UIS Green Project Letter of Intent- Fall 2022

Project Name:

Conserving Water through the Installation of Low-Consumption or Dual-Flush Toilets

Contact Information:

Name	*UIS Student/Faculty/Staff & Department (or Office)*	*UIS Email*	*Phone #* **OPTIONAL: allows GFC committee members to contact you with advice**
Anna Schurz	**UIS Student**	**aschu26@uis.edu**	**618-305-4597**

Project Information:

(1) Please provide a brief description of the project. What are the goals and the desired outcomes of the project?

The project of this LOI would be to conserve water by installing either a dual-flush toilet or to continue the shift towards low consumption toilets and install more of those on campus.

First, I'll explain the purpose of installing a dual flush toilet in a bathroom on campus. A dual flush toilet is one that uses different amounts of water depending on the need. This would save water when only flushing urine but still make sure that feces would flush by having a flush with more water. In addition to saving water, it would also create awareness to students by having this feature. The bathroom stall would have a sign, "Brought to you but the UIS Green Fee" but it could also have a flier when it first gets installed to inform students, staff, and faculty. Furthermore, the dual-flush toilet would benefit students but also workers like faculty and staff. The desired outcomes would be saving water on campus and thus saving money. Another desired outcome/goal is making students aware of the feature and thus more aware of their water consumption overall. By having this feature on campus, students can see their use of water first-hand, in one specific way. The additional goal would not only be making students more aware of their water usage but also changing some of their habits in water consumption through their awareness.

The second idea for this project would be installing more low consumption toilets on campus. We already have numerous low consumption toilets installed and continuing that shift would be plausible on our campus but could also have a lasting effect on the water consumption on campus. The goal of shifting towards more low consumption toilets would be to decrease our water consumption and thus conserve water. In addition to installing more of these toilets, we could also add signs in the bathrooms to create awareness about the feature and thus about where the Green Fee money goes. This could be done for existing low consumption toilets but also for any new ones that would be installed.

(2) Please describe why this project matters to you and how it relates to sustainability.

Although Springfield is not plagued by droughts, the necessity for using water wisely is still important. Water is a resource that everyone needs to survive and thus we all need to take care of it. One part of the definition of sustainability is using resources in a way that don't deplete them or cause the natural cycle of resources to become unstable in order to ensure that future generations and the environment around us can benefit from them. When concerned with water it sometimes falls into the trap of the Tragedy of the Commons and thus, we all need to make an effort to conserve it and protect our supply.

Both the long-term and short-term effects are using less water. Over the long-term we could make a significant impact and conserve water. Furthermore, we could have short-term and long-term effects of making students, faculty, and staff more aware of their water usage. This could help change their short-term behavior,

such as using the dual flush option, but also their long-term behavior by changing some of their daily habits through creating awareness.

(3) Where will the project be located?

For the dual flush toilet there are two different options. The first option would be installing one toilet in one of the all-gender restrooms in PAC. This would allow all genders to use it, but it would also be used by the community due to the variety of events that the PAC hosts. The second option would be to install two toilets by putting one in each gender restroom in the UHB building. We would choose one stall in the restroom of each gender and label it and thus people can choose to use it. The advantage to having it in UHB would be that there is a lot more daily traffic by students, faculty, and staff and thus would allow more usage. The disadvantage is that we would need funding for two toilets, one for each gender restroom. The advantage to having it in PAC is that even the community benefits from it and we would only need to install one toilet. The disadvantage is that there is less traffic there.

Thus, I see two options for the location of a dual flush toilet which could be decided by the funding or discussion of the Green Fee committee.

If we would take the other path, of installing more low consumption toilets, it would be installed on campus where previously they were not. In addition, depending on the funding we would need to install them first where they are more of use.

(4) Please provide a brief summary of how students will be involved in or affected by the project:

The students on campus would be involved by actively choosing to use it and participating in the dual flush system. The same would be true for the low consumption toilets, the students would be actively participating by using them. They would be affected by it by becoming more aware of their water consumption. Then students could become involved in helping conserve water by changing their daily habits. Furthermore, as previously stated, not only will students benefit but also faculty and staff since they can also use the project. Moreover, the faculty and staff can also become aware of their water-consumption and thus change some of their habits.

