

An aerial photograph of a city grid, likely San Francisco, with a dark blue rectangular overlay on the left side. The overlay contains white text. The city grid shows streets, buildings, and some green spaces. A prominent green line runs diagonally across the lower part of the grid. The text on the overlay reads: EFCAMPUS: WATER REDUCTION PLANNING, SPRING REVIEW MEETING, and MAY 20, 2021.

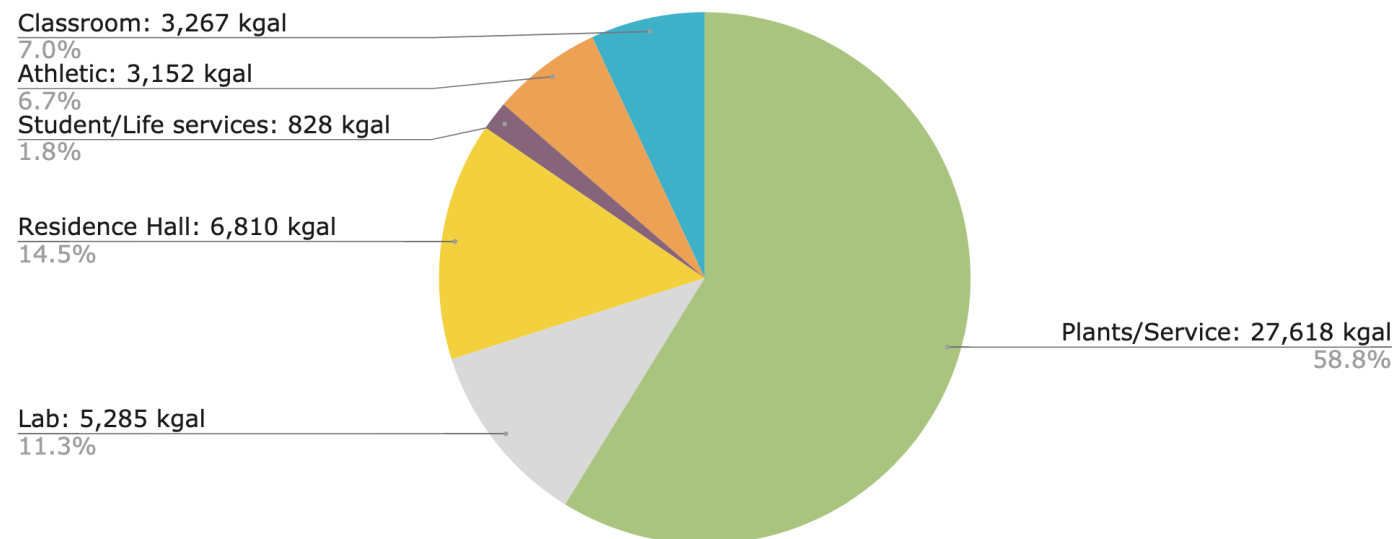
EFCAMPUS: WATER REDUCTION PLANNING

SPRING REVIEW MEETING

MAY 20, 2021

UCHICAGO AIMS TO REDUCE ITS WATER CONSUMPTION BY 15% BY 2025

Water Reduction Opportunity By Space Type (kgal and percentage)



TO SUPPORT UCHICAGO'S WATER REDUCTION GOALS WE DRAFTED A FINANCIAL
MODEL AND WATER REDUCTION PLAN

Financial Model

[illegible]

Water Reduction Plan

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Require project approval and discuss with Housing & Residence Life TBD
Install new fixtures and go through with operations to ensure that the retrofit works as expected, TBD

Calculation Methodology

The following formula was used per fixture type consumption post retrofit:

$$\text{Total Consumption} = (\sum \text{retrofited days}) * \text{flow rate of male residents} + x * \text{flow rate of female residents}$$

To calculate the number of male and female students year 2007 was divided by half. It was assumed day We assumed that for each flush, the sink will break and one simultaneously 20 seconds, adding average max takes. *Showers weekly, while we from H2O Technologies.)

The annual savings in terms of dollars was calculated 10.57 dollars, based on information from the above.

We assumed all rooms were double, each with two bathrooms. 2 individual residents at the same time in each room, so we added 16 units onto the total.

