

Case Study: UCD Laundering Methods

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Abstract

The University of California, Davis uses water on campus for a variety of reasons. While measures have been taken to reduce the amount of water used on campus (i.e. increasing irrigation efficiencies, installing low-flow toilets, urinals, faucets, etc.), one area on campus that has not yet been targeted for water use reductions is laundering. The vision of this project was to investigate two different water use efficiencies on campus, specifically two different methods of laundering. Unitrans has their hand towels and mechanic uniforms dry cleaned through a third party vendor, while the athletic sports teams use older, commercial-grade washing machines on campus in Hickey Gym for their laundering needs. The objective of this project is to compare and contrast the costs and benefits of each laundering method currently in place. It is also the objective of this project to determine the efficiency of each method and if there are ways to improve water use efficiencies in each laundering method.

Difficulties we came across while developing and executing this project include: acquiring financial information regarding the costs for the dry cleaning service utilized by Unitrans and acquiring precise figures for the amount of laundering that was done by both methods due to lack of data. As a result, estimates based on information from the staff at Hickey Gym and Unitrans were used. Our conclusions showed that, generally speaking, dry cleaning consumes half the amount of water per article of clothing than washing machines. However, we found that it is much cheaper to use the washing machines than the dry cleaning service. Limitations in our project are that dry cleaning and laundry using traditional washing machines are different systems, therefore they are hard to compare.

Introduction

The University of California, Davis uses water on campus for a variety of reasons. The University of California at Davis is very concerned about the sustainability of all working parts of the university. The University was named the greenest campus in the nation. Low flow toilets have been installed and irrigation of the lawns has become more water use efficient. There seems to be no efforts on reducing the consumption of water on campus in the laundry systems. Washing clothing uses a lot of water and we intend to investigate the water uses and cost associated with two different methods on campus.

Objective

This project presented us with an opportunity to look at water-related issues in any way that we chose. Since UC Davis is not only a public university with a lot of research in water resources, but also an institution that we all have in common, focusing on the campus seemed like a good place to start. By investigating the differences in efficiency between two separate laundry services for the campus, we hoped to be able to make suggestions for ways that the UC Davis campus could reduce its water use in regard to laundry services. We felt that choosing Unitrans, which utilizes an outside dry cleaning service, and Hickey Gym, which utilizes internal washing machines, was a good representation of the laundry services.

Our main objective for this project was to evaluate whether the dry cleaning service used by Unitrans, or the washing machines used by Hickey Gym were more water efficient. A secondary objective was to evaluate the costs and benefits of both of those services in order to determine which was more cost-effective for UC Davis. The results could then be used to advise UC Davis how to maximize water use efficiency, cost efficiency, or both.

What we found is that the machines that are currently being used to clean the various sport teams equipment are less water efficient than the dry cleaning method. We found that the washing machines used roughly 2 gallons per garment. The dry cleaning used around 1 gallon per garment. Therefore the dry cleaning method was twice as efficient.

The following list explains our project design:

- Pat, Mollie and Sam collected data from the two different methods.
- Kelley and Pat performed calculations were done in order to be able to evaluate the methods on the same metric

- The entire group performed analyses in order to determine the cost effectiveness of the two methods.
- Data will be summarized into a table

The products of this investigation will include a detailed cost benefit analysis of the two different methods based on gallons used per garment. A table that compares the two methods will be developed.

Hypothesis

We expect that the washing machine method of laundry use in the Hickey gym will be less water efficient and that there will be alternative ways to increase water use efficiency of the gym. We also expect that the dry cleaning method utilized by Unitrans will be more water use efficient however it will be more expensive.

