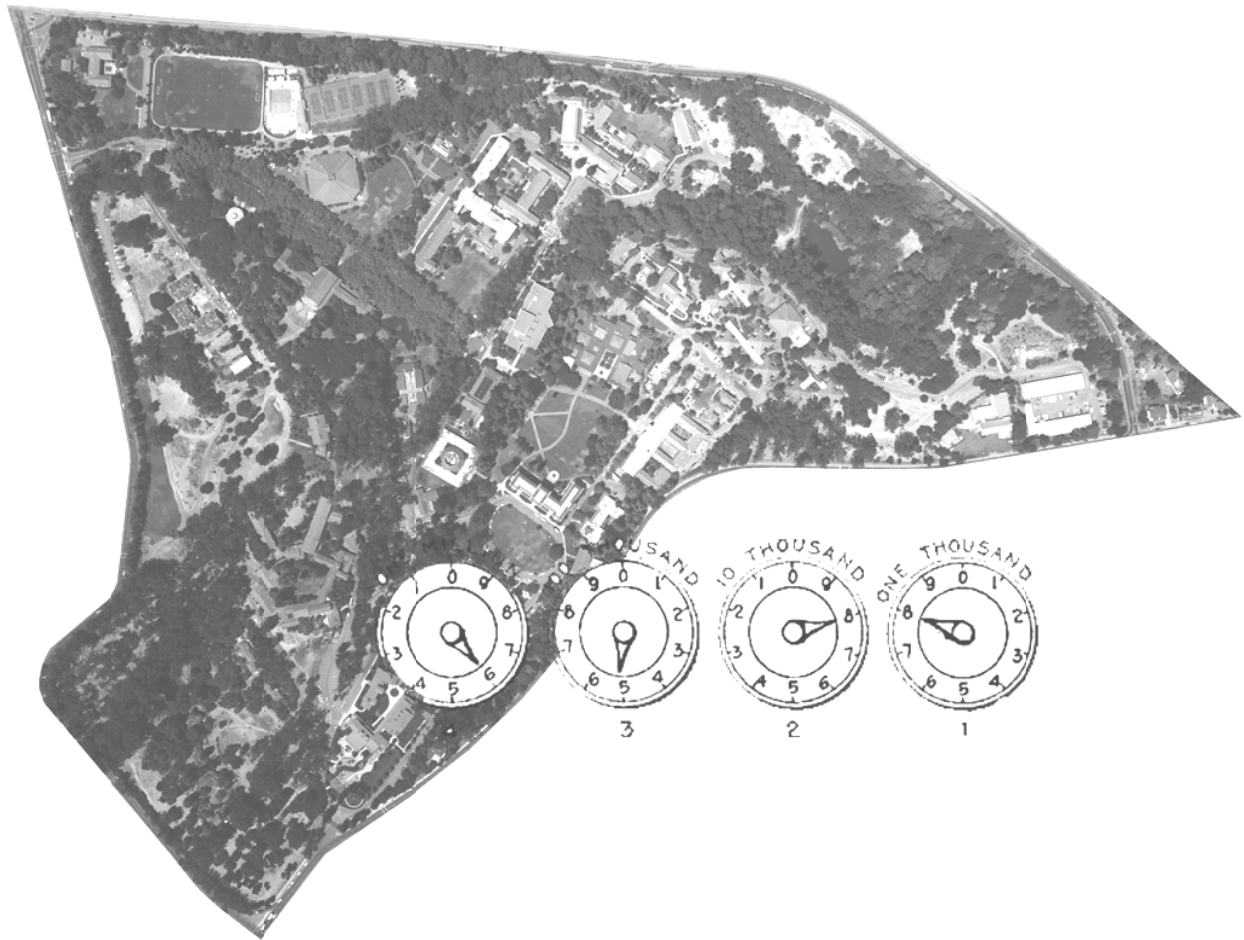


# Mills College Climate Action Plan 2010

American College and University President's Climate Commitment



Prepared by  
The Mills College Sustainability Committee  
January, 2010

## Table of Contents

<b>The Climate Action Plan (CAP) and Mills College.....</b>	<b>(3)</b>
<b>Greenhouse Gas (GHG) Emissions Inventory.....</b>	<b>(4)</b>
<b>Mills Energy Trends.....</b>	<b>(5-7)</b>
<b>Reduction Target.....</b>	<b>(7)</b>
<b>Potential Projects List.....</b>	<b>(8-11)</b>
<b>Tracking Progress.....</b>	<b>(12)</b>
<b>Curriculum and Educational Outreach.....</b>	<b>(12-13)</b>
<b>Acknowledgements.....</b>	<b>(13)</b>