To calculate the costs, we used the above water showereheads, which was \$75, \$34, and \$43.40.

The total cost for all fixtures comes from a water and assumed larger scale projects (\$2 - 3 billion).

Proposed Next Steps

Confirms savings using plumbing contractor's estimates above are valid and ensure potential amount covered.

Refer to this Excel spreadsheet for all calculations:
<https://chicago.github.io/downtown-arc-a-2008-2012/PDF/ADU%20-%20A&B-A&B-AZ%20-%20C&D%20-%20E&F%20-%20G&H-I&J-K-L-M-N-O-P-Q-R-S-T-U-V-W-X-Y-Z.pdf>

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WCM 26: Target a 20% reduction from fixture replacements. (Max Privately Residential Commons)

- Description:
Changing fixtures on sinks, toilets, showers to reduce water consumption in Max Privately Residential Commons.
- Estimated Water Savings
By retrofitting fixtures in Max Privately Residential Commons per year.
- Cost-Benefit Analysis

Fixture Type	Benefit of Retrofitting (gallons)	Total Current Consumption (gallons)
Toilet	710,419	
Faucet	491,217	
Showershead	2,667,622	
Total	4,031,258	

Cost of Implementation (Total Cost includes fixture and labor)

- Simple Plumbing (man)
- Net Present Value
- Cost per kgal water reduction

Proposed Timeline

Confirms savings using plumbing contractor's estimates above are valid and ensure potential amount covered.

THE UNIVERSITY OF CHICAGO

The data was broken down on a building-by-building basis by space types. Space types that consisted of a single floor for investigation. Figure 2-4 comparison.

Campus Water Usage By Building Type

Introduction

Campus Water Consumption

Benchmarking analysis

Water Conservation Efforts To Date

Retrofit Goal and Preliminary Project List

- Vitality plans
- Laboratory Buildings
- Residence Halls
- Campus Student Life Building
- Athletic center
- Offices
- Classrooms
- Libraries

Financial Impact of plan

Social Cost of Water

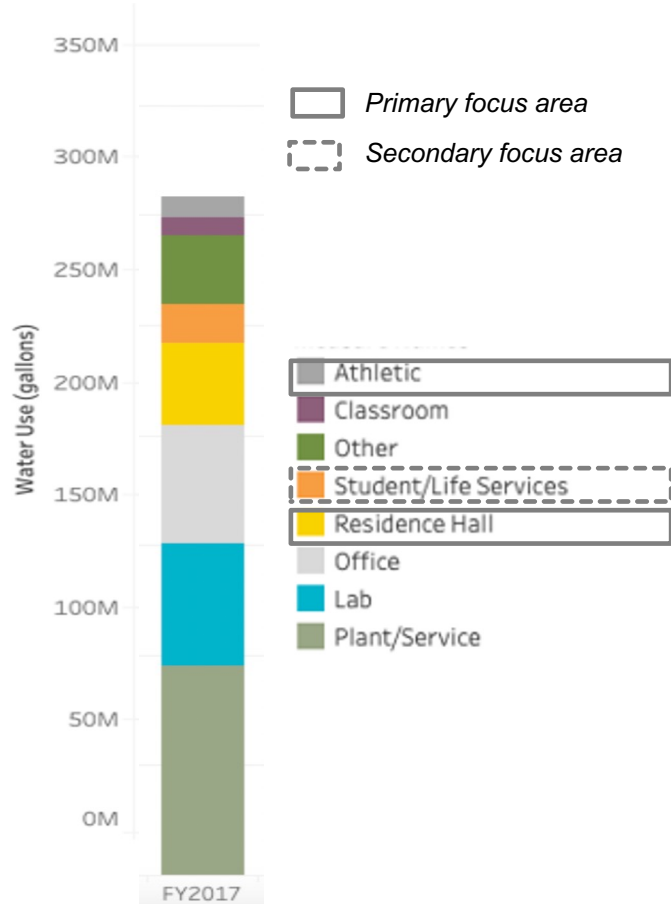
APPENDIX

Model to assess important financial indicators of WCMs,
including annual water cost avoidance, project cost, simple
payback, net present value (NPV) and internal rate of return
(IRR)

