Occidental Campus Greening: Research and Recommendations

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Abstract

In the green revolution, Institutions of Higher Education play a critical role in inspiring, educating and carrying out change. Increasing research supports the belief that universities must be leaders and catalysts of environmental change. In order to lead this movement, universities must model and promote sustainable practices. Where does Occidental College fit into the conversation around campus sustainability? What steps must the institution take to become a model of success?

In order to answer these questions, while there are many campus environmental issues that could be evaluated, this report focuses on three of those topic areas: water, transportation, and organization. Research in each area was undertaken to assess what changes needed to be made to the Occidental campus to make it more sustainable. A four step process was used. In step one, the Occidental campus was assessed through an extensive literature review of reports and data about campus greening at Occidental since 1998, including a series of interviews and correspondence with staff, faculty, and students. In step two of the research process, campuses outside of Occidental were examined in order to identify best practices in the three topic areas. Each school was assessed and the ones with programs that had potential for implementation at Occidental were selected for case studies. Schools without strong sustainability infrastructure were also investigated more closely. Step three involved crafting a list of recommendations for the college moving forward. The list of recommendations detailed benefits and challenges to implementing each program. The last step involved making immediate changes to the campus.

The findings made clear that Oxy has much progress to make in the three topic areas in comparison to the other institutions. In the topic area of water, establishing water use reduction targets, creating a landscaping and water use plan, participating in water and energy use

challenges, and investing in water saving technologies that will reduce indoor water use were the suggested next steps. It was found that 43.8% of Occidental's peer institutions have water goals and 75% participate in water and energy challenges. In the area of transportation, over 80% of colleges had either parking fees or did not allow freshmen to bring cars to campus. Occidental does neither. The Report recommends a five year plan that phases in a parking fee while simultaneously making other methods of non-car based transportation more available, accessible and affordable as the best practice for Occidental moving forward. In order to improve the organization of sustainability work at Oxy, the two major recommendations include institutionalizing the sustainability committee and hiring a full time and qualified sustainability manger. Additionally, the college should develop a sustainability work study program and renew their AASHE(Association for the Advancement of Sustainability in Higher Education) membership while enrolling in STARS(The Sustainability Tracking, Assessment and Ranking System).

These findings indicate that there is a lot of progress still to be made in order to improve the College's environmental sustainability and become a model of environmental change. Yet, there are clear changes to be made in each topic area in order to continue to work towards becoming a leader of the sustainability movement at Institutions of Higher Education.

Introduction

A search of the phrase "Occidental College sustainability" on the internet will lead to success stories related to the creation of the sustainability fund, increasing efforts to provide local and organic food in the Market Place, and a video tour of the new solar array. Despite these positive strides for the college, further improvements are needed if Occidental is to become a strong model for sustainability moving forward. Occidental must join with the numerous

institutions who are acknowledging their responsibility to make environmental change and use their best practices to propel us forward. The areas of water, transportation and organization deserve particular attention due to the lack of attention placed on them in the past and the environmental conditions of Southern California.

Background: Occidental's Water, Transportation and Organization

Before delving into the research process and findings, it is important to acknowledge why each topic area became a focus of this research. Water, transportation, and organization were chosen for specific and unique reasons. In the future, the attention given to these three topic areas should be lent to all areas of campus sustainability, including waste management, food, energy and green building.

Occidental College is located in Southern California where the climate is dry and water is a scarce resource. The Occidental campus is beautiful, yet watering of the campus costs our environment about 80 million gallons of water a year and costs the college between $430,000 and $520,000 every year (B. Steele, personal communication, June 6, 2013). Additionally, the 2013-2014 academic year at Occidental College has officially been declared the water themed year. This means that First Year writing seminars will have a water focus and four speakers are coming to campus in the fall to speak about water related topics. Therefore, it is absolutely essential that the college take action in the area of water conservation during the summer of 2013 and into the academic year. While looking at water as a global issue in the water themed year, the college also needs to make sure to address it as a local issue, right on campus.

Transportation has always been an important environmental concern for the college due to its location in the car dependent city of Los Angeles. As of July 2013, 873 students currently

had cars registered on campus (H. Nieto, personal communication, July 18, 2013). This number does not include graduated seniors or incoming first year and transfer students so the number can be expected to rise by almost 300 cars for the 2013-2014 school year. Students with cars make up about 50% of the student population. Additionally, cars are the primary method of transportation used by most staff members. The school's reliance on cars increases pollution in the local air. Occidental and the surrounding Eagle Rock and Highland Park communities are affected. Furthermore, the campus is increasing CO2 and methane emissions and contributing to the global climate change crisis. It is necessary to address transportation at Oxy in order to reduce pollution and combat climate change.

Both water and transportation concerns are of utmost importance, but progress on these fronts will not be optimal without the necessary organizational infrastructure in place to carry forward sustainability related changes. In this report, organization is referred to as the third topic area. This topic area refers to how sustainability work at the college is being pushed forward. Currently, the college does not have an active sustainability committee, nor does it employ a full time sustainability position. Without formal structures working towards a sustainable agenda for the college, progress will be slow and inefficient. Therefore, this topic area deserves significant attention.

Research Question

What changes need to take place on the Occidental campus to improve sustainability efforts in three topic areas, including water use, transportation and organization?

Objectives

• Identify areas in which Occidental can reduce water use and improve practices around water

• Identify transportation alternatives to driving and ways to make students invested in alternatives

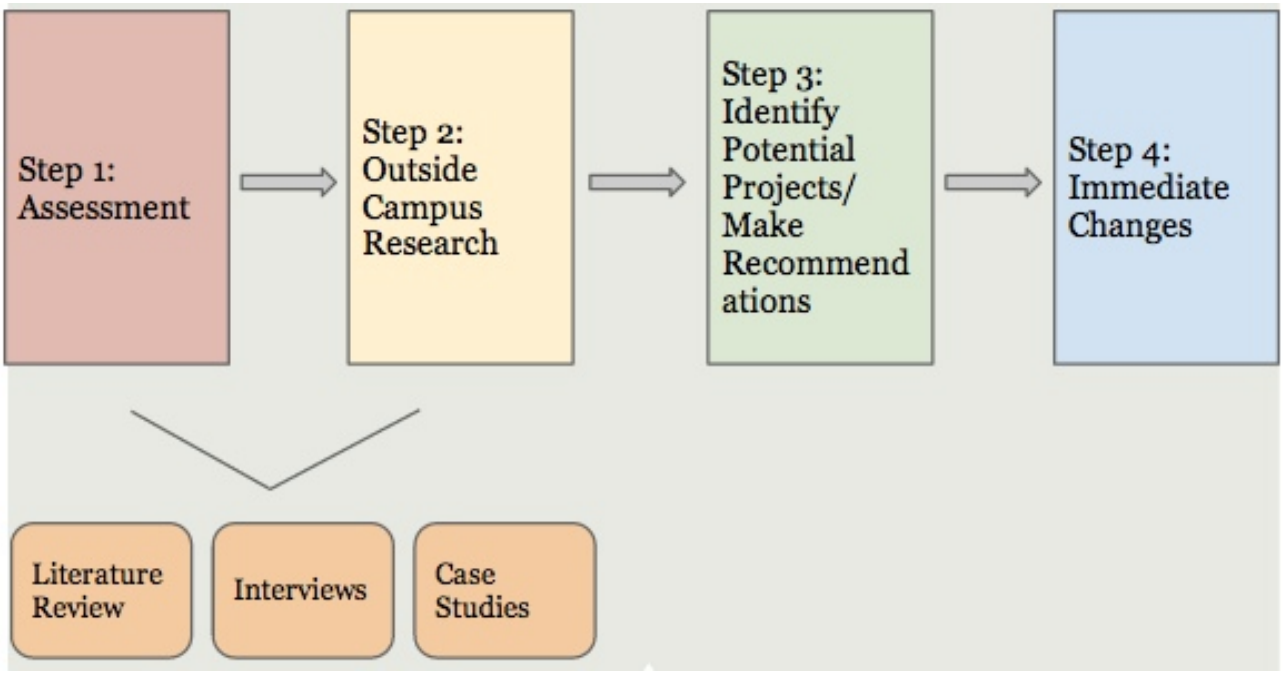
• Understand student and staff networks working on sustainability projects in order to find potential for reorganization and collaboration