This project also shows students how their green fee money is used since it is something that is used on a regular basis and can be used by everyone.

The university can also use their sustainable features to attract students. It shows that they are environmentally conscious, and in the case of this project, aware of their water consumption. Current and incoming students may find this important and support the university by choosing to attend it.

(5) Please provide a brief summary of the project timeline. (For example, when will the necessary items need to be purchased? When should the project be installed or initiated?)

This project can be implemented as soon as the funds are approved. The items will need to be bought and then they can be installed when the university (facility and maintenance) sees fit. I would advise installing the toilets on a day where there are little staff and students present, such as a Friday morning. We would go in increments; the toilets would not need to be installed all at the same time. It can also be done in the summer or between semesters. The implementation process should not take long as there are not several steps, and it does not depend on the season. The toilets would be installed and then we can monitor the success of the project.

In addition to the toilets, it would be helpful to have an explanation for the project so that students/faculty/staff can understand the use of the Green Fee money and be aware of the project. Adding signs to the project could be something that could be discussed in the committee and chosen to do at any time after the implementation of the project.

(6) Please provide a brief itemized breakdown of the funds needed.

We will help you factor in the cost of labor and installation. If you have a plan for where you would like to purchase supplies from, provide it here and include a URL link to each item on the desired retailer's website.

For this project we would need to buy a toilet bowl and a valve in order to make a low consumption toilet. The university uses tankless toilets, and they are wall mounted. When looking at saving water it is important not to buy touchless sensor toilets since those can malfunction and end up using water or the battery runs out. When the battery runs out it will prevent things from being flushed and thus it will sit around.

When looking at the direction of the project for installing more low-consumption toilets, we would stick to the previous suppliers for the university and give them funding to buy and install more.

With the help of Chuck Coderko, the associate vice chancellor of facilities and services, it is estimated to be about $275 for a low-consumption toilet. This would include $125 for the 1.6-gallon toilet bowl and $150 for the 1.6-gallon flush valve from current suppliers. Thus, depending on the budget of the Green Fee it would be possible to obtain numerous new toilets and make a significant impact on the water consumption. The current suppliers are through construction suppliers and the university buys Kohler or American Standard.

When going the route of the dual flush toilet, it needs to be taken into consideration that the university uses tankless toilets and that installation would need to avoid ripping open walls, etc. This being said we would have to buy a diaphragm and handle that would convert an existing low consumption toilet into one that also has the dual flush feature. We would buy the Regal 111 model diaphragm and green handle kit from Regal as well. For $60 we could convert one toilet into dual flush. In case we run into an older toilet which has a flush valve that isn't compatible with the Regal diaphragm and handle then it would require a new flush valve. A new flush valve could be bought for $203 a piece.

This budget shows that we can make a major impact by changing a lot of toilets to low consumption and thus making a big effect on water consumption. We could also either do a pilot project for the dual flush toilets or change a lot of existing low consumption toilets into dual flush toilets and thus make a major impact in this manner.

Overall, the cost depends on how large we want to take this project, but it is feasible and can make a major impact. For changing toilets to low consumption, it would be $275 and an extra $60 for the dual flush feature. This being said, with an estimate of about $8250 we could convert 30 toilets into low consumption toilets and an extra $1800 to make those 30 with the dual flush feature as well. If we ran into compatibility issues it would be $203 to make them dual flush but most toilets should be compatible.

A big thank you to Chuck Coderko for helping with the budget and feasibility of this idea. Attached is an email string of myself and Chuck Coderko. He is very excited about this idea and would support implementing it.

(7) Do you have any suggestions for how we could measure the success of this project?

The success of the project could be measured by looking at and assessing the campus water bills. By comparing the water bill after installation to an old bill it could show that the amount of money spent is decreasing and/or show less water usage and thus would imply a decrease in water consumption. Furthermore, we could ask students/staff/faculty and send out a survey asking for their feedback on the toilets. Finally, we could also ask the janitor and maintenance crew if it is less or more maintenance and if they need more work, the same amount of work, or less work to clean. Overall, by analysis of the water bills and thus looking at water consumption and in addition collecting feedback, we can measure the success.

(8) Has this been done before? Provide an example of a similar project implemented at another university or community.

