forms of lease agreements)	Can maintain the tax-exempt status if structured properly. May be less costly to build based on institution's overhead, since procurement costs are high. The institution can focus on its core mission of education and research. Can bring a level of expertise and resources that may not be available at a reasonable cost to the institution. Utility costs can be levelized without significant swings in annual budgets due to capital requirements. Can provide an infusion of funds to the institution. May be a benefit to the balance sheet based on contract structure. Can provide guarantees in capital costs and operating efficiencies. Utility operations is not considered a core competency or primary mission of the institution.	May reduce the institution's input during design, construction, and operation. If interests are not aligned, may be a difficult contract to manage. If equity and debt are required through the partner, may result in significant increase in annual utility costs.
P3 Partnership—Build-Own-Operate Agreements (Also can be considered as a sell infrastructure to monetize those assets)	The institution can focus on its core mission of education and research. Can bring a level of expertise and resources that may not be available at a reasonable cost to the institution. Utility costs can be levelized without significant swings in annual budgets due to capital requirements. Can provide an infusion of funds to the institution. May be a benefit to the balance sheet based on contract structure. Can provide guarantees in capital costs and operating efficiencies. Utility operations is not considered a core competency or primary mission of the institution.	May result in the utility asset and operation being subject to property and sales tax. For all future renewals of agreement, the institution becomes a captive customer with less negotiating leverage. If assets are sold, the partner will recover those costs in the utility fees and rates, raising future costs for those utilities.

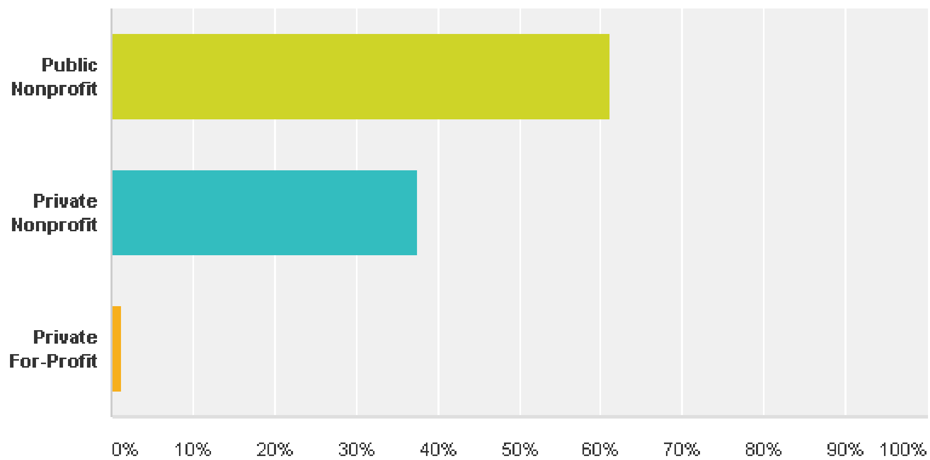
Business Approach	Pros	Cons
Full-Cost Recovery Revenue Enterprise Entity	Can provide stability in utility costs from year to year by building and spending from reserves. Adds to awareness of energy and utility costs for both the academic and nonacademic departments. Can provide financial feedback from sustainability efforts on the campus. Operating the utility infrastructure as a business unit may reduce complexity.	Can result in significant reserves between large capital renewal projects. Changes in academic culture and responsibility for building energy use can be difficult. Adds to complexity in annual budgeting process for the individual buildings and departments.
Internal Operating Expense— Year-to-Year Budgeting and Operation	100% of unused budgets usually flow back into institution's general fund. No long-term contracts to manage. Except in emergencies, provides more flexibility in annual use of funds.	Must compete with other annual capital and operating budgets on academic merit. Generally associated with large swings in annual costs for both operating budget and capital requirements. Can result in a use-it-or-lose-it repair or replacement program and higher infrastructure costs. Emergency repairs can impact other planned capital and maintenance projects.

Appendix II
APPA-CFaR Survey on Utility Infrastructure Operations and Funding Best Practices.

