

# University of Idaho

**PREPARED BY CORE 175: EARTH AND OUR PLACE ON IT  
TAUGHT BY: ED KRUMPE  
SPRING 2011**

**UI MOSCOW CAMPUS  
SUSTAINABILITY ASSESSMENT**

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## University of Idaho Water Conservation

- 1 Lower Water Domestic Use
- 2 Campus Heating System
- 3 Water Chilling System
- 4 Groundwater Pumping

# Water System



## LOWER DOMESTIC WATER USE

If one looks around they will see that there has been numerous efforts implemented to conserve water, ranging from low volume showerheads to automatic shut off sinks in rest rooms. Domestic water use accounts for a large percentage of annual water the University of Idaho requires. The University has been working hard to take all possible measures lowering water consumption by installing water conserving faucets and toilets in new buildings, as well as replacing old water-guzzling fixtures.

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### How Are We Doing?

The University of Idaho is well on its way to lowering domestic use. In the past years campus Facilities and Housing departments have been concentrating on small upgrades to water systems in the buildings, and dormitories. There have been efforts to install low flow fixtures, automatic sinks, and more efficient water use systems throughout the campus. University Housing has something very special in the works. The department has recently become the fortunate recipient of a special grant that has given them the opportunity to install over a half a dozen uniquely designed low flow toilets with a partial or full flush feature. This special feature allows for a half of a flush for liquid waste while still providing a full flush for solid waste. This measure alone will save hundreds considering that a traditional toilet usage is 20 gallons a day per person, where as these select flush toilets will only utilize about five gallons per person. That's a significant difference. But because these toilets have recently been installed it is hard to say just how much savings these toilets will produce, but the future is looking bright. Under the current budget restrictions it has faced, the University of Idaho has still made significant efforts to improve the situation in regards to domestic water waste on campus. With the installations of water saving fixtures combined with the efforts to make people more conscientious of their water consumption, the University of Idaho over the years has taken their average total water consumption from 314 gallons per year down to 250 gallons per year. And even though that's a lot, the University of Idaho would like to make that even less. So, until the U of I has exhausted every avenue of conserving water it will continue to strive for optimal water conservation. Unfortunately, that is all dependent on funding. From our understanding, there are no long term projects that are directly focusing on lowering domestic use specifically.

# Water System



## LOWER DOMESTIC WATER USE

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### Recent Accomplishments

The Idaho Commons and TLC building, upon its completion in 2005, was the first new building on campus to have low flow fixtures installed throughout the building. Joe Kline, of the Facilities Management Center, shared how the university could conserve even more water. He expressed that although they would like to, at the very least, switch out all of the present water fixtures with low flow ones, the current funding leaves them unable to do so. However he happily stated that they do have available funds for the purchase of low volume fixtures when a current older one malfunctions and needs replaced. In other words, it is a slow process, but the university is inching its way toward being more efficient when it comes to water. Mr. Kline also stated that they had been experimenting with automatic sinks and toilets that respond with human movement, within the Facilities building. And not the automatic ones that requires batteries, but rather the ones that are directly hardwired because battery operated fixtures are not as efficient. Facilities found the hardwired automatic's to be highly economical, but that the fixtures were still in the testing phase to determine reliability.

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### Comparing our Performance

So we know that the University of Idaho has taken steps to reduce their water consumption on campus by means of domestic use by the installation of water saving toilets, faucets and showerheads, but how do they compare to efforts at other universities, say perhaps Idaho State University? Well, upon evaluation of ISU's water conservation efforts they make claim that their installations of low volume water devices such as sinks and toilets have saved the university well over 24.5 million gallons of water per year and an annual cost savings of around \$79,000. And while it has been estimated that the University of Idaho has saved well over these amounts of ISU per year as a result of water conservation efforts, no clear statistical data could be confirmed at this time. But efforts are underway to provide declarative numbers in the future.

# Water System



## CAMPUS HEATING

The University of Idaho Steam Plant uses a very efficient system of heating and cooling campus using steam produced by the burning of woodchips. This steam plant has been the primary source of heat production for over 100 years. Once operating primarily on coal and natural gas, in 1986 the wood-fired boiler was added to the plant and is now responsible for the majority of the plant's steam production year round.

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### How Are We Doing?

Biomass energy production is not only economically beneficial; it is also a very sustainable, low-waste alternative to natural gas. The woodchips that are used to heat the University of Idaho are purchased from local mills, providing a cheap and reliable source of energy. Burning woodchips is a great way to reduce CO<sub>2</sub> emissions, and the plant has a very efficient condensate return. The steam produced by burning the woodchips is sent out through a series of pipes to all of the buildings on campus. Once the steam loses heat, that is captured and utilized as heat for the buildings, it cools and returns to the plant as condensate. The plant is located downhill in respect to the major buildings, so the returning condensate flows back to the plant in a more natural way. Heating and cooling water does produce an average loss of returning condensate. However, the University of Idaho Steam Plant only loses an average of about 10% of condensate. The other 90% that is collected is reused, saving water and reducing waste.