Yes, similar projects have successfully been implemented in many places.
In Santa Catarina State University in Southern Brazil, they implemented a similar project and did an analysis about it. They implemented various features into their plumbing such as dual flush toilets but also single flush toilets and the use of a greywater system. In addition to implementing these features, they also analyzed their success. They tested various scenarios, single flush toilets, dual flush toilets, and dual flush toilets with the greywater system. They found that in the scenario with the dual flush toilets, pertaining to our project, there was substantial decrease in water consumption while the usage remained about the same as the usual toilets. They even found that this scenario used less energy than the single flush toilets according to their calculations on production and slight differences in the usage and final disposal. Overall, at the Santa Catarina State University in Brazil they found that the dual-flush toilets were effective in decreasing water consumption after they implement the project there. (Gnoatto, Kalbusch, Henning, 2019).

(9) Has anyone conducted any useful research on this topic that we should know about?

At a university in Spain, The University of A Coruna, they implemented the SOSTAUGA project. This project had the goal to make their water management more sustainable. One such way was through the reduction of water usage of the university. They implemented various features which included dual flush systems in their toilets. Furthermore, they had eco-labels meaning they informed their users about the feature. Moreover, their toilets included tankless flush valves, similar to what the UIS would need. Overall, they found that their costs were low but their effectiveness on saving water was high. They found that they attracted awareness and decreased water consumption effectively. Finally, they stated that "similar projects...are applicable to the universities and other public and private schools" (Torrijos, Soto, Calvo Dopico, 2020). This study relates to the project because it shows that dual-flush toilets and awareness can be effective.
Another study about water consumption in relation to toilets was done and reported on in the "Journal of Cleaner Production" in 2019. The study analyzed flush devices in toilets at a building at a public university. They gathered a lot of data from flush volume, to flushes per day, flush duration, etc. They did a control before installing dual flush and then studied after the dual flush devices were installed. The study found that the dual flush device caused the average water consumption to decrease. They found it decreased by 21.72%. (Freitas, Henning, Kalbusch, Konrath, Walter, 2019). This relates to the project since it shows that dual flush devices are effective in reducing water consumption. Overall, the study at a public university building shows that water consumption can be reduced greatly by simply making changes to our toilets.

(10) Do you have any additional comments?

This Letter of Intent intends to decrease water consumption by thoughtfully installing new toilets. The project outlines two different paths by either installing a dual-flush toilet (or two depending on location) or installing multiple low-consumption toilets on campus, adding on to the previous number. Both would create awareness and decrease water consumption. The path of the project depends on the funds but also the decision of the green fee committee, if they would like a new project or add to an existing one.

References

FREITAS, L. L. G., Henning, E., Kalbusch, A., Konrath, A. C., & Walter, O. M. F. C. (2019). Analysis of water consumption in toilets employing Shewhart, EWMA, and Shewhart-EWMA combined control charts. *Journal of Cleaner Production*, *233*, 1146–1157. https://doi-org.ezproxy.uis.edu/10.1016/j.jclepro.2019.06.114

Gnoatto, E. L., Kalbusch, A., & Henning, E. (2019). Evaluation of the Environmental and Economic Impacts on the Life Cycle of Different Solutions for Toilet Flush Systems. *Sustainability*, *11*(17), 4742. https://doi.org/10.3390/su11174742

Torrijos, V., Soto, M., & Calvo Dopico, D. (2020). SOSTAUGA project: reduction of water consumption and evaluation of potential uses for endogenous resources. *International Journal of Sustainability in Higher Education*, *21*(7), 1391–1411. https://doi-org.ezproxy.uis.edu/10.1108/IJSHE-02-2020-0057

AW: Idea for Dual Flush Toilets

Schurz, Anna K <aschu26@uis.edu>

Fr, 14.10.2022 19:35

An: Coderko, Charles R <ccode2@uis.edu>

Hi!

Thank you so much for your prompt and detailed response!
Going off of what you mentioned, how many 4 gallon toilets do we have on campus? If I would propose more 1.6 Gallon fixtures where would these ideally be located? Furthermore, are the housing toilets 1.6 Gallon?
If I would propose the dual flush toilet where would be an ideal spot for it on campus? And what are the costs including Installation, I know you estimated 800.
What would be the cost difference between a wall hung dual flush toilet vs the tank?

