Creating a Carbon Neutral Campus

The University at Albany's Climate Action Report

This report represents a review of the current progress towards carbon neutrality at the University at Albany and recommendations towards achieving this goal.

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1. Executive Summary

The University at Albany has striven to be a leader in environmental sustainability since the formation of the task force in 2006. With the signing of the American College and University Presidents Climate Commitment, we have solidified our commitment to this goal. The university has completed a comprehensive greenhouse gas inventory for the years 2005 through 2009. According to our most recent inventory, the university emitted 63,351 metric tons of carbon dioxide equivalent ($MTeCO_2$) and can be broken down into the following percentages by source: 41% energy use for heating and fleet use, (scope 1 emissions), 36% purchased electricity (scope 2 emissions), 16% commuting, 4% transmission and delivery losses for electricity and 4% solid waste (scope 3 emissions). The year 2005 has been chosen as our base year as it marks the point prior to the commencement of any major environmental initiatives undertaken by the university. This year is also in line with the American Clean Energy and Security Act and the Copenhagen Accord. In 2005, 74,874 $MTeCO_2$ were emitted from the university with 37% coming from scope 1, 43% from scope 2 and 20% from scope 3. This represents a 15% decline in carbon emissions during that time period.

The university is currently benchmarking its progress towards established carbon reduction goals as outlined in the SUNY Plan of 2007 and Executive Order 24 signed by Governor Paterson in August 2009. Specifically, these set goals of a 20% reduction from 2007 levels by 2014 (SUNY Plan) and an 80% reduction from 1990 levels by 2050 (EO 24). To achieve the first target, the university will need to reach an emissions level of 56,922 $MTeCO_2$ by 2014. EO 24 equates to a level of no more than 14,568 metric tons of carbon emissions in 2050 which would require a 48,783 metric ton reduction in CO_2 equivalent emissions from our current levels.

It is important to note that these numbers do not take into account expected increases in emissions due to new buildings, increased enrollments and staffing, and the inclusion of other university entities or sources of emissions not currently included in our inventory. Beyond our anticipated compliance with state mandates, the university will also need to develop a schedule for further reductions or offsets beyond the 80% required by 2050, setting our carbon neutrality date for sometime in the later part of the 21st century.

Carbon neutrality can be achieved through the following four point plan; 1. implementation of conservation measures and educational programming, 2. implementation of efficiency projects, 3. implementation of on-site renewable power and electricity generation and 4. the purchase of carbon offsets, renewable energy credits and green energy. These carbon reduction goals are very aggressive and only feasible with significant financial investment, willingness to use innovative and alternative energy systems and political willpower. The current budgetary constraints, standard practices for evaluating projects and purchasing rules present hindrances to achieving a carbon neutral campus and will need to be addressed in order to reach our goal. Since over 75% of our carbon footprint is related to our energy and electricity use (scope 1 and 2), the goals of Executive Order 24 are only attainable by changing our source of energy and electricity generation to renewable resources. Effective educational and conservation programs can be expected to achieve a 5 to 10% reduction in emissions through behavioral and policy changes. Energy efficiency projects can yield another 10 to 20% reduction. This will still leave a large portion of emissions from these scopes to be diminished through a change in our source of energy and electricity generation. In addition, the university will need to address its scope 3 emissions consisting of commuting, waste generation, and electricity transmission and delivery losses, in order to achieve carbon neutrality. Given that most of these emissions are incurred through activities that the university does not directly control, it is likely that the bulk of these reductions will need to be attained through the purchase of renewable energy credits and/or carbon offsets, whose costs will need to be projected and incorporated into future budgets.

A portfolio approach should be taken when choosing mitigation strategies, using a combination of the above four actions in concert with each other. In addition, projects which have significant environmental benefits and carbon emission reductions that generate savings over a longer term, (greater than 10 years), should be commenced alongside those that will garner more immediate savings to the university within a short time frame (less than 5 years).

It is recommended that a steering committee be set up to oversee the formation of a comprehensive sustainability and climate action plan for the university. Its goals would be to analyze the effectiveness of carbon reduction initiatives, conduct life cycle assessments of alternatives and prioritize actions. In addition, sustainability should be included in all future strategic and facilities master plans in order to assure that the carbon reduction targets are incorporated into the institutional structure in order to become achievable. It is also expected that a methodology for follow up and continual reporting, adjustment and reflection will be delineated within the sustainability and climate action plan.

