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Coordinated by the Center for Integrative Environmental Research
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EXECUTIVE SUMMARY

This report is a summary of greenhouse gas emissions for the University of Maryland, College Park (UM, the University) for the fiscal years (FY) 2002 to 2007. The greenhouse gas (GHG) inventory of the College Park campus is intended to provide a baseline for the development and implementation of future GHG emission reduction strategies. The inventory is a first critical step taken by the University toward the long-term goal of achieving carbon neutrality.

Background

On May 22, 2007, University of Maryland President Mote signed the American College and University Presidents Climate Commitment (ACUPCC, the Commitment), which is a pledge to reduce campus GHG emissions and achieve carbon neutrality. Neutrality is defined as the process of reducing and offsetting carbon producing operations that makes the campus net carbon emissions equal to zero. Within one year of signing the Commitment, all signatories must inventory their GHG emissions to determine the baseline from which progress will be measured. GHG inventories must be conducted every two years thereafter. Vice President for Administrative Affairs, Doug Duncan, took on a significant leadership role in supporting the Commitment within the University of Maryland, including providing the financial support needed to conduct the first extensive study of the campus carbon footprint.

Process & Methodology

The University’s Administration, in collaboration with the Office of Sustainability, reviewed potential external and on-campus options and selected the Center for Integrative Environmental Research (CIER) at the University of Maryland to conduct and coordinate the inventory. CIER brought together a team of on-campus experts to conduct the inventory. A Campus Greenhouse Gas Inventory Taskforce (GHG Taskforce), appointed by Vice President Duncan, was charged to assist in the completion of the inventory including selection of the physical boundary (i.e. organizational boundary), scope of emissions (i.e. operational boundary) and study period.

The College Park campus and two of its larger satellite programs (Maryland Fire and Rescue Institute and the Maryland Agricultural Experiment Station farms) were selected as the focus of the inventory, comprising a total of 275 buildings and representing 12.7 million square feet of building space. The most recent six fiscal years (FY 2002–2007) were chosen as the study period because of data availability. The GHG inventory scope included emissions associated with electricity and steam consumption, fuel use, traffic commuting, air travel, campus transportation, agricultural releases, solid waste management and fugitive refrigerant releases.
A standardized greenhouse gas calculator (Campus Carbon Calculator version 5.0, Clean Air-Cool Planet, New Hampshire) was used to conduct the GHG inventory. The calculator enabled easy entry and conversion of collected data to its carbon dioxide equivalent based on global warming potential.

**Findings**

- **Total GHG Emissions**: During the FY 2002-2007 period the University’s GHG emissions ranged from a high of 376,670 metric tons of carbon dioxide equivalent (MT-CO$_2$e) in FY 2003 to a low of just under 352,000 MT-CO$_2$e in FY 2007. The latter amount being equivalent to the GHGs emitted by 60,000 cars$^1$ or sequestered by 105,000 acres of Maryland forest$^2$ in a year.

  ![UM Carbon Footprint](image)

*E.S.1 Total University greenhouse gas emissions (FY 2002-2007) associated with energy use, agriculture, solid waste and refrigerant releases.*

- **Major Sources of Emissions**: The inventory clearly demonstrated that the major sources of GHG emissions were from the electricity and steam produced by the campus co-generation plant, purchased electricity and transportation including daily commuting of the campus community, air travel and the University fleet. In FY 2007, these sources accounted for 97 percent of the campus’ GHG emissions.

- **Other Sources of Emissions**: GHG emissions from small stationary sources, solid waste, refrigerant releases and agricultural operations together made up only 3 percent of total GHG emissions in FY 2007.

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$^1$ Assuming a car traveled 15,000 miles/year * 0.045 gallons/mile * 0.00871 MTCO$_2$e/gallon = 5.88 MT-CO$_2$e/year.

$^2$ Assuming an acre of mature trees absorbs 3.33 MT-CO$_2$e per year.
Electricity Contribution: Electricity consumption was responsible for 40 percent of GHG emissions in FY 2007.

Transportation Contribution: Transportation, overall, generated 34 percent of total GHG emissions in FY 2007 with sources including student, faculty, and staff commuting, air travel and the university fleet of shuttle buses and other vehicles.

Commuting Contribution: Of the total transportation-related GHG emissions, commuting to and from campus was estimated to contribute 19 percent of total GHG emissions.

Trends in GHG Emissions: Despite growth in the number of faculty, staff and students (the campus community) and the growth in the amount of occupied building space, total campus GHG emissions (MT-CO$_2$e) decreased by 1.6 percent; per capita GHG emissions (MT-CO$_2$ per campus community member) decreased by 5.2 percent; and GHG emissions per area
Carbon Footprint of the University of Maryland, College Park: An Inventory of Greenhouse Gas Emissions (2002-2007)

(MT-CO₂e per square foot of total building space) decreased by 7.4 percent during the six-year study period.

- **Reasons for Reduction:** A substantial portion of the reduction in total GHG emissions was due to the installation of the Combined Heat & Power Plant (co-generated steam and electricity), which began operation in FY 2004. The decline, particularly in FY 2006-2007, was also attributed to the decrease in gasoline consumption by student commuters and an associated increase in Shuttle UM ridership as more students resided closer to campus in response to growth of on- and near-campus housing.

- **GHG Emissions Avoided:** An investment in co-generation enabled the University to avoid 70,000 MT-CO₂e of emissions annually (20 percent of current emissions).

- **GHG Emissions Projections:** Without serious efforts to mitigate campus GHG emissions, campus emissions in FY 2020 could be 19 percent higher than in FY 2007 depending on assumptions about future growth of the campus and its energy use.

**For Future Inventories**

- The commuting calculations were based on secondary data. A comprehensive commuter survey and a better modeling tool for tracking commuting activities will be needed to improve the accuracy and sensitivity of the GHG inventory to yearly and monthly commuting levels.

- The accuracy and breath of future campus GHG inventories can be improved by reporting monthly data on electricity consumption, which would better support the development of electricity-focused mitigation strategies.

- The inventory did not include an estimate of GHG emissions associated with the consumption of materials and supplies (e.g., paper, food, bottled water) because the Carbon Calculator did not have this capability. However, future inventories should include this category of carbon emissions so that mitigation efforts directed at modifying campus purchasing protocols can be evaluated and monitored.

- Due to a lack of comprehensive data, offsets for the University’s forested land were not estimated. Although not expected to be significant, a census of the University’s forested
Next Steps - Mitigation Strategies

The data indicate that mitigation strategies should focus on reducing the major sources of greenhouse gases, which include electricity consumption, steam use (for heating and cooling), daily commuting by the campus community and air travel. The findings from this inventory will be used by the Climate Action Plan Work Group\(^3\), a diverse group of more than 40 faculty, staff and students representing 30 different schools, departments, and offices, charged with developing the University’s Climate Action Plan. In drafting the plan, the Climate Action Plan Work Group should consider the full range of mitigation options with significant focus on strategies within the major source categories listed above. The final plan must be submitted to the ACUPCC by September 2009.