## The Climate Action Plan and Mills

In 2007, the Mills College Sustainability Committee was created to synthesize the various environmental programs and efforts across campus. This included the completion of one of the first LEED Platinum rated buildings in the Bay Area. The Betty Irene Moore Natural Sciences Building project was part of a significant capital construction campaign which spawned institutional support for green building practices. After formulating the committee's mission and initiatives, Mills signed the American College and University President's Climate Commitment (ACUPCC), finding efforts well aligned with the commitment's goals.

The committee is comprised of students, faculty, staff, and alumnae, including the key positions of Campus Architect, Director of Facilities, and a former member of the Board of Trustees. The committee reports to the Vice President for Operations who presents accomplishments and challenges to senior administration and the Board. The committee operates under the guiding mission statement:

"The Mills College Sustainability Committee exists to support the Mills College mission of education with a focus on promoting environmentally sustainable practices on campus, providing policy leadership and facilitating community partnerships. It seeks to encourage environmental inquiry, research and responsibility and to develop planning tools and specific strategies for a long-term vision of a sustainable Mills."

In 2008, Hannah Peragine, a committee member and senior at Mills, completed the first Greenhouse Gas Inventory as her senior thesis. The inventory was updated with historical data and clarifications, including fiscal year 2009. A summary of the GHG inventory results and its implications for setting a GHG emissions target is included in this plan.

In preparation for this Climate Action Plan, the Sustainability Committee prepared an extensive list of potential projects with associated cost estimates. Projects vary widely in scope, length and cost, and a combination of several will be required to meet the target. Consequently, project review and approval will occur throughout the coming years.

Mills, a small college nimble in facilities management, is strategically situated to make infrastructural improvements in energy consumption on campus. The maturing of the Sustainability Committee and acceleration in student involvement has Mills positioned to encourage complimentary behavioral changes as well. Work on several fronts has already begun.

This Climate Action Plan sets out to:

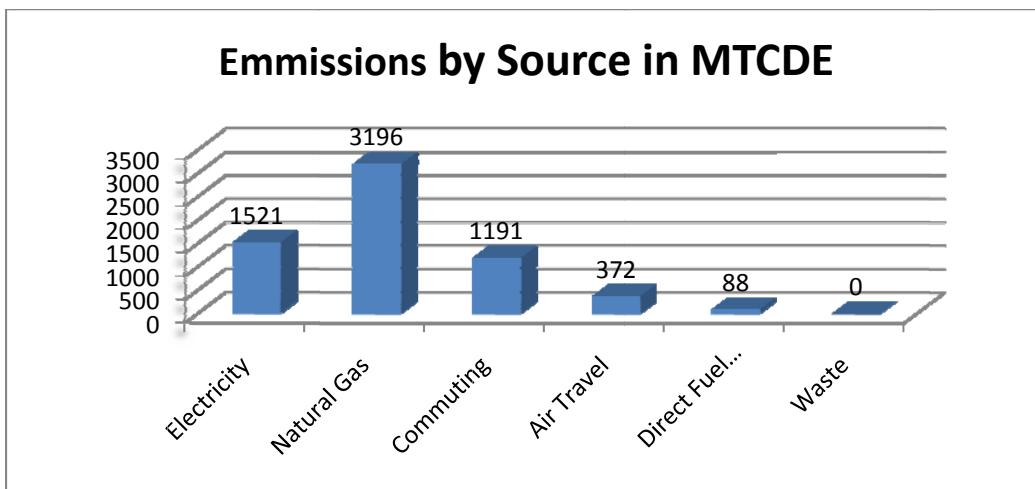
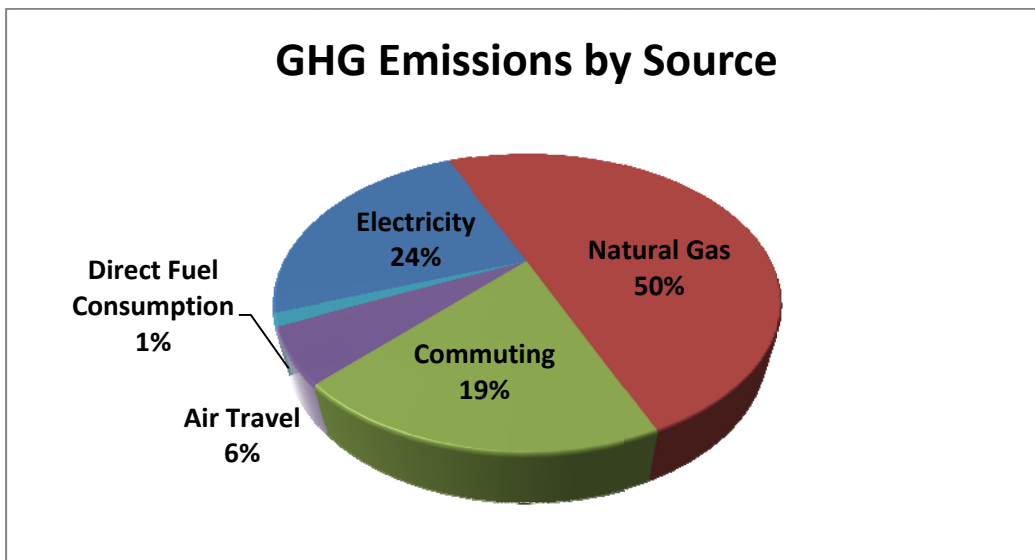
1. Explain current trends in energy consumption and other factors contributing to GHG emissions
2. Establish a feasible near term goal for GHG emission reductions
3. Identify and detail projects capable of reaching the goal
4. Determine how to track progress and establish future goals

