

Greening New Mexico Volleyball

Final Report



Kelly Williamson

Sustainability 499 Capstone

December 2010

Table of Contents

<u>Abstract</u>	<u>2</u>
<u>Introduction</u>	<u>3</u>
<u>Green Game</u>	<u>8</u>
<u>Methods</u>	<u>8</u>
<u>Results</u>	<u>12</u>
<u>Discussion</u>	<u>13</u>
<u>Carbon Offset Assessment</u>	<u>15</u>
<u>Methods</u>	<u>15</u>
<u>Carbon Calculation</u>	<u>16</u>
<u>Solar Water Heater Installation Assessment</u>	<u>19</u>
<u>Conclusion</u>	<u>21</u>
<u>Literature Cited</u>	<u>22</u>
<u>Appendix</u>	<u>23</u>
<u>A. Photo Gallery</u>	<u>23</u>
<u>B. News and Media</u>	<u>28</u>

Abstract

Climate change is a serious global challenge facing humanity. The majority of our population does not understand the complexities of the greenhouse effect or comprehend how their daily lives have a significant impact on carbon emissions. An effective way of illustrating one's personal environmental impact is to perform a carbon footprint calculation. As a student of Sustainability Studies and a member of the University of New Mexico's volleyball team, I wanted to become an avid advocate of sustainable practices for the people with whom I regularly surround myself. My intent for this project was to educate the volleyball community on the seriousness of climate change, to teach them how to calculate their carbon footprint, then begin a conversation on how to decrease their footprint by promoting carbon mitigating practices in their daily lives and around campus. In order to achieve these goals I calculated the amount of greenhouse gases emitted by the University of New Mexico's volleyball team solely from air travel during the fall of 2009 and 2010. This was done to illustrate to what extent one human activity, in this instance, air travel, can negatively affect the environment, and to have a basis for promoting my fellow-teammates and community members to pursue actionable measures that will decrease greenhouse gas emissions.

The team traveled approximately 9,400 miles via airplane during the fall season of 2009, emitting 62 tons of carbon into the atmosphere. By the end of the fall 2010 semester, the team will have emitted 87 tons of carbon. I have defined two ways in which the team could alleviate the stress it places on the environment. First, we can become educated on the issues of climate change, then teach our fan base, students, faculty, and administration about sustainable practices and their importance. Second, we can urge each other and the aforementioned to engage in projects that specifically mitigate the greenhouse gases we emit.

In order to begin this process, the UNM volleyball team hosted their first "Green Game" on September 14th, 2010 in which issues concerning energy conservation, food localization, and carbon offsetting were presented to the crowd. I also met with members of UNM's Physical Plant Department and administrators within the Athletic department and began a conversation of how UNM Volleyball can offset their carbon by installing a renewable energy resources on campus.

Introduction

Earth's temperature is rising due to the greenhouse effect (IPCC 2007). Greenhouse gases, such as carbon dioxide (CO₂) and methane, trap long-wave radiation in the Earth's thin layer of atmosphere that would otherwise have reflected back out to space. As a result, the temperature of the atmosphere and the oceans is getting dangerously warmer (Gore 2006). Currently, total greenhouse gas emissions per capita in the United States - including industrial and commercial emissions - amount to 19.2 metric tons of CO₂ yearly, based on the 2008 Emissions of Greenhouse Gases Report from the U.S. Energy Information Administration (EIA 2008).

Correlations between increased levels of greenhouse gases and the surge of fossil fuel use as a means for energy production have led scientists to conclude that the climate crisis has been generated by human activity (Gore 2006). Pre-industrial concentration of carbon dioxide was 280 parts per million (ppm) when humans used wood and other biomass as fuel. In 2005, the level was 381ppm, a significant increase (NOAA/Scripps Institution of Oceanography 2005). The ratio of carbon isotopes 12 and 14 in coal is different from the ratio in wood, such that combustion of coal skews the isotopic signature of carbon in the atmosphere towards that of coal. These findings illustrate that the elevated CO₂ levels were caused by human combustion of fossil fuel (Bacastow et al. 1974). This correlation is significant because the process of industrialization marked the time when humans began burning fossil fuels. Today, society remains dependent of fossil fuel consumption. In the United States, 85% of all energy sources are derived from burning

carbon compounds. Oil accounts for 39%, natural gas accounts for 23% and coal 23% (US Department of Energy 2010).

Transportation sources accounted for approximately 29% of total U.S. greenhouse gas emissions in 2006 (US Environmental Protection Agency 2006). Air travel has become more affordable, thus more people have the ability to fly longer distances, and to do so more frequently. Today, the global airline industry consists of over 2000 airlines operating more than 23,000 aircraft, providing service to over 3700 airports. In 2006, the world's airlines flew almost 28 million scheduled flights and carried over 2 billion passengers. The growth of world air travel has averaged approximately 5% per year over the past 30 years, with substantial yearly variations due both to changing economic conditions and differences in economic growth in different regions of the world (IATA). An average domestic trip generates greenhouse gases equivalent to 1.4 tons of carbon dioxide per passenger (Conservation International 2010).

The climate change crisis is a global concern that is not well grasped by most citizens (Gore 2006). While many have heard the term and understand the basic principles, the severity of the problem is not made apparent in the daily lives of people. Neither is the issue of accountability. Carbon offsetting is a practice that has surged among environmentalists as a means of mitigating the negative effects human activities have on the environment. The objective of offsetting is to counterbalance the amount of carbon emitted by either sequestering the same quantity of carbon from the atmosphere that was released through projects such as reforestation, or to inhibit the emission of carbon via energy conservation or investments in renewable energy. Offsetting initiatives are most

often achieved through financial support of projects that reduce the emission of greenhouse gases. The amount of individual carbon emitted can be determined by calculating one's ecological, or carbon, footprint. According to Wackernagel and Loh (2002), the ecological footprint is '[a] measure of how much productive land and water an individual, a city, a country, or humanity requires to produce the resources it consumes and to absorb the waste it generates, using prevailing technology' (Wackernagel et al. 2002). Specifically, an ecological footprint calculator can be utilized to measure waste in terms of the amount of CO₂ emitted by a particular activity.