2. Introduction

History of UAlbany and its surrounding natural resources

The University at Albany was founded in 1844 as a preparatory school for teachers and later joined with the State University of New York system in 1962. Today the University at Albany is an internationally recognized public research institution and is home to 18,000 students at the graduate and undergraduate level and employing more than 3,900 faculty and staff.

The Capital Region of New York State is an area rich with natural and cultural resources. Nestled within this diverse environment, the university is surrounded by the majestic Berkshires, Catskills, and Adirondack Mountains; combined they hold the largest wilderness area east of the Mississippi River. The main campus of the university holds approximately 500 acres and has a wide variety of vegetation blanketing more than half of the area. The main campus was designed by renowned American architect Edward Durell Stone and is regarded as an important example of modernist architecture.[a] The campus was described by author Thomas A. Gaines, in his book, *The Campus as a Work of Art*, as "one-of-a-kind".

The Albany area is embedded in a whole system of wild and semi-natural areas. Water arrives from reservoirs in the heavily-forested Helderberg Mountains to the southwest. Rainwater runs off our rooftops and parking lots into our holding pond and drains into several creeks, which eventually transports the water into the Hudson River and out to sea. Air is cleansed by many kinds of forests, small and large, including beautiful trees on campus. Wildlife of many varieties abounds and can be visible in and around the Capital Region. The campus itself is home to its own valuable ecosystem and is neighbor to the Albany Pine Bush, home of the Blue Karner Butterfly. Making a connection to and learning about the contributions of this natural world is an important component of environmental sustainability.

Global Warming Primer

As far back as 1898, there were concerns that carbon dioxide emissions, resulting from the onset of the Industrial Revolution, could lead to global warming. It was not until the 1970s, however, that scientists' growing understanding of the Earth's atmosphere system brought this previously obscure field of science to wider attention. In response to increasing scientific knowledge, a series of intergovernmental conferences focusing on climate change were held in the late 1980s and early 1990s. In 1988, the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC). The IPCC was given authorization to assess the state of existing knowledge about the climate system and climate change; the environmental, economic and social impacts of climate change; and possible response strategies.[b] After a peer review process by hundreds of scientists and experts, the IPCC released its First Assessment Report in 1990. The IPCC found that human activities do lead to emissions of greenhouse gases (GHG) and that these gases are likely to cause rapid climate change. In 1994, the Convention on Climate Change set an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other source emissions of carbon dioxide and other greenhouse gases.[c]

In 2001, the United States recognized that progressive and intensifying global warming can be linked to the occurrence of large quantities of greenhouse gases in the atmosphere. The main greenhouse gases in the Earth's atmosphere consist of water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Greenhouse gases in small amounts lead to a natural global warming affect that warms the earth's surface and allows for life on planet Earth. However, problems begin when

more greenhouse gases are generated in the atmosphere than are necessary to warm the planet to an ideal temperature. Scientific studies have indicated that the most prevalent greenhouse gas is carbon dioxide and that the majority of emissions of CO_2 since the mid-20th century are a result of human activity. Other harmful greenhouse gases indentified include: methane (CO4), nitrous oxide (N2O), and fluorinated gases (CFC, HCFC and halons).

Included within the listed human activities which intensify the effect is the production of carbon dioxide through the burning of fossil fuels and cutting down of carbon-dioxide-absorbent forests. Heating buildings, purchasing electricity derived from a fossil fuel and transportation are the three top sources of CO_2 emissions. Agricultural practices, changes in land use, sewage treatment, and other causes attributed to global warming results in the release of methane and nitrous oxide. Methane is an extremely potent greenhouse gas eventually oxidizing in the atmosphere to form carbon dioxide and water vapor. Nitrous oxide is the main agent for the destruction of stratospheric ozone in oxidized form and is approximately 300 times more powerful of a greenhouse gas per unit weight than carbon dioxide. Hexafluorides, specifically sulfur hexafluoride, is released into the atmosphere as a result of use in the electric, steel and iron industries. Sulfur hexafluoride is 22,800 times more potent of a greenhouse gas than carbon dioxide and can damage vegetation and livestock.[d] Chlorofluorocarbons (CFCs) and other gases also play a role in trapping heat in the atmosphere that would otherwise be radiated slowly into space. CFCs were created in the 1930's and used as a propellant in aerosols, refrigeration coolants, and today as electronic circuit board cleaners. It should be noted that although other greenhouse gases are much more potent in their detrimental effect on the environment, carbon dioxide receives the most attention as it has proven to be the most prevalent and leading cause of global warming.