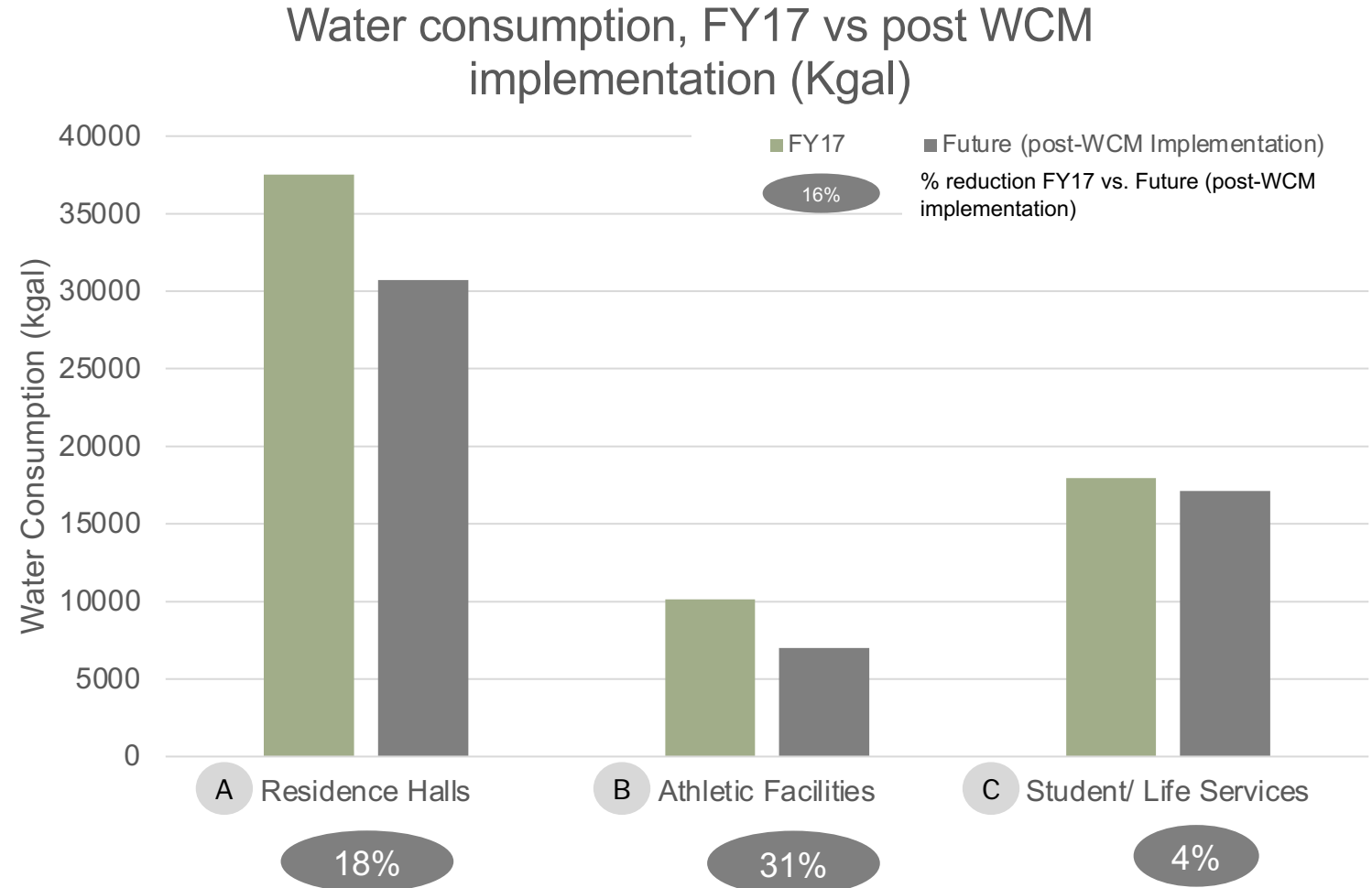
Plan detailing UChicago's water reduction plan, including details on campus water consumption, benchmarking analysis, project list by WCM, financial impact of plan, and social cost of water

WE TOOK A DEEP DIVE INTO THREE BUILDING TYPES

Campus water usage by building type



Water use following water conservation measure implementation



A RESIDENCE HALLS

- Implement annual behavioral change competitions in all residence halls to motivate students to conserve water through reduced shower/sink times
- Replace fixtures in all residence halls to updated efficiency standards