Q1

Type of Institution

Answered: 80 Skipped: 0

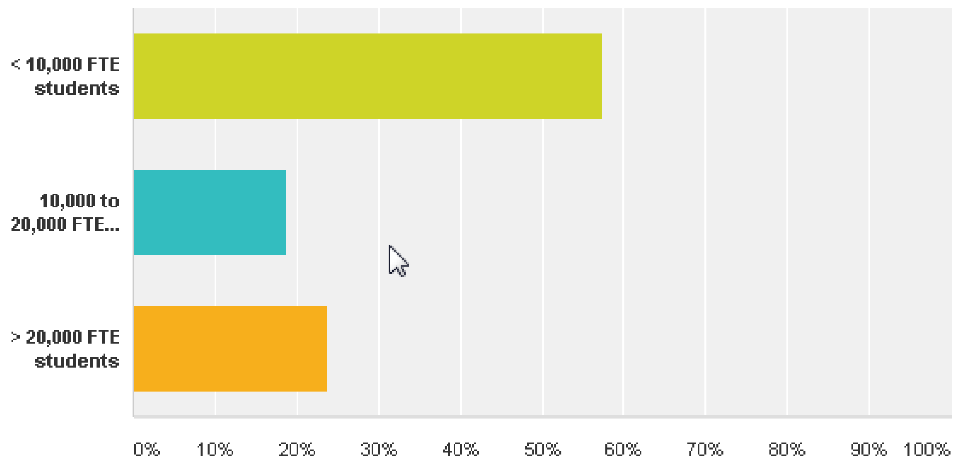


Answer Choices	Responses	
Public Nonprofit	**61.25%**	49
Private Nonprofit	**37.50%**	30
Private For-Profit	**1.25%**	1
Total		80

Q2

Size of Campus, in full-time equivalent enrollment (choose one)

Answered: 80 Skipped: 0

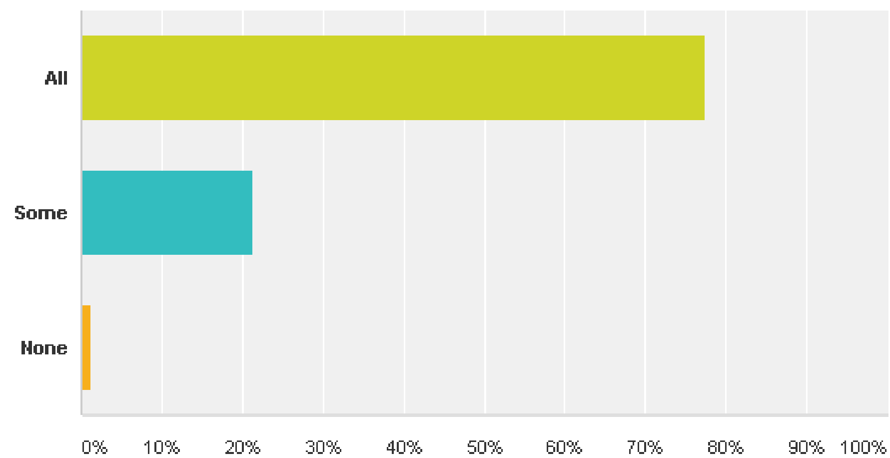


Answer Choices	Responses	
< 10,000 FTE students	**57.50%**	46
10,000 to 20,000 FTE students	**18.75%**	15
> 20,000 FTE students	**23.75%**	19
Total		80

Q3

Does your campus make independent decisions on Energy and Utility Infrastructure purchases, projects, renewal, planning, and energy financing projects?

Answered: 80 Skipped: 0



Answer Choices	Responses	
All	**77.50%**	62
Some	**21.25%**	17
None	**1.25%**	1
Total		80