Carbon footprint calculators convert the amount of CO₂ waste into a monetary value that, when invested in a renewable energy source, could offset the amount of waste. The Greenhouse Gas Protocol developed by World Resources Institute and the World Business Council for Sustainable Development estimates that carbon emissions due to air travel range from 0.11 to 0.18 kilogram per kilometer (or 0.40 to 0.65 pound per mile) depending on the length of the flight. Shorter flights result in greater emissions per mile because a larger portion of the trip is spent in the energy-intensive takeoff and landing (Personal Energy Meter Methodology 2010). According to Conservation International's carbon calculator, it would typically cost \$17 dollars to offset the greenhouse gases emitted during a domestic flight. An international flight that travels as far as 10,000 miles one way generates up to 6.3 tons of carbon dioxide, and would cost around \$74 to offset (Conservation International 2010).

The University of New Mexico Lobo volleyball team traveled total of 9,400 miles during their last season, emitting 62 tons of carbon into the atmosphere. The calculated

cost to offset this sum of carbon emitted is \$1,700. In the fall of 2010, the team traveled by air again for most of its away games, and spewed 87 tons of CO₂ into the atmosphere. The team will continue flying for years to come.

As a proponent of personal accountability, I feel humans must begin to understand to what extent their daily lives negatively impact the environment, and learn how to hold themselves accountable on a personal level. Through my project I hoped to create a sense of urgency in my team, my community and myself on the issue of climate change by demonstrating how just one aspect of our lives has a detrimental effect on the environment. In order to achieve this goal, I organized the first sustainability themed volleyball game at the University of New Mexico. This first annual Green Game was held on September 14th, 2010 in Johnson Center. As a means to further my efforts in demonstrating that measureable action can be taken in order to offset the negative effects our daily actions have on the environment, I have outlined the plans for the installation of a renewable energy system on campus funded by the volleyball team.

Green Game

Methods:

The aim of the green game was to promote awareness for multiple issues regarding sustainability. The event held on September 14th consisted of a UNM Volleyball game, Lobos vs. Aggies, in which multiple booths were set up around the court, each equipped with representatives and materials to educate and inform the audience on sustainable issues. The following booths were present:

1. Carbon calculator: A station containing six computers was set up where people could calculate their carbon footprint. The website 'footprintnetwork.org' was utilized. The aim of this booth was to give the crowd the opportunity to visualize the negative effect they have on the environment. After attendees inputted basic information such as the number of miles they drive in a week on average, amount of meat eaten on a regular basis, amount of processed food consumed regularly, and size and type of home, to name a few, the page expresses their carbon footprint in how many planets it would take to support their lifestyle. See Appendix A, Figure 1 and 2.

2. Sustainability Studies Program: The University of New Mexico offers a minor in Sustainability Studies. Representatives of the program, including Dr. Bruce Milne and Jessica Rowland were present to hand out fliers and recruit people to sign up for classes. See Appendix A, Figure 3.

3. Office of Sustainability: Mary Clark illustrated what steps UNM has taken thus far in order to become more sustainable. She discussed the campus' four LEED certified buildings, the two community gardens designed and maintained by students, and the

University's Carbon Action Plan, which details how the university proposes to reach carbon neutrality in 2050. She promoted the "Love Red Live Green" campaign with giveaways, such as pencils made of recycled materials and reusable grocery bags. See Appendix A, Figure 4.

4. Recycling: Linda McCormick, head of UNM's recycling program stressed the importance of recycling and provided information about what can and cannot be recycled on campus and in Albuquerque using poster boards and an interactive game show contest. Her department also provided enough recycling bins to place one next to each of the trashcans located in the gym. See Appendix A, Figure 5.

5. Local foodshed awareness: Representatives of La Montanita Co-op, a community-owned, consumer cooperative, educated people on the importance of eating locally and introduced the idea of "food miles." The La Montanita Co-op is a leader in the local foods movement. It offers 1100 local products from approximately 400 local producers, and 20% of total purchases are sales in local food (www.lamontanita.coop). See Appendix A, Figure 6 and 7.

6. Pledge to Switch: Game attendees were urged to pledge to switch out their incandescent light bulbs to high efficiency compact fluorescent light bulbs (CFL) in their homes. Attendees were informed that a compact fluorescent light bulb (CFL) will save about \$30 over its lifetime and pay for itself in about 6 months, and that it uses 75 percent less energy and lasts about 10 times longer than an incandescent bulb (Energy Star 2010). Once they signed the pledge to switch, they were rewarded with a CFL. Light bulbs were purchased utilizing the \$400 budget of Lobo Marketing. See Appendix A, Figure 8, 9 and 10.

To promote the event, I recruited help from my friends and classmates. James Deans made a flier to promote the event. See Appendix B, Figure 10. I was also interviewed by Ken Sickenger, writer for the *Albuquerque Journal*, before the game, and hence was able to promote the event to the entire city. See Appendix B, Figure 11.

The timeline below details what activities I took on in the time leading up to the Green Game. This helped me stay on track during the planning process.