### Did You Know?

The UI Steam Plant used 266,550 Gallons of water in January 2011 to heat 70% of the building on the UI campus

# Water System

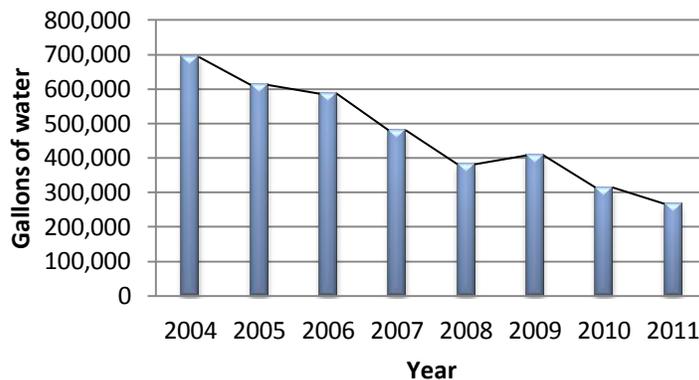


## CAMPUS HEATING

### Recent Accomplishments

- The steam plant is currently able to provide heat to around 70% of the buildings on campus.
- The amount of water that the UI Steam Plant uses to heat campus varies month to month, but the overall number of gallons per year has been decreasing since 2003.
- In January of 2004 the Plant used a total of 692,355 gallons of water. In January 2011 that number was more than halved, when the UI Steam Plant only used 266,550 gallons.
- This decrease has been the result of increased knowledge of the system along with repairs to piping that is responsible for the delivery of steam to campus buildings and carrying the returning condensate back to the plant.

### Power Plant Water Usage for the month of January



Our team created this graph using the data given to our group by Mike Lyngholm, the UI Steam Plant manager. This graph demonstrates the total amount of water used in the month of January for each year from 2004 to 2011. As you can see the water usage is down significantly from just 2004.

# Water System



## WATER CHILLING

The University of Idaho holds a unique system for water chilling. There is a 90 foot container placed near the University golf course on Perimeter Drive that can hold up to two million gallons of chilled water. The water chilling system is unique to the campus as it is the first of its kind. With the two existing centralized water chilling systems, the campus will be able to provide for more efficient air conditioning in the years to come. A new chilling plant has been created directly attached to the new water chilling container.

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### How Are We Doing?

Upon interviewing a project manager for CTA Architects Engineers, the firm in charge of creating this new water chilling plant, I was startled to discover that the new plant could cut the amount of money spent on cooling at the University by up to 30%. Facilities stated that the money saved through this newer more efficient system will be used to make upgrades to existing systems onsite. The newly added plant has all of the newest technologies involved with water chilling integrated and are reported to be operating at maximum efficiency.



Efficiently cooling the water used to air condition the U of I campus has always been a struggle due to the water chilling system in effect. With the addition of the new structure, efficiently cooling the campus will be a BREEZE. Students can help cut cooling costs by opening windows and purchasing small portable fans.

# Water System



## WATER CHILLING

### UI Water Chilling Facts:

-As of fall 2010, the University has implemented the third water chilling facility into the other two existing systems.

-Electric centrifugal chillers and steam absorption chillers that utilize steam to generate cold water provide for a majority of the campus uses.

-For the near future, the U of I is planning to decommission existing water chilling plants as newer technology arrives. Some of the existing plants may be modified to bring in the new changes in efficiency.

-On a peak load day (95 degrees temperature with a minimum amount of 35% humidity), the system can easily operate with little to no hiccup in cooling.

-The project to create the third water container began in 2008

-The project to create the third water container began in 2008

-The Water Chilling system was introduced with little to no improvement in the last 10 years; the addition of the newest water chilling plant was completed in the fall of 2010.

-The old system of water chilling operated in a moderate amount of efficiency, while introducing the third helped curb overload and evenly distribute the workload.

-The primary refrigerant used is water, which creates an enormous amount of positive impact on the environment as almost no harsh chemicals are used in the chilling plants themselves

### Did You Know?

The University has 3 plants responsible for air conditioning.

# Water System



## GROUND WATER PUMPING

In recent years the University of Idaho has been working hard to reduce and reuse water on campus. With more efficient heating and cooling systems, we have significantly lowered our use in the last decade. According to the Palouse Basin Aquifer Committee meeting on Feb 17, 2011 the Palouse region (including Moscow, Pullman, UI, WSU, Colfax and Palouse) pumped a total of 2.5 Billion gallons of water from aquifers in 2010. This total number of gallons pumped includes all uses, and is 6% less than what was used in 2009, and 18% less than 1992. These numbers go to show that even with a growing school and city, the Palouse region has been working hard to bring water use down.

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### How Are We Doing?

According to the Water Use Report put out annually by the Palouse Basin Aquifer Committee (PBAC), the University of Idaho has decreased in the amount of gallons pumped out of the Palouse regional aquifers. There is little information concerning the causes of this decrease in the report, but there is a lot of evidence that proves we have been using less over the years. In 2006 the UI Domestic use was estimated at 8% using 220 million gallons. There was a 1% decrease by 2009, corresponding to a decrease in an estimated 40 million gallons.

