

Wooden Sustainability

Team Leaders

Anna Miller and Jennifer Webb

Team Members

Negar Avaregan, Raul Gaina, Jonathan Diamond,
Jonathan Chang, Brittney Laver

Stakeholders

Rich Mylin, Associate Director Facility and Event Operations
Rudy Figueroa, Assistant Director UCLA Recreation
John Fallman, Student Recreation Venue Manager



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Executive Summary

The Wooden Sustainability Team focused on three areas to make the gym more sustainable: water, lighting, and cleaning products. The objective for water was to reduce the amount of water the gym used. The primary focus was to decrease the water usage in the showers by researching and installing water efficient showerheads. The main goal for lighting was to reduce the amount of wasted energy from lights being left on in unoccupied rooms. To accomplish this task, research was conducted on motion sensors, occupancy sensors, and daylight harvesters. For cleaning products, the objective was to find and recommend alternative, eco-friendly products. This goal required research on current products used and alternative “green” products available. All of these projects are helping to make the gym more sustainable, which will in turn help protect the environment and save resources as well as reduce the gym’s running costs.

The water group researched showerheads with different gallon per minute (gpm) flows. For a trial run, the showerheads in the staff locker rooms were replaced with two different 1.5 gpm showerheads and staff members were asked for feedback through a survey. The survey gave positive results and was thus a driving force in purchasing 32 1.5 gpm showerheads for the men and women’s locker rooms. By replacing the current 2.5 gpm showerheads with the 1.5 gpm heads, it is estimated that the gym will save approximately 1.4 million gallons of water per year, which equates to roughly a \$15,000 annual savings. The showerheads are currently in the process of being installed. Since the savings are substantial, 38 additional showerheads have been purchased for other recreation facilities.

The lighting group researched motion and occupancy sensors as well as daylight harvesters. The group researched the different types of sensors, the rooms they can be used in, and the costs. The group met with an electrician that gave recommendations as to which rooms can use certain sensors. After discussing the findings with the electrician and with the stakeholders, occupancy sensors and protective cases were approved for purchase to be installed in the racquetball and squash courts. It is difficult to estimate savings from the sensors because the exact energy usage per light fixture in each room is not available. As the gym sees a reduction in energy use and lighting cost, it is recommended to replace the lighting in different areas of Wooden, which include using daylight harvesters.

The cleaning products group researched alternative, environmentally friendly cleaning products. The research began with a general idea of what types of products are available. The group discussed current cleaning products with the stakeholders and began researching alternative products from UCLA preferred vendors. The group found “green” alternative products that cost the same or less than conventional products. Not all of the current products had “green” recommendations that were within the budget allocated to cleaning products at the John Wooden Center. This is especially true for “green” restroom paper products.

To save more water, it is recommended that Wooden research energy and water saving washers and water saving faucets. In the area of energy use with lighting, it is recommended to replace metal halide lights with more efficient induction lighting. To help reduce cooling costs, Wooden could look into tinting the windows to allow less direct sunlight into the building. For cleaning products, it is recommended that UCLA Recreation choose green, alternative products whenever possible and to use paper products with a high post consumer recycled content. Within the implementation of these recommendations, the John Wooden Center can reduce their environmental impact, moving towards a more sustainable future.

Objectives

Water

The focus of the water subproject at Wooden Center was placed on replacing the showerheads. This is because there were not enough industrial-sized washers available at the time to make a strong recommendation for an efficient and cost-effective washer. Our first task for showerheads was to acquire 2 test products for a survey conducted in spring quarter. This survey was conducted for Wooden Center staff members at the staff locker rooms. The main objectives for spring quarter were to conduct the survey after installing the showerheads in the staff locker rooms, to make a decision on which showerhead to purchase further after analyzing the survey results, and to purchase 30 or more showerheads for the Wooden Center.

Lighting

Our sector of the Wooden Sustainability Team aimed to decrease the total amount of energy used by the Wooden Center by taking on the task of replacing the current light switches in the rooms of Wooden with motion sensor lighting in order to reduce the amount of energy usage. We worked with our stakeholder Rich Mylin, facility managers John Fallman and Rudy Figueroa, and facility electrician Jeff Beaver to work towards the best approach for installing new light controls in as many feasible rooms of the building as possible. Since the Wooden Center has close to 50 different types of bulbs throughout the center, we cannot apply these sensors uniformly. However, we targeted the light fixtures that dissipate the most improperly expended energy in order to maximize the reduction of energy used.