July	August	September	October
Week 1: Brainstorming	Week 1: Draft a marketing plan, create fliers Contact local businesses -PV companies -Co-ops Walk through of Johnson gym – brainstorm booth logistics	Week 1: Work on script for Randy Ensure commitment of volunteers to work booths -SSP (Terry?) -Computer station -Light bulb station	Week 1: Collect newspaper clippings that covered the event Compile photographs Interview fans on their opinion of the event – measure impact. Was the event successful in promoting awareness?
Week 2: Logic Model, Draft, Presentation	Week 2: Reserve computers for night of Sept 14 th Recruit volunteers to help on the night of the Green	Week 2: Finalize script for Randy Involve team with promotion of game and green décor (green ribbons,	Week 2: Edit Proposal. Include detailed results section and discussion

	<p>Game</p> <p>Create floor-plan check with the fire marshal</p> <p>Work with marketing dept. on advertising for the event night</p>	socks)	
<p>Week 3:</p> <p>Preliminary meeting with key players</p> <p>-Rebecca Houge from Marketing to discuss light bulb budget</p> <p>-Jeff Zumwalt from Physical Plant to discuss feasibility of solar water heater installation</p>	<p>Week 3:</p> <p>Ensure commitment of local businesses</p> <p>Propose vending healthier, organic foods at concession stand during game and coordinate options upon approval</p> <p>Meet with Janice Ruggiero from Athletics to confirm funding</p>	<p>Week 3</p> <p>14th: Host Green Game</p> <p>Interview with The Mountain</p>	<p>Week 3:</p> <p>Work on setting up a revolving fund</p> <p>Evaluate progress on installing a renewable energy source on campus. Reevaluate if necessary.</p>
<p>Week 4:</p> <p>Complete Draft of Proposal</p> <p>Calculate expected carbon emission for upcoming fall season</p>	<p>Week 4:</p> <p>Write/ adapt a pledge for making the switch to higher efficiency light bulbs</p>	<p>Week 4:</p> <p>Obtain approval to organize similar event next season</p>	<p>Week 4</p> <p>Confirm that flight miles traveled during current season will also be offset and put towards renewable energy</p>

Results

The first “Green Game” was carried out successfully on September 14th, 2010. The event was held to showcase multiple sustainable practices. This event educated over 2,200 volleyball fans about sustainable practices. Representatives from the Sustainability Studies Program, the recycling department, the Physical Plant department, and La Montanita Co-op each had their own booth where they informed fans on the importance of sustainable practices. The director of the Sustainability Studies Program, Bruce Milne, my coaching staff, UNM Athletics marketing director, Rebecca Hogue, numerous crowd members, and media representatives deemed the “Green Game” a success. See Appendix B, Figure 13 for the Albuquerque Journal article that reported on the game. You may also visit <http://www.golobos.com/allaccess/?media=195148> for media coverage of the game and event. Two weeks after the Green Game, I was interviewed by a reporter for *The Mountain*, a sports channel that covers the Mountain West Conference in order to describe my experience of organizing the event and to promote the “Green Game” theme to other schools in our region.

The CFL campaign was a success because 700 light bulbs were distributed during the game. 700 is slightly more than 30% of 2200, the number of attendees, therefore I obtained my expected distribution.

I would argue that a broader consequence of the event was that the people present realized UNM has already begun to take steps towards a more sustainable future. I venture to say that attendees will be more attentive to future efforts put on by the representatives present at the game. For example, when the Sustainability Studies Program hosts another

Sustainability EXPO, attendees of the game will be more likely to participate because they have already been introduced to the concepts and understand the significance of the effort.

Discussion:

A promising result of the Green Game was that because of its success I have already obtained approval to host another Green Game in the fall of 2011. It is my hope that the volleyball team will establish a tradition of hosting a sustainably themed game once a season in order to continue promoting awareness and activism.

Due to the success of the event, members of the Lobo marketing staff have already expressed interest in using the green theme at a basketball game this year. I expect that such an event will draw much attention due to the larger crowds of basketball games and the venue of the remodeled Pit stadium.

Months after the Green Game, I read an article published by the University of Michigan's athletics website: "University of Michigan to Host First Zero Waste Event at Crisler Arena." A basketball game was used as a venue for a sustainability awareness campaign. During the game, all cups, plates, forks, napkins and trays were made of natural corn-based material called polylactic acid that resembles clear plastic and can be fully composted. Instead of trash barrels, two bins were placed at each waste station labeled "recycling" and "composting." Apparently other Division I institutions are striving to become more eco-friendly as well. One of the organizers of the event stated: ""Our goal is to reduce the amount that people throw away and to help the campus community become more aware of how much they use, how much they discard, and how they might increase recycling and composting so we are sending less into landfills" (www.mgoblue.com).

There is more work to be done on my end to promote the success of green games within the New Mexico Athletics program as well as promoting it in other campuses across the country. I now know I have the support of my coaching staff and athletic administration to promote the event to other members of our conference and potentially to schools around the nation that partake in NCAA athletics.

Carbon Offset Assessment

Methods

The carbon footprint calculation of my volleyball team's air travel was performed primarily to show my teammates and coaches how our actions can specifically be related to climate change. It also became a factual basis for my argument that it is essential that we, as individuals, make a personal commitment to reduce our carbon emissions.

As a team, we have often discussed the importance of accountability in shaping the success of our team on and off the court. I truly believe that this same concept of accountability can be utilized to promote the environmentalist movement: each person must learn to what extent their actions are harming the environment and hold themselves accountable in order to ensure the continuation of life on Earth as we know it.

I have outlined an effective way the volleyball team could begin to hold itself accountable for some of the carbon it emits. The carbon footprint calculation detailed below produces a monetary value necessary to offset the amount of carbon emitted. If the Athletic department could put forth the amount of money needed to offset the carbon emitted by the team's air travel once a semester and put it towards energy conservation or a renewable resource, the team could claim that they are taking the first step towards carbon neutrality and are holding themselves accountable.