Do you know how much water we would save with one dual flush or one 1.6 gallon fixture?

Sorry for the many questions but I want to think through various aspects for the proposal!

Thanks!
anna

Von: Coderko, Charles R <ccode2@uis.edu>
Gesendet: Freitag, 14. Oktober 2022 15:30
An: Schurz, Anna K <aschu26@uis.edu>
Betreff: RE: Idea for Dual Flush Toilets

Anna,

I like your idea to reduce water consumption. The university has been working to do this by installing urinals, toilets and flush valves that are “low consumption”, take into account the limitations of the university’s sewer system, and meet water conservation directives. Unfortunately it has been slow going. Investing in toilets isn’t glamourous, but I am thrilled you are looking into it. We would welcome any help. Especially if to can help with funding through the Green Fee Committee.

I am not sure how much research you have done yet, but it would be good for you to explore how wall hung toilets and urinals work with flush valves. You may find something new that I am not aware off and I love new ideas. As you explore options, please know the outside of the on-campus residences, 99% of the fixtures on campus are wall hung (vs. toilets with a tank).

Big picture:

Generally speaking, there are basically 4 sizes of toilet fixtures:

1. 3.5 to 4.5 gallon – these are the old school pre-1995 fixtures which use a fair amount of water. The university has quite a few of these in our older buildings. We desperately want to replace these.

2. 1.6 gallon “Low Consumption” – these are the standard size fixtures being installed to conserve water. They are basically in the sweet spot of minimal use of water and still compatible with building sewer systems across the United States. They meet code and water conservation mandates. These are the type the

Act) install these in all new or major renovation construction.

3. < 1 gallon “Low Flow” (.6 gallon for toilets and .3 for urinals) – these may be okay for a home, but don’t really work in older buildings or heavily used public facilities. The slope of the pipes on the sanitary sewer system in the buildings needs to be steep and have short runs for these to work. There isn’t much water being flushed and if there isn’t water, the #2s (although they may make it out of the bowl) don’t go down the pipes. Also, if the pipes have shallow or long runs (like our campus buildings do) there isn’t enough water flow to push the #2, paper, etc. all the way down the pipes. As you can imagine, clogs occur and then bad things happen. Also, these toilets tend to do a lot of swirling of water. This is okay in a home, but these low flow fixtures really don’t get everything out of the bowl. As a result, over time the porcelain turns a nasty yellow-ish & brown-ish tint. Also when these are used in public buildings, there are often odors by the end of the day. We use a lot of green products and we are not a fan of hanging those colored “sweet smelling” disinfectant disk on the toilets. Sad thing is most of the time people end up flushing these twice since often not all of the stuff goes down…..now you just flushed twice and almost gotten to 1.6 gallons anyway.

4. Waterless – the university isn’t plumbed to accommodate these. They are also very nasty.

Something important to also keep in mind is the toilet/urinal bowl and the flush valve must match. If you have a 3.5 to 4 gallon bowl, you must have a 3.5 to 4 gallon flush valve. Too little and the bowl doesn’t fill and the #1s and #2s don’t go down. On the other side, if you have a .6 gallon bowl, if you put a 1.6 or 3.5 gallon flush valve on, shoes tend to get wet and nobody likes that. So it isn’t as easy as just changing out a valve or changing out a bowl. If you want to use less water, you will have to change both the bowl and the flush valve.

So with all that in mind, 1.6 gallon fixtures (“low consumption”) is my recommendation on how to help reduce water consumption yet still accommodate the limitations of the university’s sewer system. There have been a few dual flush valves out there, but they are typically a 1.28 gallon / .9 gallon per flush. Again, the amount of water delivered can cause issues in older buildings. If someone flushes twice, you have again exceeded the 1.6 gallons and defeated the purpose.

Dual flush valves + toilets are also more expensive…sometime 3x to 4x as much. Given the cost of dual flush, the problems they cause with existing pipes, and the fact that often dual flush valve parts are hard to come by since they are non-standard and kind of a specialty, the university has chosen to continue to switch to 1.6 gallon low consumption fixtures.