	Steam	Heating Water	Cogeneration	Chilled Water	Total Respondents
Primarily central plants	67.39% 31	45.65% 21	23.91% 11	78.26% 36	46
Primarily distributed production systems in the individual buildings	31.11% 14	91.11% 41	4.44% 2	73.33% 33	45
Do you own the central plants and distribution systems for...:	70.83% 34	62.50% 30	22.92% 11	89.58% 43	48
Have you used long-term P3 agreements for capital renewal?	75.00% 3	75.00% 3	75.00% 3	100.00% 4	4
If Yes, would you do it again for...:	100.00% 3	66.67% 2	100.00% 3	100.00% 3	3
Do you maintain your own systems?	67.92% 36	88.68% 47	20.75% 11	94.34% 50	53
Have you used long-term P3 agreements for operations and maintenance?	60.00% 3	40.00% 2	40.00% 2	80.00% 4	5
If Yes, would you do it again for...:	50.00% 1	50.00% 1	50.00% 1	50.00% 1	2
Do you meter and charge the buildings for utility use?	80.00% 16	40.00% 8	20.00% 4	65.00% 13	20
Do you use a full-cost recovery charge rate for institution-supported buildings (academic, research, administrative buildings)?	100.00% 9	33.33% 3	44.44% 4	77.78% 7	9
Do you use a full-cost recovery charge rate for utilities for non-support (auxiliary, non-academic related) buildings?	73.68% 14	52.63% 10	36.84% 7	73.68% 14	19

1. *No central plants or distribution systems. We submeter electrical use and charge auxiliary departments.*
2. *We do not include capital renewal in utility rates. We charge housing, student rec center, and union their full utility costs. Other auxiliary departments pay maintenance and operations costs only. There is no charge to institutional-supported facilities.*
3. *We meter buildings but do not charge—as a private institution, we don't have the constraints to bill.*
4. *Unaffiliated nonprofit building on steam distribution system.*
5. *Partial cost recovery charged. Excludes major repairs or capital renewal.*
6. *We meter all buildings. We recharge auxiliary operations on a square-foot (SF) basis.*
7. *We meter but do not charge for utilities to education and general purpose (E&G) buildings, but do charge auxiliaries.*
8. *We meter every building but bill academic and nonacademic with lump-sum aggregated bills monthly.*
9. *We are in the process of converting to reliability centered maintenance (RCM) methodology for charging costs to schools and departments, prorated based on net assignable area (without meters). Purchase and installation of turnkey cogeneration plant now underway using hybrid P3 approach.*
10. *We are primarily a distributed plant with integrated campus-wide building automation. Some shared plants in quads, but not a central plant.*
11. *Our medical campus is co-located with a hospital and we tie into their central heating and cooling plant for steam, chilled, and hot water.*

Q5

Do you own All, Some, or None of the generation, supply, or treatment of your utilities? These would include Electricity, Natural Gas, Water, and Sanitary Sewer.

Answered: 57 Skipped: 23

	Electricity	Natural Gas	Water	Sanitary Sewer	Total Respondents
All	45.83% 11	33.33% 8	70.83% 17	70.83% 17	24
Some	76.67% 23	40.00% 12	56.67% 17	40.00% 12	30
None	66.67% 20	86.67% 26	70.00% 21	80.00% 24	30

	Electricity	Natural Gas	Water	Sanitary Sewer	Total Respondents
Do you own all of the distribution system to individual buildings from a primary generation or metering point?	87.50% 42	52.08% 25	70.83% 34	66.67% 32	48
Do you use a combination of self-owned and utility-owned distribution to individual buildings?	67.86% 19	64.29% 18	60.71% 17	60.71% 17	28
Do you use any long-term P3 agreements for capital renewal for...:	100.00% 1	100.00% 1	100.00% 1	0.00% 0	1
If Yes, would you do it again, for...:	100.00% 1	100.00% 1	100.00% 1	0.00% 0	1
Do you maintain your own systems?	90.57% 48	64.15% 34	88.68% 47	84.91% 45	53
Do you use any long-term P3 agreements for operations and maintenance of these utility systems?	100.00% 2	50.00% 1	50.00% 1	50.00% 1	2
If Yes, would you do it again, for...:	100.00% 1	0.00% 0	0.00% 0	0.00% 0	1
Do you meter and charge the buildings for utility use?	100.00% 18	72.22% 13	88.89% 16	44.44% 8	18
Do you use a full-cost recovery charge rate for institutional support buildings?	100.00% 8	87.50% 7	87.50% 7	50.00% 4	8
Do you use a full-cost recovery charge rate for utilities for non-support buildings?	100.00% 17	88.24% 15	88.24% 15	82.35% 14	17