This CAP is Mills' first and sets a reduction target based on GHG emission levels established in the 2008 baseline inventory. **Mills proposes to reduce GHG emissions by 15% over the next 5 years.**

## Mills College Greenhouse Gas Emissions Inventory - 2008

The inventory was conducted in 2008 and revised in late 2009. A complete report is available on the ACUPCC website: <http://acupcc.aashe.org/>.

Data collected for past years were incomplete, so the inventory was used to establish base year emissions for fiscal year 2008: July 1, 2007 – June 30, 2008. The inventory accounts for sources of emissions, their quantities, and their contribution to anthropogenic GHGs as equivalent to the warming potential of Carbon Dioxide (CO<sub>2</sub>). GHG totals are presented in metric tons of carbon dioxide equivalent (MTCDE). **In the fiscal year 2008, Mills College GHG emissions totaled 6,360 MTCDE.** Of this, 50.2% was from natural gas use, 23.9% was from electricity use, 18.6% from commuting by faculty, staff and students, 5.8% from air travel funded by the College, and 1.4% from direct fuel consumption. High waste stream diversion resulted in a negative value for emissions from waste and is excluded from the total; though it is still included in the report.



## Mills Energy Trends

Nearly all of Mills' GHG emissions come from the use of natural gas, electricity, and fuel by commuters. Natural gas and electricity consumption combine for nearly 75% of the total, with gas making up 50% alone. Before setting a reduction target, it is useful to review Mills' historical utility records dating back ten years (including 2009). Since FY2008, natural gas use has decreased by over 15% while electricity consumption has increased 8.0%. Based on this alone, Mills saw a 6.0% reduction in emissions for FY2009. A concurrent dip in both electricity and natural gas of 14% and 7.6% respectively, occurred between FY2002 and 2003. Thereafter, natural gas use remained within 5% of the previous year levels until 2009. Electricity consumption on the other hand, has continued to increase and the year to year increase in kilowatt hours has accelerated.

Given that FY2009 had the lowest natural gas use and the highest electricity use in 10 years, with sharp changes from the previous year, a clear understanding of other general factors must be taken into account, particularly the weather.

Demographic, development and weather records were obtained to try to understand any possible correlation with energy consumption. The table below shows the results for ten fiscal years. Please note that increases in square footage are included to show the year(s) in which construction was completed.