Cleaning Products

The focus of the last subgroup's portion of the Wooden Center's Project is to replace or provide more "Green Friendly" cleaning supplies to be used at the Gym. A product is

considered to be “green” when it is biodegradable, uses recycled materials, has no fragrance, no Volatile Organic Compounds and may have a green label such as the Green Seal Certified. We initially contacted the Wooden Center’s Associate Director of Facility and Events Operations, Rich Mylin and consulted with him the various cleaning products that are currently being used. In collaboration with John Fallman, Student Recreation Venue Manager, we have closely worked together in recommending some of the products currently being used in the Wooden Center to more environmentally friendly cleaning products. Meanwhile, we made sure that the new products would fit into their budget and met the specific germ-killing requirements.

Background

Water

The decision regarding which showerhead to purchase could not have been made just by our research. It was important for at least 2 test showerheads to be used and evaluated based on their performance. Our performance indicators were the following: showerhead spray range, showerhead water pressure, and the option to adjust water pressure. These factors and their performance ratings for the 2 showerheads would determine which of the 2 would be selected to propose to our stakeholders. We believed that with low-flow showerheads, having adequate water pressure would be the main concern. However, the 2 showerheads in the survey both had high water velocities that provide acceptable water pressure.

The difference between the 2 showerheads was that one of them had the trickle-options, which allows users to reduce the water flow to a “trickle” while the water is being heated. The trickle-option can potentially lead to drastic water savings if patrons are able to utilize it. The other showerhead did not have the trickle-option, but rather a simple, standard design.

Lighting

Energy does not come cheap, especially when powering an entire university gym is involved. Our team observed that much of this energy and money would be saved if the lights could automatically turn off in a room not being used, which occurs particularly often in the offices, conference rooms, stairwells, raquetball courts, and at night in rooms not being occupied by maintenance. Many rooms and hallways of Wooden are also extremely well lit by natural light coming in through windows during the day, making the indoor lighting unnecessary. With the courts that use metal halide bulbs as an exception, we aimed to have sensor lighting installed throughout the building. According to the type, dimensions, and usage of the room, we planned to install motion sensor lighting, occupancy sensor lighting, or daylight harvesting. While some methods are more expensive than others, our stakeholder is in full support of anything that will generate a full return on investment in three years or under.

According to the U.S. Environmental Protection Agency, energy savings from proper use of devices such as occupancy sensors, daylight harvesters and motion detectors can save an estimated 40% to 46% in classrooms, 13% to 50% in private offices, 30% to 90% in restrooms, 22% to 65% in conference rooms, 30% to 80% in corridors, and 45% to 80% in storage areas (Waste Reduction Partners). Thus, the John Wooden Center stands as a perfect facility to take advantage of these innovative energy saving devices.

Cleaning Products

As a gym, the John Wooden Center uses many gallons of cleaning products per day. These products must be able to kill a variety of bacteria beyond what normal household products can handle. Many contain chemicals that, with frequent contact, can irritate the skin or eyes and many have detrimental environmental impacts that are not always immediately visible. Our

subgroup researched products with reduced environmental impacts, which often has the positive side-effect of being safer in relation to health concerns.

Initial Conditions

Water

Beginning our investigation of the John Wooden Center water consumption policy we considered all aspects of water consumption at the gym ranging from toilets to water faucets, shower heads, and even washers and driers. However the one that stood out the most was the showerhead aspect since the showers seemed to be in use nonstop when we would visit the gym. Originally the locker room showerheads used 2.5 gpm (gallon per minute) showerheads, which with an estimated 2 hours use each day, would require the gym to use 9,600 gallons per day.