Climate Change Regulations

The Kyoto Protocol is an international agreement that included 165 countries. Taking place in December of 1997 in Kyoto, Japan, the agreement was seen as an important step toward a global emission reduction schedule that would lead to the stabilization of GHG emissions and provide the essential architecture for any future international agreement on climate change. The protocol adopted new commitments that required developed countries to reduce greenhouse gas emissions after the year 2000.

The Copenhagen Accord was drafted in December, 2009 from the international meetings that took place to create the next wave of commitments on climate change in advance of the Kyoto Protocol expiration in 2012. This is a non binding document in which developed nations agreed to reduce their carbon emissions and developing nations agreed to slow their carbon emissions with a goal of limiting global warming to a 2 degree Celsius increase during this century. The United States, under the guidance of President Obama, has pledged to reduce carbon emissions according to the following schedule (all from 2005 levels): 3% by 2012, 17% by 2020, 42% by 2030 and 83% by 2050.

A climate change bill, entitled the American Clean Energy and Security Act, has been passed by the House of Representatives and is currently under negotiations in the Senate. This bill includes the same targeted carbon emission reductions as the Copenhagen Accord. This bill also includes a cap and trade plan for carbon emissions. Similarly, New York State Governor Paterson issued Executive Order 24 which called upon New York state agencies to reduce emissions by 80% of 1990 levels by 2050.

In the absence of national legislation, the EPA has taken steps to limit carbon emissions. The Supreme Court ruled in 2007 that the EPA had the right to regulate greenhouse gases. Since then, the agency has determined greenhouse gases to be harmful to public health and have proposed stricter regulations. A recent Senate bill attempting to limit this power was defeated. One federal regulation already in place requires facilities with power plants releasing over 25,000 metric tons of CO_2 submit annual emission reports to the EPA. This goes into effect in January 2011. At the present time, the university would not be required to complete these reports as our emissions are under this threshold. However, since our level of emissions from the power plant is hovering near this limit, the mandate could apply if our need for energy production from the plant increases or if our energy mix shifts towards oil due to interruptions in natural gas supply.

History of Environmental Sustainability at UAlbany

The University at Albany has been instituting new ideas and programs for a more environmentally friendly way of conducting business for several years. Environmental interests were formally culminated by the development of the Task Force on Environmental Sustainability by then President Kermit Hall in February 2006. In creating the Task Force, President Hall outlined its broad goal by stating; "as a public higher education institution, the

University at Albany has both an obligation and an opportunity to be a leader in environmental sustainability. Our institution can and should serve as a model for other colleges and universities as well as for our own students and the community around us." This campus wide environmental initiative was started to encourage faculty, staff, and students to embrace the university's responsibility to conserve, protect, and enhance the beauty of the campus and the surrounding community. The Task Force comprised of six committees formed with a goal to lower consumption, protect environmental resources, improve transportation efficiency, and reduce waste on campus through the promotion of education and research. In October of 2006, the Task Force was responsible for the highly successful launch of the "go green" initiative on campus. Programs developed by the task force include; the annual Farmer's Market, the fall energy campaign and participation in Recyclemania.

In 2007, the State University of New York assumed a national leadership role in energy sustainability and education by establishing an environmentally conscious SUNY wide policy. This policy, known as the SUNY Plan, outlines specific procedural guidelines for campus conservation by promoting sustainable practices on SUNY campuses. The goal of this plan is to reduce all GHG emissions by 20% from 2007 levels by 2014 as well as set specific energy and green building policies for campuses to follow. The UAlbany Task Force, realizing the need for a point person to coordinate and achieve these goals, recommended the creation of a new position to assume these responsibilities. In January 2008, the university hired its first Director of Environmental Sustainability and the Office of Environmental Sustainability was formed to coordinate task force activities and other environmental activities and programs on campus. Since then, numerous projects have been undertaken by the university to increase awareness on our campus community regarding sustainable practices and to reduce our carbon footprint.

President George Philip, recognizing the unique responsibility that institutions of higher education have as role models for their communities, signed UAlbany on as a member of the American College and University Presidents' Climate Commitment on May 5, 2008. This is a high-visibility effort to address global warming by garnering institutional commitments to neutralize greenhouse gas emissions and to accelerate the research and educational efforts of higher education to equip society to re-stabilize the earth's climate.[f] This commitment has over 670 signatories including SUNY Buffalo, Binghamton and Stony Brook as well as local colleges, St. Rose and Union College.

