University of Tennessee, Knoxville
Fiscal Year 2007-08
Greenhouse Gas Emissions Inventory Update

Introduction

This report summarizes the anthropogenic greenhouse gas (GHG) emissions generated by The University of Tennessee, Knoxville (UT Knoxville) Main campus and Agricultural campus for fiscal year 2007-08 (July 1, 2007 to June 30, 2008). It is a supplement to the original inventory (Chinery 2007), which documented these GHG emissions for FY 1990-91 through FY 2006-07.

Annual updates of the original GHG emissions inventory are required as part of the American College and University Presidents Climate Commitment (ACUPCC), which was signed by Chancellor Loren Crabtree in fall 2007. The original inventory and annual inventory updates are intended to inform future GHG reduction strategies as UT Knoxville moves towards the long-term goal of achieving carbon neutrality, or zero net GHG emissions.

Methodology

Under the supervision of Sustainability Manager Sarah Surak, honors student Leslie Chinery completed the first-ever inventory of UT Knoxville's GHG emissions in 2007. During summer 2008, Ms. Chinery updated this inventory with data from fiscal year 2007-08. Unlike the original inventory, the FY 2007-08 Inventory Update accounts for air miles traveled as part of faculty/staff business and student program activities. This information was obtained for FY 2003-04 through FY 2007-08 and inputted into the calculator to estimate GHG emissions resulting from to faculty, staff and student air travel.

For the original inventory and the FY 2007-08 Inventory Update, the Clean Air-Cool Planet Campus Carbon Calculator, Version 5.0 (Clean Air-Cool Planet 2006), was used to estimate GHG emissions for the university. This standardized calculator divides GHG emissions into three scopes: 1) **Scope 1 emissions**, or direct emissions produced on-campus; 2) **Scope 2 emissions**, or direct emissions produced off-campus; and, 3) **Scope 3 emissions**, or indirect emissions. The calculator estimates the "carbon footprint" of the university, expressed as metric tons of carbon dioxide equivalent (MTCDE) emissions.

