Water Conservation Tool Kit

Funded by the Illinois Sustainable Technology Center, a division of the Prairie Research Institute at the University of Illinois at Urbana-Champaign
This Tool Kit is meant to serve as a resource for Illinois Colleges and Universities looking to increase water efficiency for their campuses.

Specifically this resource shares the experience of a 2014/15 project to reduce water consumption through three primary initiatives:

- Water Fixture Retrofits
- Behavior Change Campaign in Residence Halls
- Laboratory Fixture Retrofits

This Tool Kit will provide other resources and opportunities to engage your community in water conservation on campus.
Conservation on Campus

• It is important to recognize that many of your campuses may already be doing quite a bit to conserve water
  o In the process of implementing this project, we learned that many halls had already underwent some level of retrofit
• The auditing of existing fixtures is a good project to be conducted by students
  o But should be verified by facilities’ staff
• Scenarios for more efficient equipment can be developed by students
  o But facilities engineers are best equipped to determine appropriate fixtures given the use and abuse that can take place
• Trialing equipment in a small number of locations is very effective in testing installation and effectiveness
Part 1 – Residence Hall Retrofits
Background

• Following a series of student-led water audits, residence halls were identified as potential retrofit opportunities.
• This project provided the funding and impetus to engage facility staff in confirming retrofit needs.
Student Audits

- Water audits are simple data collection efforts that can be delegated to students.
- Minimal equipment is required.
- Important information to be collected is Brand and Name of fixture, Actual flow rate of fixture, Location and quantity of fixtures, Observations (perceived leaks or clearly deferred maintenance).
- Although best confirmed by facility staff and engineers, a student audit can be a good way to identify potential retrofits.
- See the resource section at the end for more resources on conducting water audits.
Interventions Installed

- Fluidmaster 550 DFRK
  - Installed 132 dual flush conversions on tank toilets in 6 residential buildings
  - Fits Toto and Gerber toilets but not American Standard
  - Cost: $25 – 30
  - Vendor: Martin Supply Company
  - Saves 45% more water
Interventions Installed

- Sloan WES212A Dual Flush Handle
  - Converted 50 single flush valves into dual flush in residence hall
  - 1.6 gpf for solids
  - 1.1 gpf for liquids
  - Cost: $35 – 45
  - Vendor: Martin Supply Company
  - **Saves 45% - 65% water per flush**
Interventions Installed

- Toto CST 243ER-01
  - Installed 40 new toilets in 2 residence halls
  - 1.28 gallons per flush
  - Cost: $125 - $150
  - Vendor: Martin Supply Company
  - Saves 56% amount of water
Interventions Installed

- Faucets & Aerators
  - Replaced 6 leaking faucets
  - Installed 50 aerators (.5 gpm)
  - Faucet cost: $220
  - Faucet vendor: Air Delights
  - Aerator Cost: $2.55 each
  - Aerator Vendor: Conservation Warehouse
  - Water savings vary by water pressure
Interventions Installed

- Autoflush Toilets & Urinals
  - Vendor: Air Delights
  - Cost: $170 - $175
  - Water savings vary by application
Interventions Installed

- High Efficiency Showerheads
  - Vendor: Peoples Gas
  - Cost: $15
  - Water savings vary by application
Part 2 – Behavior Change Campaign
Residence Hall Participation

- 7 apartment style residence halls were chosen with water fixtures that have not been retrofitted
- We divided the halls into groups of about the same size.
  - Group 1: retrofit and behavior change – Fairfield Hall
  - Group 2: retrofit only – Marquette Hall
  - Group 3: behavior change only – Georgetown, Spring Hill
  - Group 4: none of the above (control) – Canisius, Seattle, Xavier Halls
In Fall of 2014, all 580 students were emailed an electronic survey to assess their behavior knowledge, values, and attitudes. A $3 gift card to a local coffee shop was the incentive. The response rate was 48%.

In Fall of 2014, we installed 3 dual flush conversions in 3 rooms of resident assistants to pilot technology. All worked well.

December 2014, we installed 58 dual flush conversions in Fairfield and Marquette. We partnered with Peoples Gas to install aerators and showerheads at no cost.

May 2015, we installed 74 dual flush conversions, 50 single valve to dual valve conversions, and 40 toilet replacements on the Lake Shore Campus. On the Water Tower Campus, we installed aerators, new faucets, and autoflush urinals and toilets.
Educational stickers were placed in the shower and on retrofitted toilets.
Behavior Change Campaign

- Jan 2015 – water conserving posters were placed in key areas in residence halls of Group 1 and 3
Behavior Change Campaign

- Jan 2015 – water conserving pledge was distributed

There are MANY ways to shorten your shower!

1. Make a 5 minute playlist. Finish showering before the music stops.
2. Set a 5-minute alarm. Finish showering before the alarm goes off.
3. Take a Navy shower. Run the water only to get wet and rinse off.