• Make research available online for the Occidental community

• Develop background knowledge to facilitate a successful "Campus Greening" class (UEP 246) in the fall (and in subsequent years) that can address the campus's needs around transportation, water and student involvement, as well as any future environmental issues and impacts to be addressed.

Methods

Campus water use, transportation and organization were investigated in a four step process. First, an assessment of the Occidental campus was completed in the three topic areas. Next, data was collected about Occidental's 16 peer institutions, colleges and universities that Occidental compares itself to in a number of arenas. Best practices among these institutions were identified and then mini case studies were completed at three schools. Finally, a complete set of recommendations were crafted with detailed benefits and challenges. The four steps are outlined below:



Step 1 - Assessment - 4 weeks

In the initial stage of research, the Occidental campus was assessed in three topic areas of 1) water, 2) transportation and 3) organization. Staff, faculty, and students who are knowledgeable about campus sustainability were interviewed. Seven formal interviews were completed with a member of Facilities, a staff member in hospitality services, the director of communications, three professors, and one student. Resources that detail past campus greening work at Occidental were gathered, reviewed, and analyzed. These documents dated back to 1998. The documents were analyzed by creating a timeline of past greening work at the college as well as an organizational chart.*[1] Past assessments by outside organizations such as the Green Report Card were also used in the first phase of research.

Step 2 - Outside Campus Research - 3 weeks

[1] Appendix B and C

Step two began by reviewing research about colleges and universities around the country and their innovations in the three topic areas. Then Occidental's 16 peer institutions were used to gather data about best practices at schools that had similar finances, student populations, and physical environment with Occidental. Few of the schools were located in Southern California and environmental conditions varied quite a bit. Interviews were conducted with institutions that had programs with the potential for replication at Occidental. Interviews were given over the phone and focused on one of the three topic areas. Schools that were chosen included Colorado College, Franklin and Marshall College, Macalester College, Pomona College, Reed College, Rhodes College, Scripps College, and Whitman College. Yet, due to time restraints and lack of response and availability, interviews were only conducted with Franklin and Marshall College, Macalester College, and Whitman College.

Schools that Occidental College uses when comparing itself to other institutions:

1. Carleton College
2. Colorado College
3. Dickinson College
4. Franklin and Marshall College
5. Hamilton College
6. Macalester College
7. Oberlin College
8. Pitzer College
9. Pomona College
10. Reed College
11. Rhodes College
12. Scripps College
13. Skidmore College
14. Trinity College
15. Union College
16. Whitman College

Step 3 - Identify Potential Projects - 3 weeks

Step three involved using the prior research about campus needs in the three topic areas, from the assessment phase as well as information gathered from the outside campus phase to identify key projects that could be implemented on the Occidental campus. A full chart of recommendations was crafted that detailed the potential project and their benefits and challenges to implementation.[2] The recommendations included overall goals for addressing each topic area as well as strategies to achieve these goals.

[2] *Appendix A

Step 4 - Website and Immediate Changes - 1 week

The last stage of research included preparation for making updates to the school sustainability website. This will provide material available online for prospective and current students and the greater Occidental community and promote awareness about the campuses greening efforts and why they are important. Projects for the fall 2013 semester have been further developed.

Findings

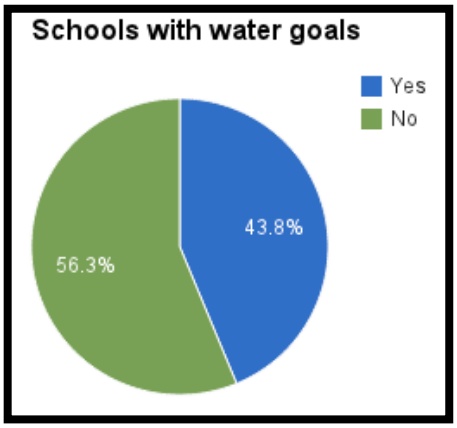
This research process involved compiling both quantitative and qualitative data in the three topic areas. Below is the quantitative data that was gathered. The information has been condensed to the reference most relevant and applicable statistics that also reflect the recommendations.

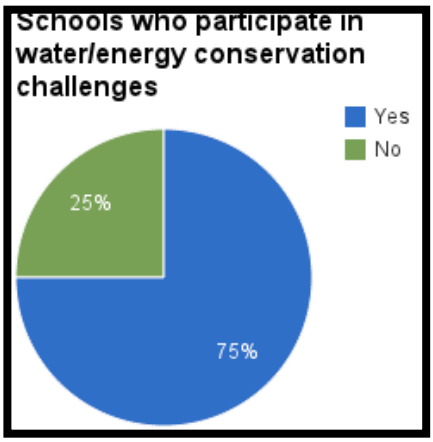
Water Statistics - Occidental:

- Between $420,000 and $530,000 is spent each year on water
- The college uses approximately 80 million gallons of water every year (rough estimate, as it varies year to year)
- 66% of campus water use is towards irrigation/outdoor water use

Water Statistics - 16 Peer Institutions

- 43.8% of the peer institutions have water goals or targets
- 75% of the peer institutions participate in water/energy saving challenges