The offset project would be visible to fans and the community so that the volleyball team could capitalize on good press, as well as to ensure that the money is utilized effectively to offset carbon emissions. Ideally, in order to accomplish this goal, a renewable energy resource would be installed on a campus building. I would recommend a solar

water heater installation on either Johnson Center or Tow Diem, where the volleyball team trains because the renewable, solar energy used to heat the shower water could effectively displace energy from fossil fuels, thereby decreasing the amount of carbon emitted.

Carbon Calculations

I calculated that amount of greenhouse gases released during the flights we took during the 2009 and 2010 season using the Sustainable Travel International website. I entered the airport code for the city of my departure and arrival, and the site calculated the number of miles traveled and the tons of carbon dioxide released. Carbon calculations are based on the assumption that the emissions per commercial air passenger mile vary slightly in accordance to distance traveled. Table 1 below differentiates between short, medium and long distances traveled. According to the Climate Neutral Network and the Bonneville Environmental Foundation, the full climate impact of aviation, including non-CO₂ greenhouse gases is two times greater than that of CO₂ alone. CO₂ is an abbreviation of ‘carbon dioxide equivalent’ and is the internationally recognized measure of greenhouse emissions (Climate Neutral Network 2009).

Table 1: Pounds of carbon dioxide equivalent generated during flights of varying length

Flight Length in miles	Pounds of CO₂/Mile	Pounds of CO₂/Mile/Passenger
Short haul (<281)	0.638	1.27
Medium haul (281-994)	0.447	0.894
Long haul (>994)	0.39	0.781

Furthermore carbon calculators suggest an amount of money that would be required to offset the carbon emissions.

The following table demonstrates the effect of one person's travels during the fall of 2009 and how much it would cost to offset the carbon emissions.

Table 2: Carbon calculation for one individual traveling with the volleyball team for fall 2009 travel

UNM Volleyball - Carbon Offset for fall 2009			
Data for 1 Passenger:			
Flight (Round trip)	Miles traveled	Tons of CO2 Released	Offset Price
ABQ-PDX	1108	0.693	17.6
ABQ-PHX	330	0.277	7.04
ABQ-DEN	334	0.282	7.17
ABQ-SLC	485	0.363	9.18
ABQ-COS	278	0.252	6.4
COS-SAN	625	0.533	13.51
ABQ-LAS	483	0.359	9.11
ABQ-DAL	560	0.408	10.34
ABQ-MSY	1029	0.646	16.38
TOTAL	5232	3.813	96.73

The following table outlines the total emissions and cost for the entire team for the fall season of 2009.

Table 3: Carbon calculation for total number of passengers traveling with the volleyball team for fall 2009

Data for Team: 18 passengers			
Flight (Round trip)	Miles traveled	Tons of CO2 Released	Offset Price
TEAM TOTAL	94176	68.634	1741.14

Because the team travels by plane every fall during our season, I think it is appropriate to calculate the carbon emitted every year to illustrate the compounding effect. A table outlining the emissions for the fall of 2010 follows.

Table 4: Carbon calculation for one individual on the volleyball team for fall 2010 travel

UNM Volleyball- Carbon Offset for fall 2010		
Data for 1 Passenger * Indicates round trip		
Flight	Tons of CO2 Released	Offset Price
ABQ-PHX	0.138	3.52
PHX-HNL	1.051	26.65
HNL-LAX	0.9237	23.42
LAX-ABQ	0.2295	5.82
ABQ-TPA*	1.1289	28.62
ABQ-SAN*	0.4333	10.98
ABQ-DAL*	0.4077	10.35
ABQ-DEN*	0.2828	7.17
ABQ-LAS	0.1797	4.56
LAS-DEN	0.2134	5.41
DEN-ABQ	0.1414	3.58
ABQ-SLC*	0.3623	9.18
TOTAL	5.4917	139.26

Table 5: Carbon calculation for total number of a passengers traveling with the volleyball team for fall 2010

Data for Team: 17 passengers		
Flight (Round trip)	Tons of CO2 Released	Offset Price
TEAM TOTAL	93.3589	2367.42

In summary, over the course of two seasons, the UNM volleyball team has emitted approximately 150 tons of carbon dioxide equivalent into the atmosphere. It would cost around \$4,000 to offset it.

Solar Water Heater Installation Assessment

In May of 2010, I obtained support from the head volleyball coach, Jeff Nelson and Athletic Director, Janice Ruggiero to investigate a cost effective offsetting project on campus. I met with Jeff Zumwalt of UNM's Physical Plant Department and Hans Barsun of UNM's Engineering Department to inquire as to how the university goes about funding and installing a renewable energy resource on campus. They put together rough estimates of how the installation of a solar water heater could potentially offset the volleyball teams carbon emissions. Hans Barsun has done preliminary research on the amount of hot water produced in Johnson center, the size of a solar water heater needed to produce this quantity of hot water, and how much money could be saved on energy costs by installing the renewable energy system. The basic facts are as follows:

The water meter on Johnson center shows that 13,000 gallons of hot water are utilized per day. We can loosely assume that half (6,500 gallons) is utilized for showering purposes. Approximately 200,000 British thermal units (Btu) are required to convert the

6,500 gallons of water from 65 degrees Fahrenheit (the average groundwater temperature) to 110 degrees Fahrenheit (desirable shower water temperature). Barsun confirmed that a system large enough to supply all the showers in the building, is expected to cost between \$60,000 and \$100,000. A minimal solar water heater system can be expected to cost between \$10,000 and \$15,000. Estimated savings for the minimal system are about 180 million Btu per year. This equates to about \$1200 of saving during the course of one year.