Lighting

The price per kiloWatt hour (kWh) at the John Wooden Center is \$0.0876, which can add up extremely quickly in a facility of this size. The Wooden Center is open seven days a week for up to 19 hours, and requires a massive amount of energy to support. The gym currently has about 50 different types of bulbs throughout the building, including metal halide lights in the basketball courts that would not be compatible with motion sensor lighting because of the time that it takes for them to turn on. Throughout the two floors of the facility, we identified 30 rooms/areas that were ideal for installing motion sensor lighting. The raquetball courts upstairs and downstairs are periodically unoccupied, and the front desk is supposed to be notified of vacancy so that they can turn off the lights in that specific court. This unfortunately is not kept track of 100% of the time. Main hallways, entrances and exits, and the Gamers Lounge are all in areas of large windows and skylights that allow ample natural light to flood in yet still have lighting fixtures that are kept turned on. Other areas we targeted include the conference rooms, offices, stairwells, and

Pyramid, Dynasty, Blue, and Gold Rooms that similarly have lighting fixtures that are kept on throughout the day even when there are no occupants.

Cleaning Products

We began researching cleaning products without knowing what was currently being used in the Wooden Center, however eventually received a proper list of all current products. We found that all but two of the cleaning items being used at the Wooden Center weren't "green", or didn't meet "green" criteria.

Research Methodology

Water

We began our research by looking into water efficient showerheads. We found various results ranging from 0.5 to 2.5 gallons/minute. Our research suggests that the gym was already using efficient showerheads. However these heads represented only the upper limit of efficiency, and there was a lot of room left for improvement. Once we decided upon a 1.5 gpm showerhead we purchased 2 and had them installed in the staff locker rooms. At the same time we designed a survey meant to determine the effectiveness of the new heads and distributed them to the staff. Once the positive feedback was received, we met with our contact, Rudy Figueroa, and decided to purchase new 1.5 gpm showerheads for all 32 showers in the John Wooden Center, and another 35 for the Student Activities Center Building.

Lighting

We focused on researching three main types of devices for installation: Motion Sensors, Occupancy Sensors, and Daylight Harvesters. Each of the three devices have specialized applications and assets that can benefit specific rooms throughout Wooden. We used

WattStopper as our primary product search engine, as it is the preferred vendor for UCLA electrical supplies, to find the most beneficial sensors at the most reasonable price.

Motion Sensors: Essentially replace light switches, and guarantee that lights will never be left on for extended periods of time. Motion sensors come in three general types that can be applied as required throughout the building: wall switch sensors, ceiling sensors, and wall mount sensors. Wall switch sensors physically replace light switches, and are generally preferred for smaller rooms where doors are located next to switches. Ceiling sensors have the ability to pick up motion in 360 degrees from a ceiling location and can be accessed wirelessly. Lastly, wall mount sensors mount to high corners of walls and are able to pick up motion in a 180-degree range. These can also be wirelessly connected to the lights.

Occupancy Sensors: Essentially are extremely sensitive motion sensors, which can detect much finer movements and are much smaller. This makes them suitable for demanding applications such as offices, schools, and conference rooms, in which standard motion sensors do not perform reliably and will most likely generate complaints. The sensors automatically turn lights on when a room is occupied and off when a room is vacant, and is generally considered the most effective energy saving device in the realm of lighting. When choosing an occupancy sensor, you must take three variables into account to make sure they will perform properly: functionality (whether you want only on/off functionality or daylight dimming as well), ceiling height (normal sensors work best with ceilings that are 5 meters or less, and specialized devices exist for higher ceilings), and the supply voltage (certain types of lights require specialized controlling units).

Daylight Harvesting/Daylight Dimming: Devices that regulate the amount of artificial illumination based upon the degree of natural light entering the building from outside. When

sufficient natural light exists, the artificial light dims and the desired level of light is always maintained. Sensors for these devices can be put in every room, attached to occupancy sensors or can have a central unit that adjusts light levels for an entire sector of the building.

Cleaning Products

In our research on cleaning products, we had lots of questions about which products are currently being used, how much they cost, what specific type of bacteria the product kills and the type of surface it cleans. We relayed our questions to our stakeholders who helped us with our research. While we were waiting for our questions to be answered, we began to research the various options available for green cleaning products. We decided to focus our research on improving the disinfectants for the machines, floor varnish, hand soap, and the paper towels and toilet paper among others. With our new findings, we can better recommend and present our hopeful new inventory to John, and create enhanced changes to the center; changes that will not only benefit the environment, but that will also be financially feasible.