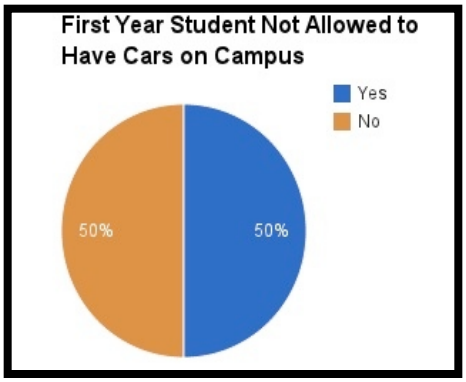


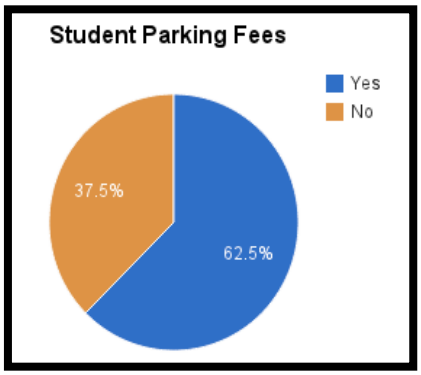
Transportation Statistics - Occidental

- 873 cars registered on campus as of summer 2013
- About 50% of the student body registers cars on campus

Transportation Statistics - 16 Peer Institutions

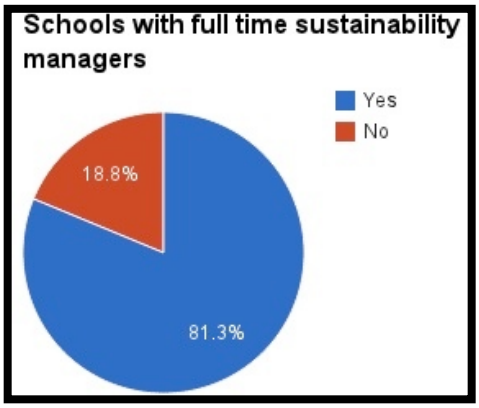
- 10/ 16 (62.5%) schools have parking fees for students
- 8/16 (50%) schools do not allow First Years to have cars on campus
- 3/16 (18.75%) schools have either (a)student parking fees or (b) do not allow First Years to have cars on campus
- 2/16 (12.5%) schools offer incentives to leave cars at home

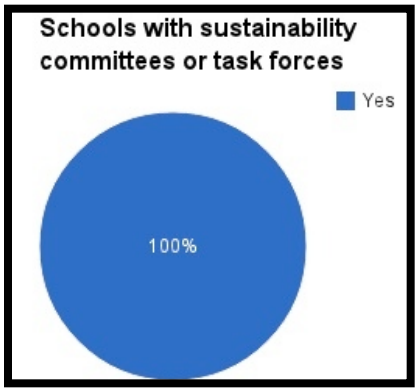




Organization Statistics -16 Peer Institutions

- 7/16 (43.7%) schools have paid positions for student sustainability workers
- 16/16 (100%) of schools have sustainability committees or task forces
- 62.5% of schools have sustainability offices
- 13/16 (81.3%) of schools have sustainability coordinators or managers





In addition to collecting quantitative information, qualitative information was gathered through interviews. Interviews were conducted with Oxy employees and later with employees at specific peer institutions. Trends are analyzed with the Occidental interviews separate from the interviews with personnel from the peer institutions.

I. Water

The first topic addressed in each interview with Oxy employees was water. Although the interviews focused on assessing water use at Occidental and what has been done in the past, recommendations were also shared. Many interviewees mentioned the landscaping at Occidental as problematic. The college has a lot of grassy spaces that require frequent watering. Also, sustainability has not been a major focus in determining the type of plants on campus. Professor Vallianatos identified the unsustainable nature of the campus landscaping in reference to water when recommending that "we need to create landscaping planting with an explicit goal of water reduction and reuse" (M. Vallianatos, personal communication, June 19, 2013). This opinion was expressed by other interviewees as well. In the area of water, many Oxy employees mentioned the progress with bottle filling stations and reducing the use of plastic water bottles. In the

2012-2013 academic year, water filling stations were installed near the tennis courts and outside of the Samuelson Pavilion. Although progress has been made, many acknowledged that students are still reliant on plastic water bottles. Amy Munoz, Associate Vice President for Hospitality Services, when talking about the recent lack of progress in reducing plastic water bottle use, explained that "I just think people need the education to make the right choices. We also need more bottle filling stations to make that the norm" (A. Munoz, personal communication, June 14, 2013). Munoz, like others, acknowledges the progress on water bottles but is clear that additional progress can be made with education.

Filling stations and water bottles were mentioned often, but there was a lack of acknowledgement for indoor water use and specifically improvements in that area. Bruce Steele in Facilities Management was knowledgeable about low flow upgrades, but many interviewees did not seem informed or interested in indoor water use when asked about the school's progress around water. Yet, overall, there was the sense from most Oxy employees that water use could and should be more of a focus for the school moving forward.

II. Transportation

In the area of transportation, there was a greater variety of opinions expressed. Some interview participants clearly felt that transportation was one of the most pressing issues to address, while others, although believing the issue is very important, thought that the barriers to addressing parking make it a difficult issue to address right away. The conversation around transportation usually involved discussing parking fees, banning first year students from having cars on campus, public transportation, biking, electric vehicle charging stations, and Zipcars.

When asked about what programs Oxy has implemented in the past to increase sustainable methods of transportation, the two major programs mentioned were the bike cage, which was opened in 2010, and Zipcars which were brought to campus around the same time. These were talked about by most as successful although the potential for expansion of both programs was also noted.

Despite many participants mentioning these programs, the conversation often turned to the topic of parking fees. Parking fees were controversial among those questioned. Two interviewees brought up the fact that parking fees are inequitable. They were concerned about charging staff or students for parking if it was not affordable. It was brought up that for staff making hourly wages, paying for parking could be a big deal. Yet, Professor Vallianatos had an opposite opinion when he explained "I believe it is equitable to charge a lot for driving and then use the fees for the alternative methods of transportation" (M. Vallianatos, personal communication, June 19, 2013). In the past, fees have been considered but the argument against implementation was that it would be hard to implement and costly because additional safety officers would need to be hired to monitor the program. This argument was also brought up in an interview with Jim Tranquada, director of communications. Tranquada brought up many reasons why parking fees are not as simple as they seem. His job as Director of Communications involves navigating Occidental's role in the local Eagle Rock and Highland Park community. He brought up the point that students may start parking off campus if Oxy charges for parking. This could conceivably cause conflict in the community. Also, Tranquada acknowledged that the

situation can be managed; it is just more complicated than simply implementing parking fees (J. Tranquada, personal communication, June 13).