The average cost of a 1.6 gallon toilet bowl is ~ $125.00
The average cost of a 1.6 gallon flush valve ~ $150.00

Quality dual flush wall hung toilet + valve are typically greater than $800.00

I am not opposed to installing a dual flush valve toilet in a restroom, but we would have to select the right restroom. You would also have to understand that this would kind of be a one off type feature. If it breaks, it would be unlikely the university would hunt down the parts to fix it. The 1.6 gallon solution is less expensive, we have parts on hand (or they are easy to obtain), and we can fix or replace them quickly since time is typically of the essence when toilets go down.

Bottom line: I would much rather continue to invest in the 1.6 gallon fixtures and continue the battle against the 4+ gallon monsters on campus. I wish the sewer systems in our buildings could use the low flow fixtures, but they just won’t work in a lot of the restrooms.

Last thought: With as little as $20,000 in Green Fee money, we could install around 70 new toilets. That would put a pretty good size dent in our fixture replacement plan. Plus how awesome would it be to have a sticker on the toilets and urinals on campus that say “Brought to you by the Green Fee Committee” ☺

Thanks,

Chuck Coderko
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From: Schurz, Anna K
Sent: Thursday, October 13, 2022 10:12 PM
To: Coderko, Charles R <ccode2@uis.edu>
Subject: Idea for Dual Flush Toilets

Hi!

My name is Anna Schurz and I am in Intro to Sustainability Class and we are working on Letter of Intents for the green fee proposal. My proposal is installing a dual flush toilet on campus to save water. My professor advised me to reach out to you. I was hoping to just throw out the idea of a pilot project and thus install one toilet for example in an all gender bathroom. What would be the cost and logistics of this? Even if it isn't neccesarily plausible I would love to have information about it.

Thank you so much!

anna

Fwd: Idea for toilets on campus

Schurz, Anna K <aschu26@uis.edu>
Mo, 31.10.2022 15:22
An: Styles, Megan A <mstyl2@uis.edu>

Gesendet von Outlook für iOS

Von: Coderko, Charles R <ccode2@uis.edu>
Gesendet: Monday, October 31, 2022 2:56:10 PM
An: Schurz, Anna K <aschu26@uis.edu>
Betreff: RE: Idea for toilets on campus

Anna,

I had our plumber dig into the flush valve you have pictured below. WE CAN DO THIS!!! Well, kind of…. we can do something very very similar to what you are proposing with a small caveat - we need to use Regal parts and pieces.

If we purchase Regal 111 model diaphragms and the green Regal handle kit we can replace the existing diaphragms and handles on the university's 1.6 gal toilets and urinals and make them into a "dual flush" convenience. Overall, it will work just like the Sloan flush valve you have in your email below. The better news is if we use the Regal parts, it will only cost us about $60 to convert each flush valve on a toilet/urinal.

If we have an older flush valve that isn't compatible with Regal parts, then we would have to put a whole new flush valve on to get a dual flush system. We can get a Regal dual flush valves at cost for $203 each (about $20 less than the Sloan).

As for priorities, my vote would be:

#1 - change all the 3+ gallon fixtures out for 1.6 gal fixtures. Doing "dual flush" at the same time would be great, but it is an added cost of about $50.
#2 – change all the flush valves on the toilets/urinals to dual flush, but that is $60 per toilet assuming the existing flush valve is compatible with Regal parts. If not, it is $203 for each non-compatible toilet.

Hope this helps,
Chuck

Chuck Coderko
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From: Schurz, Anna K
Sent: Friday, October 21, 2022 12:07 PM
To: Coderko, Charles R <ccode2@uis.edu>
Subject: AW: Idea for toilets on campus

Hi!

I think I found something that might actually work.
https://www.plumbingsupply.com/water-saving-flush-valves.html

This would be what we need right? It works for wall hung toilets and we would just need to bowl in addition.
I know it isn't the brand the university buys from but this is the only thing I found and I would just propose it for a pilot project where we can see if it works.

Thank you,
anna

Von: Schurz, Anna K <aschu26@uis.edu>
Gesendet: Donnerstag, 20. Oktober 2022 19:10
An: Coderko, Charles R <ccode2@uis.edu>
Betreff: AW: Idea for toilets on campus

Hi!

