Utility System P3 Project

Scope of Work and Project Information

February 2022

Table of Contents

Disclaimer: This Scope of Work and Project Information document ("SOW") is subject to all disclaimers and qualifications found in the accompanying Request for Proposal Phase 1 ("RFP Phase 1") document.

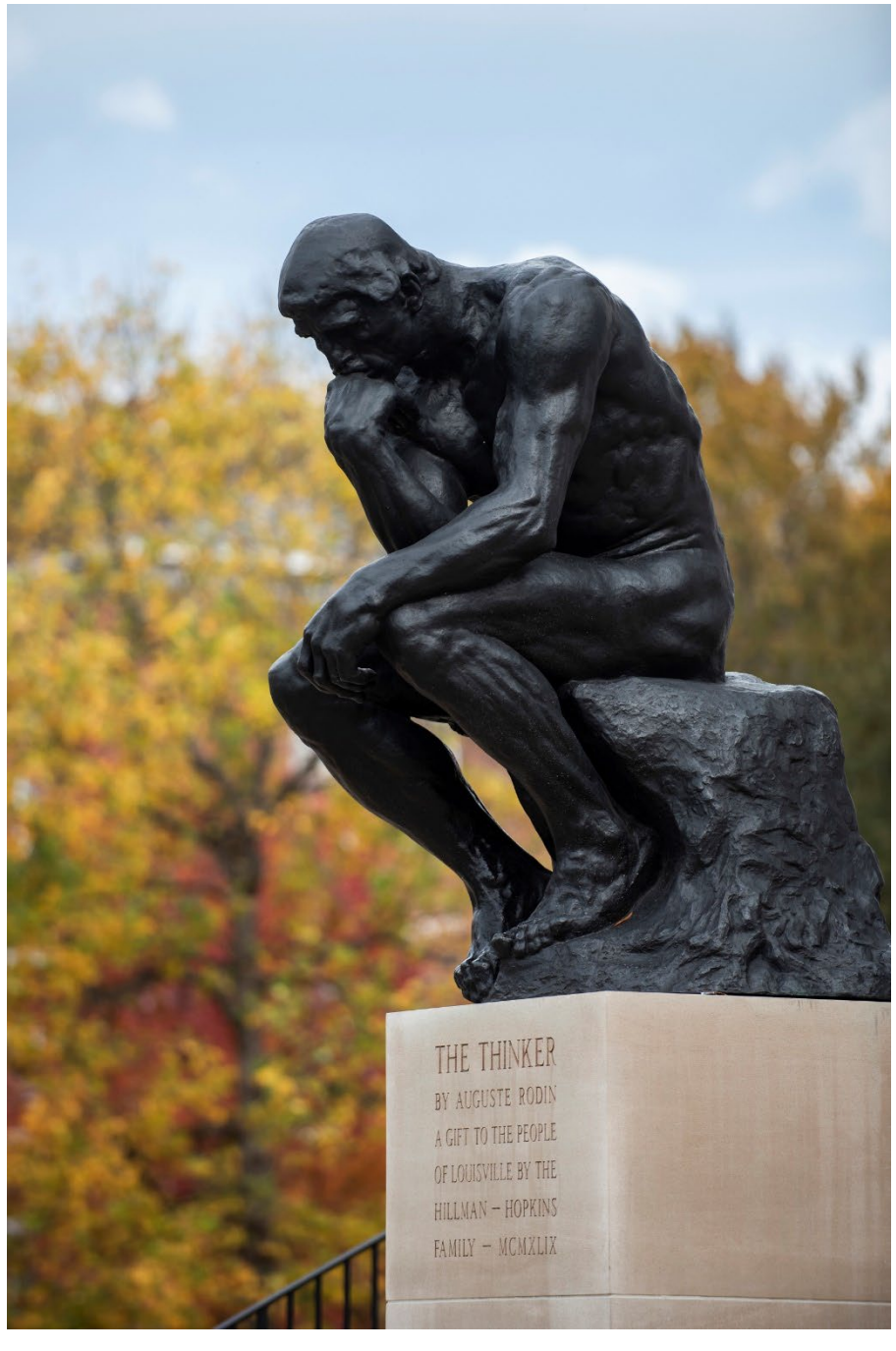
1. Executive Summary

Opportunity Overview

The University is seeking to enter into a public-private partnership ("P3") concession that will enable it to increase the long term reliability and sustainability of its utility system and generate funding to promote its CARDINAL principles for future generations of students

Background to the P3 Approach:

- The University is exploring a P3 concession with a private utility operator (the "Concessionaire")
- The University recognizes the value of partnering with a specialist provider of energy services to modernize and maintain its utility system
- The P3 aims to generate a new flexible funding source for the University to invest in future strategic initiatives
- The University's Interim President has determined that a P3 approach is likely to offer benefits compared to traditional delivery

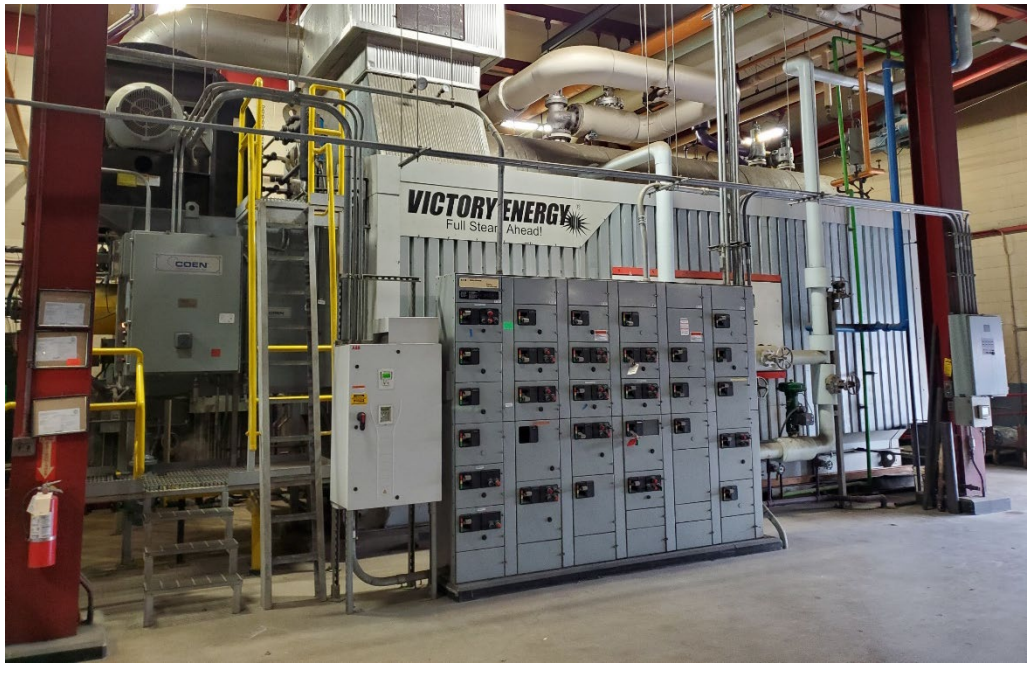


Specific Goals and Objectives of the P3:

- Generate an upfront capital sum that can be used to fund the University's core mission
- Maintain and upgrade the plant throughout the life of the project
- Achieve certainty over long-term operational and renewal costs
- Contribute to meeting the UofL's climate objectives including the forthcoming Climate Action Plan ("CAP") goals

Opportunity Overview (cont'd)

The University's proposed P3 is being structured to meet its specific goals and has been designed to reflect other successful projects that have recently closed in the market.



Project Scope / Highlights

- Opportunity for the Concessionaire to manage on-campus utility production and distribution systems through a 50 year lease and concession agreement (the "Concession Agreement")
- Concessionaire will be a partner with UofL to actively manage and innovate solutions to:
  - upgrade, operate and maintain the steam and chilled water plant located in the Service Complex Building ("SCB") along with the electric and tunnel distribution for the Belknap Campus (collectively, "Utility System")
  - analyze the Utility System and develop capital improvement plans to drive efficiency, sustainability and reliability over time
  - apply its experience of cutting edge technologies to identify and deliver demand-side and plant efficiencies that can improve project economics and help meet CAP decarbonization targets

Contract Scope / Highlights

- Concessionaire will pay the University an upfront payment ("Closing Consideration") in order to participate in this opportunity
- The University will pay a Utility Fee to the Concessionaire comprising Fixed Fee, O&M Charge and Variable Fee components similar to other university energy projects
- Concessionaire operational performance will be regulated by a range of key performance indicators focused on system reliability and efficiency
- The University expects to transfer its existing staff and will require that the Concessionaire offer staff the opportunity to enrich their training and career advancement as well as a competitive employment package