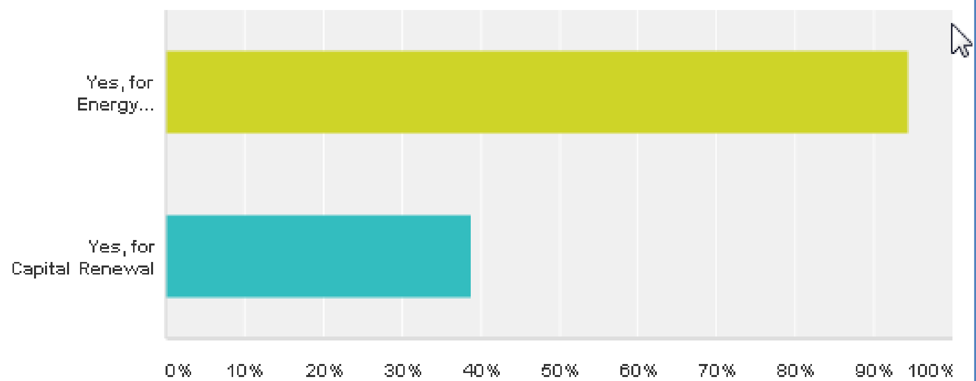
1. *We are in serious negotiations for the first time to launch a P3 agreement for steam/hot water. We meter every building and attribute to cost centers. We do not "charge."*
2. *We charge some nonsupport buildings, but not full cost recovery.*

3. *Meter auxiliary units/buildings*
4. *We charge back for utilities usage for buildings that are not funded by government.*
5. *We charge housing, student rec center, and union their full utility costs. Other auxiliaries pay maintenance and operations costs only. No charge to institutional-supported facilities.*
6. *We meter, but do not charge for utilities*
7. *Unaffiliated nonprofit buildings on distribution systems.*
8. *Partial cost recovery charged. Excludes major repairs or capital renewal.*
9. *We meter buildings but do not charge back*
10. *We meter and only charge auxiliaries.*
11. *We own our sanitary collection system, but treatment is piped to the town plant.*
12. *As above at item 4 for conversion to RCM methodology for cost recovery. We are in discussion with our local electrical utility about blended ownership of our behind-the-meter electrical distribution system (outcome not yet clear). Once our cogeneration plant is installed, we will generate up to 100% of current electrical needs (initially 65% by December 31, 2015; within two weeks we will determine final electrical output and decide whether it is cost effective to match current and projected demands).*
13. *We own all of our backup generation and campus infrastructure for all of the power, gas, water, and sewer lines, but only from the curb line or master meter.*
14. *Ancillary services and outside agencies pay full cost recovery on all utilities.*

Q7

Have you used P3 partnerships or energy service companies (ESCOs) for energy reduction programs and/or for capital renewal programs?

Answered: 18 Skipped: 62



Answer Choices	Responses	
Yes, for Energy Reduction	94.44%	17
Yes, for Capital Renewal	38.89%	7
Total Respondents: 18		

For Energy Reduction Programs

1. *Bonds the university sold*
2. *10-year contract that included both capital improvements and resulted in energy reduction*
3. *In-house*
4. *Internally financed*
5. *Self-funded*
6. *Internal funds*
7. *State provided low-interest loans*
8. *Bank*
9. *Energy savings performance contract (ESPC)*
10. *ESCO*
11. *Lease purchase*
12. *Unknown*
13. *Bank, SunTrust, TD capital leasing*

14. *First ESCO financed directly by the ESCO with payback from savings over 10 years. Second ESCO (ESCO 2) will pay a third-party financier back over 20 years from the derived savings and revenues.*
15. *It was a termed lease payment with turnover of the assets for $1.00 at conclusion.*
16. *Financed with bond funds/return-on-investment (ROI) savings*

