

NEW MEXICO STATE UNIVERSITY

Climate Action Plan



GRANTS CAMPUS

September 1, 2009

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Executive Summary

During April of 2007 President Michael V. Martin committed to neutralizing all the university's global warming emissions, and accelerating research and educational efforts that will help stabilize the earth's climate. By signing the American College & University Presidents Climate Commitment, the president joined over 200 other institutions across the United States that are dedicated to minimizing and even reversing global warming.

Along with the signing came the pledge that the university would complete a university wide greenhouse gas (GHG) emissions inventory within twelve months and create a Climate Neutrality Plan within two years.

Some of the actions taken to date have been:

- The establishment of the Energy Task Force as the Sustainability and Climate Change Task Force of which the Grants campus is a member.
- A commitment to meet U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver standard in all new construction and major renovation projects.
- Completion of a comprehensive greenhouse gas emissions inventory by each campus and posting on the American College & University Presidents Climate Commitment web site.

Although the Grants campus is a very small campus set in a small town rural environment, it is committed to making the smallest possible footprint on our surroundings. We have identified many areas of energy waste and taken positive action to reduce this use. We continue to look for opportunities to minimize greenhouse gas emissions and reduce energy use. Our goal is to reduce our emission to net zero by 2028, twenty years after committing to the reversal of global warming.

Emissions Inventory

The majority of emissions from the Grants campus come from the energy used to heat, cool, and light its eight buildings and security lighting. (See Table 1 for details.) Natural gas is used as the primary method to heat all campus buildings and the water throughout campus. Martinez Hall, the largest building on campus, was originally designed over forty years ago to use solar water heat as the primary means of keeping the building warm and providing heated tap water. As little as three years ago the solar system was partially functional, but has degraded to the point that it is no longer serviceable and the university has had to rely on low pressure natural gas fired boilers for heating. Electricity is used for many purposes in the campus buildings and is the second greatest contributor to greenhouse gases on campus since fossil fuels are used to generate the power for the electricity grid.

Unlike many universities and colleges, the Grants campus is located in a rural area on the high plateau of northwest New Mexico. This location poses a unique problem for the faculty and staff working in Grants. Many meetings, conferences, and seminars take place in cities far removed from the area. Employees frequently travel to Albuquerque, Santa Fe, Las Cruces and Phoenix to attend university business functions. Additionally, visits to feeder high schools for recruiting go to the far reaches of Cibola County. Students, staff and faculty commuting to and from work also contributes greatly to the GHG inventory due to the long distances traveled. Some students may drive 60 to 70 miles to attend classes. The travel associated with university business is the third largest contributor to greenhouse gases by the campus.

Table 1. Grants campus Greenhouse Gas Emissions FY 07-08

	GHG Emissions CO2 Equiv (tons)	Percent of Total
Buildings		
<i>Electricity</i>	626.7	25.52%
<i>Natural Gas</i>	1,607.4	65.46%
Total Buildings	2,234.1	90.98%
Transportation	201.7	8.21%
Landfill	19.5	0.80%
Agriculture	<u>0.3</u>	<u>0.01%</u>
Total	2,455.6	100.00%

The Grants campus works diligently to reduce the waste stream through recycling efforts. All cardboard and office paper is collected and donated to the local paper company for recycling. Aluminum cans are collected, sorted and sold, providing funds for bird seed and animal food for our earth garden. Plastic bottles are also segregated and taken to Albuquerque for recycling by faculty and staff who are dedicated to a green earth. As a result of the recycling efforts, less than fifteen tons of waste goes to the landfill annually.

Since the Grants campus is in a very arid region, agriculture in the typical sense is not practical. The very small portion of greenhouse gases contributed by the facilities agriculture is the result of fertilizing grass, trees and shrubs. Unless total xeriscaping is adopted, little can be done to reduce the gases contributed as a result of beautifying the campus.

Facilities Background

The Grants campus came under the New Mexico State University umbrella in 1968. Two permanent buildings, McClure Hall and Fidel Hall, were on the site at that time and are still in use today. Martinez Hall was constructed during 1977-78 and a child day care center, comprised of three temporary modular structures, was put in place during 1995. The latest additions were two small security houses and a garage that were built in 1997 and 1998. (See Table 2 for building details.)