Investor Benefits

Investment Highlight		Description
1	**Partnership with a substantial public university**	► Kentucky's nationally recognized metropolitan research university with more than 23,000 students and 7,000 faculty and staff ► Solid, investment grade rating with a stable outlook built upon fiscal discipline, increasing net tuition revenues (despite the pandemic) and strong donor support
2	**A clear procurement process with committed leadership**	► The University has committed leadership and other stakeholders for this P3 project and an efficient and streamlined procurement designed to quickly realize the benefits of the P3 approach ► The University has secured a formal determination from the Interim President in favor of the P3 option and will, separately, obtain the required legislative approvals for the final RFP in accordance with the Commonwealth's P3 regulations
3	**Exclusive and stable long term cash flows**	► Concessionaire will be the exclusive provider of steam and chilled water from the Utility System to the Belknap Campus buildings that are connected to the existing loop. ► Long term, predictable cash flow stream over the Concession term including a Fixed Fee escalating over time and a defined return on capital for lifecycle investments
4	**Opportunity to invest in and improve the existing Utility System**	► Opportunity for the Concessionaire to identify, finance and implement a rolling program of capital works to improve the efficiency, reliability and sustainability of the Utility System ► Potential investments in ECM and other measures to support the University's revised Climate Action Plan which is expected to be completed in 2022 ► Opportunities to drive efficiencies from the Utility System and monetize them through the Closing Consideration
5	**Potential for campus growth**	► The University plans for new construction of approximately 400,000 sf (just over 10% of existing core campus) comprising new classroom (~50%), residence (~15%) and engineering buildings (~35%) ► Concessionaire will also have the potential opportunity to propose additional, standalone buildings to the distribution loops during the Concession Agreement term

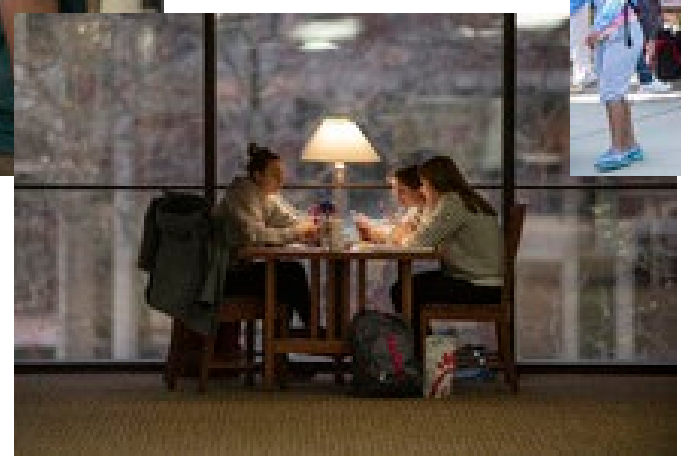
2. Overview of the University

Overview of University

Founded in 1798, the University of Louisville ("UofL" or the "University") is a state research institution located in the Commonwealth's largest metropolitan area and is the second largest public university in the state by total students

University Overview

- UofL has three campuses, including: (i) the Belknap Campus – considered the main campus – located three miles from downtown Louisville and houses eight of the University's 12 colleges and schools; (ii) the Health Sciences Center located in downtown Louisville that includes the University's health–related programs as well as the University of Louisville Hospital; and (iii) the ShelbyHurst Campus located in eastern Louisville used primarily for administrative offices. The scope of the P3 concession is limited to the SCB at the Belknap Campus and will not include either of the other two University campuses
- Total student headcount of 22,211 including 15,927 undergraduate, 6,287 graduate and post-doctoral students as of Fall 2020 with over 150,000 alumni across the U.S. and globally
- The UofL FY 2020 operating budget totaled ~$1.2 billion with nearly 7,000 faculty and staff include 4,276 administrative and other staff and 2,723 faculty across its campuses
- The University's endowment totaled $707m as of FY 2020



Overview of University (cont'd)

The University is a nationally recognized research university – ranked the best college in Kentucky according to U.S. Department of Education statistics and named a Top Producer of Fulbright Scholars for a 6th time in 2020

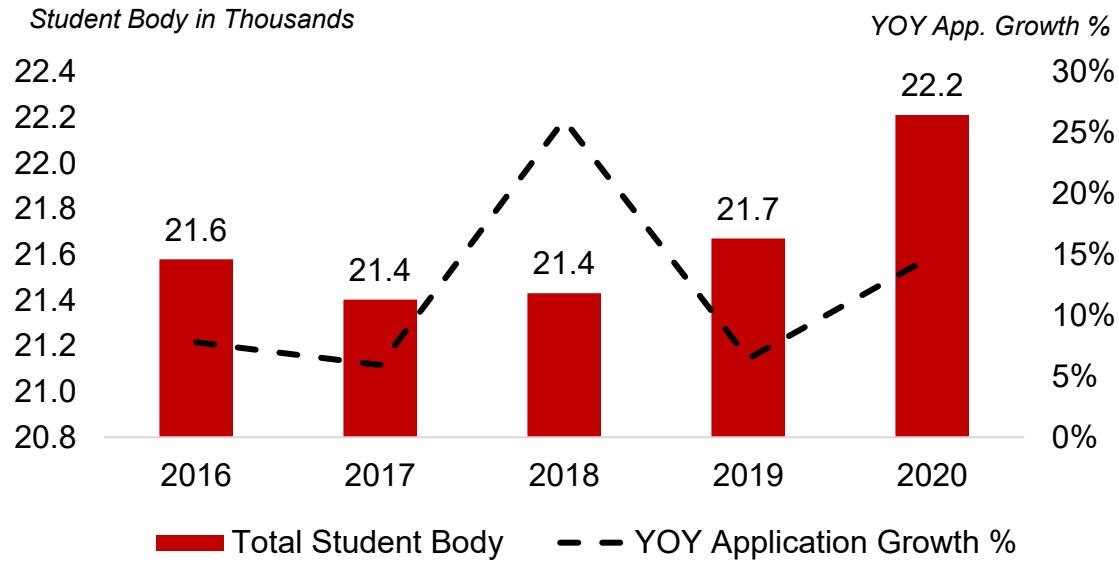
Academic Snapshot

Average GPA / ACT 2020 Freshman Class	3.64 / 25.0
International Students / Countries	~1,000 / 95
% Minority	~33%
First-generation College Students	~34%
Bachelor Degrees Awarded (2019-20)	~3,100
Post-Bach. Degrees Awarded (2019-20)	~2,100
Fields of Study Offered	250 +
# of Academic Schools / Colleges	12
First Year Retention Rate	~81%

Athletics Snapshot

Nickname	Cardinals
Conference	ACC
# of Men's Varsity Sports	9
# of Women's Varsity Sports	12
National Championships	3
Final Four Appearances Men / Women	10 / 3
Basketball Arena (Capacity: 22,090)	KFC Yum! Center
Football Stadium (Capacity: 61,800)	Cardinal Stadium

Total Student Body / Application Growth Rate



University and Project Leadership

The University has a highly experienced leadership team committed to implementing the energy system Concession.

Dan Durbin, Executive Vice President for Finance and Administration

- Dan functions as the senior financial and administrative advisor to the University President and other administrators. He is responsible for leading the University's overall financial and operational planning, management and administrative activities that span multiple units and affiliated entities.
- Dan also serves as an Instructor in the University of Louisville College of Urban and Public Affairs, holds and MPA from West Virginia University and a BA with majors in accounting and finance from Glenville State College.

Mark Watkins, Chief Operating Officer and Vice President for Operations and Administration

- Mark is accountable for leading the university operations planning, innovation and transformation, and for optimizing university resources that supports over 23,000 students and 6,500 faculty and staff. Prior to joining the University of Louisville in 2016, Mark was a Regional Vice President for Sodexo serving universities throughout the country as well as National Vice President for Sports and Leisure in the universities division. In these roles he supported contract management partnerships for dining and facilities services.

Sally Molsberger, Chief Procurement Officer

- Sally provides long term planning, strategy development and execution of procurement activities across the university including category management and sourcing, procure-to-pay, vendor management, contracting, including Personal Service Contracts (PSC), print production, and compliance to policies and regulations. Prior to working at the university, she was V.P. of Sales for S.M. Arnold, Inc. in St. Louis, MO and worked in the private-public sector for 20 years.

Sajid Mian, Assistant Vice President for Facilities Management

- Sajid has been with the University of Louisville since 2019 and is responsible for all strategic planning and day-to-day operations in the Physical Plant Department and the University Planning, Design and Construction Department, which spans over three campuses.
- Sajid holds an MBA from California State University, Stanislaus; MSc in Electrical Power Engineering; and BSc in Electrical & Electronic Engineering from California State University, Sacramento.

City of Louisville Overview

The University is situated in Louisville, the largest city in Kentucky which is part of an extended tri-state area with a close proximity to other major Midwestern cities. Louisville offers substantial amenities in its own right with select state and local highlights summarized below:

State of Kentucky Overview

- As of July 2021, the State's population was ~4.5 million a 3.9% increase from 2010[1]
- Kentucky's unemployment rate was 4.1%[2] as of November 2021 and the Commonwealth was rated Aa3 by Moody's, as of December 2021[4]

City of Louisville Overview

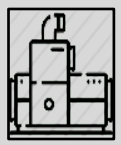
- Louisville is largest city in Kentucky and the 29th largest in the country. In 2020, the City's consolidated population was just below ~800k, representing a 5.7% growth from 2010[1] with 18-65 years old making up 61.3% of population
- As of November 2021, the city's unemployment rate was 3.0%, below the national average of 4.2%[2]
- Top employers in Louisville include UPS, Humana, Inc., Ford Motor Company, Norton Healthcare, UofL Health, and Kroger Co.[3]

Sources: 1. U.S. Census Bureau Quick Facts I 2. U.S. Bureau of Labor Statistics I 3. Livability.com I 4. Moody's

3. Proposed Concession Structure

Outline Technical Scope

The Concessionaire will have the opportunity to propose innovative approaches to upgrading and managing the Utility System with the scope to be finalized as part of the RFP development. However, it is expected that the scope will include the following:

System Component	Expected work to be undertaken by Concessionaire
Steam & chilled water plant 	• O&M and lifecycle of boilers and boiler balance of plant systems – including feedwater, condensate, natural gas, fuel oil, water treatment (NOTE: Louisville Gas & Electric ("LG&E") will retain ownership of natural gas piping, regulators, and meters within exterior fenced area up the outlet of the meters.) • O&M and lifecycle of chillers and chiller balance of plant systems – including cooling towers, chilled water pumps, water treatment • O&M and lifecycle of the Service Complex Building, which houses the plant, and its auxiliary systems – including on site HVAC, potable water and sanitary sewer, compressed air, building security, fire detection/alarm. (NOTE: Louisville Water will retain ownership of the city water meter within the plant basement) • Required capital works to the plant will be addressed through a regular capital improvement plan to be agreed with UofL. Any works would be undertaken by the Concessionaire under a Variable Fee approach described on the following pages
Instrumentation and control systems 	• O&M and lifecycle of key systems including boiler controls and burner management system ("BMS") for the SCB; Chillers controls; electrical controls and relays; remote chilled water loop differential pressure measurement (NOTE: Provide coordinated access to the University for the IT cabinet located in plant basement) • Opportunity to install and operate energy "dashboard" monitoring system to visualize real time energy data across the plant and energy use intensity (kBTU/sq. ft) for each University building connected to the network
Electrical distribution systems 	• 13.8 KV System – including switchgear, breakers, transformers, capacitor banks at the SCB and campus distribution side of the 13.8KV switchgear and capacitor bank. (NOTE: LG&E will retain ownership of electrical meters within the switchgear room.) • 4160V Systems – including switchgear, breakers, transformers, sub-panels at the SCB • Low Voltage Systems, 480V and less – including switchgear, breakers, transformers, motor control centers, sub-panels, lighting, receptacles at the SCB • UofL may include the 13.8KV Distribution to the Belknap Campus as part of the scope. Opportunity for installation of revenue grade sub-meter for each building on the campus distribution loops to tie into I&C controls and help manage building energy use (NOTE: Coordinate all entry/exit and maintenance of all 13.8KV equipment areas with University Life Safety group.)

Outline Technical Scope (ctd.)

System Component	Expected work to be undertaken by Concessionaire

Tunnel and utilities distribution network	• O&M and lifecycle of the tunnel structures and access hatches/doors
	• O&M and lifecycle of:
	  • Steam: Supply through first isolation valve after the first regulator from 125psi to building service pressure
	  • High pressure and low pressure condensate: Returns through first isolation valve within each building's mechanical room
	  • Chilled water supply and return: Supply and return through first isolation valve within each building's mechanical room
	• O&M and lifecycle of tunnel auxiliary systems – including sump pumps and ventilation units
	• Concessionaire will have the opportunity to add sub-metering for steam, chilled water and low pressure condensate at each building served in order to help manage and optimize building utility use

Permitting and existing contracts	• Take responsibility for maintaining relevant permits and safety systems including security, fire detection and alarm equipment within the SCB, boiler emissions air permit, chiller refrigerants permit, water treatment and fuel oil testing and conditioning • Potentially manage the University's relationships with utility providers including LG&E and Louisville Water (to be determined as part of the RFP process)
Capital planning	• Actively manage the lifecycle of Utility System components, develop a periodic capital improvement plan and present options to the University to upgrade and improve the Utility System over the term • Finance and implement the lifecycle improvements as agreed with the University including the potential addition of standalone buildings to the Utility System

Utility efficiency opportunities	• Opportunity for the Concessionaire to identify, implement and manage energy conservation measures within the SCB and University buildings. The University may seek to use resulting savings to increase its budget for the Fixed Fee and a larger Closing Concession
	• The University is open to innovative ideas but has identified opportunities around:
	  • Options for upgrading building air handling units and building chilled water systems to improve existing delta-T / over pumping chilled water issue
	  • Demand-side energy efficiency measures including improved lighting (LEDs), motion detection and other controls-based options
	• Opportunity for the Concessionaire to support the implementation of the University's Climate Action Plan that is due to be completed during 2022

Key Commercial Elements

Concession Overview

- University wishes to enter into a **50-year Concession Agreement** with a Concessionaire to manage its Utility System which currently serves the steam and chilled water needs of the University's Belknap Campus. Concessionaire will deliver the services through an experienced utility operator ("Operator")
- University will pay the Concessionaire a "Utility Fee" (described further below) in exchange for an upfront Closing Consideration and the Concessionaire's management of the Utility System
- The Concessionaire will be obligated to operate and maintain the Utility System to industry standards, that will be outlined and agreed as part of the Concession Agreement during the procurement process, as well as have the exclusive right to undertake lifecycle work at an agreed upon return with the University's agreement
- The University intends to use the upfront Closing Consideration to further other campus priorities as well as to invest in the University's Foundation with returns used, in part, to support future Utility System lifecycle costs as well as ongoing payments to the Concessionaire

Utility Fee Overview

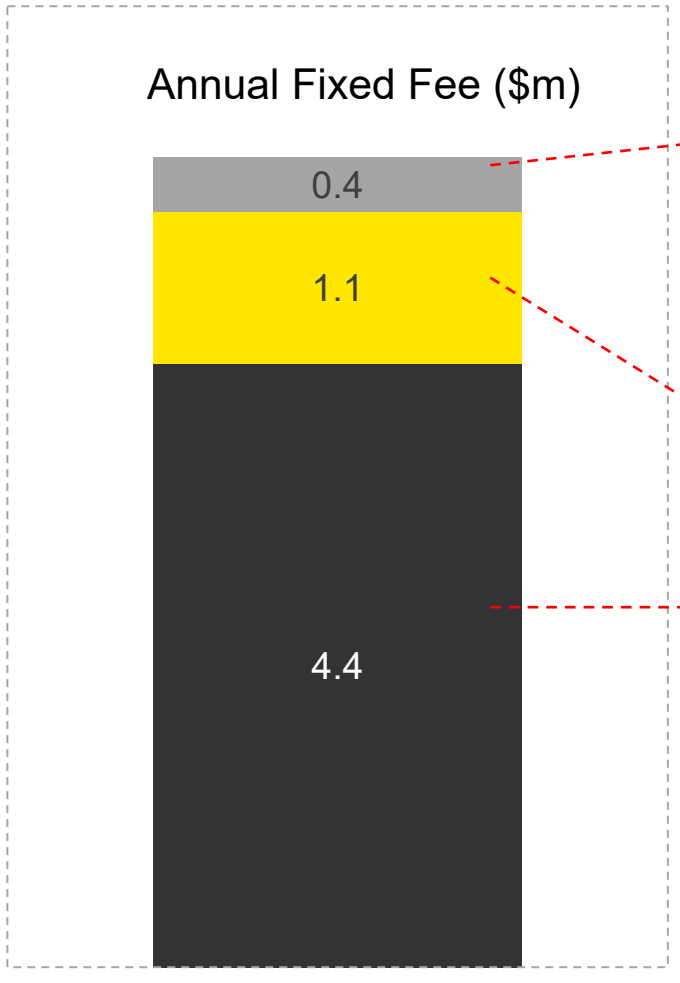
Payment from University	Description
1 Fixed Fee	Annual fee of $5.9m paid by the University to the Concessionaire that will escalate at a fixed rate
2 Operating Fee	Fee to the Concessionaire to cover O&M expenses, including: ▪ Capped O&M Costs: out-of-pocket expenses of the Concessionaire to cover items such as labor, supplies, overhead services as well as input utility charges / contracts ▪ Uncapped O&M Costs: specifically identified out-of-pocket expenses to be negotiated (e.g., Delay Events, University directed changes, change-in-law requirements)
3 Variable Fee	Fee used to cover lifecycle work by the Concessionaire made up of two parts: ▪ Capital Recovery Amount: amortized value of lifecycle work over 20-year period ▪ Concessionaire return: predetermined return based on an agreed gearing ratio by the Concessionaire using market values for debt and equity that will be periodically reassessed

Fixed Fee and Closing Consideration

Fixed Fee Overview

- The Fixed Fee represents the fee that UofL will pay to the Concessionaire during the Concession term to cover the debt and equity used to finance the upfront Closing Consideration. As further described below, the Fixed Fee is sized from reallocated input utility budgets (based on expected efficiency savings), capital program budgets and existing debt service budgets
- UofL intends to invest the Closing Consideration into the University of Louisville Foundation (endowment fund), which has averaged a ~7% rate of return over the past 20-years
- The University's primary objective is to maximize the upfront Closing Consideration within the Fixed Fee budget. The University has identified sources of funding available to generate a $5.9m Fixed Fee as described below

Sources Supporting University Budget for the Fixed Fee



Transfer of Input Utility Budgets Based on Efficiency Savings

- The University has identified the opportunity to make savings from implementing energy efficiency improvements (for example, addressing and identified "Delta-T" inefficiency). UofL expects that bidders may identify additional sources of savings from efficiency projects where credible and defensible opportunities arise that can allow UofL to reallocate budgets in favor of the Fixed Fee

Reallocation of Existing Capital Budgets

- Reallocation of capital budgets to support the Fixed Fee

Allocation of Existing Debt Service Budgets

- UofL intends to defease current Energy Savings Performance Contract ("ESPC") debt and apply the budgets to support the Fixed Fee