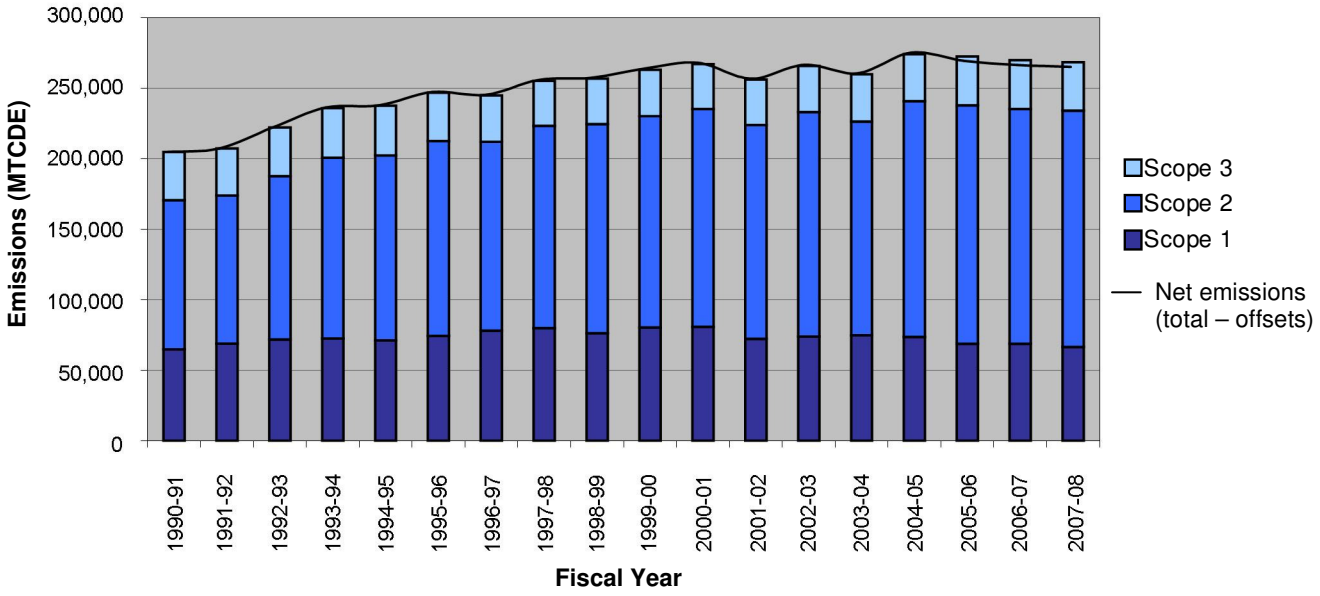
Findings

- ***Total Emissions*:** During FY 2007-08, UT Knoxville was responsible for approximately 268,448 MTCDE of GHGs (Figure 1). Since FY 2004-05, total GHG emissions have decreased by 2.2%. As noted in the original inventory, however, total emissions steadily increased from FY 1990-91 to 2004-05.

- **Mitigated Emissions:** For the third consecutive year, UT Knoxville purchased green power from the Tennessee Valley Authority/Knoxville Utilities Board Green Power Switch® Program. These 3,375 blocks of green power generated 525,000 kWh per month, which reduced university GHG emissions by about 4,129 MTCDE per year. Emissions were reduced an additional 18 MTCDE in FY 2007-08 through on-campus composting of fallen leaves and other landscaping debris. Altogether, the university's net GHG emissions (total emissions - mitigated emissions) for FY 2007-08 equaled 264,301 MTCDE (Figure 1).

- ***Scope 1 Emissions*:** Scope 1 emissions represented 25% of UT Knoxville's GHG emissions in FY 2007-08. These emissions come from coal and natural gas burned in the campus steam plant, university-owned vehicles and agricultural activities. Scope 1 emissions continue to decrease from their peak of 80,744 MTCDE in FY 2000-01.

Figure 1. Greenhouse Gas Emissions, Fiscal Years 1990-91 through 2007-08.



- ***Scope 2 Emissions*:** Scope 2 emissions remain the largest contributor to UT Knoxville's carbon footprint, accounting for approximately 62% of GHG emissions in FY 2007-08. These off-campus emissions are attributable to fossil fuels burned to provide the university with electricity. Since FY 2004-05, Scope 2 emissions have remained relatively constant (Table 1). Compared to FY 1990-1991, however, Scope 2 emissions have increased by 58.7%.

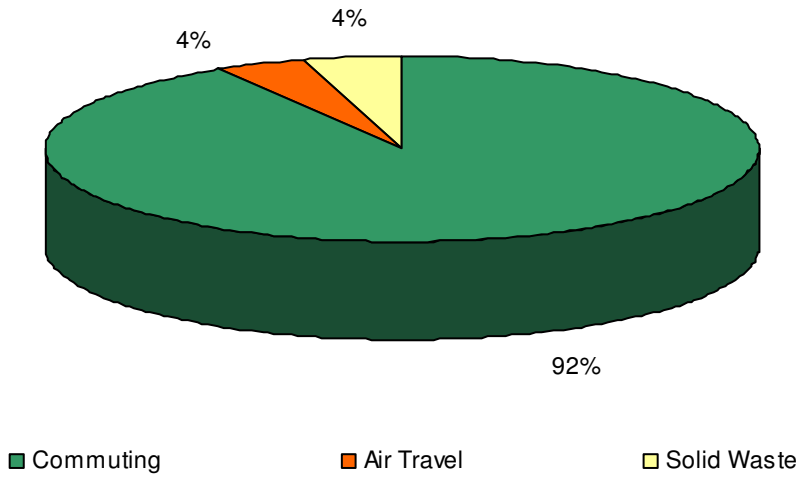
Base Year	Scope 2 Emissions (MTCDE)	% Change
1990-91	105,603	58.7
2000-01	154,491	8.5
2004-05	167,344	0.2
2006-07	166,506	0.7
2007-08	167,600	--

Table 1. Scope 2 Greenhouse Gas Emissions, Fiscal Year 2007-08 Compared to Different Base Years.