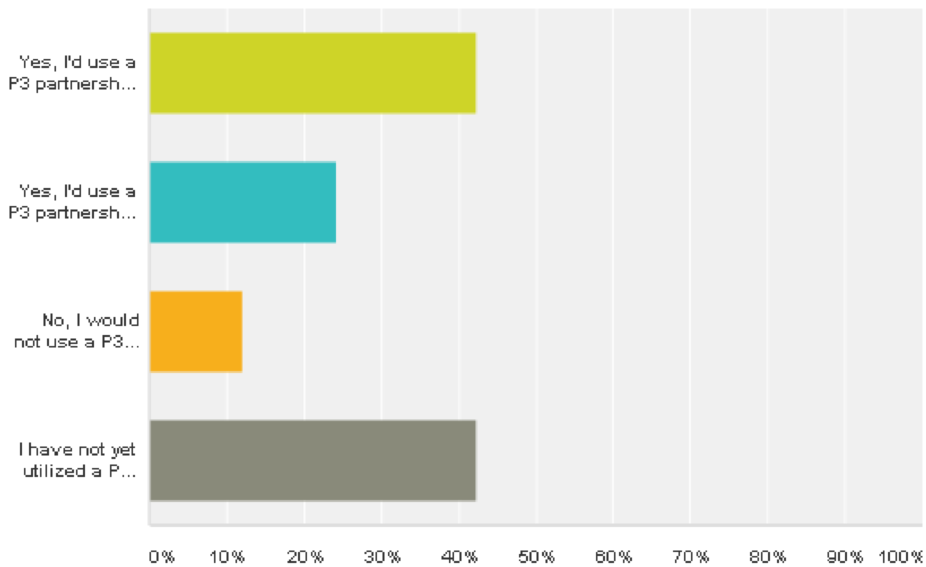
Capital Renewal Project Financing

1. *Bonds the university sold*
2. *10-year energy services contract; ESCO paid utility bills and for capital improvement that resulted in energy reduction. We were billed based on previous usage.*
3. *State provided low-interest loans*
4. *Our P3 partner did the financing with taxable and nontaxable bonds and corporate equity.*
5. *Lease purchase*
6. *Same as above; built into the ESPC.*
7. *Same as above with energy reduction.*
8. *Under consideration*

Q9

If Yes to Question 7, would you do it again?

Answered: 33 Skipped: 47

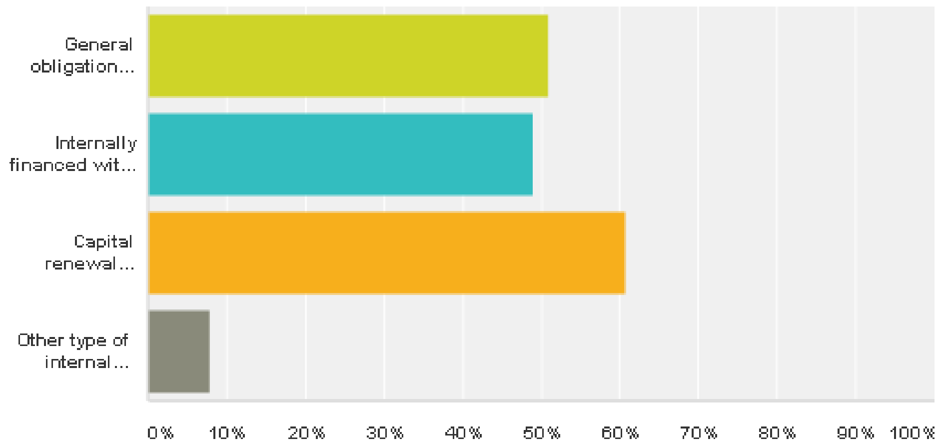


Answer Choices	Responses	
Yes, I'd use a P3 partnership or ESCO for a future Energy Reduction project	42.42%	14
Yes, I'd use a P3 partnership or ESCO for a future Capital Renewal project	24.24%	8
No, I would not use a P3 partnership or ESCO again in the future	12.12%	4
I have not yet utilized a P3 partnership or ESCO arrangement	42.42%	14
Total Respondents: 33		

Q10

Have you used internal financing for energy reduction programs? A checkmark means "Yes."