It is apparent that the sum needed to install a solar water heater system greatly surpasses the \$4,000 offset price of the volleyball team's air travel. I propose the volleyball team continues calculating their carbon emissions due to air travel every year and make a commitment to setting aside the offset price in order to create a revolving fund that would be invested in paying off a renewable energy installation. In the long run, a solar water heater would pay for itself in energy savings and eventually create more energy than was needed to make it. If there is enough of a financial incentive to go through with the installation, money can be pooled from the Engineering Department and/or the Physical Plant department.

Conclusion

My original expectation of this project was to witness the installation of a renewable energy source on UNM's campus during my undergraduate career. At this point in time, I have no guarantee that this will come into fruition but I am committed to furthering the project. I hope to meet with administrators of the athletic department including Janice Ruggiero, Tim Cass and Vice President of Athletics, Paul Krebs in the spring of 2011 to urge them to fund the installation on Johnson Center because the initiative will save energy costs in the long run, and will demonstrate proactive leadership in the struggle against climate change.

From this project I have learned that education and awareness building are essential when tackling climate change. Promoting awareness and pursuing actionable measures are the best ways to decrease carbon emissions. I think the Green Game and the Carbon Offset Assessment were two successful ways of promoting carbon-mitigating practices at the University of New Mexico.

Literature Cited

- "Air Travel." Carbon Offsets. Sustainable Travel International. Web. 22 July 2010.
<<https://sustainabletravelinternational.org/documents/opcarboncalcs.html>>.
- Bacastow, It and CD. Keelilng. 1974. Atmospheric carbon dioxide and radiocarbon in the natural carbon cycle: II. Changes from AD. 1700 to 2070 as deduced from a geochemical model. In gM. Woodwell and LV. Pecan. Eds. Carbon and the Biosphere. BHNL/CONF 720510. Springfield, Va. National Technical Information Service
- "Carbon Calculator." Make A Difference. Conservation Internai:ional, 2010. Web. 21 July 2010.
<<http://www.conservaltion.org/act/live..green/carboncalc/Pages/deault.aspx>>.
- ETA - Emissions of Greenhouse Gases in the U.S. 2008-Carbon Dioxide Emissions.' Independent Statistics and Analysis. US. Energy Information Administration, Dec. 2009. Web. 20 July 2010.<<http://www.ei.a.d oe.gov/oiaf/1605/ggrpt/carbonhtml#transportation>>.
- "Footprint Calculator." Ecological Footprint - Ecological Sustainability. Global Footprint Network, 31 Oct 2009. Web. 22 July 2010. <<http://www.footprintnetwork.org/enfindexphp/GFN/page/calculators/>>.
- "Fresh, Fair, Local." *La Montanita Co-op*. Web. 12 Dec. 2010. <<http://www.lamontanita.coop/>>.
- Gore, Albert. An Inconvenient Truth: the planetary emergency of global warming and what we can do about It. New York: Rodale, 2006. Print.
- International Air Transport Association (IATA), Fact Sheet: World Industry Statistics, www.iata.org.
- "Light Bulbs (CFLs).'Buy Products That Make A Difference.' ENERGY STAR. Web. 29 July 2010.
<http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProciuctGroup&pgw_code=LI3>.
- "Methodology." Conservation International. Conservation International. Web. 22 July 2010.<<http://www.conservation.org/act/live..green/carboncalc/pages/methodology.aspx>>.
- "Personal Energy Meter Methodology." The Great Energy Challenge. National Geographic, 2010. Web. 29 July 2010. <<http://environmentnationalgeographic.com/enviroilment/energy/greatenergy-challenge/metho dol ogy/>>
- "University of Michigan to Host First Zero Waste Event at Crisler Arena." *University of Michigan Official Athletic Site*. 1 Dec. 2010. Web. 12 Dec. 2010. <<http://www.mgoblue.com/sports/m-baskbl/spec-rel/120110aae.html>>.
- Wilson, Judy. "2009 Lobo Volleyball Recap.' Go Lobos. IJNM Athletics, 28 Dec. 2009. Web. 20 July 2010.<http://grfr.cstv.com/photos/schools/nm/sports/wvolley/auto_pdf/2009flnalvbnotes.pdf>.