As part of this commitment, the university has agreed to establish an institutional structure to guide the development and implementation of sustainability programs; complete a comprehensive greenhouse gas emissions inventory annually and establish an action plan for carbon neutrality. Under the guidance of the Office of Environmental Sustainability and the Office of Energy Management, with input from our Task Force, some immediate interim actions to reduce greenhouse gas emissions were adopted. These include:

- Establishing a policy that all new campus construction will be built to at least the U.S. Green Building Council's LEED Silver standard or equivalent
- Adopting an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist
- Encouraging the use of and providing access to public transportation for all faculty, staff, students and visitors at our institution
- Participating in the Waste Minimization component of the national Recyclemania competition, and adopt 3 or more associated measures to reduce waste.

Greenhouse gas inventories were first developed for the university for the years 2005 to 2009. The inventory for 2010 will be completed at the end of this academic year. The year 2005 was chosen as the base year for several reasons. First, it marks the year prior to the creation of the "Go Green initiative" on campus when significant awareness and action focused on environmental sustainability was started. Second, the most accurate and available data dates back to this year. Third, this also coincides with the base year for the American Clean Energy and Security Act and the US targets proposed in the Copenhagen Accord.

An inventory was also drafted for 1990 in accordance with the baseline set by Executive Order 24. The energy numbers for this year were provided by SUNY central administration and other data points were estimated based on historical averages. Details of the findings and methodology of these inventories are described in the next section.

3. GHG inventory

Explanation of terms

A comprehensive greenhouse gas (GHG) inventory provides for the quantification of emission sources through an accounting of the amounts and sources of emissions of greenhouse gases attributable to the various operations of an institution. The completion of an inventory will provide an essential foundation for focused, effective approaches towards mitigation of negative environmental effects and provide the foundation for outreach on the issue of climate change at a college or university. The inventory reports on the six greenhouse gases covered by the Kyoto Protocol — carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). It should be noted that at this point, most greenhouse gas inventories mainly account for emissions from direct university activities. With the exception of electricity, it generally does not take into account the indirect or embedded emissions associated with the purchase of a product. For example, an apple bought from a local farmer will most likely have a lower emission associated with it than one that is shipped across the country. These indirect transportation emissions are not included in the inventory.

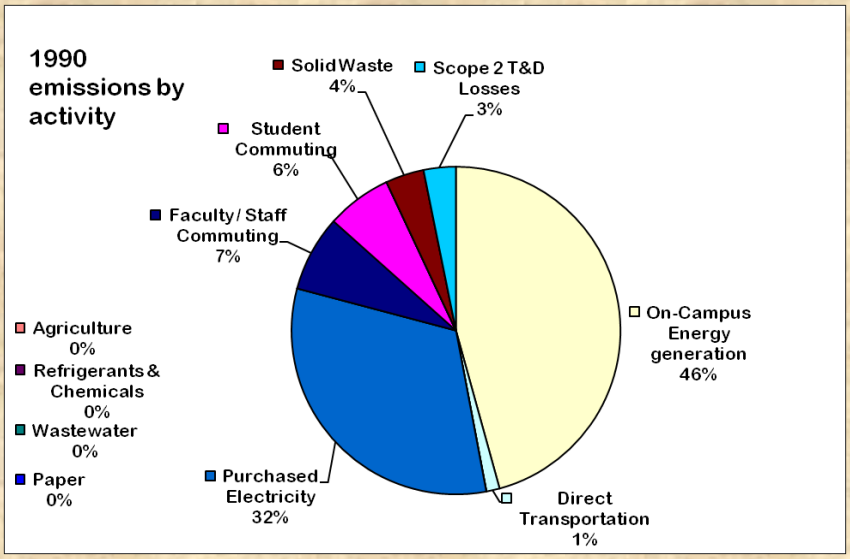
Emissions are categorized into three scopes. Scope 1 emissions refer to the direct GHG emissions occurring from sources that are owned or controlled by the institution. This is applicable to energy sources that the university uses and includes emissions from the campus power plant operations, fleet use, refrigerants and chemicals and use of non-organic fertilizer. Refrigeration gases and chemical emissions can occur due to equipment leaks or discharge during normal recharging. These are significant factors in global warming because of their high global warming potentials (GWP). Scope 2 emissions refer to indirect emissions generated in the production of electricity consumed by the institution. Scope 3 emissions refer to all other indirect emissions, those that are a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution. Reported variables within this scope include commuting by students, faculty and staff, solid waste generation, academic travel, use of water, the purchase of paper and transmission loss associated with purchased electricity.