Data and Cost Analysis

Water

Under the original estimates that each shower in the gym is used at least 2 hours each day, we have calculated that the switch to the 1.5 gpm shower head will save the gym 3,840 gallons each day. Under the price that the gym officials said they pay for water, this suggests that over a year the gym will be saving 1,382,400 gallons of water, corresponding to ~\$15,000 saved. Compared to the price of each showerhead, \$3.89 each, the payback period for this part of our project is little under a week.

There were eight staff members that participated in the survey for evaluating the two showerheads. Two users assessed the showerhead with the trickle-option; the showerhead

without the trickle-option was used and evaluated by 6 users. Several conclusions can be made based on survey responses. The majority of staff members are aware of the concept of sustainability and in particular, low-flow showerheads. Most staff members feel that showerhead water pressure is the most important feature of a showerhead. The second most important feature is having a sufficient water spray range.

Lighting

Our group’s cost analysis was crafted for two distinct reasons: first, we needed to find a breakeven “energy saved” quantity, in terms of per month savings (assuming a three year payback requirement), where after that point in energy savings, the project would self fund; and second, finding exactly how much the entire project would cost.

This chart was the basic outline of our cost analysis.

Rooms/Halls:	Hardware Augmentation:	Make / Model:	UCLA Pricing:	Room Total:
First Floor Back Offices	1 Ultrasonic Sensor	WT Ultrasonic Ceiling Sensor **	\$97.37	\$97.37
Exit To IM Field	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Conference Room (downstairs)	1 Motion Sensor + Dimmer	PW-100D Passive Infrared Dimmable Wall	\$29.46	\$29.46
Staircase in Center of Building	1 Wall-mount Motion Sensor	WPIR Passive Infrared Ceiling Sensor	\$55.00	\$55.00
Hall Next to Men's Lockers	1 Ceiling-mount Motion Sensor	CI-200 Series Passive Infrared Ceiling	\$41.60	\$41.60
Hall between Pardee Gym/Squahs	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Squash Court #1 (downstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #2 (downstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #3 (downstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #4 (downstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #5 (downstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Wooden Center Entrance	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Zone between Cashire/Collins/Emergency Exit	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Club Sports Offices	1 Ultrasonic Sensor	WT Ultrasonic Ceiling Sensor **	\$97.37	\$97.37
Pyramid Room	1 Wall-mount Motion Sensor	WPIR Passive Infrared Ceiling Sensor	\$55.00	\$55.00
Dynasty Room	1 Wall-mount Motion Sensor	WPIR Passive Infrared Ceiling Sensor	\$55.00	\$55.00
Hall next to Dynasty Room	1 Ceiling-mount Motion Sensor	CI-200 Series Passive Infrared Ceiling	\$41.60	\$41.60
Squash Court #1 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #2 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #3 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #4 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #5 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Squash Court #6 (upstairs)	1 Wall-mount Motion Sensor (w/ casing)	Watt Stopper WC Protective Cage + WPIR Passive Infrared Ceiling Sensor	\$22.29 + \$55.00	\$77.29
Gold Room	1 Ceiling-mount Motion Sensor	CI-200 Series Passive Infrared Ceiling	\$41.60	\$41.60
Blue Room	1 Ceiling-mount Motion Sensor	CI-200 Series Passive Infrared Ceiling	\$41.60	\$41.60
Hall between Gold/Blue	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Hall between Squash/Blue	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30
Admin Offices	1 Ultrasonic Sensor	WT Ultrasonic Ceiling Sensor **	\$97.37	\$97.37
Conference Room (upstairs)	1 Motion Sensor + Dimmer	PW-100D Passive Infrared Dimmable Wall	\$29.46	\$29.46
Gamers Lounge	1 Daylight Harvester	LightSaver LS-301 Dimming Photo Sensor	\$66.30	\$66.30

The first column (from the left) represents each of the rooms that our stakeholders deemed candidates for hardware augmentation. The second column represents the actual hardware augmentation desired. The third column represents the model number that best suits the specific

room. [It should be noted that our group met with the head UCLA electrician and he informed us that UCLA has a relationship with a company named “Watt Stopper”. In addition, he wants to keep UCLA on the Watt Stopped standard (they are one of the most reliable companies available)]. Due to UCLA’s existing relationship, the school gets special pricing not available to the public. The fourth column represents these special prices. And the fifth column represents the room total cost.