Appendix A: Photo Gallery



Figure 1: Carbon Calculation Station

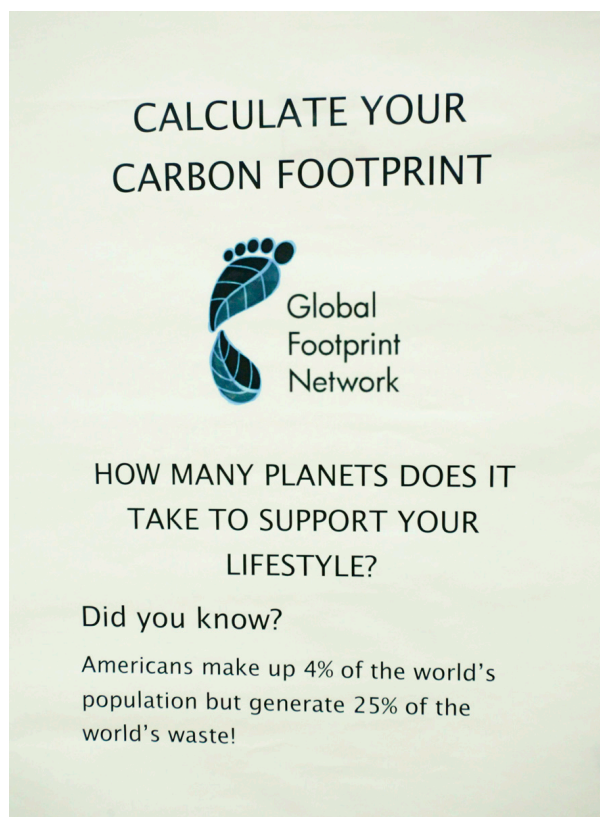


Figure 2: Banner located at the Carbon Calculator Station

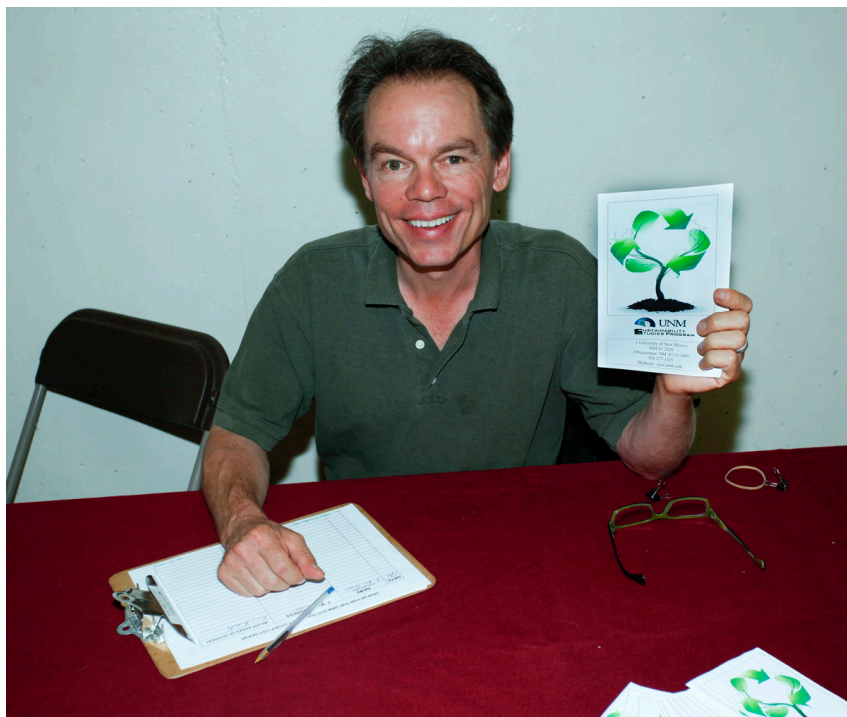


Figure 3: Sustainability Studies Program Booth



Figure 4: Office of Sustainability Booth



Figure 7: La Montanita Co-op Flier



Figure 8: Pledge to Switch Station – Jessica Rowland displaying the CFLs distributed during the game

Project Switch

SAVE ENERGY BY SWITCHING YOUR INEFFICIENT
INCANDESCENT LIGHT BULBS TO
COMPACT FLUORESCENT BULBS!



A Compact Fluorescent Light bulb (CFL):

- uses about **75% less energy** than standard incandescent bulbs and lasts up to **10 times longer**
- saves more than **\$40 in electricity costs** over its lifetime
- produces about **75% less heat**, so it's safer to operate and can cut energy costs associated with home cooling

Did You Know?

If every American home replaced just **ONE** light with a CFL, we would save enough energy to light **3 million homes** for a year, save about **\$600 million** in annual energy costs, and prevent **9 billion pounds** of greenhouse gas emissions per year, equivalent to those from about **800,000 cars**.

Source: energystar.gov

Figure 9: Banner located at CFL station



I, Jody Calabaza, PLEDGE TO MAKE THE SWITCH
FROM INCANDESCENT LIGHT BULBS TO **COMPACT FLUORESCENT**
LIGHT BULBS (CFL) BECAUSE IT WILL HELP ME SAVE MONEY ON
ELECTRICITY BILLS, USE LESS ENERGY, REDUCE MY CARBON
FOOTPRINT AND HELP STOP GLOBAL WARMING!

SIGNATURE:

Jody L. Calabaza DATE: 09/14/2010



Figure 10: Pledge to Switch sample form

Appendix B

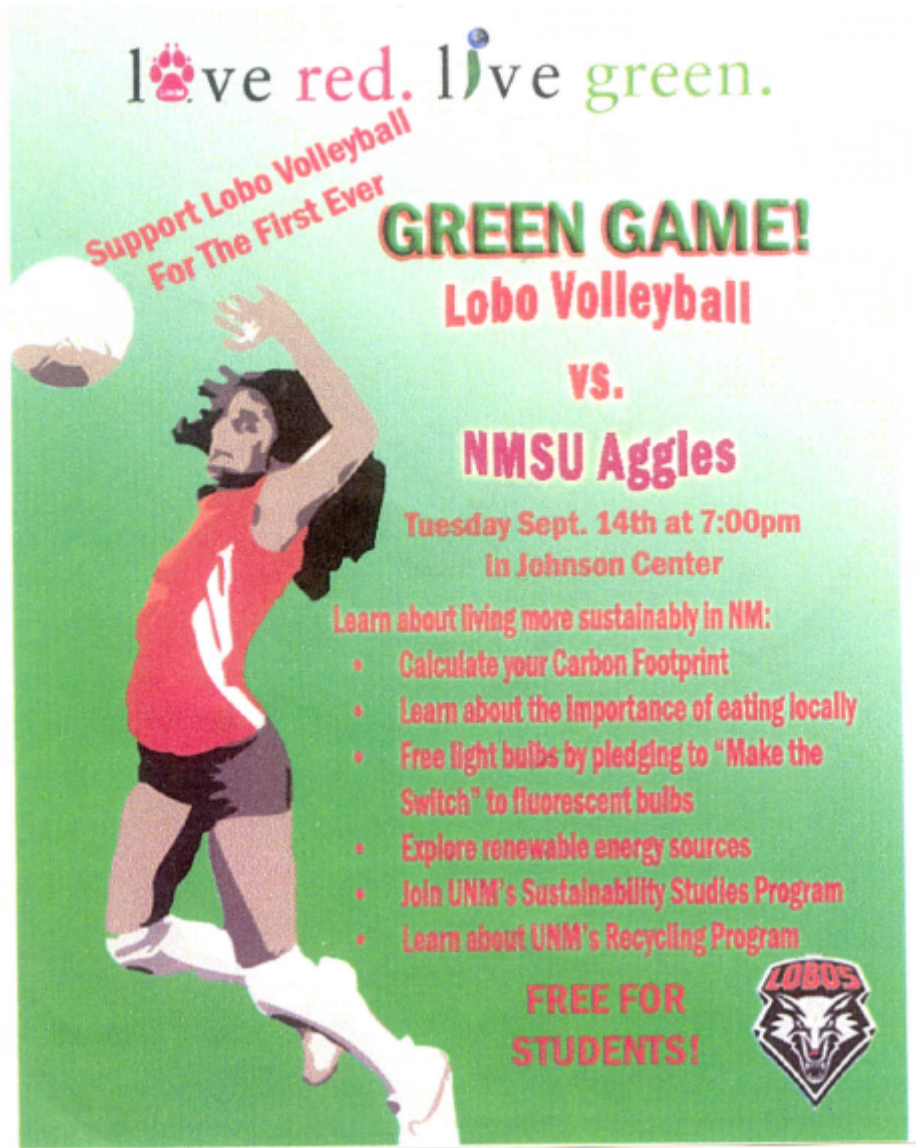


Figure 11: Promotional flier created by James Deans

Lobos To Battle Aggies Tonight

from **PAGE D1**

set to even the match, UNM came out listless in the fifth and quickly found itself in an inescapable 9-3 hole.

"That was our big problem all day," senior Jade Michaelson said, "we'd put a good run of points together then just lose it. We can't keep having letdowns like that."

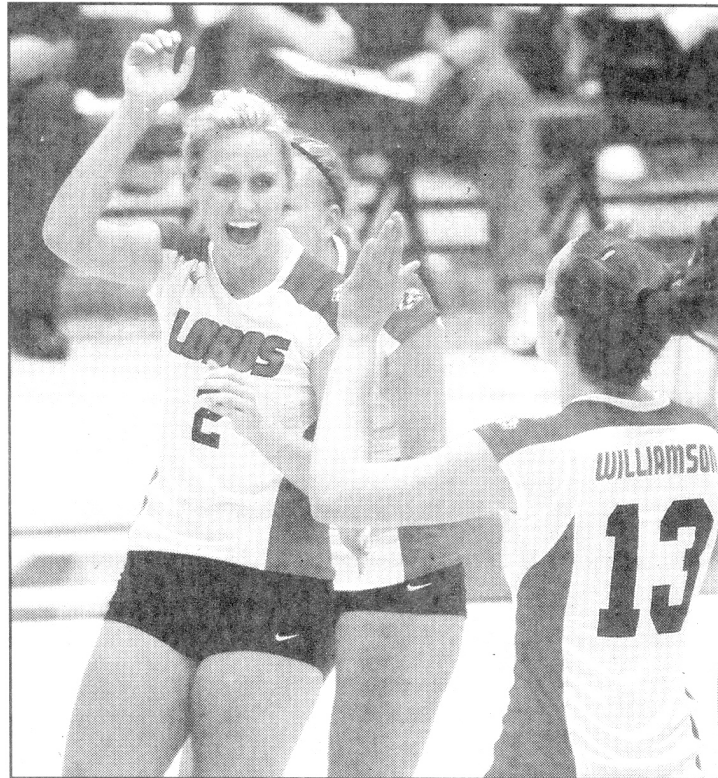
UNM will certainly need a more consistent effort against the Aggies (6-3). Led by senior outside hitter Kayleigh Giddens and junior setter Jenna DeVries, NMSU has played more consistently than its upstate rival. The Aggies also have faced a strong schedule and are coming off a five-set road loss to No. 19 LSU.

The Lobos will try to channel some positive vibes from last season's match against NMSU — a three-set sweep in Las Cruces that snapped an 10-match losing streak in the series.

"We played a very good match against them," Michaelson said. "We'll watch the tape, get to work and, hopefully, get back on track."

GOING GREEN: "Love Red, Live Green" is the theme of tonight's match, with fans receiving free energy efficient light bulbs. Information will also be available demonstrating how to calculate individual carbon footprints.

Lobo junior Kelly Williamson, a conservation biology major, is helping coordinate the event, which is designed



MORGAN PETROSKI/JOURNAL

Lobos Lisa Meeter, left, and Kelly Williamson will take on New Mexico State tonight in Johnson Center.

to promote energy conservation awareness. Williamson's project includes installing a solar water-heating system at Johnson Center within the next year to offset the carbon emissions generated by Lobo road trips.

CLIMBING THE LADDERS: Michaelson moved into second place on UNM's career assists list over the weekend. She now has 3,405 and trails

only Janelle Torres (3,794), who played from 1996-99.

Senior Lisa Meeter registered her 900th career kill recently and is closing in on exclusive statistical club. With 900 kills and 902 digs, she's within range of 1,000 in each category. Tania Gooley, Maria Gurreri and Nao Ikeda are the only previous Lobos to register 1,000 in both kills and digs during their careers.

Figure 12: Albuquerque Journal Article (pre-game)

COLLEGE VOLLEYBALL

Lobo Rally Stymies Aggies

Williamson's Big Night Paces Win

By **KEN SICKENDER**
Journal Staff Writer

On a night dedicated to energy conservation, the UNM volleyball team saved its best for last.