I, ___________________________, pledge to be a water-saving Rambler and shorten each shower by at least 2 minutes for the next week.

How will you conserve in the shower?
Signed water pledges displayed in residence hall entrance
• Jan 2015 – A “Welcome Back” goody bag was placed in front of each apartment for students upon their return after winter break.
• The goody bag includes dish soap and toothpaste for each student.
• The dish soap and toothpaste highlighted a campus celebrity – Sister Jean – modeling water conserving behavior.
Sister Jean turns OFF the water while doing dishes.

How about you?
In Feb 2015, we gave two educational, interactive water presentations to students.
Students carried a 5-gallon bucket of water ¼ of mile to experience how many Africans need to carry their daily water use to their home. SOURCE
Behavior Change Campaign

* In February, we took down the previous batch of posters and put up a new batch in key areas.
In March, we took down the previous batch of posters and put up the third and final batch of posters.
In April, we conducted a second round of electronic surveys. The survey incentive was a $5 gift certificate to Amazon or Target. Additionally, students were entered to win a Jambox bluetooth stereo if they completed the survey. The response rate was 52%.
Our behavior change campaign tools were...

- Posters
- “Welcome Back” Goody bags
- Pledge
- Interactive Presentation

The most effective strategies were the posters and “Welcome Back” goody bags as they reached the most number of students. In order to increase the efficacy of educational campaign, we would recommend that if resources allow, adding a pledge and presentation to the campaign as well.
Part 3 – Lab Retrofits
24 hoods in a Chemistry lab run experiments with room temperature water that could be recirculated instead.

Water aspirators are not used.

Water flows through glass condensers, which is attached to a larger glassware setup containing hot vapors.

These hot vapors that come in contact with the cooled glass walls from the running water are returned to liquid state.
Solution: use portable recirculating pumps
During experiments, the pump will be taken out and attached to glass condensers.
Vendor: VWR
Cost: $70 each
Saves ~50,000 gallons/year
• 2 faucets in the Clean Energy Lab used 3 gallons per min
• Installed 2 WaterSense faucets that uses 1.5 gallons per min
Part 4 – Other initiatives
In a general water conservation outreach strategy a variety of events took place over the year addressing water related issues.
Part 5 – Results
Retrofits

- In total, more than 790 equipment retrofits took place.*
- Anticipated savings during the life of this equipment is expected to be greater than 30 million gallons.
  - At 2015 water rates, this will save Loyola over $200,000 over the life of the fixtures
  - This is equal to a 11.8 month return on investment

*Includes retrofits for Labs
Behavior Change

Results were tracked in two ways

• Surveys
  o Primary survey responses saw students who received the campaign containing identity messages reported a stronger goal to conserve, $t(269) = -2.78, p = .006$ and use less water, $t(269) = 3.18, p = .002$ than students who did not receive these messages
  o Additional feedback was gained on user’s response to behavior change messaging and retrofitted fixtures

• Water bills
  o During performance period, a 2 month period compared to average of the same period over the previous four years, residence hall(s) with;
    * Retrofits only saw 38.8% water use reduction
    * Behavior change only saw 18.5% water use increase
    * Retrofits and Behavior change saw 4.4% water use increase, and
    * Control saw 13% water use increase
From the residence hall water conservation retrofit, we learned the following:

• It takes time and coordination to install retrofits.
• Retrofit installations are best done when students are not living in the residence hall.
• It’s useful to engage with student teams and have them use the university as a learning laboratory. Student groups conducted insightful water audits.

From the student behavior change campaign, we learned the following:

• Identify and promote behaviors that are do-able.
• To create a memorable and well communicated poster, incorporate humor, campus celebrities, social norms, and images of vivid consumption to make messages memorable.
• Perceived behavior change does not necessarily translate to water conservation

From the lab retrofit campaign, we learned the following:

• Staff members and academic units are not incentivized to seek out and use water efficient fixtures. This needs to change if water conservation is to be a shared goal for the university as a whole.
Part 6 – Resources
Outreach Resources

• Further information on this project is available at
  o www.luc.edu/sustainability/campus/focus_area/water/waterretrofits
  o Including edit-able posters, water trivia and other materials
• Prize / Quiz Wheel is available from multiple vendors such as: http://www.spinningdesigns.com/weeklyspecials.html
  o Comes with template to customize categories or prizes
Information Resources

- WaterSense - http://www3.epa.gov/watersense/
  o Includes savings calculators, available rebates, product guides and other information
- Alliance for Water Efficiency - http://www.allianceforwaterefficiency.org/
  o Includes active College Water Efficiency Group with case studies and audit tools
- Association for the Advancement of Sustainability in Higher Education - http://www.aashe.org/
  o Contains various case-studies and presentations on water efficiency at campuses across North America
- Chicago Metropolitan Agency for Planning - http://www.cmap.illinois.gov/livability/water