Table 2. Grants campus Buildings

Buildings	Built	Square Feet	Decatherms 2008	Btu/SqFt	Kwatt 2008	KWatt/SqFt
Martinez Hall	1977	78,076	*7,794		968,320	12.4022747
Fidel Hall	1965	16,109			6,540	0.40598423
House 1	1997	1,187	1,199		2,981	2.51137321
House 2	1997	1,187	282		1,120	0.94355518
McClure Hall	1965	14,153			30,440	2.15078075
Day Care Center	1995	2,793	**18,304		28,740	10.2900107
Garage	1998	3,359			8,200	2.44120274
SBDC		2,734	1,792		4,417	1.61558157
Security Lights					36,380	
		119,598	29,371		1,087,138	

* Martinez and Fidel Hall are on the same meter.

** McClure Hall, Day Care and Garage are on the same meter.

Martinez Hall is by far the largest of the buildings on campus and would therefore be presumed to be the biggest user of energy. This is true in the case of electricity since 90% of the lighting is still of the T-12 fluorescent and metal halide type bulbs. Natural gas usage in the building cannot be exactly determined since the meter is shared with Fidel Hall. Presumptions can be made however, that since these two large building comprise over half the square footage of the campus buildings, but use only one-fourth of the natural gas, that they are pretty efficient. Additionally, two high efficiency low pressure heating boilers were installed in Martinez Hall during the fall of 2007 and six new heaters replaced eight original heaters in Fidel Hall in 2008. These new heating units alone have realized a decrease from 13,998 Decatherms of natural gas usage in FY-06/07 to 7,794 Decatherms in FY-07/08. These numbers are somewhat skewed since the heaters in Fidel Hall were not used in January, February and March of 08 while renovations were underway.

The roof of Martinez Hall is composed of five different levels made up of TPO membrane roofing material and asphalt. The TPO coating is starting to come off and the reflective sand is nearly gone on the asphalt surface.

McClure Hall was completely renovated during the spring of 2008. Gas, electricity and water were turned off at this time, although the contractor tapped into the garage for temporary power while working on the building. All lighting was removed and replaced with energy efficient T-8

and compact fluorescent lighting. Old plumbing fixtures were also replaced with energy wise units. A state-of-the-art low pressure boiler, water cooling system, and heat pumps replaced the original natural gas heater and swamp cooler. The entire roof was also replaced using four inches of insulation and a TPO membrane roofing material. The renovation project did not call for replacement of the exterior metal siding; therefore the insulating quality of the building is unchanged. Insulation is either missing in many portions of the outside walls or of poor quality. This undoubtedly increases the energy bill.

Fidel Hall also had a major remodel during 2008. An elevator and mirror image tower were added to the front (east side) of the building, the foyer area was redesigned, storage areas in the north part of the gym floor were enlarged, and the electrical system was upgraded. Since the building is the same vintage as McClure Hall, the exterior is finished with insulation and metal siding. Unlike McClure Hall, the siding and insulation appear to be in much better condition. If energy losses occur, they are minimal. Other than the foyer area, lighting in the building is T-12 and metal halide type bulbs. The gym floor and the second level classroom take advantage of natural lighting via sky lights. Overhead lighting is only used at night and during cloudy weather. The roof of the building is a TPO membrane built on a deck of at least three inches of insulation. As mentioned earlier, six new natural gas heaters were install in the building in 2008. Cooling of the gym floor is accomplished through cross ventilation, while a swamp cooler provides cooling in the foyer area.

Small Wonders Day Care Center is comprised of three modular units set on concrete pillars. The building is heated with a combination of electric heat and natural gas heaters. Natural gas is also used for the professional grade range and one 30 gallon water heater. The remaining 10 gallon water heater is powered with electricity. Insulation in the northern most two units appears to be degraded. Lighting is exclusively T-12 type fixtures and incandescent bulbs.

The Garage is wood frame construction on a concrete slab. The front and sides are finished in stucco while the back and roof are of OSB and metal siding. The inside of the structure is bare six inch studs with no insulation. Heating is accomplished with five suspended natural gas heaters. All lighting is T-8 fixtures. The maintenance department is in the process of insulating the walls with four inch deck insulation recovered during the remodel of McClure Hall. The interior wall and ceiling will be covered with OSB and painted white.

House #1 was constructed in 1997. It is well insulated and lighted with compact fluorescent bulbs. The energy use was low for FY-07/08 because the building was vacant. Just enough energy was used to keep the building from freezing. It is heated with a natural gas heater and cooled by evaporative cooling.