Outside of parking, another common topic of discussion was electric vehicle charging stations. In 2013, Occidental installed additional charging stations next to the solar array. There were previously a couple of stations in the admissions parking lot. Although a few interviewees mentioned the charging stations as evidence of the college's progress, Professor Snowden-Ifft talked about the potential for electric cars in the future. In speaking about their potential he said "One of the reasons I like electric vehicles, is because I don't pollute my neighbor's air. If I was going to make this argument I would focus on it as a local issue." Here he was noting that electric vehicles have the potential for appeal to the Oxy community. Snowden-Ifft also explained that although this is not an area of transportation that has much applicability to students, it could be advertised to staff. The charging stations are important in his perspective because he owns an electric vehicle and being able to charge at Occidental allows him more flexibility. Yet, professor Snowden-Ifft made clear that this may not be where the college wants to go on transportation (D. Snowden-Ifft, personal communication, June 18, 2013).

III. Organization

In the area of organization, there was the least variety of opinions. In this area, employees were asked about how sustainability work is accomplished at Oxy, how the sustainability committee functioned, and about the potential for a sustainability manager. Participants were also asked about collaboration and conflict among different players in the conversation around sustainability. One answer that was very consistent was the response to the question "where is

there conflict?" Every interviewee insisted that there was never conflict, just opposing interests. Professor North in the biology department explained that the only exception is that sometimes "conflict has been driven by resource limitations" (G. North, personal communication, June 19, 2013). Many interviewees were quick to acknowledge that conflict does not exist but then listed an exception or used a phrase that they thought better represented what was being asked, such as mentioning how different people have different priorities.

The other area in which many interviewees had similar responses was when asked about the sustainability committee. The sustainability committee was a group of faculty, staff, and students working together towards sustainability. Interviewees often mentioned the dysfunctional nature of the committee, explaining that it had too many people, lacked focus, was not able to offer service hours, lacked a chair of the committee that could invest the necessary time, and did not have an operating budget. Although the overall impression about the committee made clear its ineffectiveness, employees interviewed also acknowledged its success in creating the solar array subcommittee, which in the 2012-2013 year was able to carry out the solar array project after four years of hard work. The other aspect of the committee that was mentioned as successful was its ability to be a space for faculty to express challenges in their own departments and collaborate with others to address those challenges.

Peer Institution Interviews: Case Studies

The interviews with the peer institutions are not analyzed in the same way, as different questions were asked to each interviewee at each institution. Instead of asking similar questions, questions were individualized based on the knowledge previously gathered about the schools

from a literature review. Hence, these interviews took a closer form to short case studies. Staff were interviewed and case studies were completed at Whitman College, Macalaster College, and Franklin and Marshall College.

Case Study: Whitman College

Whitman College has recently made changes in the topic area of organization. The college has just hired a full time sustainability manager for the 2013-2014 academic year. Both the head of the sustainability committee from the 2013-2013 year and the sustainability coordinator who was hired during the summer of 2013 were interviewed. They were asked about the new position, who and what was involved in its creation, and about the effectiveness of their sustainability committee.

Whitman is an intriguing case study because their initial solution to the sustainability coordinator effort was different from every other peer institution. Originally, Whitman hired one student coordinator with a $5000.00 budget. Later, they changed it to two student coordinators. The coordinators were paid to work 10 hours a week and collaborate on advancing a sustainability agenda. Although some strides were made with this system, it overall was unsatisfactory and did not match the staff and students needs according to Rachna Sinnott, the chair of the sustainability committee in the 2012-2013 year. The students did not have enough time to carry out the full responsibilities of a sustainability coordinator, yet they were able to provide guidance to students who wanted to implement their own sustainability projects. It quickly became clear that a full time sustainability coordinator was still needed and students and staff started organizing to make that a reality. The key element at Whitman, as described by

Sinnott**,** was involving student government. Once student government was invested in creating the position, students were able to make implementing a full time sustainability coordinator their top priority for the 2013-2014 school year (R. Sinnott, personal communication, July 23, 2013).

The new coordinator hired, Tristan Sewell, had little to say about the process of implementing the position as he was not present, but he did contribute when asked about future plans for the college. He was enthusiastic about the college creating his job but questioned its placement in facilities. He emphasized being able to help students carry out projects and get involved with sustainability and expressed concern over connecting with students when placed in the facilities department. He hoped the placement may change in the future, yet Sinnott, who was involved in the creation of the job, said that there was no other apparent department to place him in. She also mentioned that facilities would be a good placement in order to advance recycling efforts (T. Sewell and R. Sinnott, personal communication, July 23, 2013).

The interview with the Whitman sustainability staff also gave light to the effectiveness of the sustainability committee as an element contributing to pushing forward a sustainable agenda for their college. Sinnott explained that the committee is advertised to the entire campus community and anyone is invited to come. Hence, the numbers often fluctuate and there are a handful of 5-10 people that typically show up to meetings, many of whom are science faculty. Although the committee has been able to make some improvements and continue to meet once a month, they are looking to Sewell to make major improvements to the committee's effectiveness this year. The major concern is attendance. In order to combat that challenge, Sinnott explained that they had tried to have the President of the college invite people and have departments

designate representatives to attend the meeting, yet neither option was fully successful. The committee is expected to undergo changes this year in order to make it more effective (R. Sinnott, personal communication, July 23, 2013).

Case Study: Franklin and Marshall College

When investigating Franklin and Marshall College (F and M), the in-depth data collection focused on water use and conservation. Water was of interest at this college because in initial research, it became clear that the school has a sustainability master plan and a storm water management master plan. They also have goals specific to water conservation. In the first phase of research, Oxy employees mentioned these as good possibilities moving forward at Occidental. Through the initial data collection phase, quantitative information was gathered. F and M have specific goals that include 100% water containment by the year 2030. [3] The other major water goal that F and M aims to achieve is to have a 25% reduction of campus water use between 2010 and 2025. Outside of making lofty goals, F and M has already made improvements. One water project that stands out include the installation of low flow aerators in over 90% of the schools faucets and 50% of the school's shower heads were also replaced with low flow shower heads. The remaining 50% are due to be changed in the next couple of years (Sustainability at FandM, 2013).

This data was useful in understanding the basics of water improvements at F and M, and the interview with the director of the environmental center, Sarah Dawson**,** was necessary in order to understand how the goals and plans were developed and carried out. In questioning her,

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[3] Personal Communication, Sarah Dawson

she explained that the sustainability master plan and the storm water master plan were created differently. The sustainability master plan (http://www.fandm.edu/beyondgreen/sustainability-master-plan/water-conservation**)** was developed by the sustainability task force, a coalition that included the business VP, Dean, staff, professors, and students. An outside contractor was hired as well. The stormwater master plan, was created in 2008 before the sustainability master plan and was a product that came out of the Facilities Department. Currently, the school is on track with their goals outlined in the master plans, but Dawson was quick to acknowledge that it has only been one year (S. Dawson, personal communication, July 15, 2013).

Dawson was also asked more generally about water projects at F and M. When asked "What are the most successful steps your school has taken to conserve water?" Dawson responded that the most successful steps included the storm water master plan and water reduction goal, aerated faucets, free disposable water bottles, more filling stations, greywater and storm-water catchment and the implementation of green roofs on five buildings. She also mentioned that pervious pavement is a requirement in any campus changes. Although these projects were considered the most successful at addressing water use, she made it very clear that student campaigns have pushed forward many changes, such as the disposable water bottle ban (S. Dawson, personal communication, July 15, 2013).