Operating Fee and Performance

Operating Fee Overview

The Operating Fee will include a "Capped O&M Costs" to cover the routine O&M expenses and commodity charges the Concessionaire incurs – subject to demonstration of efficient operation of the utility system – with a maximum escalation rate p.a. An "Uncapped O&M Cost" will also be included in the Operating Fee to cover negotiated out-of-pocket expenses (e.g., Delay Events). Expected Capped O&M Costs are set out below:

Routine O&M

- Routine O&M costs

- Labor
- Routine Work/Purchases
- Service Contracts

Commodity Charge

- Commodity charges incurred are passed through to the University (subject to demonstration of efficient operation of the utility plant)

- Natural Gas
- Purchased Electricity
- Water and Sewer
- Chemicals
- Pre-treatment

KPIs and KPI Compensation

- The Concessionaire will be responsible for all aspects of the Utility System operations during the term, and will comply with the performance standards set by the University
- UofL will establish Key Performance Indicators ("KPIs") to ensure safety, reliability, and efficiency of the system using predetermined metrics to measure the Concessionaire's ability to meet the performance standards.
- If the Concessionaire fails to meet any KPI requirement, it will be required to make **KPI compensation payments** to the University – an amount that will be based on of a number of factors including, but not limited to, the severity or system impact of the failure, the degree by which the KPI was missed, and the number of times the metric was missed
- The performance standards and KPIs will address metrics that are similar to other projects that have closed in the market

Variable Fee and Capital Investment

Variable Fee Overview

Capital Recovery Amount

- Will be based on the amount of lifecycle work approved by UofL incurred in the prior Fiscal Year
- The cost of the lifecycle work will be depreciated over a recovery period using a straight line basis of 20 years[1]
- The capital recovery amount paid to the Concessionaire each year will be equal to the depreciated expense for all capital costs that were extant in the prior fiscal year

Concessionaire Return

- Will be the return earned by Concessionaire on the unrecovered balance of the capital costs
- UofL is considering setting the cost of capital for the Variable Fee based on the following sources. Based on current values they would generate a weighted cost of capital of 5.9%
  - Gearing of 60% debt / 40% equity
  - Moody's Seasoned Baa Corporate Bond Yield (currently 3.54%)
  - Equity return based on LG&E approved return (currently 9.425%)

Capital Improvements 5-Year Plan

- Every fiscal year, the Concessionaire will be required to submit to the University a proposed budget for capital improvements for the next five years of the term (as well as projected O&M for those projects)
- The University will have discretion to approve each proposed capital improvement project
- UofL has identified initial projects it anticipates directing the Concessionaire to address but will seek the Concessionaire's input and expertise in identifying other requirements during the term

Variable Fee Illustrative Example

	Fiscal Year									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Approved Capital Improvement Cost	**$10.0**									
Capital Recovery Amount		**$0.5**	**$0.5**	**$0.5**	**$0.5**	**$0.5**	**$0.5**	**$0.5**	**$0.5**	**$0.5**
P3 Partner Return										
Unrecovered Balance	–	$9.5	$9.0	$8.5	$8.1	$7.6	$7.1	$6.6	$6.1	$5.6
Rate of Return	–	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Return on Unrecovered Balance	**–**	**$0.6**	**$0.5**	**$0.5**	**$0.5**	**$0.4**	**$0.4**	**$0.4**	**$0.4**	**$0.3**
Total Variable Fee to P3 Partner	**–**	**$1.0**	**$1.0**	**$1.0**	**$1.0**	**$0.9**	**$0.9**	**$0.9**	**$0.8**	**$0.8**

1) The Recovery Period for an Approved Capital Improvement may extend beyond the Term and the Concessionaire may recover the outstanding sum over remaining project life

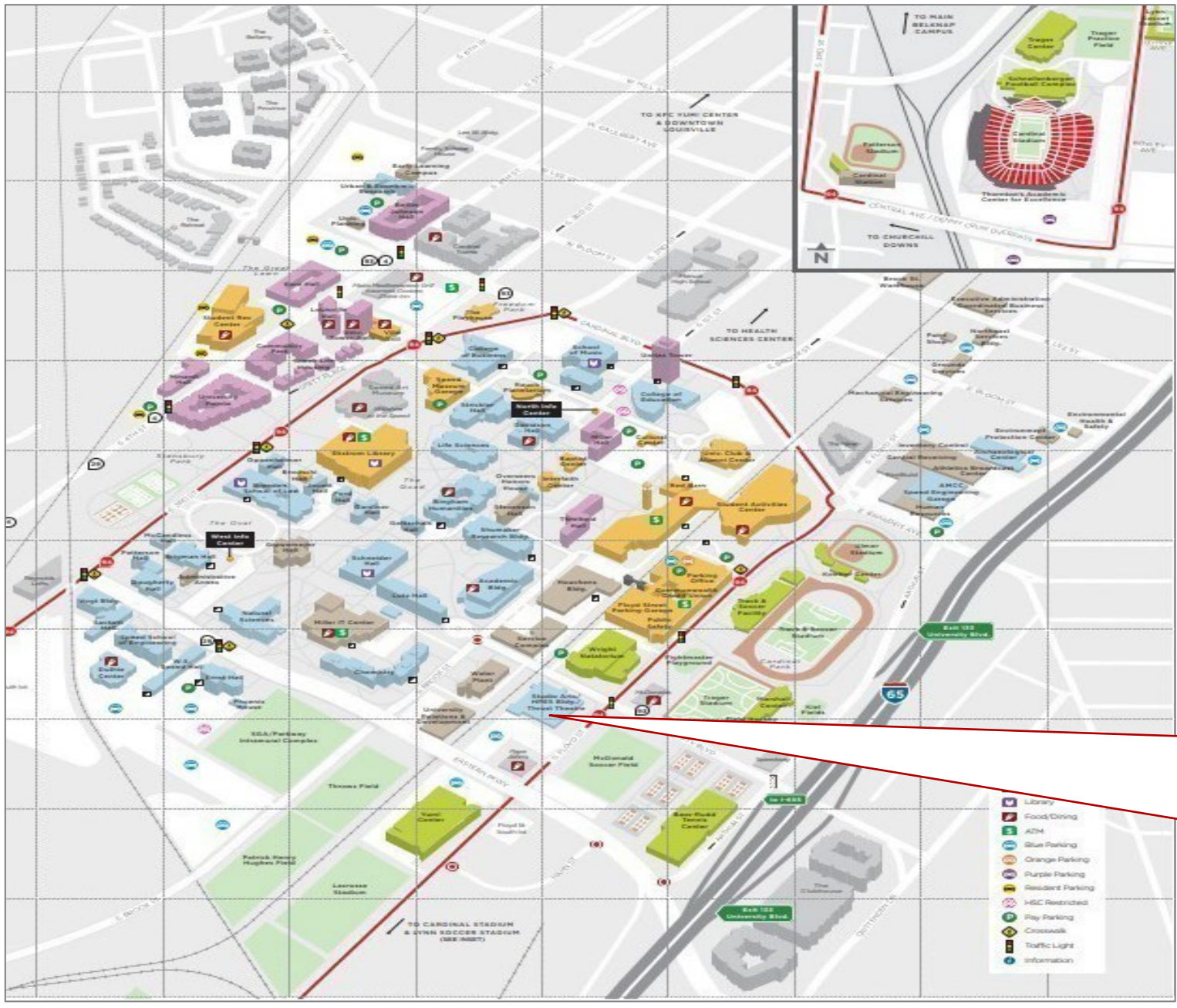
Concession Agreement Overview

Commercial Term	Description
Term and structure	The University will lease the utility facilities and the Utility System land for a term of 50 years to Concessionaire
Ownership	All real estate and improvements forming part of the Utility System are owned solely by the University for GAAP and state law purposes
Exclusivity	Concessionaire shall have right to operate, maintain, improve, and expand the Utility System for the University
Closing Consideration	Concessionaire will pay the University the Closing Consideration (i.e. the upfront monetization payment) on the Closing Date
Utility Fee	Prior to each Fiscal Year, the Concessionaire shall forecast the Utility Fee for such Fiscal Year. The University shall pay the Concessionaire in monthly installments according to the forecasted Utility Fee.
Utility Fee adjustments	The obligations of Concessionaire and the Utility Fee will be adjusted for force majeure events, delay events, and compensation events in a manner similar to other university energy projects
Compensation on Termination	Payments due from the University in the event of termination for University default will be similar to other university energy projects, including with reference to the fair market value of Concessionaire's interest and outstanding leasehold mortgage debt
System condition	Concessionaire agrees to accept the Utility System "AS IS"
Operating performance	• Concessionaire will deliver the services through an experienced utility operator ("Operator"). Operational performance will be guaranteed by a range of key performance indicators focused on system reliability and efficiency • Failure to comply with key performance indicators shall result in the payment of compensation to the University • If Operator persistently (i) fails to operate the Utility System in compliance with the operating and performance standards or (ii) fails to achieve any key performance indicators, then the University may require that the Concessionaire remove the Operator
Input utilities	Concessionaire may be required to assist the University with the procurement of electricity, natural gas, or other input utilities necessary to fully operate the utility system in accordance with the performance standards (to be decided during the procurement). Input utility costs will be a pass through subject to Concessionaire agreement of a base level of consumption and efficient operating parameters for the plant
Lender terms	The Concession Agreement will include lender-specific terms that are required for limited recourse financing
Existing staff	Assume that existing staff, described further in the next section, will transfer to the Concessionaire

4. Description of the System

Overview of the Plant and Distribution

The University's Utility System provides steam and chilled water to 42 buildings on the Belknap Campus, including UofL's extensive athletic facilities and premier research establishments