- ***Scope 3 Emissions*:** Historically, Scope 3 (commuting, air travel and solid waste) emissions have comprised roughly 14% of UT Knoxville's total GHG emissions and are dominated by commuting activities. This trend continued during FY 2003-04 through FY 2007-08, despite the inclusion of faculty, staff and student air travel emissions for those years as part of the FY 2007-08 Inventory Update. During FY 2007-08, for example, Scope 3 emissions accounted for 13% of all GHG emissions. The vast majority (92%) of Scope 3 emissions was attributable to faculty, staff and students commuting to campus (Figure 2). Solid waste and air travel accounted for the remaining 8% of Scope 3 emissions in FY 2007-08. Combined, solid waste and air travel emissions made up only about 1% of total GHG emissions.

- ***Other Sources of Emissions*:** Greenhouse gas emissions from fertilizers, agriculture, solid waste and refrigerants together comprised only 2% of total emissions in FY 2007-08.

Figure 2. Scope 3 Greenhouse Gas Emissions by Source, Fiscal Year 2007-08.



Discussion

Table 2 presents the results of GHG emissions inventories conducted by several peer institutions. These results were obtained from the ACUPCC Reporting System website (AASHE 2008). Emissions in Table 2 are shown are for fiscal year 2007-08 unless otherwise indicated. Results from other peer institutions were not available at the time of this report.

Overall, UT Knoxville's net emissions are lower than those of the selected peer institutions. Net emissions per full-time equivalent student are lower than all of these institutions except the University of Florida. Furthermore, net emissions per 1,000 square feet are the lowest among these institutions. This suggests that UT Knoxville is relatively successful at restricting its net greenhouse gas emissions.

Institution	Net Emissions (MTCDE)	Per Full-Time Enrollment	Per 1,000 Square Feet
University of North Carolina at Chapel Hill	518,469	20.0	29.6
University of Maryland College Park	351,144	10.8	27.7
University of Florida	432,123	9.2	24.8
University of Tennessee, Knoxville	**264,301**	**9.9**	**19.7**

Table 2. Net Greenhouse Gas Emissions for UT Knoxville and Selected Peer Institutions.

Next Steps

Based on the results of this inventory update, as well as those of the original inventory, future GHG reduction strategies should address three major sources of UT Knoxville's greenhouse gases: **purchased electricity**, **on-campus heating and cooling** and **commuting**. Emissions due to purchased electricity and on-campus heating and cooling may be greatly reduced through a combination of the following approaches: energy conservation policies, education to facilitate behavioral change (e.g., turning lights off when not in use), technical strategies and creative strategies. Energy conservation policies and behavioral change strategies in general have little to no cost. Technical and creative strategies, on the other hand, may have significant up-front costs, but these strategies will lead to dramatic long term energy savings.

To reduce GHGs attributable to campus commuting, **Transportation Demand Management** (TDM) initiatives such as the City of Knoxville's Smart Trips program (City of Knoxville 2008) and the Employee Vanpool Lease program (UT Center for Transportation Research 2008) should be promoted to UT Knoxville faculty, staff and students on a regular basis. As with all TDM initiatives, these programs encourage commuting to campus by walking, cycling, ridesharing and public transit. All of these modes of transportation are more efficient than driving alone when roads are congested with traffic. The award-winning TDM program at Cornell University (Cornell University 2008) has reduced the number of parking permits by 25% and enabled Cornell employees to commute 10 million fewer miles each year, resulting in a significant reduction in GHG emissions.

The findings from this inventory will be used by the Sustainability Oversight Committee, a diverse group of faculty, staff and students charged with developing the UT Knoxville Climate Action Plan. In drafting the plan, the Sustainability Oversight Committee should consider the full range of GHG reduction options with significant focus on the major sources of emissions listed above. The final plan must be submitted to the ACUPCC by September 15, 2009.

References

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