Answered: 51 Skipped: 29



Answer Choices	Responses	
General obligation funding	50.98%	26
Internally financed with savings in future budget dollars	49.02%	25
Capital renewal allocations	60.78%	31
Other type of internal funding (please specify) Responses	7.84%	4

Green Revolving Fund
3/23/2015 11:57 AM

part of maintenance funding
3/23/2015 9:41 AM

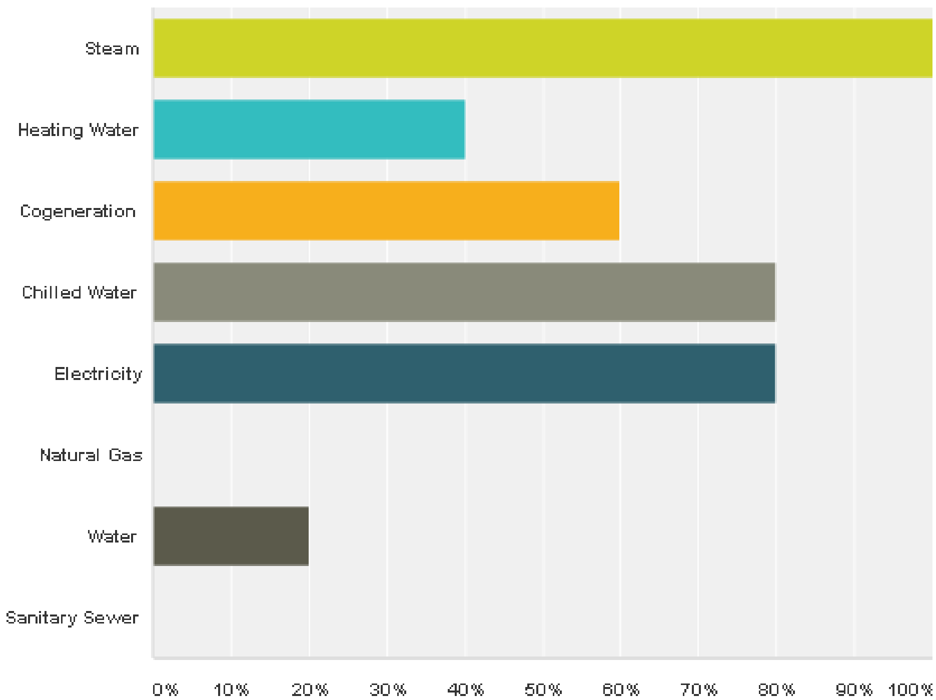
Green Revolving Fund established
3/23/2015 9:23 AM

Auxiliaries have used cash to install energy efficient equipment. E.g. LED lights, DDC controls
3/13/2015 12:00 PM

Q12

Are any of your utility infrastructure systems operated as a self-supporting enterprise or 501(c)3 entity? Check all that apply.

Answered: 5 Skipped: 75

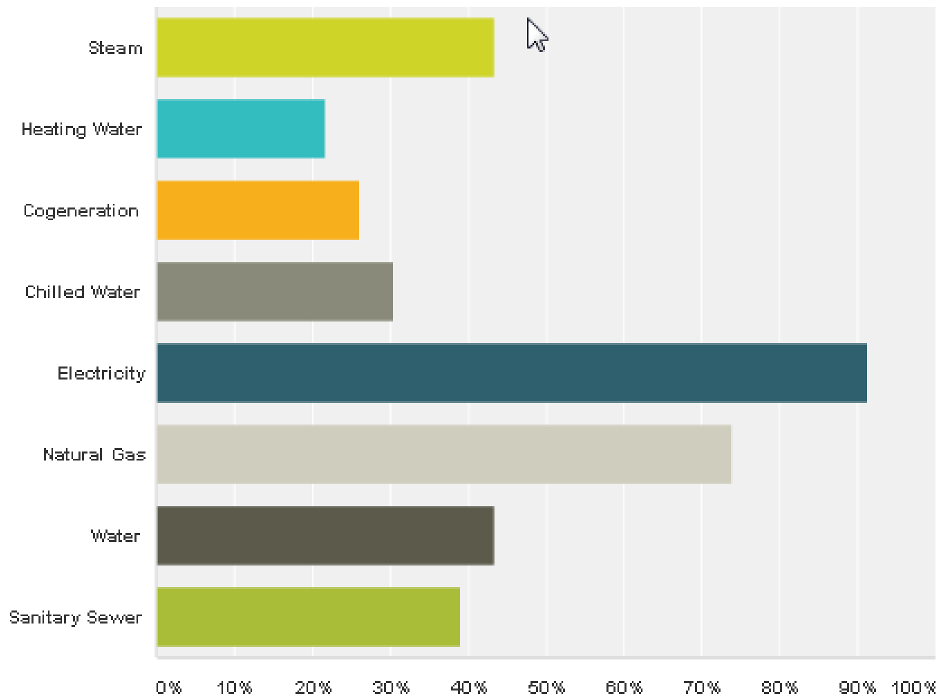


Answer Choices	Responses	
Steam	100.00%	5
Heating Water	40.00%	2
Cogeneration	60.00%	3
Chilled Water	80.00%	4
Electricity	80.00%	4
Natural Gas	0.00%	0
Water	20.00%	1
Sanitary Sewer	0.00%	0
Total Respondents: 5		