- The SCB was constructed in 1979, is ~32k sq. ft over four floors and serves 42 buildings
- Steam and chilled water assets are summarized below with detail on the following pages
- Steam, chilled water and condensate are distributed through ~2 miles of tunnel across two loops
- The plant is staffed by 8 skilled operators with additional staff delivering life safety and electrical services

Service Complex Building Capacity

Steam boiler #1 (2010)	78,000 pph	Chiller #1 (1996)	2,100 tons
		Chiller #4 (2004)	1,750 tons
Steam boiler #2 (1979)	Retired	Chiller #2 (2000)	"Duplex" style w/ two refrigerant circuits. 2,100 tons
		Chiller #5 (2004)	1,750 tons
Steam boiler #3 (2012)	83,000 pph w/ economizer	Chiller #3 (2016)	1,800 tons
		Chiller #6 (2004)	1,750 tons

Steam System Summary

System Component	Description
Boilers	• **Boiler No. 1** *(installed in 2010)*: rated for 78,000 PPH; Victory Energy; gas fired with flue gas recirculation; no economizer; no Continuous Emissions Monitoring System (CEMS) since below 100 MMBTU/hr • Boiler No. 2: Coal fired and retired in place in 2018; steam drum PSV's were removed; auxiliary coal conveying equipment, FD and ID fans/ductwork, bottom and fly ash collection equipment, remain in-place • **Boiler No. 3** *(installed in 2012)*: rated for 83,000 PPH; Victory Energy; primarily gas fired and includes #2 fuel oil (FO) backup firing with flue gas recirculation and an economizer; not equipped with CEMS since it is rated below 100 MMBTU/hr; Boiler 3 is the lead/primary boiler due to the higher thermal efficiency
Boiler operating parameters	• Both operating boilers #1 and #3 are A-type, water-tube boilers with low NOx Coen burners and windbox mounted FD fans. Neither boiler is equipped with superheaters • The maximum allowable working pressure (MAWP) of the boilers is 150 psig. Main steam is supplied at 125 psig • Boilers are shut down from April to October, drained and stored in dry lay-up.
Boiler controls	• Controlled locally through Autoflame control panel located in the front of each boiler. • Auxiliary control system was replaced in 2015 and is PLC/BMS based. Automation software is Automation Direct “Point of View”. The BMS resides in the small control room positioned between each unit • BMS operated locally and no remote controls capabilities. Remote alarms are available.
Fuel supply	• Natural gas: Supply to SCB by 6 inch gas main at 80 psig by LG&E; regulated down to 15 psig for the boilers. • Natural gas regulators and meters managed by LG&E up to the outlet of the meters • Fuel oil (FO): Stored in six, 15,000-gallon single wall underground tanks; emergency use only for Boiler 3; No significant FO backup operation required, beside annual testing, since installation. • FO conditioned twice per year; each FO tank is equipped with individual supply and return lines
Steam Distribution	• Distributed to campus at 125 psig via two loops: 1) North part of the campus with a 12 inch main; and 2) South part of the campus through a 10 inch main • SCB staff manage steam piping and equipment up to the isolation valve after the first steam regulator for each building • Distribution to some buildings is via direct bury piping exiting the tunnels or between building’s mechanical rooms.

Steam System Summary (ctd.)

System Component	Description
Feedwater system	• Deaerator: Spray tray type unit; MAWP is 30 psig (typically 12-15 psig operating); sized for 400 gpm flow; installed 2006 but original steam injection station; Catalyzed sulfite is mixed daily for chemical treatment • Boiler Feedwater Pumps: 3 boiler feedwater pumps; all under 10 years old; 2 x 400 gpm pumps (one VFD pump and one single speed pump); 1 x 200 gpm pump, single speed (primarily used for start-up or shutdown) • All pump motors are 480V electric motor driven; all pumps provide 460 ft of head and are centrifugal type with horizontal split case configuration.

Condensate	• Condensate returned in separate:
	  • High pressure (HP) return line: Returns condensate from 125 psig steam traps within the plant and tunnels
	  • Low pressure (LP) return line: Returns condensate from 40 psig (or less) steam traps and heating coils within the buildings. LP condensate is pumped back to SCB from each building on north loop. Approximately 40% of the condensate in the south loop is pumped back to SCB from each building.
	• Condensate is returned directly to the deaerator in the SCB. Recovery is ~85% of steam production.
	• Returned condensate is treated with a food grade amine filmer. Returned condensate averages 9 pH and 20 µmhos or less conductivity.

Auxiliary system equipment	• Blowdown Tank: Receives surface blowdown from both Boilers #1 and #3. Typical blowdown rate is ~4%. Flashed steam is vented through side roof to atmosphere. The blowdown outlet side of the heat exchange drains to sewer • Condensate Flash Tank: Drains the steam and condensate distribution piping when the boilers are shut down for the winter. The flash tank is located in the basement near the chilled water distribution pumps, vented to atmosphere and drained to sewer.
Chemical treatments	• Chemical treatment for boilers is a polymer blend; Nalco currently provides testing and inspection of chemical treatment equipment for both the steam and chilled water systems.
Makeup water	• Two, 6 inch city water lines provide makeup water to both the steam and chilled water systems; Louisville Water meters are located onsite. • Water makeup for steam system is pretreated with five, NaCl pellet fed, industrial water softeners. Nitrite based treatment for the chilled water system and molydbate based treatment for the tower water systems are used.

Chilled Water System Summary

System Component	Description

Chillers	• Six chillers supply 42 degree F water to campus with a total installed capacity of 11,250 tons. Historical peak chiller load during the summer is estimated to be 8,075 – 8,575 tons and in the winter approximately 3,000 tons
	• All chillers are 4160V electric motor driven with main breakers located in the switchgear room. Water treatment for the chilled water system is automated and nitrite based. TRACR controller is leased from Nalco, rest of water treatment equipment is plant owned
	• The chiller plant consists of the following:
	  • **Chiller No. 1** *(installed 1996)*: 2,100 ton Carrier; uses R134a refrigerant
	  • **Chiller No. 2** *(installed 2000)*: 2,100 ton Trane (duplex Style Dual Compressor); uses HCFC 123 refrigerant
	  • **Chiller No. 3** *(installed 2016)*: 1,800 ton York; uses R134a refrigerant
	  • **Chillers No. 4, 5 & 6** *(installed 2004)*: 1,750 ton Trane each; each uses HCFC 123 refrigerant

Chiller Pumps	• The chilled water system is a primary/secondary pumped configuration with each chiller served by a primary pump connected to a combined chiller water header.
	• **Primary pumps**: six primary pumps:
	  • **Chilled Water Pumps No. 1 & 2** *(installed 1996 and 1998)*: 3,360 GPM each
	  • **Chilled Water Pumps No. 3, 4, 5 & 6** *(pump 4-6 installed in 2003; pump 3 installed in 2016)*: 2,800 GPM each
	• **Secondary pumps: five secondary pumps each with a total design head of 130 ft:**
	  • **Campus Loop Pumps No. 1, 2, 3 & 4** *(installed 1996)*: 4,500 GPM each
	  • **Campus Loop Pump No. 5** *(installed 2000)*: 2,250 GPM
	• There are two smaller secondary pumps serving the Houchens loop (single speed, 445 GPM, design head of 70 ft.)

Cooling Tower	• There are a total of 16 cooling towers located on the roof of the chilled water side of the plant, with a total condensing capacity of 10,600 tons, including:
	  • **10 Towers** *(installed in 1996)*: 5x 750 ton and 5x 500 ton with common tower supply/return headers
	  • **4 Towers** *(installed in 2000)*: 2x 750 ton and 2x 500 ton with common tower supply/return headers
	  • **2 Towers** *(installed in 2016)*: 925 ton with a secondary set of headers with cross-ties to the main headers
	• The 2x 925 ton towers and the northern most 2x 500 ton and 2x 750 ton towers are winterized with winter chiller operation. Headers and supply/return lines to and from towers are heat traced on winterized towers. The remaining towers and supply/return header are drained and not in operating during the winter season

Chilled Water System Summary (cont'd)

System Component	Description

Cooling Tower (cont'd)	• There are six condenser water (tower water) pumps, one located adjacent to each chiller:
	  • **Tower Pump No. 1** *(installed 1996)*: 6,300 GPM
	  • **Tower Pump No. 2** *(installed 2000)*: 6,300 GPM
	  • **Tower Pump No. 3** *(installed 2016)*: 5,250 GPM
	  • **Tower Pump No. 4, 5 & 6** *(installed 2004)*: 5,250 GPM
	• Chemical treatment for the cooling tower system is automated and molydbate based. Nalco has a service contract for weekly visits for test / maintenance on all plant water treatment systems, as well as monthly visits for any satellite cooling towers on campus buildings

Chilled Water Distribution System	• Chilled water leaves the plant in the main tunnel to campus via 30 inch mains and reduces in size to 24 inch just after the interface for the Belknap Classroom Building. The main tunnel interface is located at the northwest corner of the plant basement.
	• There are also two smaller distribution loops to buildings nearby the plant:
	  • **Northeast corner loop** *(installed 1978)***:** One interface at the northeast corner of the plant basement to the Service Complex (Building 080A) and Houchens Building (Building 081); installed within tunnels
	  • **East side loop** *(installed 1992)*: One interface at the east wall of the plant basement to the Studio Arts/HCS Advising Center (Building 071) and the Wright Natatorium (Building 012); installed within pipe-in-pipe sleeves
	• Chilled water supply and return piping within the tunnels contains valves and branches to each building. Balancing valves and any tertiary loops for select buildings are located with buildings' mechanical room(s). Distribution to some buildings is via direct bury piping exiting the tunnels or between building's mechanical rooms.
	• Chilled water supply temperature at the plant is approximately 42 deg. F. Chilled water return temperature varies from each building; however, the SCB frequently experiences low return temperatures of 45 – 47 deg F compared to the system design return temperature range of 52 – 57 deg F. Summer time load is approximately 9,500 GPM per day on average and drops approximately 80% in the winter time.