Data Sources:

- Equipment managers at Hickey.
- Belco website- water use of washing machines
- Esource website- water use of dry cleanings
- City of Davis website for price of water

Methods and Assumption

Hickey:

- Patrick and Mollie communicated with the equipment managers at Hickey Gym and asked about the amount of washers, how many times are they run per day, and what teams get their equipment washed.
- Found there are 4 washers in Hickey gym, 2 in the men's and 2 in women's locker rooms
- There is also 1 washer in the football stadium

- These washers are Belco 130 gallon washers that hold on average 60 sports jerseys. (Belco website)
- The gym employees said that the washers were run on average 5 times a day

Unitrans:

- Samuel contacted the lead manager of Unitrans to ask them what dry cleaners they used.
- They would not relay much information to a student so we did general internet searches to find water consumption values and prices
- We found that 100 lb of laundry consume 188 gallons of water for the PERC dry cleaning system, which is the most common system
- The weight of one Unitrans jumpsuit is 7.5 oz.

Calculation/Results

Water Efficiency:

- Washing Machines at Hickey Gym:
 - 60 sports jerseys per load/130 gallons of water per load
= 2.16 gallons of water per article of clothing
 - 5 loads per day * 130 gal/load * 5 machines = 3250 gal/day
- Unitrans Dry Cleaning
 - 60 articles of clothing per load/65 gallons per "load"
= 1.084 gallons of water per article of clothing
 - 5 "loads" per day * 65 gal/"load" = 325 gal/day

Price per year:

Washing Machines

- 3250 gpd x 260 (Weekdays) = 845000 gallons/year
price in Davis based on cubic feet

0.17 cents per ccf (100 Cubic Feet)

- 1 ccf = 748 Gallons
- Total usage: 1129.68 ccf per year @ 0.17 cents
- $1129.68 * \$0.17 = \192.05 per year for water at the 3 locations

Unitrans

- $\$5 / \text{garment} * 60 \text{ garments in one load} = \300 per "load" for 5.42 gallons
- $5 \text{ loads per day} * 300 = \$1500/\text{day} * 3 = \$4500$
 - $\$4500/\text{week} * 52 \text{ weeks in a year} = \$234,000/\text{year}$

Comparison Table:

	Water-Use (gal/article of clothing)	Yearly Cost
Hickey Gym/Washing Machines	2.16	\$192.05
Unitrans/Dry Cleaning	1.084	\$234,000

Conclusions

We found that the dry cleaning method was twice as water use efficient than the washing machine method however the cost dry cleaning far exceeded the cost of the washing machines. The main findings were that Hickey Gym uses almost twice the amount of water per article of clothing than the Unitrans dry cleaning service. In reference to cost-effectiveness, we averaged out the price of dry cleaning large garments around the Davis area and determined that the price to wash one jumpsuit would be \$5.

While the results of this study are estimates they do lend to some interesting conclusions. Schools and universities could take this information in order to determine their laundry systems. If the school was short on funding and need their laundry washed quickly then they should go with washing machines. Some considerations should be taken on the water use efficiency of the washing machines. The more efficient the machine is, the annual costs for water will be reduced. Some jerseys or suits must be dry cleaned, so if the school is considering dry cleaning they should understand the increased washing costs but the reduced water consumption. Dry cleaning takes longer time so that should be taken under consideration.

The results of this study can be used to by the government to inform the public on their water consumption, as well as provide options to reduce water use. If a family has enough money to

pay for dry cleaning this could reduce the amount of water used per household. While dry cleaning provides an option to reduce water consumption, it has other negative environmental consequences like air pollution and waste.

Recommendation/Limitations

After completing this project and analyzing our results, we realized that there are some limitations to our study. The most important is that the two methods that we chose to compare, laundry machines and dry cleaning, are different systems. Washing machines are used for general laundering, while dry cleaning is used for more delicate or hard to clean items. Since they are different systems, they have different operations, making them difficult to compare. Moreover, they can't really be used interchangeably, the dry cleaners are used for some items and washing machines are used for others. Regardless, we found our results useful and recommend that UC Davis continues to use washing machines for the sports teams, but gets newer, more efficient machines in order to improve water-use efficiency. Since the uniforms used by Unitrans likely need to be dry cleaned, and this method uses less water, we recommend that UC Davis continues to utilize this service.

References

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