Case Study: Macalester College

Macalester was investigated as a mini case study because they have created a successful and comprehensive landscape plan. When interviewing the sustainability manager at the college, she was also asked what she thought the most successful projects were to address the issue of water. Similar to Franklin and Marshall, Macalester has been making progress in addressing

storm water recapture. They have also integrated two rooftop gardens and two green roofs into the school landscape. Yet, the project that the coordinator raved about was the installation of aerators all across campus. A student worked with a company where she got the idea to switch out the aerators at Macalester. Aerators are cheap and the student was able to get a discount from a local company. With help, she switched out all aerators at the school with costs mostly for labor hired to do installation. Labor was also easy because students were able to learn how to install aerators. The coordinator reported that the combination of aerator installation and dual flush toilets across campus was able to reduce housing water use by between 50% and 70% (personal communication, July 17, 2013).

Other important findings at Macalester were related to the landscape plan implementation. The coordinator explained that a company was hired to make a full plan using "native and low maintenance adapted plants." They also focused on plants that can withstand floods and droughts. In the process, Macalester was able to use students to discuss what they wanted the campus to look like and later link the landscape plan to classes. This also allowed student labor to be a part of the process. The Facilities Department was heavily involved in initiating and carrying out the plan. Full development of the plan took over a year (personal communication, July 17, 2013).

The case studies at Whitman, Franklin and Marshall, and Macalester, were able to lend clear and specific information to the research process. These details became applicable and useful when developing recommendations for Occidental. Furthermore, these case studies should be used as reference in the 2013-2014 academic year as the recommendations begin to be implemented.

Recommendations

Based on the findings above, a set of clear recommendations have been created to detail the next steps for the college.*[4] These recommendations were developed in step three of the research.

I. Water

In the area of water, three overall goals are determined as necessary to help push Occidental to save water. The goals include creating water reduction targets, reducing indoor and outdoor water use, and spreading awareness and education about water conservation on campus. In order to achieve these goals, four strategies are suggested. The first strategy is to set a campus wide water reduction goal. This goal involves minimally reducing water use by 25% by the year 2025. Many of the peer institutions, such as Franklin and Marshall, have water reduction goals of 25% although the timeline varies. A water goal will insure that Oxy is continually progressing to reduce water use, although determining an achievable and measurable goal for the college remains a challenge. Campus wide water use data is not collected in a way that would make it possible to check for yearly water reduction targets.

The second strategy for addressing water use involves developing a campus wide water use and landscaping plan. The plan would help to reduce Oxy's outdoor water use which accounts for 66% of water use at the college. The plan will be must successful if implemented by an outside firm specializing in sustainable landscaping, alongside the sustainability manger and sustainability committee, as well as facilities. It would be most effective for the sustainability committee to form a landscape and water use sub-committee. The plan must include increasing drought tolerant and native plants, storm-water recapturing mechanisms and emphasize creating

[4] *Recommendations are listed in a chart format in appendix A below

a more walkable campus. Although the plan would save money, reduce water consumption and maintain the lovely aesthetics of the campus, hiring an outside consultant will be costly.

Indoor water use also needs to be addressed through a couple of strategies. The first strategy will help to meet the goal of increasing water use and awareness about water consumption on campus. In the fall, an energy and water conservation challenge will be led through the UEP 246 Campus Greening Class. Each hall will seek to decrease electricity and water consumption for two weeks. Water and electricity usage will be measured by the college's metering system, a system that the college recently created at a high cost. The hall with the greatest percent reduction will receive a prize. If the fall competition is successful, Occidental should participate in the nationwide Campus Conservation Challenge in the spring. Colleges on our comparison list, such as Oberlin, saved 50,000 gallons of water through their three week long competition (*Ecolympics 2013 Comes to a Close*, 2013). The competition encourages students to change their behavior to be more environmentally conscious. This will allow for water and energy reductions during and after the competition timeline. Students will also be able to carry the environmental education that results from the competition into the future. Yet, student buy-in for the program may be challenging.

The second strategy that will further indoor water use conservation is making infrastructural improvements that decrease indoor water use. The facilities department, sustainability coordinator, and sustainability committee should explore cost effective and environmentally advantageous options such as low flow upgrades, dual flushing toilets, and aerators. These changes are not dependent upon student involvement or behavioral change yet will produce a distinct decrease in water use. Aerators are also cheap to buy and install. Yet,

finding labor and time to make infrastructural changes as well as determining which products are appropriate may be difficult.

II. Transportation

In the area of transportation, it is recommended that Occidental implement a five year transportation plan. The recommendations are set up in a five year plan because certain changes should be implemented simultaneously. For example it is important to increase alternative modes of transportation while banning first years from having cars on campus. The overall goals for improving sustainable transportation is to reduce cars on the Occidental campus, thereby decreasing pollution. Simultaneously, the school must support and encourage use of alternative transportation methods including public transit and biking, and make Oxy a more bikeable and walkable campus.

In year one, five strategies should be used to address these goals. These strategies include installing parking meters on lower campus, offering incentives for students to leave their cars at home, making more tap cards available, advertising public transportation information, and developing a campus wide bike plan. Parking meters will be beneficial to help reduce driving on campus and reduce cold start emissions, although they would be difficult to monitor and initially fund. Incentives for students to leave cars at home, tap cards, and advertising public transport information would all help to reduce student driving and are fairly easy to implement. A campus bike plan would help to further encourage alternative methods of transportation. Many colleges have bike plans and the area around Occidental is now one of the most bike friendly parts of Los Angeles.[5]

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[5] Personal Communication, Mark Vallianatos

In year two, student parking fees should be initiated. The first option is to charge all students and staff for parking in year two. The second option would phase in parking fees by only charging first years in year two. Based on other schools fees, a reasonable parking fee would be between $50 - $100 per semester. This will decrease backlash yet reduce the amount of funding gained and have less of an impact on how often students and employees use their cars. The challenge in implementing parking would be monitoring permits and the resistance from students and employees. If option two was chosen, then employees who take alternative methods of transportation or carpool should be rewarded in year two. This will help to catalyze progress in reducing driving among Oxy employees.

In year three, the now Sophomore class should continue to pay for parking and will be more familiar with paying for parking from their first year at Oxy. In addition, first year students should not be allowed to have cars on campus. This will greatly decrease the number of cars on campus and allow first years to experience LA with public transit or bikes. Students will realize the possibilities available without a car.

By year four, both Sophomores and Juniors should be paying for parking. This will be part of the process of continuing to phase in parking fees. The bikeshare should be expanded to have 40 bikes available. During this expansion, the possibility of allowing a maximum of 10 bikes to be available for use by community members should be considered.