Chilled Water System Summary (cont'd)

System Component	Description
Controls	• There are six differential pressure (DP) measurements between the supply/return headers at select buildings on the furthest distribution points for controlling the campus loop pumps. • The remote DP measurements are received in a controls/IT cabinet located in the basement of the SCB. • The balance of the chilled water plant including chillers, chilled water pumps, cooling towers and tower water pumps are controlled locally within the plant.
Chiller System Auxiliaries	• **Cyclone Separator** (*installed 2002*): There is one LAKOS cyclone separator unit with a 20 HP return pump for removing solids from the chilled water loop. The separator is arranged in a side-stream configuration with a flow capacity of 1,100 GPM • **Expansion Tanks** (*installed 1978*): There are two large air-blanket type expansion tanks located in the basement of the plant. Both tanks are rated to 150 psig MAWP and are original to the plant • **Chilled Water Make-Up System** (*installed 1978*): includes two 125 GPM single speed pumps, an atmospheric make-up tank/basin and a nitrite-based treatment system. City water is used for make-up to the chilled water system • **Sand Filter System** (to be replaced Feb/Mar 2022): There is one SONITEC sand filter unit with a 5 HP pump for filtration of the chilled water loop. The sand filter is arranged in a side-stream configuration.

Electric System Summary

System Component	Description
General	• Louisville Gas and Electric (LG&E) provides electricity via two 13.8 KV circuits that enter the north end of the SCB • Main breakers, meters and relays are located within the high voltage switchgear room. LG&E manage the meters. The 13.8KV switchgear is split into two sides: one for the SCB and one for campus distribution (apart from Fairfax Building which is fed from SCB circuit) • Switchgear can allow for serving both sides from a single feed but neither circuit can carry full campus. Electrical switches were replaced in 2016 • One 13.8 KV back-up feed is located remotely from the SCB and is fed from the LG&E offsite. Can be cross-tied to accommodate various outage situations but cannot accommodate the full campus load
SCB 13.8 KV supply	• Power is distributed to most campus buildings at 13.8 KV via concrete encased underground duct banks and arranged on four distribution loops circuits (no submetering). Power is stepped down locally to either 480Y/277 or 208Y/120 • Some campus buildings are not connected to these loops and receive direct overhead service from LG&E metered locally at each building • Two 13.8 KV-4160 V transformers (XRFMR #3 and #5) are located outside the SCB in a fenced area adjacent to the switchgear room. The transformers are oil filled type, include secondary containment, and were installed in 1996 and 1998 • Three 13.8 KV-480/277 V transformers (XRFMR #1, #2, and #4) are also located outside the SCB in the fenced area. The transformers are oil filled type, include secondary containment, and were installed in 1978 • Two 13.8 KV capacitor banks are located outside the SCB in the fenced area and each capacitor bank is connected to one side of the 13.8 KV switchgear
SCB 4160 V supply	• Chillers 1 - 6 are the only 4160V users within the plant; 4160V switchgears and breakers are located in main electrical room. Each 4160V transformer feeds a separate 4160V switchgear and the switchgears include a cross-tie switch to allow powering from either transformer • Additional 4160V electrical panels are located adjacent to each chiller with local controls for each chiller
SCB 480 V supply	• All other plant equipment is 480V or less fed from one of three transformers; 480V switchgear, main breakers and main MCC's located in secondary electrical room above main electrical room. The 480V MCC next to the boilers includes backup feed

Balance of Plant Equipment & Distribution

System Component	Description
Compressed air	• Five air compressors for the SCB serving instrument air system and service air system • There is a smaller auxiliary compressor and refrigerated dryer for control air to the SCB
Sump pumps	• Two sump pumps located at the SCB plant with a local level controller mounted near the pumps
Building ventilation	• The plant includes the following HVAC equipment: three chilled water plant exhaust fans; two steam plant exhaust fans; three building combustion air fans; additional ventilation fans in the electrical rooms and chemical storage areas
Fire protection	• Smoke detectors, pull stations and fire extinguishers located throughout the plant. No interior sprinklers or firewater distribution within the plant. Hydrants are located around the plant exterior.

System Component	Description
Tunnel distribution	• Built in phases between 1950-1978; ~2 miles long and serves most of the Belknap Campus. • Tunnels supply steam and chilled water throughout campus and return condensate and chilled water to the SCB • Some building systems including electrical power, IT/ethernet, storm water and sewer pipes, or potable water sometimes cross through the tunnels but are generally routed outside of the tunnel network

Staffing Structure

Utility System staff operate and maintain the plant's steam and chilled water systems, as well as the distribution of steam, chilled water and condensate system through campus tunnels. UofL also maintains third party contracts for services described below.

	Staff and Roles	Scope of O&M Responsibilities
Physical Plant and Utilities Group	1 Forman 33+ yr exp. 3 Plant Operators (+1 open position) 52+ yr total exp. 3 Assistant Plant Operators (+1 open position) 23+ yr total exp.	• Physical plant systems (steam, chilled water, auxiliaries) • Distribution tunnels • Steam, chilled water, high and low pressure condensate systems within tunnels and up to first isolation valve for building branches • Steam piping up to first isolation valve after building pressure regulator
Electrical Group	No electrical staff transfer	• 13.8KV, 4160V and 480V systems within Physical Plant • 13.8KV campus distribution through each building's step-down transformer and service switch • 480V feeder for Fairfax building through step-down transformer and service switch
Life Safety Group	No life safety staff transfer	Physical Plant: • Fire protection • Alarms • Security Systems • Hazard or disaster response communication

Current Maintenance Approach / Programs

Utility System staff operate and maintain the plant's steam and chilled water systems, as well as the distribution of steam, chilled water and condensate system through campus tunnels. UofL also maintains third party contracts for services described below.

	Description
General Maintenance	Typical operator rounds and system checks include: • Plant walks and visual observations of operating equipment on 2hr intervals • Operator log entries on 2hr intervals for key plant operating data • Daily water chemistry checks for steam system, cooling tower water and city make-up water • Rotating tunnel inspections for expansion joints and steam traps
Electric systems	• University Electrical Group staff operate and maintain the high voltage (480V and greater) electrical systems both with the Physical Plant and distributed across campus. Physical plant staff coordinate entry to electrical switchgear rooms and if any inspections of HV electrical systems are required. • University Life Safety Group staff operate and maintain fire protection, alarms and security systems both within the Physical Plant and distributed across campus.
Building services	• University Building Services Group staff operate and maintain building utilities and air handling system. Building staff coordinate with Physical Plant staff for any operation and maintenance of valves at the tunnel/building interfaces
Other contracts	Miscellaneous service contracts for the physical plant and utilities include: • Weekly NALCO water treatment equipment inspections, testing and maintenance. NALCO also performs monthly visits for satellite cooling tower systems on campus buildings • Fuel oil tanks levels are checked once per month. Fuel oil is cycled and conditioned twice per year to primarily check for moisture content and sweep the tanks • Trane and Carrier provide annual refrigerant leak checks on chillers and as-needed service calls The University does not expect that the Concessionaire would retain these existing contracts but would be responsible for replacing with similar contracts under the Concession
Input utilities	• LG&E provides natural gas and electricity to the SCB and campus buildings • Louisville Water provides potable water, storm and sanitary sewer services to the SCB and campus buildings

Safety Programs

The University maintains safety programs at two levels: (1) implementation determined by exposure and (2) mitigation methods required. In addition to University-wide programs, the following are current programs in place for the Physical Plant and utilities.

Programs	• Physical Plant Safety Handbook • Permit Required Confined Space Program • Hazard Communications Program (storage, labeling and documentation of hazardous materials)	• Control of Hazardous Energy / Lockout Tagout • Electrical Safety and Arc Flash • Respiratory Protection
Procedures / Assessments	• Confined Space Hazard Assessments • Lockout – Tagout Procedures • Tunnel Work Procedures • High Voltage Electrical Area's Access Communication	• Noise Sampling • Personal Protective Equipment Hazard Assessments • Pre-Employment Physicals
Training	<u>Basic</u> • Asbestos Awareness • Bloodborne Pathogens • Hazard Communications • Lockout – Tagout Awareness • Walking Working Surfaces • Personal Protective Equipment • Ladder Safety • Non-Qualified Electrical Safety • Ergonomics	<u>Advanced</u> • Lockout – Tagout Authorized User • Confined Space Entrant, Attendant and Supervisor • Powered Industrial Truck Operator • Fall Protection Authorized User • Aerial Work Platforms Operator • NFPA 70e Arc Flash
Environmental	Department of Environmental Health and Safety (DEHS) maintains environmental program oversight for the Physical Plant. These programs are administered through cooperation between Physical Plant, DEHS, and 3rd party advisors and include: • Air Permits • Underground Storage Tank Management	• SPCC Plans • SARA Tier II and Refrigeration Tracking

Sources: (1) UofL Physical Plant Steam and Chilled Water Plant Safety Program Summary, 2022

Recent Capital Projects

The University has previously completed upgrades or equipment replacement projects for both within the Physical Plant and distributed utilities systems within Campus Buildings. Examples are summarized below.

