CONNECTING CAMPUS LIFE TO GLOBAL CLIMATE CHANGE

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Introduction

A greenhouse gas inventory estimates the amount of global-warming causing gases emitted into the atmosphere as a result of an institution's activities. Also known on some campuses as a "climate footprint," it is fairly simple to complete, mainly requiring the collection of various kinds of energy bills and using coefficients to determine the greenhouse gases released by each energy use. A greenhouse gas inventory outlines our local relationship to one of our most pressing international and local environmental issues, and it can help identify wasteful energy use and priority areas for action.

In conducting a greenhouse gas inventory, we followed the lead of our local city government. The City of New Orleans joined the Cities for Climate Protection campaign (CCP) in 1999, and hosted the CCP's annual workshop in September 2000. Over 400 local governments, representing 8% of global greenhouse gas emissions, have adopted the CCP program of conducting an emissions inventory, setting an emissions reduction target, and developing and implementing a local action plan to reduce emissions. In March 2001 the New Orleans City Council approved a target of a 10% greenhouse gas emissions reduction by 2015. As local governments and universities share many of the same kinds of facilities and operations, the CCP model seemed an excellent template for tackling climate change on a university campus. (1)

A greenhouse gas emissions inventory seemed a new way to encourage people to be conscious of their energy use. Tulane did not have any energy efficiency education programs in place when we began, and the facilities staff was skeptical of getting people on campus to change their energy habits. By doing a greenhouse gas inventory and energy efficiency education programs at the same time, we could use them as mutually reinforcing messages. The inventory would help motivate people who are concerned about global warming, while it would also help people who are motivated by energy cost savings recognize the link between energy use and climate change. A greenhouse gas inventory also seemed a way to make climate change as accessible an issue for students to work on as recycling. It makes the environmental impacts of our energy use measurable and tangible, and similarly enables you to measure the results of your retrofits and educational efforts in numbers that are more meaningful than kilowatt hours.

Greenhouse gas inventories of some form will ultimately be the basic tool of almost any global climate change policy, from mandatory emissions reductions to emissions trading schemes. Student involvement in the Kyoto climate change talks at the Hague in November 2000 showed the educational—as well as the political—power of student involvement in the negotiation of solutions to a complex, international environmental issue. Conducting a greenhouse gas inventory gives students an opportunity to be involved in emerging policy responses to climate change at home on their own campus. Ultimately, we hope to use the experience of one institution to help individuals and the larger community better understand the Kyoto Protocol and other policies proposed to slow global warming, including an understanding of the types, extent, benefits and expense of emissions reduction strategies.

Process

The work described in this paper was done by a five person team: Tulane's Environmental Coordinator, a freshman environmental policy major, a freshman environmental studies and chemistry major, a junior environmental studies and geology major, and a fourth year architecture major. To create our team, a position description for "Student Energy and Climate Change Specialists" was developed and advertised throughout the university. The positions were modeled on Tulane's Student Recycling Coordinator, a student who is hired by Facilities Services and conducts recycling education and develops proposals for improving our recycling system every year. The Student Energy and Climate Change Positions were funded by the Center for Bioenvironmental Research at Tulane and Xavier Universities, as part of grant awarded by the U.S. Department of Energy's Environmental Management Program for research on Long-Term Stewardship. Several of us had already been working on climate change education and policy with Tulane's Green Club and the new campus chapter of Free the Planet.

We met weekly as a team for one hour, reviewing the week's progress and brainstorming next steps. Each of us took responsibility for leading one project and drafting a report on it, with the others helping out as needed. At the end of the semester the group presented preliminary results at a Tulane Earth Day Report. Our individual project reports are available on the internet at www.tulane.edu/~eaffairs.

At the beginning of our project, we conducted a telephone survey of 150 students about their understanding of global warming. We asked questions about students' general awareness of global warming and its causes and effects, such as "What causes global warming?" and "What are the things that you do in your daily life that contribute to global warming?" The majority of those surveyed were aware that driving a car contributed to global warming, but most of the people surveyed were unaware of other causes. 70% were somewhat concerned about global warming, with 15% highly concerned and 15% unconcerned. 88% thought the U.S. should take action on global warming now. These survey results can help us design our education campaigns, and give us one of benchmark from which to measure the results of our programs.