In year five, the final year, all upperclassmen will be paying the parking fee to have their cars on campus. Additionally, an employee sliding scale parking fee should be introduced. The employee sliding scale fee would be reflective of salary. Those making less than $25,000 a year would pay $50, those making between 25,000 and 50,000 a year would pay $100, and those

making above $50,000 would pay $150 for the school year. This would generate revenue for greening on campus and greatly reduce local air pollution. In year five efforts should also be made to reduce roadways accessible by cars on campus. Not only would this measure discourage driving, but it would also increase public health and public safety.

III. Organization

The area of organization if of particular importance because it needs to be addressed in order to advance sustainability in all other areas on campus. The overall goals in this area are to centralize sustainability work on campus, increase communication between staff, students, and the administration, and develop systems that will ensure that sustainability work is continually progressing at Occidental College. There are five overall strategies that are necessary to meet these goals.

The first strategy is to institutionalize the sustainability committee with a charge and mission statement. The committee can push forward college wide sustainability goals and smaller sub committees can be formed for specific projects, such as the water use and landscaping plan. In order for the committee to be effective, it needs to have a budget, offer faculty service hours, and have a dedicated committee chair.

Secondly, Occidental needs to invest in an AASHE(Association for the Advancement of Sustainability in Education) membership and enroll in STARS. An AASHE membership gives the school recognition for their commitment to sustainability, access to resources from other colleges and universities, and a discount on STARS. STARS is a framework for evaluating the schools sustainability and has its own benefits such as being tested by other colleges and allowing Oxy to stay on track to advance in all areas of sustainability. Yet, both AASHE and

STARS have a small cost and a designated staff member at Occidental, preferably a sustainability manager would need to have time to fill out the assessment.

It is also necessary to increase sustainability across all sectors of campus. This can be done through a sustainability work study program that should be developed in the 2013-2014 academic year. This program will produce more applications to the sustainability fund as students will be assigned to departments, such as athletics, and be responsible for initiating projects in their assigned department. Yet, it will be a challenge to initially develop the program and have staff oversight.

Lastly, it is of the utmost importance for the school to hire a sustainability manager. Details of the position are specified in the job description, appendix D. There are two options. The first is for the school to hire a full time sustainability manager for an unspecified amount of time who has a minimum of a masters degree. This is the best option, as candidates with Masters degrees will have additional knowledge and experience. The second option is for the sustainability manager to have minimally a bachelors degree and preferably be a recent Oxy graduate. This is the lower cost option. The sustainability manager would be hired for two years and be a transition into option one, a more qualified and long term position. An Oxy graduate would have the advantages of being familiar with the campus. If this option is chosen, in the future an employee should be hired with a more advanced degree in a sustainability related field. The sustainability manager should chair the sustainability committee, apply for outside funding, teach the UEP 246 class and coordinate sustainability work at the college.

Conclusion

The findings of this research study show that Occidental has many steps to take to advance their sustainable practices related to water conservation, tranportation and the organization of sustainability efforts at the college. The recommendations in this report should be carried out, continually evaluated, and built upon in order to maximize their effectiveness. In the future, the research on campus greening also needs to include student perspectives. Student's opinions matter when making recommendations for the college's future plans. Furthermore, more direct contact with peer institutions will be useful in further research and implementation of the recommendations. As Occidental continues to follow its mission to prepare students for an "increasingly complex, interdependent and pluralistic world," the college needs to implement these recomendations and engage the campus fully around environmental sustainability.

References

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Appendix A: Recommendations

Water Conservation

Goals:

1. Set water reduction targets
2. Reduce indoor and outdoor water use
3. Spread awareness and education about water conservation

Strategy	Benefits	Challenges
1: Set a campus wide water reduction goal in the 2013-14 water themed year. *A minimum reduction goal would be reducing water use 25% by 2025. 25% was chosen based on other colleges reduction percentages. Currently the college's water costs are between $430,000 and $520,000 a year.*	● Ensure the college is making continual progress. ● If we spend an average of $475,000 per year, reducing water by 25% would bring the cost down to about $355,000, a total savings of $120,000 a year.	● Determining an achievable, yet impactful goal for the college ● Collecting accurate campus wide water use data
2: Develop a water use and campus landscaping plan during the 2013-2014 academic year. *The Occidental College Campus Landscaping plan should be the responsibility of the Sustainability Committee. Ideally, a professional consultant or firm should be hired. The landscape plan would include increased drought tolerant and native plants, stormwater recapturing mechanisms, and emphasize creating a more walkable campus. High visibility projects should be implemented immediately.*	● Saves money while reducing water consumption ● Maintain the aesthetics of the college ● Potential for alumni partners	● Hiring a professional firm will be costly (cost still being determined) ● Will take several years to implement ● Labor costs

3: Participate in water and energy competitions. *In the fall, an energy and water conservation challenge will be led through the UEP 246 Campus Greening Class. Before the competition, the percentage of campus water used by residence halls will be determined. Each hall will do their best to decrease electricity and water consumption for two weeks. Water and electricity usage will be measured by the college's metering system. The hall with the greatest percent reduction will receive a prize. If the fall competition is successful, Occidental should participate in the nationwide Campus Conservation Challenge in the spring. Oberlin, saved 50,000 gallons of water through their competition.*	● Students will change their behavior to be more environmentally conscious ● Water and energy reductions during and after the competition timeline ● Students will be able to carry the environmental education that results from the competition with them in the future	● Getting students invested in the program ● Creating an environment that maximizes sustainability education
4: Make infrastructural improvements that decrease indoor water use. *The Facilities department and the Sustainability Committee should explore cost effective and environmentally advantageous options such as low flow upgrades, dual flushing toilets, and drinking water stations. In 2009-2010, the college reported having 90 low flow faucets, 10 low flow showers, two dual flushing toilets, and two waterless urinals.*	● Distinct decrease in water consumption on the metering graphs ● Aerators are cheap ● Increasing drinking water stations will reduce the amount of bottled water on campus	● Finding the labor to install infrastructural changes ● Determining which products are appropriate.