Led by Kelly Williamson's career-high 20 kills, the Lobos came from behind to edge New Mexico State in a five-set thriller at Johnson Center. It was New Mexico's second straight win in the Rio Grande Rivalry and first at home since 2002.

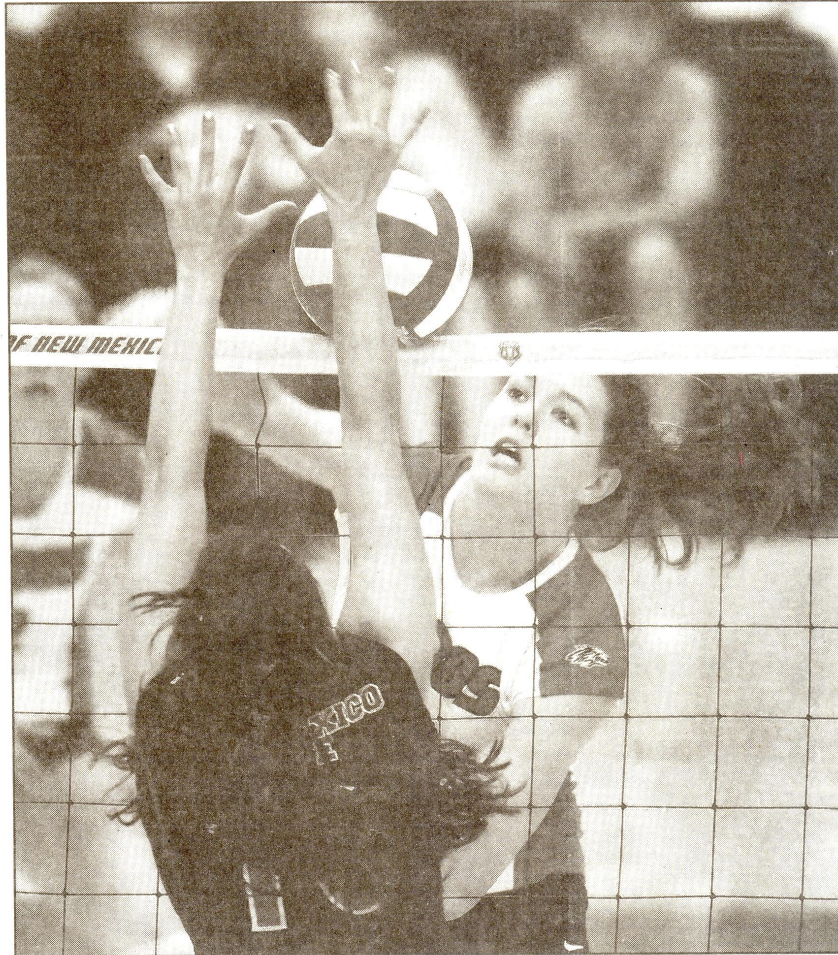
The Aggies (6-4) effectively shut down UNM (5-5) in the first and third sets and seemed on the brink of defeating the Lobos for the 11th time in 12 tries. But spurred on by a raucous crowd of 2,252, the home team earned the victory 20-25, 25-16, 21-25, 25-17 and 15-7.

"It was so important for us to get this done, especially in five sets," said Williamson, who helped organize the "Love Red, Live Green" promotion that included distributing energy-efficient light bulbs to fans. "New Mexico State has a great program and they fight hard, but we needed this one."

UNM was coming off a deflating five-set loss to Cal Santa Barbara in Saturday's final match of the Lobo Classic. Coach Jeff Nelson's team got off to a dismal start in the final set of that contest. Tuesday's final set was different.

"Everyone was sick about what happened Saturday," Nelson said. "We spent a lot of time talking about when we're most confident and how to get back to that place. I think that may have helped us tonight. We looked like a different team in the last two sets."

Coach Mike Jordan's Aggies were the aggressors early, dominating the net behind Kayleigh Giddens, Whitney Woods and Kelsey Brennan. The trio helped NMSU earn a 13-4 advantage in blocks and limited the Lobos to a .053 hitting percentage in the first set. Two late kills by Woods helped the Aggies clinch the set.



DEAN HANSON/JOURNAL

UNM's Kelly Williamson, right, hits a shot over New Mexico State's Jennah DeVries during the Lobos' five-set win at Johnson Center. Williamson finished with a career-high 20 kills.

UNM got things rolling in set two, scoring eight straight points on a Lisa Meeter service run to grab a 14-8 lead and never look back. Williamson had 10 kills in the sets, while Allison Buck came up with eight of her 15 digs.

The Aggies finished stronger in set three, however, getting three kills by Giddens during a closing 8-2 surge. Giddens, a cousin of former UNM basketball star J.R. Giddens, had 13 kills in the first three sets, but only two more afterward.

"In game four we finally started digging Giddens and

Friday

UNM at South Florida, 5 p.m.;
NMSU vs. Pepperdine, 11:30
a.m. (Arizona Invite)

forcing her into some errors," Nelson said. "That really got us back in the match."

UNM's service game also improved, with Buck, Taylor Hadfield and Mariah Agre putting effective runs together.

"Our serve receive went south in the last two sets," Jordan said. "Give UNM credit, they served well and passed so

much better than we did when it counted."

Hadfield racked up six of her 19 kills in the fourth set, getting four straight as the Lobos built a cozy 19-9 lead and forced a decisive fifth. She then reeled off six straight service points to help UNM take a 7-3 lead in the clinching set.

Meeter finished with 14 kills, Ashley Rhoades added 10, while Michaelsen had 50 assists and 13 digs for the Lobos. Woods ended up with 13 kills, Brennan had 12 and Jennah DeVries finished with 46 assists for NMSU.

Figure 13: Albuquerque Journal article (post game)