That makes sense. And I didn't know that about the touchless sensors but that makes sense too. So just looking online I can't really find anything dual flush without the tank or a flush valve. I clearly don't know what I am doing haha. Your information has been very helpful and I appreciate it!

Thanks,
anna

Von: Coderko, Charles R <ccode2@uis.edu>
Gesendet: Donnerstag, 20. Oktober 2022 16:56
An: Schurz, Anna K <aschu26@uis.edu>
Betreff: RE: Idea for toilets on campus

Anna,

I like the toilet from Home Depot you found. I have two old dual flush toilets in my house and I am gonna check it out. I might steal your find to replace them.

Unfortunately, the Home Depot toilet isn't a good option for the university. To the max extent possible, we want to install fixtures that don't require the university to:

1. Tear out walls. With an in-wall tank system like shown on the Home Depot model you found, we would have to cut a hole in the wall and then cover it with a panel or reconstruct the wall. With many of our restroom walls being either tile (lots of labor) or CMU block walls, that won't accommodate an in-wall tank, 9 times out of 10 we need to stick to flush valves. The time (labor) and material costs to cut out and repair the wall or purchase a panel are an unwanted expense.

2. We get our toilets through construction suppliers. Below is the cost of the 1.6 gallon toilet and flush valves ($275 total). $850 for the Home Depot model is pretty steep for us. Pictured below are two toilet styles with flush valves (the silver things).
    a. The average cost of a 1.6 gallon toilet bowl is ~ $125.00
    b. The average cost of a 1.6 gallon flush valve ~ $150.00

3. We also work to keep everything to one generic standard (two max) so we can keep parts on hand and don't have to search for unique parts or have a bunch of different parts in our bench stock. Kohler and American Standard are two manufactures we like and they are quality/sturdy units. Our porcelain sees all kind of action at the university and we need them to be battle ready. I am not familiar with the Home Depot one, but overall, residential toilets typically don't hold up at the university. We are constantly replacing or repairing toilets in the university's housing units since they install residential units mostly.

4. The Home Depot toilet would also require us to replumb the water supply and more than likely the sanitary sewer since they don't appear to align (e.g. the Home Depot isn't wall hung). We need something easy we can simply attach to the existing pipe in the wall where the water enters the flush valve and a toilet that has the standard floor/wall clearance to mount/attach to the sewer line. Below are two pictures of the style of low consumption toilets (Kohler) that we found to be excellent.

Side notes: Not a big fan of the touchless/sensor flushers. One - the batteries go dead….a lot. Since the toilet won't flush without a new battery power or a two gallon bucket of water to wash it down, the #1s and #2s sit until someone reports it. Nobody like to find those kind of surprises. The standard flush handle is the way to go. Two – the sensors sometimes mess up and the toilet continues to flush every few minutes. The dreaded "phantom flusher" make me sad as gallons and gallons of water go down the drain. I only tell you this in hopes I can recruit you in my fight against touchless sensors on toilets.

Lastly, we purchase most of our plumbing supplies from Connor Co. or Capital Group. We work really hard to keep the money local and spread the purchases equally between these two.

Hope this helps,

Thanks
Chuck

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From: Schurz, Anna K
Sent: Tuesday, October 18, 2022 4:54 PM
To: Coderko, Charles R <ccode2@uis.edu>
Subject: Idea for toilets on campus

Hi!

I have continued my research and because I don't know anything about toilets (haha) I didn't know what exactly we would need to fit our sewer system and the no tank toilets. I talked to Dr. Styles and she said that it would be ok for me to ask you where our current supply comes from. This would be for implementing the idea for installing more low consumption toilets. Where have we been getting the bowls from and valves?

On the other hand for the idea for a dual flush toilet, I found a toilet but I have no idea if it would work. Would you be willing to give me some feedback on this one?
https://www.homedepot.com/p/Geberit-2-piece-0-8-1-6-GPF-Dual-Flush-KARO-Elongated-Toilet-with-2x6-Concealed-Tank-and-Plate-in-White-Seat-Included-C-5170-01KIT2x6/316023684
If I understood your previously email correctly, we would also need a valve, correct?

I appreciate taking your time to read this email and would appreciate any feedback!
Unfortunately, I am not familiar with these things and I want to thank you for your help in steering me in the right direction.

Thanks!
anna