Transportation

Implement five year transportation plan starting during the 2013-2014 academic year.
Goals:

1. Reduce the number of cars on the Occidental College Campus thereby decreasing air pollution caused by Oxy students.
2. Support and encourage use of of alternative transportation methods including public transit and biking.
3. Make Occidental College a more bikeable and walkable campus

Strategy	Benefits	Challenges
Year 1		
1. Install parking meters on lower campus. *Initial meters should be along Bird Rd above the Tiger Cooler and in the front circle by Rush Gym. Parking meters will initially be $1 per hour. Assessments will be carried out every month during the first year the parking meters are in to determine if the parking cost is effective. Ideally, 90% of the spots should be filled at any point during business hours because it shows that the cost is low enough that people will pay, but high enough that the spots are not in constant demand.*	● Reduce driving on campus ● Reduce cold start emissions ● Introduce paid parking on campus If fourteen spots were installed on Bird Road it would cost $17,700 over the first five years. This includes the approximately $5 per month per space operating fee. If each spot is being intermittently used for a total of four hours per day during the academic year for $1 per hour then they would generate $11,826 per year. The meters would pay for themselves within two years.	● The initial investment ● Monitoring the meters and ticketing ● For a most effective system there should be parking meters at all lower campus parking spots ● Students may park off campus which could instigate backlash from community members

2. Offer incentives for students to leave their cars at home. ● *Offer free zipcar memberships plus $35-$75 in free driving hours to students who agree to leave their car at home for the year.* ● *Loan bikes to students for the entire semester based off a lottery system.* ● *Give out free TAP cards worth $25-$35 to students who do not bring cars on campus. An administrator can apply for LADOT discounts for a large group of people.* *Option 1: Incentives offered second semester to returning students that had a car on campus the previous semester.* *Option 2: Incentives for all students who do not bring cars to campus.*	● Fewer personal vehicles are brought to campus ● Students are able to get off campus at a discounted price.	● Determining which students intentionally left their cars at home as opposed to never considering bringing their cars to campus. A simple solution to this challenge is to reward all students who do not have car on campus regardless of their initial intentions.
3. Increase the number of free TAP cards available to all students through OSL.	● Incentivize public transit so students can travel for free ● Decrease number of cars on campus	● Finding a source of constant funding to put money on the TAP cards may be difficult. The ASOC Sustainability Fund is supporting the seven TAP cards that are in OSL now.
4. Make public transit information easily accessible through the Oxy website, posters, and leadership trainings. *This information should include access to timesheets for the metro buses closest to Oxy; the easiest routes to get to Target, the Americana, Glendale Galleria, and downtown; and the safest biking routes.*	● If alternative transportation becomes easier and more accessible students will be more likely to use it	● Publicizing the information

5. Develop a bike plan for campus. *Double the number of bike racks, paint roadways to mark bike lanes, and install "Share the Road" signs, and traffic speed limit signs. Work with the city to install bike lanes on the back roads of Eagle Rock. Installing bike lanes costs between $5,000 to $50,000 per mile depending on pavement condition, signage, and maintenance needs.*	● Slowing cars down leads to a safer campus ● Making the campus more bike friendly will encourage biking from upper to lower campus instead of driving ● Reduce cold start emissions	● Funding ● Labor costs ● Finding space on the road for bike lanes
Year 2		
1. Initial Parking Fee. *Charge a $50-$100 per semester parking fee.* *Option 1: Charge all students and employees who park on campus.* *Option 2: Charge First Year students. A First Year fee will decrease backlash because First Years will not know any different. Phase in fees for upperclassmen and employees.*	● Deter students from bringing cars to campus ● Option 1: It would generate an estimated $75,000 per year (with a $100 annual parking fee). ● Generate money to support a revolving green fund, a Sustainability Manager salary, a Sustainability Committee's budget, or paying back the parking meters.	● Backlash from students ● Monitoring parking permits on campus
2. Create web-based ride matching application. *Students will be encouraged to post online when they are going on a trip off campus. Students will be able find rides with other students.*	● Increases carpooling ● Build community	● Creating an effective application or online posting tool ● Eliminating stigmas surrounding sharing rides with strangers
3. Reward employees that take alternative methods of transportation or carpool. *Employees that sign up to carpool may have parking fee waived. Staff who bike, walk, or take public transportation to campus get an annual stipend or a TAP card equal to the cost of a free parking space.*	● Employees utilize alternative transportation methods ● Reduce the number of cars on campus	● Determining which staff consistently use alternative transportation options ● Determining a consistent source of funding
Year 3		

1. Option 2 Parking Fee: Sophomore Parking Fee. *Sophomores pay $50-$100 per semester parking fee.*	● See “Year 2, Strategy 1.”	● See “Year 2, Strategy 1.”
2. Eliminate First Year’s ability to bring cars on campus.	● Decrease number of cars on campus ● If First Years can find a way to navigate LA with public transit or their bikes then they realize that a car is not necessary	● Backlash from students
Year 4		
1. Option 2 Parking Fee: Junior and Sophomore Parking Fee. *Juniors and Sophomores pay $50-$100 per semester parking fee.*	● See “Year 2, Strategy 1.”	● See “Year 2, Strategy 1.”
2. Expand Bikeshare to 40 bikes. *Consider the possibility of making a maximum of 10 bikes available to community members.*	● Oxy will continue to provide alternative transportation options that allow students to explore the city without contributing to air pollution.	● 40 bikes will not be sufficient to give all Oxy students an equal chance to see the city. The Bikeshare must also be open more frequently for students to have more access to the bikes.
Year 5		
1. Option 2 Parking Fee: Upperclassmen Parking Fee. *Seniors, Juniors, and Sophomores pay $50-$100 per semester parking fee.*	● See “Year 2, Strategy 1.”	● See “Year 2, Strategy 1.”

2. Employee Sliding Scale Parking Fee. *Implement salary reflective parking fees for staff, faculty and administrators. The pilot program would start with fees based on salaries:* *Employees:* ● *Annual Salary <= $25,000 - $50/school year* ● *Annual Salary > $25,000 <=$50,000 - $100/school year* ● *Annual Salary > $50,000 - $150/school year*	● Deter employees from bringing cars to campus ● Generate money to support a revolving green fund, a Sustainability Manager salary, or a Sustainability Committee's budget.	● Backlash from employees ● Union guidelines
3. Reduce roadways on campus accessible by car. *Use chains to block off roads - this way emergency vehicles can still have access. In addition, install strategies to slow cars on open roadways.*	● Make the campus more bike and pedestrian friendly ● Reduce convenience of driving from one campus destination to another	● Determining mobility of Campus Safety around campus

Administration

Goals:

1. Centralize sustainability work on campus
2. Make connections between students and staff and the administration
3. Develop long lasting mechanisms that ensure that sustainability projects are continually being implemented

Strategy	Benefits	Challenges
1: **Institutionalize the Sustainability Committee with a charge and mission statement.** 100% of the colleges on our comparison list have Sustainability Committees. The task force needs to offer faculty service hours and have an operating budget in order to be effective.	● The committee can serve to push sustainability goals forward ● Avenue for staff and faculty to get involved with sustainability ● Can create smaller task forces to work on specific projects (such as the landscaping plan)	● Creating a budget ● Allowing faculty service hours ● Finding someone to chair the committee (sustainability manager)
2: **Rejoin AASHE. AASHE is the Association for the Advancement of Sustainability in Higher Education.** By becoming a member, colleges have access to resources and a network of colleges working towards a global sustainability goal. Occidental has been a member in the past but has not renewed its membership this year. Membership costs $1,105.00. http://www.aashe.org/membership/about	● Resources from other colleges and universities ● Discount on STARS and conference tickets ● Recognition for commitment to sustainability.	● Finding a source to fund the membership cost
3: **Enroll in STARS Assessment.** STARS would be useful to the Occidental campus as it is is a framework for assessing campus sustainability and can replace an annual sustainability report. It is used by many institutions and is helpful in setting sustainability goals. STARS is discounted with an AASHE membership. It costs 900.00 for AASHE members and 1,400.00 for non AASHE members.	● Framework is tested by other colleges ● Joining will help Occidental to stay on track with sustainability goals.	● Funding enrollment ● Having a designated Occidental staff member (preferably a sustainability manager) with time to fill out the assessment