At this point we found that the project hardware added up to a balance of \$1996.72. This number, unfortunately, did not assist in our quest to find a breakeven point because we required our numbers in terms of kWh saved (kilowatt hours saved). Thus, we took our total hardware cost (\$1996.72) and divided it by the price of energy, \$0.0876 per kWh (again UCLA pays less than average citizens due to state subsidies). This led us to the value 22793.60 kWh. This number represents the cost of hardware in terms of kilowatt-hours. Rich had previously told us that energy saving hardware had to pay for itself in three years (36 months) for the gym to consider giving funding. So we simply divided our 22793.60 by 36, and we found that the required amount kWh saved per month to break even in the required 3 years is an average of 633.15. To review: the total hardware cost = 22793.60, the amount of hours required to be saved per month to pay for the project in three years = 633.15.

This same process was carried out for the amount of labor required to install the hardware devices in each room. The results were as follows: 114155.25 kWh total (\$10,000.00), and a required 3170.98 kWh per month saving to break even in 36 months. Finally, after adding the two “required monthly savings” values together, we concluded that for this project to be viable 3804.13 kWh must be saved per month.

Cleaning Products

When researching the products we hoped to use as replacements, we kept in mind that they needed to not only be “green” and environmentally friendly, but also needed to be around the same price, if not less, than what was currently being used. Our initial research led us to find the following products:

Disinfectants:

1. Oxivir Disinfectant Cleaner <http://www.matsmatsmats.com/eco-friendly/yoga-disinfectant.html>
2. Pure Green 24 Disinfectant <http://www.thegymdepot.com/servlet/the-67/Pure-Green-24-Disinfectant/Detail>
3. Vital Oxide Disinfectant <http://www.dustmitex.com/newsite/greendisinfectant.html>
4. Zogics Cleaning Supplies: <http://www.shop.zogics.com/>

Paper Towels and Toilet Paper:

1. Lets Go Green: <http://letsgogreen.biz/pages/paper/papertowels.html>
2. Seventh Generation: http://www.seventhgeneration.com/Recycled-Toilet-Paper?gclid=CPGMgq3DsQACFRsVawodw0_XTA
3. Green Forrest Paper Products: <http://www.greenforestpaper.com/products.php>

Laundry Detergent:

1. Seventh Generation: <http://www.seventhgeneration.com/Laundry-Detergents?gclid=CJiBuuXDsqACFSkYagod1TMKTA>
2. How to make your own: <http://planetgreen.discovery.com/home-garden/make-your-own-laundry-soap.html>
3. Green Works: http://www.target.com/gp/detail.html/183-2276981-7936233?asin=B002MZW9QE&AFID=Froogle_df&LNM=|B002MZW9QE&CPNG=home&ref=tgt_adv_XSG10001

After already doing preliminary research on cleaning products, we were able to meet with John Fallman. He provided us with all of their current products including the cost and the size. We discussed different alternatives and requirements for the products. He also gave us feedback on what he would like to see and explained to us some of the products’ uses. He provided us with material safety data sheets (MSDS) on all of the past and current products to allow us to see what exact chemicals are in the products that need to be present in the future products we are hoping to purchase. We were also told who their preferred vendors are. Wooden purchases their products from Waxie, Hillyard, Safe and Clean, Grainger and Clean Source. However, the

Waxie and Hillyard are the two vendors that supply the cleaning products. We were notified that it would be financially beneficial to purchase our new products from these vendors, seeing as UCLA receives a special discount from them. From that point forward, we decided to look into the various alternative products that those specific vendors provide, and whether or not “green” products exist within them. The products currently being used in the John Wooden Center that we hope to replace include:

Current Wooden Cleaning Products

Name	Company	Item #	Size	Case Size	Cost
Roll Towels	Waxie	850572	600ft/roll	12	\$51.57/case
Multi-fold Towel	Waxie	850232	250 towels/roll	16	\$21.71/case
2-ply Toilet Paper	Waxie	851178	550 sheets/roll	80	\$36.41/case
Morning Mist	Waxie	170034	1 gallon	4	\$62.13/case
Purell	Waxie	381705	2000 mL	4	\$70.20/case
Germicide Clorox Bleach	Grainger	1VN32	1 gallon	6	\$27.35/case
Windex	Grainger	3JW49	96 oz	12	\$86.25
Stainless Steel Cleaner	Grainger	2DBY3	20 oz	1	\$9.78
Scrubbing Bubbles	Grainger	1DU22	25 oz	12	\$73.65/case
Pull Towels	Clean Source	3440732	8 in by 660 ft	6	\$29.54
Formula D-166	Safe and Clean	Formula D-166	1 gallon	4	\$22.77
Super Shine All	Hillyard	HIL0014006	1 gallon	1	\$13.96
Hil-tone	Hillyard	HIL0021506	1 gallon	1	\$22.77
Tile and Grout Renovator	Hillyard	HIL0047506	1 gallon	1	\$9.61
Repel	Hillyard	HIL0049706	1 gallon	1	\$21.83

We did find that there were several alternatives from the frequently used vendors that are not only environmentally friendly, but will also be financially beneficial in the short and long run. Several cost effective product alternatives to be considered are:

1. Alternative to Windex: Hillyard’s Arsenal Green Select Glass Cleaner, \$5.70/qt
2. Alternative to Windex: Waxie Green Glass and Surface Cleaner, \$150.00/case

3. Hillyard’s Green Select Bathroom Cleaner, \$20.56/each
4. Alternative to Morning Mist: Johnson Wax Oxivir Disinfectant Cleaner, \$42.90/case
5. Alternative to ‘Scrubbing Bubbles’: Nature’s Source Scrubbing Bubbles Bathroom Cleaner, \$37.24/case
6. Alternative to Stainless Steel Cleaner: Waxie Green Stainless Steel Polish/Degreaser, \$39.90/case
7. Alternative to Waxie Roll Towels: Waxie Green White Universal Roll Towel, \$33.60/case
8. Alternative to Germicidal Clorox Bleach: Hillyard Aresenal Superox Peroxide Cleaner, \$13.84/gallon
9. Alternative to Hillyard Tile and Grout Cleaner/Renovator: Hillyard Aresenal Superox Peroxide Cleaner, \$13.84/gallon

Looking at price comparisons with our recommended products and current products, we see that the Wooden Center can purchase “green” products within their budget. The prices were adjusted to account for products that were concentrated. For example: Superox Peroxide Cleaner costs \$13.48 per gallon, but it is used diluted and can yield 64.5 gallons once diluted, thus the actual cost per gallon is \$0.21. The savings are listed in the right-hand column. It is important to note that these alternative products will need to be diluted, thus there may be a higher initial cost to buy empty spray bottles and containers to dilute the materials. Another things to note is for the roll paper towels, there are fewer sheets in the “green” roll and may not fit in the current towel dispensers. If these roll towels were purchased it is important to check the current infrastructure. We were in communication with Greg Mangan from Hillyard in regards to cleaning products. One suggest he gave us was to use microfiber cloths to dry dust the floors instead of using Hil-tone on the floors. Hil-tone does provide a protective finish on the floor that helps it last longer, but dry dusting in between can help reduce the amount of chemicals needed on the floor.

Price Comparisons – “Green” Products to Wooden Products

Current	Price	Alternative	Item #	Price	Savings
Windex	\$9.58/gal	Hillyard Green Glass and Surface Cleaner	HIL0082704	\$0.74/gal	\$8.84/gal
Windex	\$9.58/gal	Waxie Green Select Glass Cleaner	950110	\$1.08/gal	\$8.50/gal

Grainger Stainless Steel	\$0.49/oz	Waxie Stainless Steel Polish/Degreaser	750323	\$0.21/oz	\$0.28/oz
Scrubbing Bubbles	\$0.25/oz	Nature's Source Scrubbing Bubbles	N/A	\$0.18/oz	\$0.07/oz
Roll Towels	\$7.16/1000 ft	Waxie Green Roll Towels	851248	\$7.01/1000 ft	\$0.15/1000 ft
Morning Mist	\$3.84/32 oz	Oxivir Disinfectant	N/A	\$3.52/32 oz	\$0.32/32 oz
Germicidal Bleach	\$4.56/gal	Hillyard Superox Peroxide Cleaner	HIL0083322	\$0.21/gal	\$4.35/gal
Tile and Grout Renovator	\$0.38/gal	Hillyard Superox Peroxide Cleaner	HIL0083322	\$0.21/gal	\$0.17/gal