House #2 was constructed in 1997. It is also well insulated and lighted with compact fluorescent bulbs. It is heated with a natural gas heater and cooled by evaporative cooling. Little can be done to increase the efficiency of these two houses other than installing a solar heating system.

The Small Business Development Center building was acquired in 2006 and completely remodeled in 2008. It is heated with two high efficiency natural gas heaters and cooled with two Freon driven air conditioners. The building seems to be well insulated and thermally sound. The only shortcoming on this building is the roof which is asphalt material and pea gravel. It is the original roof installed when the building was constructed. It is degraded and needs replacement within five years. Natural lighting is accomplished with four skylights in the center of the building and large thermal windows at each of the compass points.

Exterior Security Lights are metal halide bulb fixtures with wattages ranging from 175 to 250 watts or more. All fixtures in parking areas are owned by the university while those along the perimeter of University Drive are owned and maintained by Continental Divide Electric Cooperative. The university pays for the power to light the roads and parking lots.

The Motor Pool Fleet consists of ten cars and trucks ranging in production years 1988 to 2006. The vehicles produced before 2000 are “gas hogs” past their prime and are in need of replacement. These trucks and vans are scheduled for replacement in the near future and will be replaced with energy wise models. Although not energy efficient, the newer cars produced after 2000 are well maintained and serviceable. As these vehicles reach the end of their service life, they will be replaced with hybrid cars or fuel efficient models. (See Table 3 for vehicle details.)

Table 3. Grants campus Motor Pool

Make	Model	Year
Ford	F250	1988
Chevrolet	1500	1992
Dodge	Van	1994
Chevrolet	Blazer	1996
Dodge	Van	1996
Chevrolet	Malibu	2002
Chevrolet	Malibu	2002
Chevrolet	Malibu	2002
Chevrolet	Impala	2006
Ford	Freestar	2006

Grants Campus Emission Reduction Measures

Possibilities for reduction of emissions include direct reduction of the facilities and transportation GHG emissions, carbon sequestration, and purchasing emissions offsets that represent reduction at some other location. Direct reduction would be the most meaningful at the Grants campus since the majority of greenhouse gases are contributed by the buildings, and modes of transportation used to commute to and from work and to events relating to university business. Additionally, reductions in these two areas will benefit the campus through energy cost savings, education benefits and lifestyle changes.

Carbon sequestration at this site is not easily feasible since the campus is located in an arid climate on a relatively small plot of land of which half is comprised of clay and rock on mountainous terrain. Irrigation of any agricultural growth beyond a small scale is not practical.

Purchasing emissions offsets in the form of Renewable Energy Credits may be a practical partial solution for the campus for two reasons. During new construction or major renovation projects when seeking LEED certification, the purchase of carbon offsets can earn the institution one or two points toward certification, depending on how many credits are purchased. Additionally, purchasing 130 MWh of credit will offset the entire 626.7 metric tons of green house gas generated by electricity used by the campus during an academic year.

Emission Reduction Measures Timeline

The Grants Campus has been working toward climate neutrality since President Martin signed the American College & University Presidents Climate Commitment. Leaders recognized the importance of energy efficiency and climate neutrality, and started working toward that goal immediately. The leadership also realizes that emission reduction cannot happen overnight, but must be implemented in a planned, systematic effort that will become part of the culture. The campus will implement this plan through a phased approach, believing it will take twenty years to come to complete fruition. This plan is broken down into five year increments as detailed below.

Much of this plan depends on availability of capital outlay funds to finance the ventures. Without money, little can be done to reach the goal of climate neutrality.

Emission Reduction Implementation

As stated earlier, the Grants campus has unofficially started implementation of the climate neutrality plan. As equipment fails, it is being replaced with the most energy efficient models possible within the constraints of fiscal boundaries. Two new high-efficiency low-pressure boilers installed in Martinez hall serve as a prime example. This purchase alone has cut the natural gas usage for the building by half. Other planned and completed actions are listed below in five year increments.