<b>Fiscal Year (7/1 to 6/30)</b>	<b>1999- 00</b>	<b>2000- 01</b>	<b>2001- 02</b>	<b>2002- 03</b>	<b>2003- 04</b>	<b>2004- 05</b>	<b>2005- 06</b>	<b>2006- 07</b>	<b>2007- 08</b>	<b>2008- 09</b>
<b>Square Footage [Thou.]</b>	852.6	852.6	880.5	880.5	880.5	881.3	916.0	936.0	936.7	965.4
<b>Natural Gas Use (Therms) [Thou.]</b>	596.8	619	597.7	514	510	536.8	548.1	524.9	514.0	433.4
<b>Electricity Consumption (kWh) [Mil.]</b>	5.716	5.326	5.345	4.984	5.168	5.259	5.351	5.675	6.171	6.668
<b>Student Total Head Count</b>	1130	1105	1189	1204	1210	1256	1372	1411	1454	1481
<b>Total FTE</b>	359.5	366.0	370.3	379.7	357.3	354.1	365.5	419.8	410.1	419.8
<b>Commuters</b>	709	689	727	724	788	812	881	863	864	899
<b>Residents</b>	421	416	462	480	422	444	491	548	590	582
<b>Heating Degree Days</b>	NA	NA	NA	NA	NA	NA	NA	NA	3,337	3,015
<b>Cooling Degree Days</b>	NA	NA	NA	NA	NA	NA	NA	NA	376	459
<b>Avg. heating season temp. (deg F) *</b>	54.4	52	53.2	54.2	54.3	53.6	53.6	52.8	51.8	53.6

Natural gas consumption has the greatest possible correlation with trends in the weather, particularly in the heating season (October thru April\*). FY2009 had nearly 10% fewer heating degree days than FY2008, and may explain a significant portion of the observed 15% decrease in natural gas use. Aside from FY2008, warmer average heating season temperatures tended to coincide with less natural gas consumption, though no definitive correlation can be made.

Although not simply correlated with increases in square footage, construction likely had an impact on natural gas consumption. Renovations shut heating systems down for extended periods of time and upgraded equipment to be more efficient. In FY2003 a 14% dip occurred the same year a large residence hall was under construction and unoccupied. Since 2005, Mills has undertaken several other construction projects, adding roughly 55,000 square feet to the developed campus. During this time, 10 aged domestic hot water heaters were replaced with more efficient equipment and several direct digital control (DDC) systems were installed, providing facilities better control of heating in buildings. Recently, more buildings and their heating systems are shut down for longer periods over the winter break, when students are gone for nearly a month. These factors likely contributed to the decrease in natural gas consumption, despite a rising residential population.

The observed increase in electricity use is less likely associated with the weather given that Mills has few air conditioning systems. Before 2003, there seems no real correlation between residents and electricity consumption; though a decrease is observed the same year a large residence hall was taken offline. Thereafter, it does seem possible that the steady rise in consumption is associated with increases in population and occupied square footage. The recent construction projects discussed above required significant amounts of electricity, and the buildings now online have added plug loads and equipment as opposed to replacement (i.e. of existing Natural Sciences and Music building boilers). Students and campus populations in general, have increased plug load demand with wider use of computers and electronic devices. While expanded digital controls have allowed facilities staff better use of electrical systems, and several lighting upgrades have increased campus efficiency overall, more people, equipment, service (i.e. outlets), and behavioral trends seem to have significantly outweighed these gains.

While no surveys or detailed commuting statistics were collected before the initial 2008 inventory, the number of commuting undergraduate students has increased by over a third since the 2000 academic year. During this time, the proportion of undergraduate commuters to residents has remained between 43 and 48%. Similarly, graduate students, whose vast majority are commuters, have increased by a quarter over the same period. Therefore, an increase in student population has added approximately one driver for every two added enrollees. This implies a general trend towards more drivers and cars on campus, as evidenced by increased spaces and contention for central campus parking. Despite improvements in fuel efficiency over the years, there is likely a general trend towards an increase in GHG emissions from commuting. However, annual public transit passes have been purchased by students as part of their general campus fees and ridership has been high. The college has also expanded the shuttle service with a larger vehicle after users overwhelmed capacity. There is more opportunity for commuters to travel via other means, however parking passes and demand will remain the key indicator of commuting emissions.

Mills huge success with recycling and composting programs (including winning the per capita composting award and other high marks in the nationwide Recycle Mania competition) resulted in a negative value for GHG emissions. However, the negative value was excluded in the 2008 baseline inventory total. The college plans to improve these programs and only apply relative emissions reductions towards meeting the target. Mills hopes that this will provide motivation to keep the program strong and build on prior achievements.