It is important to note that Wooden currently uses two “green” products: Hillyard’s Super Shine-All and Formula D-166 by Safe and Clean. The Super Shine-All is Green Seal Certified, which means it has a low environmental impact. Formula D-166 is 100% non-toxic and 99% biodegradable. Wooden should look into finding more products that are similar to these ones.

Key Findings

Water

One of our main fears was that people’s perception of these new products would be very negative. The new showerhead does not look very aesthetically pleasing, and one of our other concerns was that the water pressure would not be satisfactory for users. From our survey we have found out that this was not the case. The high pressure of the head compensates for the reduced amount of water, and actually produces a better stream of water than the original head.

Although there were wide-ranging responses regarding the staff members' experience, almost all of the feedback was positive, or between 7 and 10, on the scale from 1 to 10. The written feedback provided by a few survey participants strongly influenced the Action Research Team's decision to purchase the Whedon USB3C Saver-shower Standard Ultra 1.5 GPM shower-

head, which does not have the trickle-option. The main concern was whether all patrons would consider the showerhead trickle-option necessary; this option may only confuse and lead to misuse of this type of shower-head. In addition, there were only a few participants that noted that being able to adjust the water pressure was an important feature.

The staff members that participated in the survey expressed high satisfaction with the more simple showerhead's water pressure. Therefore, we proposed to our stakeholder at the John Wooden Center that the simple showerhead be used for both the men and women's public locker rooms. Upon agreement, and with assistance from our ART leaders, 70 standard 1.5 gpm showerheads were purchased. A total of 32 showerheads will be allocated for the John Wooden Center, and the other 38 will be used towards other facilities affiliated with UCLA Recreation.

Lighting

To successfully complete this project's cost analysis, we would require specific quantities of time that lights are on in each room, and the exact amount of time that lights would be turned off or darkened as a result of the devices installed. These values are not readily available, thus we could not fully come to an incontrovertible conclusion regarding how much of this project would be viable; however, we made some extremely educated guesses as to which parts of the project would and would not be worth the Wooden Center's asset investment. Our general conclusion rests with the daylight harvesting devices and the racquetball court motion detectors. The gym leaves on hundreds of lights every day where there is already ample skylight and window light illumination. If an individual were looking at the ground in these areas and were to be asked if the lights are on or off (during the day), the difference would be indeterminable. Thus, daylight harvesting devices that would measure the required illumination output would greatly diminish lighting costs. The second prime areas of investment are the racquetball courts.

These 11 courts are illuminated the entire day, and often they are not used more than once or twice. This would save hundreds of kilowatt-hours per day.

Cleaning Products

Through our research and communications with our stakeholders, we found that it would be reasonable, practical and beneficial for The Wooden Center to replace some of their commonly used cleaning products with more environmentally sound products. These products, with the exception of two, can be purchased through existing vendors. These new products will not only save us money, but it will fulfill the requisites needed to make the Wooden Center a more “green friendly” gym, and will bring us one step closer to making UCLA a more environmentally friendly school.

Recommendations

Through our research, each of our subgroups determined other areas of potential savings in water use, energy use, and subsequently, cost of both. Research also showed where improvements could be made with regards to cleaning product choices. The recommendations made by each group are as follows:

Water

- Switch to automatic faucets
- Install dual-flush toilets
- Apply the aforementioned products in all Recreation facilities
- Replace all showerheads in the Student Activities Center

Lighting

- Replace metal halide lights throughout Recreation facilities with induction lighting
- Add tint to windows to naturally reduce heat in the gym

Cleaning Products

- Purchase green, alternative products that are both environmental and economical
- When purchasing new, first-time use products, look for green alternatives
- Look for alternatives for Germicidal Clorox Bleach, Hil-tone, and Tile and Grout Renovator
- Switch to recycled paper products
- Consider using specific machines to dilute the products. Greg Mangan recommended using special machines, such as the ones through Hillyard because they use only the amount of cleaning products needed in dilution. It is a more efficient system than diluting the products by hand, which will help save money on purchasing products and is beneficial for the environment because fewer chemicals are being used at a time.