Conducting the Inventory

A number of tools for conducting greenhouse gas inventories are available on the internet. The inventories done by Tufts University and the CU Environmental Center at the University of Colorado-Boulder are good templates. The United Nations Environment Programme (UNEP) has published comprehensive guidelines for institutional inventories, including sample spreadsheets and emissions factors. An excellent report by the Pew Center on Global Climate Change reviews the policy questions raised by inventories and provides links to a range of inventory initiatives. (2)

We chose to purchase a software called *e-Mission* from Torrie Smith Associates. Torrie Smith software is used by the Cities for Climate Protection program, including the City of New Orleans, so using the software makes it easier for us to coordinate with the New Orleans Mayor's Office of Environmental Affairs. The e-Mission software is designed specifically to calculate greenhouse gas emissions due to activities done by businesses. The software is fairly expensive, but has a number of advantages over tools such as the UNEP spreadsheets. It is very user-friendly, allowing any interested student (or staff person) to use it, regardless of experience. It provides fuel and emission coeffficients for different states and countries—averages of the amount of greenhouse gases emitted by electricity

generation for the state. You can also enter coefficients provided by your own utility. It includes emissions coefficients for criteria air pollutants, so you can estimate reductions of NOx, SOx and particulate emissions. It has a "Measures" feature that allows you to project estimated energy, cost and greenhouse gas emissions savings of different actions. It has a "Travel Assistant" feature that makes it easy to estimate emissions released by different kinds of transportation. A demonstration version of the software can be uploaded from www.torriesmith.com.

A greenhouse gas emissions inventory can measure, most narrowly, the emissions released directly on campus: the emissions released by burning natural gas or diesel in our co-generation plant, and the burning of gasoline and diesel by motor vehicles. Most broadly, a greenhouse gas inventory can try to account for all of the releases that are necessary to our activities, including the energy used to produce the things we use on campus and energy used by providers of outsourced services. Our inventory falls somewhere in between. Using the Torrie Smith software, we looked at the emissions of greenhouse gases created by building energy use, campus fleet vehicles, and the travel of commuters going to and from campus. (The e-Mission software also has categories for tracking emissions from Manufacturing, Business Travel and "other," which we didn't complete.)

We collected data, such as kilowatt hours of electricity, thousands of cubic feet of natural gas used, and gallons of unleaded gas and diesel, from various offices around campus. A remarkable survey of campus transportation habits conducted by an Urban Sociology course in Fall 2000 provided us with data that could be used to estimate emissions from commuting. The data were then entered into their respective places within the software, and, after making calculations, the software output the amount of carbon dioxide released in metric tonnes.

We collected data for 1990 and 2000, in order to give us a sense of what meeting the Kyoto Protocol, the international treaty on climate change, might mean for an institution like Tulane. While Kyoto specifies a national U.S. reduction to 7% below 1990 levels, using Tulane as a microcosm might help us understand the implications of reducing to that level—what meeting Kyoto might mean for us on a local level. Our tentative estimate of year 2000 greenhouse gas emissions is 37,128 metric tonnes carbon dioxide equivalent for the Uptown campus (the campus that is home to all of Tulane's undergraduate programs.) We are still missing data for one large building of senior apartments that is metered separate from the campus grid. Beyond the numbers, we were struck by two early findings:

1. Driving is a major source of campus greenhouse gas emissions. While building energy use—electricity use, lighting, heating and cooling—was by far the largest source of emissions, we estimate that commuting contributes over 20% of the uptown campus's greenhouse gas emissions. Staff commuting alone contributes over 10% of our greenhouse gas emissions. This is even more remarkable when you remember that over three thousand students live on campus, and building energy use includes their energy consumption 24/7. Our findings are somewhat corroborated by the City of New Orleans greenhouse gas inventory, which found that personal vehicles contribute 37% of the entire city's greenhouse gas emissions.

2. Outsourcing and changing ways of reporting energy and fuel data complicate using 1990, the base year of the Kyoto protocol, for emission reduction targets. We were surprised by how many offices were able to provide us with 1990 or early 1990s energy use data. However, some energy and fuel bills may be reported differently now than they were in 1990. For example, some departments may rent vehicles and reimburse fuel charges, rather than owning vehicles and refueling them at the motor pool. As a result, even though our initial findings show that campus emissions have not increased

significantly since 1990, we need to investigate whether some energy use has been moved rather than reduced.

Energy Efficiency Research Projects

Once we have completed the inventory and establish a target for reducing emissions, we must figure out ways to meet the target. As we conducted the inventory, we began to study the different uses of electricity on campus that are most familiar to students, and estimated potential savings, both in dollars and greenhouse gas emissions.

Dorm Room Energy Study

Maureen Devery conducted a general study of dorm room electricity use. She recruited 17 members of the Green Club and their roommates to record their room's electricity use in a 24 hour period. Each person taped a sheet of paper on every appliance or device that uses electricity and when anyone turned on or off the appliance they recorded the time. The study gave us a basic understanding of electricity use in dorm rooms and gave us some very interesting estimates of student electricity use. There are an average of 11.3 appliances per person in a dorm room. Computers, refrigerators, and lighting, are the big energy users, and appliances such as water coolers, cordless phones, answering machines, cell phone chargers and even air fresheners are consumers of electricity that we don't usually notice. The study found that dorm room electricity use is responsible for 3 pounds of carbon dioxide emissions per person per day. People were intrigued by the look inside dorm life the study offered, and we received good coverage of the study in the campus newspaper.