	Description

Physical Plant	• Chilled water system upgrades installed in 2016:
	  ○ Chiller #3 (1800 tons), chilled water pump 3 (2800 gpm), and tower water pump 3 (5250 gpm) replacements
	  ○ Cooling Towers 15 and 16 addition (2x 925 tons)
	• Main electrical switches replaced in 2016
	• PLC/BMS system for steam boilers installed in 2015
	• Boiler #1 installed in 2010 and Boiler #3 installed in 2012
	• 13.8KV capacitor bank additions in early 2000's

Distribution Network	• On-going refurbishment projects for tunnel top replacements, steam traps, steam and chilled water expansion joints
Campus Buildings Systems	Building air handling unit replacements, 3-way to 2-way chilled water valve conversions, air-side distribution and controls upgrades, etc. • Belknap Academic Building, 7x AHU's (2017) • Ekstrom Library, 3x AHU's (2007) • Student Academic Center, 3x AHU's (2017) • Strickler Hall, 2x AHU's (2010)

Known Deferred Maintenance and Planned Capital Projects

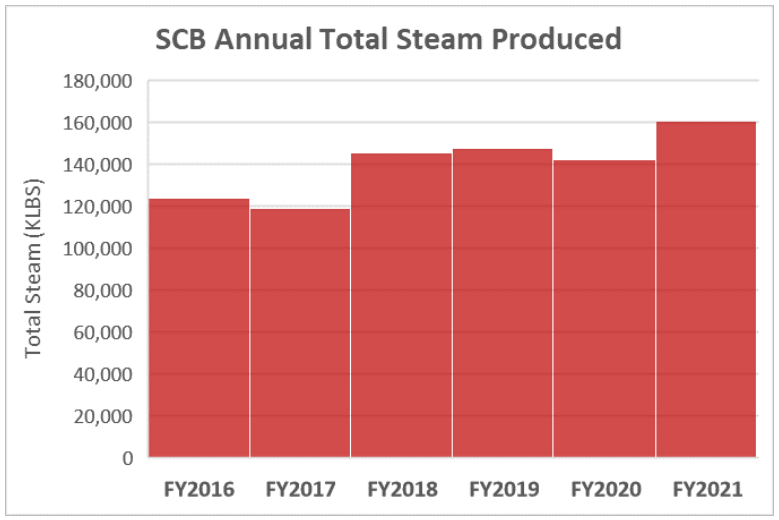
The University has identified a number of areas of potential deferred maintenance with indicative projects identified below. The Concessionaire will develop rolling capital improvement plans to continue to identify areas for further capital work over the term.

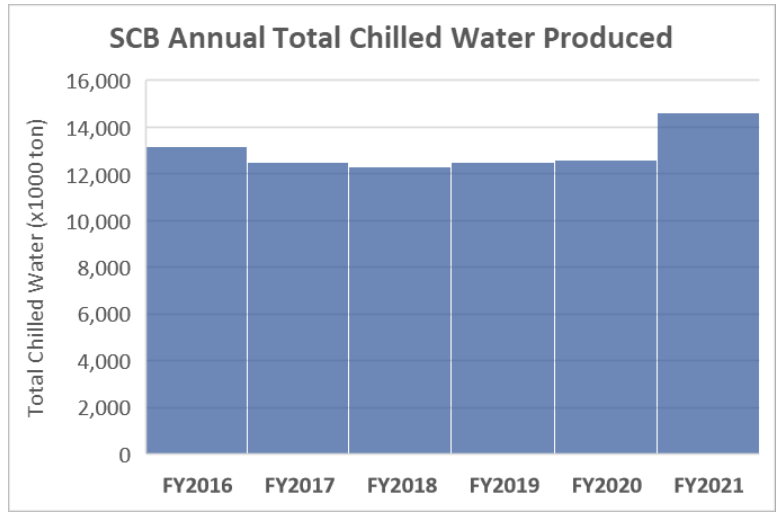
	Description and Approximate Projected Costs	
Physical Plant	Deferred projects for the physical plant primarily includes replacing or upgrading primary equipment that has reached or is nearing end of their typical useful life. Recent analysis(1) of requirements has identified the following projects: • Replace cooling towers 1 – 14, 5x 2000 tons each, or in stages of 2x 2000 tons each — $4.6M / $2.8M • Replace chillers 1 and 2A&B, 2100 tons each — $1.92M each	
Campus Buildings, Utilities Demand	Deferred projects for campus buildings include upgrading building air handling units and building chilled water systems to improve an existing delta-T / over pump chilled water issue. Recent analyses(2) have estimated the following projects: • AHU replacements, 26+ buildings, 142+ total units combined — $58M • Heat recovery chillers for year-round heating, 24 buildings — $3.4M • Physical plant controls/programming for year-round cooling — $225k	Example AHU replacements(2): • Bingham Humanities, 1971 units, 431 tons • Chemistry, 1978 units, 431 tons total • Life Science, 1967 units, 429 tons total • Music School, 1978 units, 8x 116,000CFM • Strickler Hall, 1973 units, 229 tons total
Campus Buildings, Comfort / Efficiency	Projects for improving buildings' occupant comfort, humidity control and buildings' unit efficiency include air-side HVAC system and controls upgrades.(3) These have been split into two phases, with phase I projects starting in 2022. • Phase I, starting 2022 — $2.3M • Phase II, target next 3 – 5 years after Phase I, — $4.4M	Example buildings(3): • Henry Vogt Building • Music Building • Studio Arts / HSC Building (Ph II) • Brandeis School of Law Building • Strickler Hall

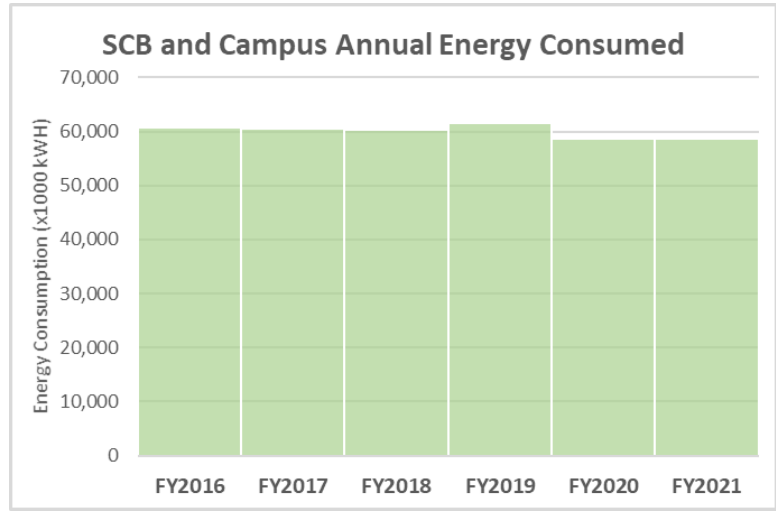
Sources: (1) CMTA UofL Central Plant Master Planning Capacity Study, 11/12/2018; (2) CMTA UofL Central Plant Connected Building HVAC Assessment Rev1, July 2021; (3) CMTA UofL FY 2021-2022 Deferred Maintenance Projects, November 2021