Zero to Five Years

Facilities

- Replace old inefficient boilers in Martinez Hall. (Completed - 2007)
- Replace old heaters in Fidel Hall. (Completed - 2008)
- Replace exterior wall-mount halogen security lights with Light Emitting Diode (LED) fixtures. (In planning)

- Replace “high-bay” lighting in Martinez Hall automotive and welding with T-5 lighting. (Completed - 2008)
- Replace T-12 fluorescent and metal halide lights in Martinez Hall with T-8 fixtures and compact fluorescent lighting. (In planning)
- Replace T-12 fluorescent and metal halide lights in Fidel Hall with T-8 fixtures and LED lighting. (In planning)
- Repair existing solar heating system to include the conversion of all tap hot water to solar. (In planning)
- Install insulation and OSB sheeting in the maintenance garage. (In work)
- Replace electric motors (at failure) with high efficiency motors. (In work)
- Repair damaged exterior walls and re-stucco Martinez Hall. (In planning)
- Install insulation and stucco exterior walls of Fidel and McClure Hall (In Planning)
- Replace old windows in Martinez Hall library with energy efficient glazing. (In planning)
- Expand the use of Interactive Television (ITV) and Teleconferencing to minimize business travel. (Complete, but still evolving. Two ITV studios on campus that are Kinko’s certified to hold ITV sessions and interactive distance meetings.)
- Xeriscape SBDC to minimize water usage and maintenance. (In work)
- Continue to build on the current recycling program. (In process)

Motor Pool

- Replace two older vehicles with hybrid models.
- Replace one maintenance truck with two two-cycle engine or rechargeable grounds vehicles such as Cushman, John Deere, or Mule.
- Assist with development of bus route in the City of Grants with a stop at the university. (Completed - 2009)

Curriculum & Technology

- Introduce sustainability across the curriculum to the faculty. (In planning)
- Develop partnerships with other branches and universities to start teaching sustainability.
- Develop “renewable energy” training in the electronics module. (Implemented and modifying)
- Continue to develop on-line courses to minimize commuting to/from the campus. (Complete, but continuing to develop)
- Recycle computer monitors and stripped computers. (Complete and evolving)

Six to Ten Years

Facilities

- Work with Continental Divide Electric Coop to replace street lighting along University Blvd. with Photovoltaic LED lighting.
- Replace parking lot metal halide lighting with Photovoltaic LED lighting.
- Start the design process for a new LEED certified instructional building that will also house the day care and facilities department.

- Replace old windows in Martinez Hall student lounge and trades with energy efficient glazing.
- Replace reflective coating on all roof sections of Martinez Hall.
- Replace urinals throughout campus with no water or low water models.
- Replace all toilets throughout campus with low water models.
- Replace the SBDC roof.

Motor Pool

- Replace three older vehicles with hybrid models.
- Purchase new efficient pickup truck to replace a twenty old maintenance vehicle.

Curriculum & Technology

- Develop a curriculum for renewable energy and sustainability.
- Fully integrate sustainability into the curriculum.
- Continue to expand the use of Interactive Television and Teleconferencing to minimize business travel.

Eleven to Fifteen Years

Facilities

- Build a new instructional building.
- Install photovoltaic parking structures.
- Replace asphalt style roof on Martinez Hall with energy efficient TPO material.
- Install photovoltaic electric system on all buildings.
- Build wind turbine farm (with cooperation of local energy companies.)

Motor Pool

- With the cooperative assistance of the City of Grants, expand the city bus route to outlying area.
- Replace three older vehicles with hybrid models or newer technology.

Curriculum & Technology

- Continue to purchase and capitalize on new energy efficient technology eventually achieving the ultimate virtual campus.

Sixteen to Twenty Years

Facilities

- Work closely with architects to design buildings of zero environmental impact.
- Replace older buildings with new LEED certified (or equivalent) structures.
- Design and build rainwater runoff catch system to augment or replace plant and lawn irrigation.

Motor Pool

- Continue to replace all vehicles on a revolving basis, never allowing them to get more than ten years old.

Curriculum & Technology

- Continue to purchase and capitalize on new energy efficient technology eventually achieving the ultimate virtual campus.

Conclusion

Over the next twenty years, most of our campus buildings will have undergone major renovation or be completely new, and almost all equipment will be replaced or refurbished. Each new purchase or advancement gives us the opportunity to improve the efficiency of energy-using equipment in these facilities, including the buildings themselves and the vehicles we drive. The most economical time to bring equipment up to new standards is when remodeling, during new construction or when replacing old machinery and equipment upon failure with the most efficient models available.

The expectation of the campus leadership is to serve as the roll model to the surrounding community in energy efficiency and climate neutrality. The goal of climate neutrality is difficult to achieve, but can be accomplished with dedication, hard work and education.