## **Mills' Reductions Target**

### **MILLS IS PLEDGING TO REDUCE GHG EMISSIONS 15% BY 2015 (FROM 2008 LEVELS)**

To date, Mills has pledged all new construction to be certified LEED silver or better, institutionalized the purchase of energy-star appliances, and completed significant renovations and equipment replacement (as discussed above). Furthermore, energy efficiency management by facilities staff (with added metering) has helped greatly. Smaller projects, like the replacement of all showerheads with low flow and efficient fixtures have not only reduced water usage, but the energy required to heat it. While these changes have made a huge difference in the past few years, there are still opportunities for further improvements, including upgrades/replacements for inefficient and/or ageing equipment.

Beyond this, the greatest potential lies within the people of the Mills community. Behavioral programs and a coordinated, campus-wide effort will expand our ability to reach the goal. Much will rely on an active student body exemplified by the burgeoning Earth CORPS student group, who led a successful tray-less dining campaign, eliminating the need to wash thousands of trays annually and saving energy required for hot water. This work can simply rely on the spread of information with encouragement and directives from campus leaders.

A major hurdle to meeting the target will be the effects of increases in campus population and square footage. Mills College has grown in student population by over 30% in the last ten years, while the completion of a major capital projects campaign in October of 2009 added over 50,000 square feet to the campus. Still, the campus has room for growth in both population and facilities. Enrollment growth is a key goal of the 2008-2013 Strategic Plan and the Middlebury College's Summer Language School has many facilities now occupied year round.

With this in mind, Mills considered a reduction target in MTCDE per person or FTE. However, it was determined that a per capita target will likely weaken the commitment to reducing the College's emissions as a whole. This short term target was chosen to be obtainable and begin an institutionalized effort to reduce emissions. Ultimately to be surpassed and replaced with a more ambitious target, it is based on identified projects, whose completion is achievable in the next five years.

## Potential Projects

The Sustainability Committee has identified several projects and estimated their GHG reduction potentials, initial cost, and annual savings. Reduction potentials were estimated in a variety of ways, depending on the nature of the project. If not originating from outside consultant proposals, estimates were made with the consultation of engineers and others knowledgeable with Mills' facilities and equipment. Often, general fuel percentage reduction estimates were necessary, but were made with an effort to remain conservative. For example, several methods are presented in concert to reduce the number of total commuters by an estimated 5%. All estimates were applied to the fiscal year 2008 GHG inventory numbers.

### **PART ONE: MAJOR PROJECTS**

#### **1. HVAC Equipment Replacement/Upgrades**

- Boiler replacement and/or system reconfiguration and eliminate/convert steam systems
- Air Handling Unit replacement and/or system reconfiguration
- Includes Direct Digital Control (DDC) upgrades

##### GHG REDUCTION POTENTIAL

179,700 kWh, equaling 44.3 MTCDE (0.7% total emissions)

82,300 Therms, equaling 511.7 MTCDE (8.0% total emissions)

Combined 556 MTCDE (8.7% total emissions)

#### **2. Passive Solar Thermal Array at the Aquatic Center**

- Install 10-12 panel closed loop solar thermal system
- Piped into existing boiler

##### GHG REDUCTION POTENTIAL

6,000 Therms, equaling 37.3 MTCDE (0.6% total emissions)

Estimated 10% reduction in natural gas consumption

#### **3. Comprehensive Lighting Retrofit**

- Retrofit and/or replace fixtures (including LEDs)
- Replace controls with some electrical redesign
- Complete redesign in some instances

##### GHG REDUCTION POTENTIAL

1,160,000 kWh, equaling 285.4 MTCDE (4.5% total emissions)

#### **4. PV Installations**

- Potential sites: Lorry I Lokey Graduate School of Business, Corporation Yard, Olin Library, and Lucy Stern
- Total 280 kW estimated for all systems

##### GHG REDUCTION POTENTIAL

300,000 kWh, equaling 73.8 MTCDE (1.2% total emissions)



## PART TWO: OTHER PROJECTS

### 1. Comprehensive Direct Digital Control System Expansion

- Bring remaining HVAC systems under DDC and expand existing
- Provide remote controls and alarms (data)
- May provide controls at systems needing replacement

#### GHG REDUCTION POTENTIAL

617,000 kWh, equaling 151.8 MTCDE (2.4% total emissions)

51,400 Therms, equaling 319.6 MTCDE (5.0% total emissions)

Combined 465 MTCDE (7.4% total emissions)