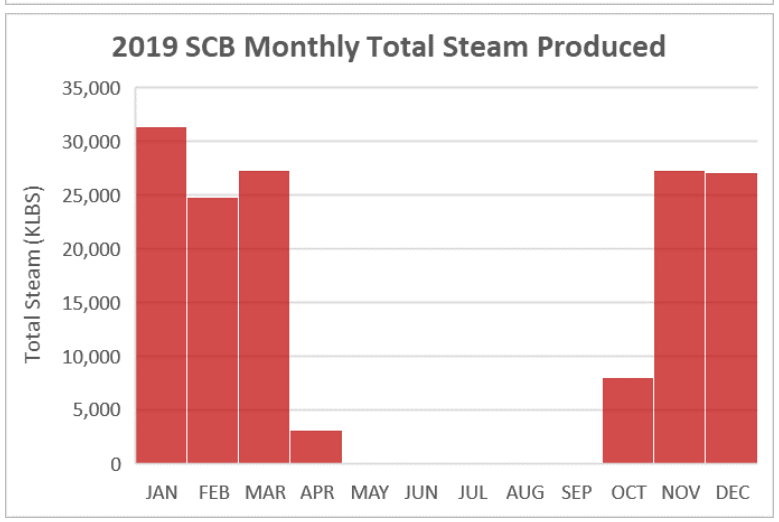
Historic and Forecast Consumption

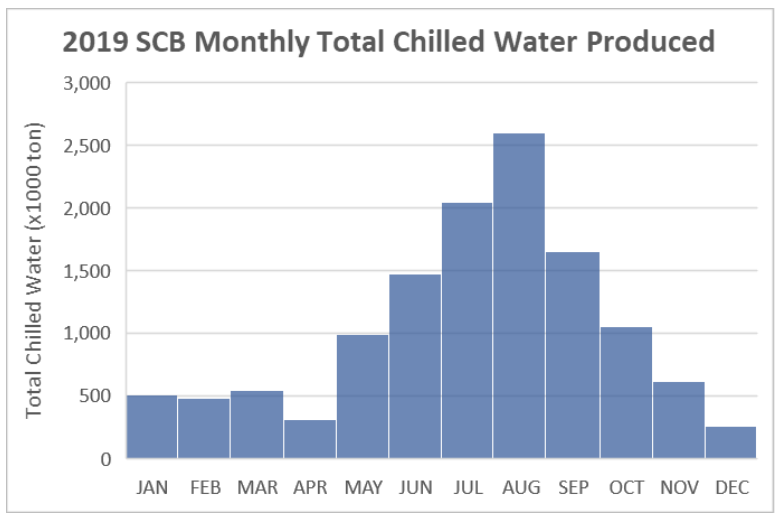
	Historic Peak Loads[1]	Estimated Load Growths[1]	Load Growth Basis, 6 – 10 years[1]
Steam	• 85,000 lb/hr winter peak • Boiler offline May - September	• Add 34,500 – 45,200 lb/hr winter peak connected load	• Construct New College of Business • Renovate Busines School Classrooms • Demolish and Replace Miller Residence Hall • Renovate and Expand Threlkeld Residence Hall • J.B. Speed Renovations • Renovate Natural Sciences Building • Upgrade STEM Instruction Buildings • New Multi-Disciplinary Engineering Building #1
Chilled Water	• 8,075 – 8,575 tons summer peak (est.) • 4,726 tons winter peak (est.)	• Add 1,715 – 2,260 tons peak connected load	
Electric	• 7,908 kW SCB peak (9/28/2018) • 7,938 kW campus peak (9/18/2018), for buildings on SCB switchgear	• Add 4,525 kW peak connected load	

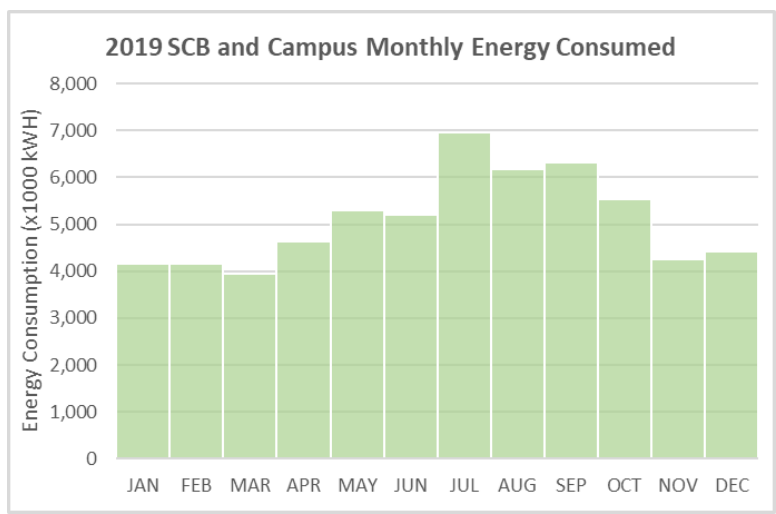








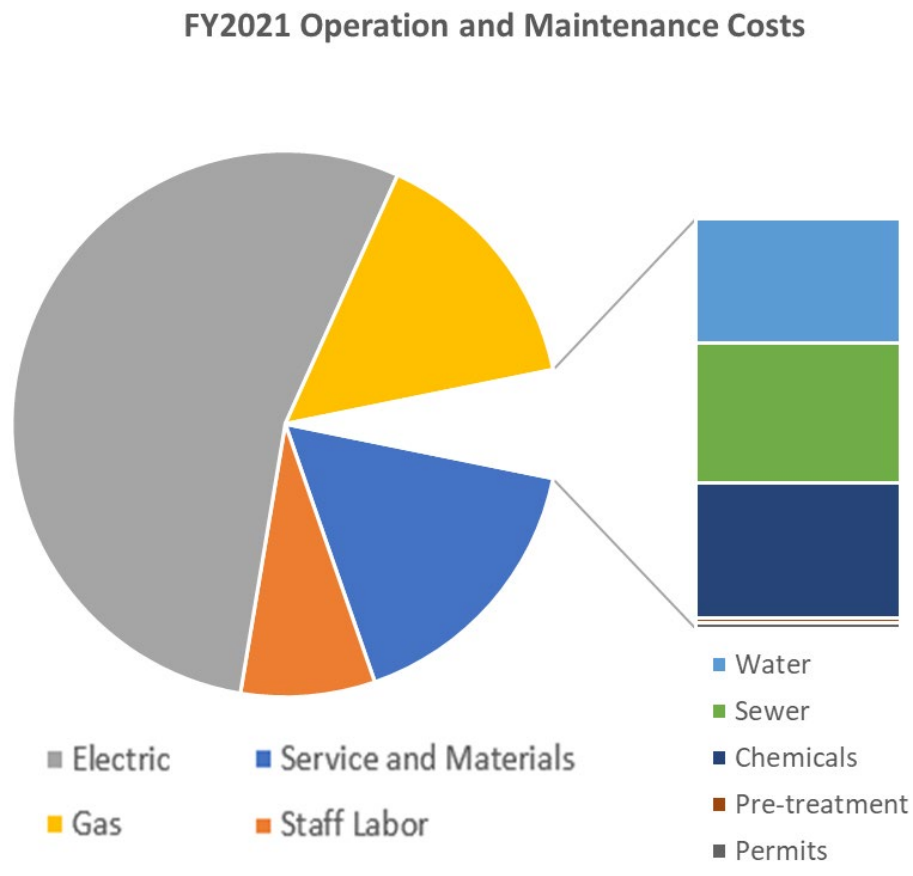




Sources: (1) CMTA UofL Central Plant Master Planning Capacity Study, 11/12/2018; Charts – UofL Monthly Production Cost Reports, 2015 – 2021
Note: Steam and chilled water data are for information purposes only and sourced from plant operating logs.

Current O&M budgets

	FY2017 ACT.	FY2018 ACT.	FY2019 ACT.	FY2020 ACT.	FY2021 ACT.	FY2022 PROJ.
Service and Materials	$ 581,101	$ 666,977	$ 732,071	$ 616,508	$ 1,159,449	$ 888,000
Staff Labor	$ 520,085	$ 525,339	$ 530,645	$ 544,609	$ 558,000	$ 568,000
Electric (SCB + Campus)	*$ 4,039,877*	*$ 4,069,445*	*$ 4,017,716*	*$ 3,965,871*	*$ 3,802,808*	*$ 3,900,000*
Gas	*$ 897,576*	*$ 897,576*	*$ 916,736*	*$ 967,957*	*$ 1,059,139*	*$ 1,100,000*
Water	*$ 123,166*	*$ 127,796*	*$ 158,152*	*$ 183,545*	*$ 135,507*	*$ 140,000*
Sewer	*$ 132,244*	*$ 152,760*	*$ 141,175*	*$ 126,906*	*$ 153,631*	*$ 155,000*
Chemicals	*$ 147,144*	*$ 147,144*	*$ 147,144*	*$ 147,144*	*$ 147,144*	*$ 150,000*
Pre-treatment	*$ 3,300*	*$ 5,448*	*$ 5,448*	*$ 5,448*	*$ 5,448*	*$ 5,500*
Permits	*$ 6,768*	*$ 6,768*	*$ 6,768*	*$ 6,768*	*$ 6,768*	*$ 7,000*
Sub-Total Commodities	$ 5,350,076	$ 5,406,937	$ 5,393,139	$ 5,403,639	$ 5,310,445	$ 5,457,500
Total O&M Costs	**$ 6,451,262**	**$ 6,599,253**	**$ 6,655,855**	**$ 6,564,756**	**$ 7,027,894**	**$ 6,913,500**
Steam (LB/yr)	118,855,150	145,195,340	147,656,480	141,836,540	160,284,770	--
Chilled Water (TPY)	12,500,982	12,314,593	12,495,200	12,587,108	14,586,359	--
Electric (kWH/yr)	60,499,200	60,374,400	61,545,600	58,636,800	58,569,600	--



Sources: Charts – 'Steam Chilled Water Plant_Annual Cost of Operations_FY2017-2021'; UofL Monthly Production Cost Reports, 2015 – 2021
Notes:
1) Electric costs include physical plant and portion of campus buildings powered from the 13.8KV plant switchgear. Costs for other buildings not connected to the switchgear are not included.
2) Steam and chilled water data are for information purposes only and sourced from plant operating logs.

5. Concession Timeline

Proposed timetable

University has developed a timeline aimed to arrive at contract execution and closing by December 2022. The University wishes to collaborate with a highly motivated partner to accomplish this goal.

RFP – Phase 1

February 2022 – March 2022

- UofL releases the RFP – Phase 1 for the Project along with a Scope of Work and Project Information document (“SOW”)
- Pre-submission meeting – February 7, 2022
- Question submittal date – February 15, 2022
- Statement of Qualifications (“SOQ”) submittal date – February 28, 2022
- UofL shortlists respondents based on their SOQs

RFP – Phase 2

April 2022 – September 2022

- Shortlisted respondents receive Request for Proposal – Phase 2 (“RFP – Phase 2”)
- 1-on-1 interviews with Proposers and bidder site visits to UofL campus
- University reserves the right to issue addendums to RFP – Phase 2 during this phase of the procurement
- Preferred Proposer is announced

Finalization of Contract

October 2022 – December 2022

- UofL and Preferred Proposer finalize Concession Agreement to reach Commercial Close
- Preferred Proposer finalizes financing package to reach Financial Close