Q13

Do you allow reserves in the utility fund to reduce volatility annually? Check all that apply.

Answered: 23 Skipped: 57



Answer Choices	Responses	
Steam	43.48%	10
Heating Water	21.74%	5
Cogeneration	26.09%	6
Chilled Water	30.43%	7
Electricity	91.30%	21
Natural Gas	73.91%	17
Water	43.48%	10
Sanitary Sewer	39.13%	9
Total Respondents: 23		

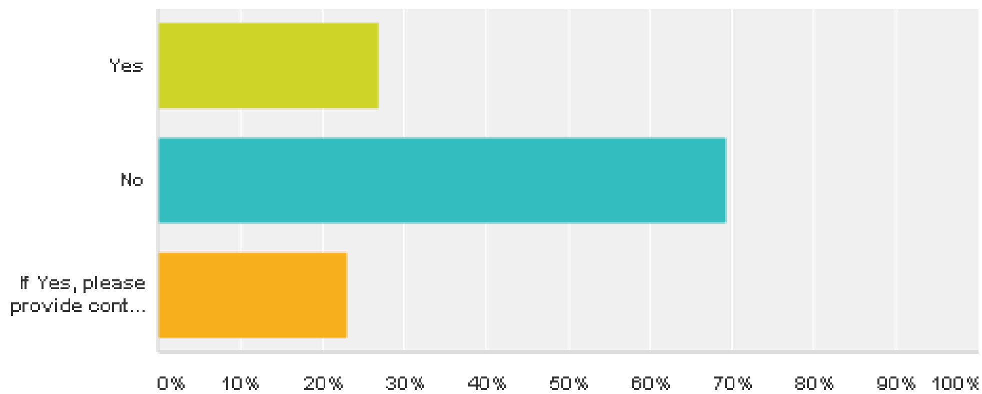
Q14: What is the dollar value of deferred maintenance for your total utility infrastructure system? • Answered: 36 • Skipped: 44	Q 15: What percentage of your current replacement value of the utility infrastructure system does that represent? • Answered: 35 • Skipped: 45
$25 million	15%
Not available	Not available
$14 million	24%
Low—Major equipment is only 14 years old	0
$90 million	20%
$5 million	20%
$15 million	20%
Greater than $10 million	50%
$35 million	80%
Unknown	Unknown
$10 million	1%
0	0
Don’t know	Don’t know
$27 million	11%
~$5 million	~50%
$2.5 million	5%
$20 million	7%
$500,000	20%
Unknown but low	Unknown but low
$500,000	Less than 10%
Unknown	Unknown
Unknown	5%
$10 million	25%
$9 million	0.3%
$3 million	30%
$20 million	1%
$1.5 million	Less than 1%
$16.2 million	35%

Q14: What is the dollar value of deferred maintenance for your total utility infrastructure system? • **Answered: 36** • **Skipped: 44**	Q 15: What percentage of your current replacement value of the utility infrastructure system does that represent? • **Answered: 35** • **Skipped: 45**
Don’t know	Don’t know
$2.5 million	20%
$5.5 million including internal building concerns	About 19%
Our overall January 2014 evaluation, at a facility condition index (FCI) of 0.13, is $87 million CAD. We have not broken it down into aggregated subsystems liabilities.	Unknown
Unknown	Unknown
$4 million	20%
$500,000–$750,000	3%
$100 million	25%

Q16

Would you be willing to participate in a more detailed discussion by phone?

Answered: 52 Skipped: 28



Answer Choices		Responses	
Yes		26.92%	14
No		69.23%	36
If Yes, please provide contact name, institution, and telephone number	Responses	23.08%	12