Estimated 10% reduction in electricity and natural gas use

### 2. Lighting Retrofit: CHES Program

- Lighting retrofits in residence halls only: Mary Morse, Ethel Moore, Orchard-Meadow and Warren Olney
- Mainly in bathrooms, kitchens and anterior spaces
- Replace existing fluorescent lighting ballasts with new, more efficient ones
- Install lighting controls and occupancy/photocell sensors

#### GHG REDUCTION POTENTIAL

82,700 kWh, equaling 20.3 MTCDE (0.3% total emissions)

Based on CHES lighting retrofit study, July 2008

### 3. Residence Hall Electricity Reduction Competitions

- Pit similar residence halls against each other and provide prize for greatest energy reduction per resident or square footage
- Mary Morse vs. Ethel Moore and Olney vs. Orchard vs. Meadow
- Provide electrical metering and data connection for monitoring via web and DDC
- Can be integrated into Mills website with link or graphical display
- Can be included as part of larger DDC control system installations (Facilities).

#### GHG REDUCTION POTENTIAL

120,000 kWh, equaling 29.5 MTCDE (0.5% total emissions)

Estimated 10% reduction in electricity use in each building, and total savings based on square footage to energy use ratio

### 4. Automatic Computer Shutdown/Hibernation Software.

- Operates on personal computers
- Purchased and installed by IT services
- Vendor options already being researched
- Does require annual cost and IT staff time

#### GHG REDUCTION POTENTIAL

125,000 kWh, equaling 30.8 MTCDE (0.5% total emissions)

Estimated 25% energy savings for 1000 PCs @ 500 kWh/year

## 5. Refrigerator Replacement Program

- Replace refrigerators with Energy Star efficient models as required
- Institutionalizes energy star purchasing requirement for replacement fridges
- Encourage students to bring energy star rated fridges for rooms

### GHG REDUCTION POTENTIAL

10,700 kWh, equaling 2.6 MTCDE (0.04% total emissions)

Estimated via Energy Star calculation tool with approximately 50% of campus refrigerators @ 850 kWh per year being replaced with 50% more efficient units

## 6. Commuting

- Extend AC transit card to graduate students staff, faculty and improve Translink service
- Expanding the shuttle to 100% of the mills community with priority to students
  - Add peak time runs year round to accommodate staff
- Raise parking permit price - reduce parking permit cost if parked for MacArthur Lot or carpooling (2 or more)
- Promote biking with more racks
- Introduce bike co-op space and/or support

### GHG REDUCTION POTENTIAL

59.2 MTCDE (0.9% total emissions)

Estimated 5% reduction in car travel

## 7. Air Travel: Flight Reductions

- Encourage teleconferences and webinars in lieu of flying (approx 5%)
- Limit number of travelers and/or number of flights (approx 5%)

### GHG REDUCTION POTENTIAL

182,500 miles, equaling 37.2 MTCDE (0.6% total emissions)

Mileage based on GHG inventory with estimated 10% reduction in air travel

## 8. Campus Fleet Efficiency

- Upon replacement, purchase electric or more efficient public safety and facilities vehicles
- Replace existing gardening machinery with electric and reduce operations altogether
- Run campus shuttle on bio-diesel

### GHG REDUCTION POTENTIAL

2000 gallons petrol, equaling 17.5 MTCDE (0.3% total emissions)

Estimated 20% reduction in petrol use

## 9. Heated Water Efficiency in Residence Halls (natural gas)

- Low flow shower heads already installed
- Provide support and materials for awareness campaigns involving students

### GHG REDUCTION POTENTIAL

5,000 Therms, equaling 30.5 MTCDE (0.5% total emissions)

Estimated 5% reduction in natural gas use from 10% reduction in halls (SF to energy ratio)

#### **10. Waste Diversion (currently 0 value in GHG inventory)**

- Add composting to janitorial contract for dept. kitchens and all bathrooms
  - 4 additional 64 gallon bins serviced 1 time per week
- 'Earth Tub' on-campus composting bins behind Tea Shop and Founders
  - May be part of Hellman summer program
- Improve composting at events
- 900 Eco-clamshells for staff and students
- Less packaging on products shipped to or sold at Mills
- Expand Farm to Fork with Community Garden
- Maintain tray-less operation
- Support Reuse Depot with expanded space and resources
- Increase participation in Recycle-mania
- Support Reusables Drive

#### GHG REDUCTION POTENTIAL

Approximately 250 MTCDE (4% total emissions) assuming waste diversion rates are maintained, and 330 MTCDE (5.3% total emissions) if diversion rates increase by 25%

### **Tracking Progress**

As a signatory to the ACUPCC, Mills is committed to achieving “climate neutrality as soon as possible.” Mills understands that this is a long term effort, involving significant changes to campus operations. Most importantly, documenting progress will help identify where reductions are, or are not materializing, allowing efforts redirected to where they are most effective.