When comparing the amount of water used by the University of Idaho to WSU there is evidence that the UI campus has been more successful. UI decreased in the three years between 2006 and 2009, while the WSU campus experienced an increase in total percentage and millions of gallons pumped annually. WSU was responsible for 479 million gallons of groundwater in 2009, corresponding to a 1% total increase from 2006 landing the campus at a total of 18% of the regions groundwater.

These numbers come from figures that are used in every yearly report; they are reliable, but may be misleading. The way to accurately measure the Universities success in lowering water usage would need to include annual precipitation and per capita consumption. If there is more precipitation one year, the annual use will decrease due to a lesser need for irrigation water. Similarly, if there are hypothetically 50% less residents and only 40% less water use it can be assumed that per capita consumption has increased and therefore not succeeded in using less water. Ultimately, the PBAC and the Palouse region have been working on decreasing water use in the hopes of creating a more sustainable water use system.

### Did You Know?

The Palouse Basin Aquifer Committee estimated that the average student used 130 gallons of water every day during the year 2007.

# Enter System

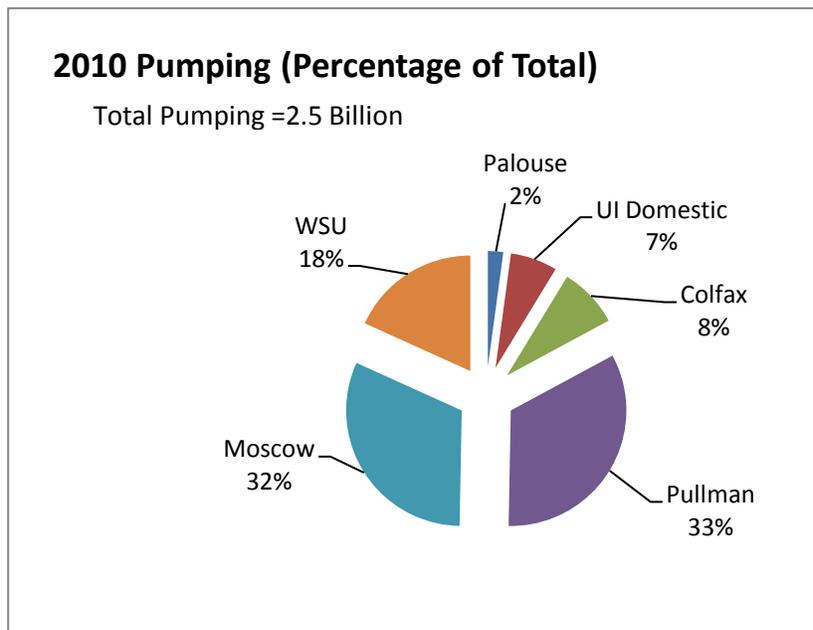


## GROUND WATER PUMPING

This chart contains data that was found on the PABC website. Using the information presented in the power point link for the 2010 Pumping and Water Levels PBAC Meeting on February 17, 2011.

As shown here the University of Idaho was responsible for an estimated 7% of pumping in 2010. The PBAC releases an annual water usage report. The 2010 report is yet to be released publicly, but you can look for the data on the official PBAC website by following this link:

<http://www.webs.uidaho.edu/pbac/>



# Water System



## THANK YOU TO ALL OF THE UNIVERSITY STAFF AND FRIENDS THAT CONTRIBUTED

Staff interviewed in the assessment of this system (bold indicates primary contributors):

<b>NAME</b>	<b>CAMPUS ROLE</b>	<b>INDICATOR(S) OF RELEVANCE</b>
<b>Joe Kline</b>	UI Director of Facilities Utilities and Engineering	All Indicators
<b>Mike Holthaus</b>	UI Water Systems Manager	All Indicators
<b>Mike Lyngholm</b>	UI Steam Plant Manager	Campus Heating
Mike Neelon	Assistant Director of University Housing	Domestic Use
Facilities Page	To educate students	Water Chilling/Domestic Use
CTA Architects Engineers	N/A	Water Chilling

## REFERENCE LINKS

1. [2006 Annual Water Use Report](#)
2. [2009 Annual Water Use Report](#)
3. [2010 Pumping and Water Levels](#)
4. [PBAC Fact Sheet](#)
5. [Mission Statement](#)
6. <http://www.webs.uidaho.edu/pbac/>
7. <http://www.isu.edu/magazine/winter09/conservation.shtml>
8. <http://www.uidaho.edu/sustainability/news/>
9. University of Idaho Power Plant Water Usage spread sheet provided by Mike Lyngholm
10. Steam Plant at University of Idaho information packet provided by Mike Lyngholm

Information in this document was compiled by University of Idaho students: Michaela Brinkmeyer, Kristina Moore, and Justin Fischer.