Residence Hall Refrigerators

Jennifer Karam looked at one of the largest draws of electricity in a dorm room, refrigerators. She compared the available refrigerators for rent to students and the most efficient models available. She found that not only could emissions be cut by a change to these new refrigerators, but also the university could save between $10,500-13,300 if all dorm room refrigerators were replaced with a reasonably priced, fairly efficient model produced by Haier. She proposed a number of possible policies that Housing and Residence Life could adopt, including publicizing energy efficient models to new students, setting up a special marketing program for energy efficient manufacturers, or offering a rebate of $10-20 to students who purchase energy efficient compact refrigerators.

Computer Energy Management

We estimate that there are over 6,000 computers on Tulane's uptown campus alone. Alana Paul calculated the energy and greenhouse gas emissions that could be saved if students turned their computers off for eight hours at night and staff and faculty turned theirs off at the end of the work day. The results were staggering: we could save almost $300,000 each year (at 2000 average electricity prices) and 1743 metric tonnes of greenhouse gas emission (5% of our year 2000 emissions). This is a priority area for action, and we are working with Tulane's Office of Technology and Information Services to educate computer users across campus. You can link easily to the web page through Green.Tulane.edu

Results and Next Steps

Our next step is to complete the inventory and release it to the campus community in Fall 2001, including presenting it to the President's cabinet, Deans and Directors. Ultimately we hope to follow the CCP process of setting a reduction target and developing an action plan. A number of priorities and ideas for new projects have come out of our first six months' work. We learned the significance of driving and will prioritize encouraging alternative modes of transportation for commuting. From our work looking at electricity use in dorm rooms, we decided to open a Model Energy Efficient Dorm Room this fall. Two of us will be living in a suite with all energy efficient and energy star appliances, many donated by manufacturers, which can be toured in person and online. Planning is also underway for an "Ecolympics" energy saving competition between residence halls and senior apartments.

We have found the inventory to be a great entry point into understanding global warming and the policies that are being proposed to prevent it. Besides the basics—learning the greenhouse gases and the activities that produce them—doing an inventory quickly raises issues at the core of the international policy debates. For example, the problems with including carbon sinks become apparent when you try to account for the carbon sequestered by your campus's ancient live oaks. A number of faculty have reviewed the software for possible inclusion as a lab assignment in their courses. The inventory could also serve as the introductory unit of a seminar on the science and policy of global warming.

This project began with the City's initiative, and ultimately we hope to help the City of New Orleans meet its greenhouse gas reduction goals, not just by reducing our own campus emissions, but by being able to help businesses and other institutions do the same. After working on the Tulane inventory, students will have the expertise to work as consultants to local businesses and institutions, helping them conduct their own emissions inventories and take initial steps towards reducing them. New Orleans is particularly vulnerable to the increased temperatures, extreme weather, and rising sea levels that are already underway. Global warming threatens the very existence of this historic, culturally- and biologically rich area. This project tries to help people take tangible steps towards understanding and addressing this overwhelming crisis.

References

1. The Cities for Climate Protection campaign is a project of the International Council for Local Environmental Initiatives (ICLEI). For more information, visit iclei.org/co2/

2. "Blueprint for a Green Campus: 2001 Update," University of Colorado-Boulder www.colorado.edu/ecenter; Thomas Gloria, "Tufts University's Green House Gas Emissions Inventory for 1990 and 1998" Tufts Climate Initiative, Tufts Institute of the Environment. www.tufts.edu/tie/tci; Christopher P. Loretti, William F. Wescott, Michael A. Isenberg. *An Overview of Greenhouse Gas Emissions Inventory Issues.* Pew Center on Global Climate Change. August 2000. Available in pdf format at www.pewclimate.org; Charles Thomas, Tessa Tennant and Jon Rolls. "The GHG Indicator: UNEP Guidelines for Calculating Greenhouse Gas Emissions for Businesses and Non-Commercial Organisations." United Nations Environmental Programme, 2000. Available in pdf at www.greenbiz.com/toolbox/tools_third.cfm?LinkAdvID=6023. The GHG Protocol Initiative of the World Business Council for Sustainable Development and World Resources Institute, a leading initiative to develop a standard method for conducting greenhouse gas inventories, provides information on inventories for a business audience. Visit www.ghgprotocol.org.