Conclusion

Beginning this project with the knowledge that as a gym, John Wooden Center consumes a large amount of water, energy, and cleaning products, our team presented many ideas to reduce each of these quantities and make the operations of the recreational facility more sustainable. Thanks to extensive help from stakeholders Rich Mylin, Rudy Figueroa, and John Fallman along with electrician Jeff Beaver and Hillyard sales representative Greg Mangan, our team was able to facilitate change towards a more sustainable future with UCLA Recreation. The positive reception of stakeholder Rich Mylin assisted our work and allowed us to make a lasting impact on the gym's environmental footprint. The high estimated savings in water costs and energy costs encouraged Rich and other facilities operators to request continued partnerships with future ESLP ART teams. Through our work and the cooperation of Recreation staff, we gained hope for future improvements towards a more sustainable operation of gym facilities.

References

Water

Tested Showerheads

Without the trickle option:

<http://www.acehardwareoutlet.com/%28zfpsi255jup34v3tleghcmiz%29/ProductDetails.aspx?SKU=49540>

With the trickle-option:

http://www.amazon.com/Ultra-Saver-Showerhead-1-5-GPM/dp/B000H5YCS4/ref=sr_1_1?ie=UTF8&s=hi&qid=1275716085&sr=8-1

Lighting

Waste Reduction Partners, comp. *Occupancy Sensors*. State Energy Office. Print.

www.energync.net/resources/docs/pubs/occupancy.pdf

Cleaning Products

Nature's Source Natural Bathroom Cleaner with Scrubbing Bubbles:

<http://www.naturesourcecleaners.com/bathroom-cleaner.aspx>

<http://www.amazon.com/Johnson-Natures-Scrubbing-Bubbles-All-Purpose/dp/B002IOM1MG>

Johnson Wax Oxivir Disinfectant Cleaner:

<http://www.buy.com/prod/general-cleaner-oxivir-tb-4277285/q/listingid/80984151/loc/66357/215109910.html>

Hillyard Green Select Products:

www.greentoclean.com/pdfs/GreenBrochLO.pdf

Waxie Green Products:

<http://www.waxie.com/waxie-green.html>

Appendices

UCLA Recreation

Wooden Sustainability Team: Raul Gaina, Jonathan Chang

SHOWER-HEADS SURVEY

Name _____ Department _____

1. Do you have an interest in using sustainable products that can reduce your environmental impact?
 Yes No
2. Before today, were you aware that there are such products as low-flow, water-efficient, shower-heads?
 Yes No
3. What factors are most important for you in order to have a satisfactory shower experience?
 a. Adequate water flow pressure
 b. Sufficient water spray range
 c. Adjustable water pressure
 d. Other (please state in a few words): _____
4. Did the 1.5 Gallon-per-minute (gpm) shower-head provide adequate water pressure?
 Yes No
5. Did you adjust the nozzle pressure of the shower head (if applicable)?
 Yes No
6. If you answered yes to 5 (if applicable), did you feel that being able to adjust the pressure was advantageous and is a vital feature of any shower-head?
 Yes No
7. On a scale from 1 to 10, with 1 representing not adequate at all and 10 representing completely satisfactory how would you describe the flow pressure of the 1.5 gpm shower-head?
 1 2 3 4 5 6 7 8 9 10
8. With 1 representing too narrow and 10 representing completely satisfactory how would you describe the spray range of the shower-head?
 1 2 3 4 5 6 7 8 9 10
9. With 1 representing very poor, 5 representing equal quality and 10 representing significantly better, how would you rate your overall showering experience with the 1.5 gpm shower-head compared with the old shower-head?
 1 2 3 4 5 6 7 8 9 10
10. With 1 representing very unlikely and 10 representing highly likely, how would you describe the likelihood of you recommending a 1.5 gpm shower-head like this one to friends and family?
 1 2 3 4 5 6 7 8 9 10
11. Please provide any additional comments, questions, or suggestions:

Thank you very much for your participation and valuable feedback! Your input is extremely important to us.