4: Develop a Sustainability Work Study Program. *This should be overseen by the sustainability coordinator. The work study students should be required to meet together twice a month to collaborate on ideas. Students can hold positions in all departments including the academic commons, athletics, facilities, campus dining etc.*	● Students will integrate sustainability across all sectors of campus ● Students will increase sustainability fund applications	● Staff oversight ● Initial development of the work study program.
5: **Institute Sustainability manager Position.** *Details on the position are on the separate sustainability manager document.* *Option 1: Full time sustainability manager is hired. Applicants should minimally have a masters degree.* *Option 2: In the first year, the position would be a 1 year fellowship pilot program. A recent Oxy grad should be hired so that they are familiar with the Occidental campus and operations.*	● Centralizes sustainability work on campus ● Chair Sustainability Committee ● A recent grad (Emma Sorrell) is available and qualified ● Can oversee student projects and sustainability work study students ● Manager will apply for outside funding from grants ● Will increase alumni giving to green projects ● Could name the fellowship after an alumni donor that contributes to the position ● Can teach UEP 246 class	● Funding the position ● Allowing a budget for the sustainability manager ● Oversight of the manager's work

Appendix B: Timeline

Date	Event
1995	**Environmental Science/ Studies Major Developed**
June 1998	**Eco-Oxy/ Eco L.A. program formally launched** 3 students intern at Oxy over the summer under the guidance of Professor Gottlieb to create an inventory and asses campus environmental issues. This preliminary research was essential to the development of the Environmental Problem Solving course in 1999.
Spring 1999	**"Environmental Problems" course launched** This course has a learning by doing ideology. The class focuses on campus greening.
2000	**Council for a Livable Campus (CLC) developed** Mission was to *"foster a more livable campus by reducing our impact on the physical environment and by improving safety and health for all who live and work here and in our neighboring communities. We seek to accomplish this in a manner that is as cost-effective, equitable, and socially just."*
2001	**College president signs the Talloires Declaration** "Composed in 1990 at an international conference in Talloires, France, this is the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The Talloires Declaration (TD) is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has been signed by over 350 university presidents and chancellors in over 40 countries." - from http://www.ulsf.org/programs_talloires.html
November 11, 2005	**Occidental College Master Plan is published** One of the key goals of the master plan is is "to incorporate a process of environmental stewardship."
2007	**Green Fund established** Anyone looking to give gifts to the college to improve campus sustainability can designate their gift to the Green Fund.
Fall 2007	**Preliminary Inventory of Oxy's Greenhouse gas emissions** https://drive.google.com/a/oxy.edu/?tab=co#folders/0Bwtnj76ySxluT1BGcDN4OUtFRUU
2008	**College is first rated by the Sustainability Report Card. Occidental receives a "D +" grade.**
August 2008	**Sustainability group created** The sustainability group would include four professors, four students, and one associate dean as wells as a representative from most departments on campus.
September 2008	**UEP 246 class sends letter to the search committee for the new president** Students push the college towards sustainability by sending a letter saying that "*we firmly believe that it is in the college's best interest to elect a president with a strong environmental agenda."*
April 20, 2009 (Founders day)	**Memo sent to incoming president Veitch** Students make recommendations in four areas including transportation, food, water, and energy. Among these recommendations include suggestions to make parking fees, a metering system, and plant more lower-water native plants.

2009	**FEAST garden created** Students create a garden on campus next to UEPI with funding from the sustainability fund.
2010	**Occidental College is given a "C" grade on the Green Report Card**
Fall 2010	**Bike Cage Opened** Students originally open bike cage for bike repairs and maintenance and bike sharing is started out of the front desk of the library. Later, bike sharing is moved to the bike cage on the bottom floor of the rangeview parking lot.
Spring 2010	**Sustainability House started**
April 2010	**Sustainability Fund Open for Applications** The sustainability fund was established by students to help green the Occidental Campus. The fund is supported by a mandatory $10.00 student fee. This allows a $40,000 fund to support sustainability projects.
April 20, 2010	**Solar Array is approved by the Board of Trustees**
2011	**Occidental receives a "B-" grade on the Green Report Card**
Fall 2011	**Rain Garden Proposed and Established** The Stearns Rain Garden reroutes rainwater into two 850 gallon cisterns to prevent stormwater runoff going into the street. The garden was created by students in the UEP 246 class. The garden was planted with drought tolerant natives.
Summer 2011	**Environmental Stewardship Task Force Created** Professor Ashenmiller led a coalition of faculty and staff who made a set of recommendations to President Veitch.
Spring 2011	**Sustainability house is refocused and renamed as "Food Justice House."** Members engage in sustainable food practices.
Summer 2012	**Occidental Green Tours started** Sustainability tours are given to approximately 50 first year students and 10 parents during orientation. The tours highlight sustainability initiative on campus and how to get involved.
Fall 2012	**First Sustainability Forum** Occidental Green Tour Guides present ideas after attending AASHE conference student summit. Ideas are presented and then discussed.
Spring 2013	**Eco-Clamshells Become Mandatory** Plastic togo boxes are no longer offered in the Marketplace. Students must use reusable containers to take food out of the Marketplace.
Spring 2013	**Second Sustainability Forum** Sustainability coordinators from UCLA and Pomona present about their roles. A panel of the sustainability coordinators and Oxy staff entertain questions from attendees.
Spring 2013	**Tap cards available in OSL** The sustainability fund makes five tap cards available in the Office of Student Life to increase use of public transportation. Students can come take a card and ride for free!
Spring 2013	**Sustainability Coordinator Petition** 231 people sign a petition for a full time sustainability coordinator at Occidental: http://www.ipetitions.com/petition/petition-in-support-of-a-permanent-full-time/. Student leaders then meet with President Veitch to discuss the possibility for a sustainability coordinator.
March 2013	**Solar array is active** One of the largest ground mounted arrays in L.A. Has a unique design that is symbolic of the liberal arts status of the college.
May 2013	**Sustainable ReCycle** When students move out for the year, they can donate their unwanted items by placing them in designated locations in their dorms. Clothing is donated but items such as furniture, binders, hangers etc. are resold in the fall to incoming first year students for discounted prices.

Appendix C: Organizational Chart

Link to Prezi: http://prezi.com/k8ack4ckswth/?utm_campaign=share&utm_medium=copy&rc=ex0share