Water Conservation Measure	Water Savings / year (kgal)	Water Cost Savings / year (\$)	Cost of Implementation (\$)	Net Present Value (\$)	Payback Period (years)
Behavioral Change Competitions	739	\$7,825	\$4,404	\$77,360	.6
Fixture Replacements	6,072	\$64,181	\$376,593	\$311,991	5.8

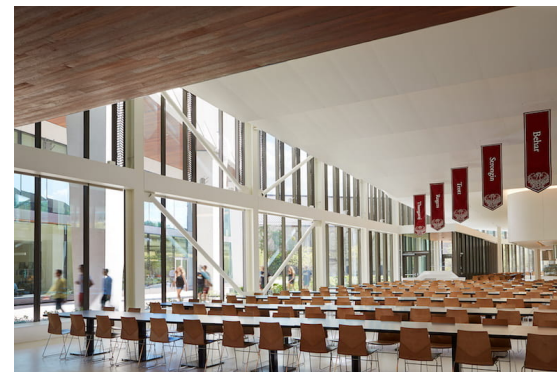
B ATHLETIC FACILITIES

- Replace fixtures in Ratner Athletics Center and Henry Crown Fieldhouse to updated efficiency standards
- Install shower timers in Ratner to attempt to shorten length of showers by gym users
- Install new equipment/systems to reduce water consumption by washers in Ratner and Crown



Water Conservation Measure	Water Savings / year (kgal)	Water Cost Savings / year (\$)	Cost of Implementation (\$)	Net Present Value (\$)	Payback Period (years)
Fixture Replacements	2,466	\$28,790	\$72,110	\$200,238	2.7
Behavioral Changes	383	\$4,052	\$710	\$41,610	.2
Laundry Waste-Water Recover	303	\$3,200	\$167,723	\$53,431	7.9

C STUDENT LIFE & SERVICES



- Replace fixtures in student bathrooms of the following dining halls: Bartlett Dining Hall (C04), Campus North Dining Hall (C26), Campus South Dining Hall (H10).



Water Conservation Measure ¹	Water Savings / year (kgal)	Water Cost Savings / year (\$)	Cost of Implementation (\$)	Net Present Value (\$)	Payback Period (years)
Fixture Replacements* *Note: following are estimates based on student knowledge. Further analysis needs to be done in this area to confirm values.	828	\$8,745	\$35,196	\$56,202	4.0

IMPACT OF PLAN

There are several benefits of implementing the water reduction plan, including:

- **Meeting water reduction goals** through the successful completion of WCMs
- **Improving UChicago's social impact**, as there are many hidden costs associated with water consumption
 - Includes non-carbon external effects of energy (primarily costs to health), carbon effects of energy (due to climate change), private costs (building, fueling, operating a plant)
- **Increasing student engagement** and **pro-environmental behavior**

Water Conservation Measure by Building Type	Water Savings / year (kgal)	Water Cost Savings / year (\$ / year)	Cost of Implementation (\$)	Net Present Value (\$)	Social Cost Impact (\$ / year) ¹
Residence Halls	6,810	\$72,005	\$380,997	\$389,351	\$175,692
Athletic Facilities	3,152	\$33,318	\$240,543	\$295,279	\$81,295
Student/Life Services ²	828	\$8,745	\$35,196	\$56,202	\$21,337
Total³	10,760	\$114,068	\$656,736	\$740,832	\$278,324

1. Social cost of water was used using sum of the energy social cost as well as the utility cost of energy
 2. This list of WCMs for Student Life & Services is not exhaustive; the team only focused on fixture replacements in this area
 3. Total is reflective of the total of residence halls, athletic facilities, and student/life services only

TIMELINE

2021-2022 Academic Year

Summer 2021

Prepare Residence hall
behavioral change
campaign

Prepare Athletics
facilities behavioral change
campaign

Fall 2021

Implement behavioral
change campaign for
Athletic Facilities +
Residence Halls

Winter 2022



Winter/Spring Break:
Fixture replacements for
Athletic facilities

Summer 2022

Fixture replacements in
Residence Halls and
Student/Life Services