Tracking progress will fall under the auspices of the Sustainability Committee. In accordance with ACUPCC requirements, GHG inventories will be conducted every other year beginning with FY2010, using the framework set by the baseline 2008 inventory. Similarly, progress narratives will be made every other year to follow. All future reports will use guidelines set in the baseline inventory and this CAP, with clear documentation where numbers deviate. Furthermore, information will be added to historical energy, demographic and weather data, with continual monitoring of changes in trends. Data collection processes have already improved as a result of the initial inventory. Changes in this and calculation methods will also be documented.

In addition to reporting to the ACUPCC, the committee reports monthly to the Vice President for Operations. This CAP, progress reports, and future GHG inventories will be made available via a link on the Sustainability page of the Mills College website: <http://www.mills.edu/green/>.

Future goals will be formulated by the Sustainability Committee in conjunction with the Vice President for Operations and will be based on experiences gained over the next several years.

## **Curriculum and Educational Outreach**

Through the following curricular and co-curricular programs, we aim to equip students with knowledge and skills to address systemic environmental and social challenges to include climate change.

### **Curricular Programs**

The College is redesigning a sophomore core course in order to more effectively introduce and integrate themes related to our Climate Action Plan. Some of the topics currently covered include, environment and literature, religion and environment, the “Greening” of Mills, ecological analysis and California urban development, green campus buildings as teaching buildings – all with an interdisciplinary emphasis. Our curriculum also provides students opportunities for cross-disciplinary and independent study that include climate change and sustainability. We hope to develop a faculty Ad Hoc Committee on Sustainability in the curriculum. We will draw upon and expand specific curricular initiatives including:

- Biology major with an Ecological Theory and Practice Track.
- Environmental Science major.
- Environmental Studies major with a public policy emphasis.
- Public Policy major with an opportunity to study U.S. and China environmental policies in the context of global climate change.
- We are discussing the expansion of faculty development funds to develop a course or interdisciplinary seminars on the subject of climate change.
- The restoration of Leona Creek and Lake Aliso are integrated into Biology courses; the Botanic Garden is an active study center of native plants and restoration ecology. It also serves as an outdoor classroom for courses at Mills.
- Feature sustainability and climate change as a part of the faculty noon-time seminars.

### **Co-Curricular Programming**

The entire Mills campus is a learning laboratory in which students study and discover the interrelationships between the environment and their lives. The College has made a campus-wide commitment to provide students with many opportunities to become involved in and engaged with the broad issues of environmental sustainability in their residence halls, classrooms, and social activities. The College’s Sustainability Center, which has become a hub of student activity under the guidance of the campus Sustainability and Recycling Coordinator, will expand student engagement activities to reflect themes of new curricular programming. We plan to expand our successful co-curricular initiatives targeting the importance of environmental sustainability to include:

- Freshman Orientation already includes a segment on the importance of environmental sustainability. We plan to expand these sessions to include the College’s climate change commitment and the important role of student engagement.
- Recruitment of a Sustainability Senator from student government to serve on the campus Sustainability Committee, which will enhance student knowledge and involvement.
- The College has a number of subject specific living learning communities in the residence halls. We will establish a Sustainability and Climate Change Living Learning Community, for first-year

student residential students interested in exploring their ideals, assumptions and awareness regarding how personal practices can foster a healthy environment. Students will have the opportunity to develop community leadership skills.

- Encouragement of students to take advantage of reduced-price public transportation
- Creation of a Reuse Center for all students.
- The Sustainability and Recycling Coordinator will continue to offer students opportunities to learn about climate change, pollution, and resource depletion, encouraging students to develop and environmental lens through which they address their work and lifestyles. In this way the College acts as an example of environmental stewardship.
- Our Botanic Garden Coordinator works with students in understanding sustainability and the ecosystems of Mills College to include: Mills Botanic Garden & the Curriculum; Native Habitat Restoration & Native Plants; Community Garden & Local Organic Food. The Garden's outdoor classroom will broaden student understanding through hands-on learning and engagement.

## **Acknowledgements**

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