Findings

The university currently has inventories from the years 2005 to 2009 as well as 1990. Emissions are being reported in metric tons of carbon dioxide equivalents ($MTeCO_2$). A metric ton equates to 2,200 pounds while a standard ton is 2,000 pounds. Three of the more significant years are discussed below.

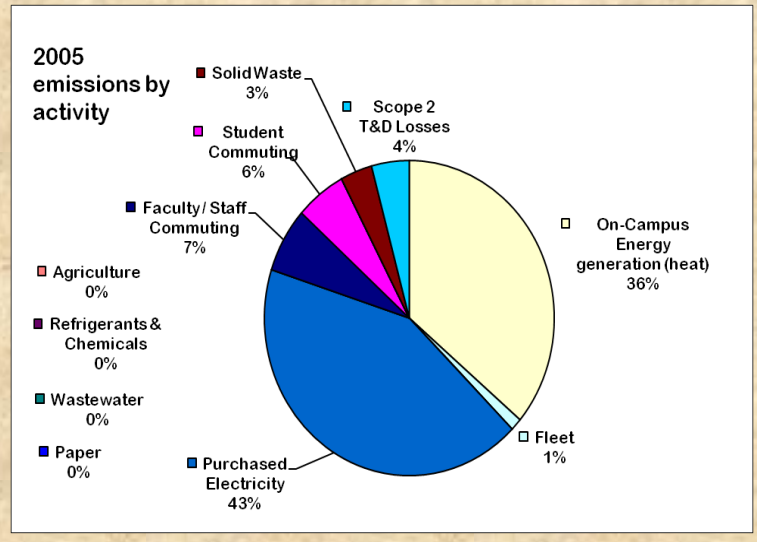
1990

The academic year 1990-1991, comprising our 1990 inventory, was calculated based on information derived from SUNY central administration and historical averages. This inventory was developed in order to track our progress in accordance with Executive Order 24. The university prefers to use 2005 as its base year as there is more confidence in the accuracy of the data. According to our calculations, 72,838 $MTeCO_2$ were emitted in 1990. Of this, Scope 1 accounted for 47% with 34,308 $MTeCO_2$, scope 2 for 32% with 23,396 $MTeCO_2$ and scope 3 for 21% with 15,134 $MTeCO_2$. Additional information on emissions from this year is available in Appendix A.



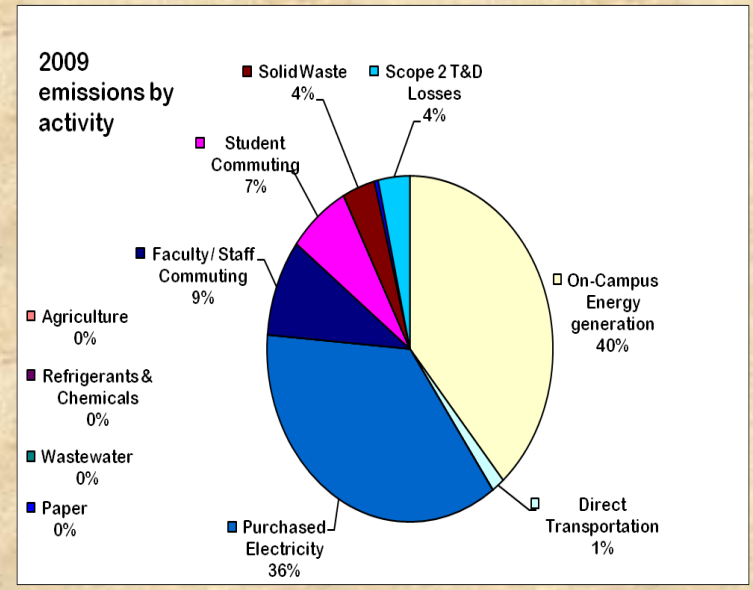
2005

The academic year 2005-2006, comprising our 2005 inventory, was the first calculated year in accordance with the most accurate and available data. The results from this GHG inventory revealed that the university emitted a total of 74,874 $MTeCO_2$. The largest source of GHG emissions came from Scope 2, which accounted for 43% (31,845 $MTeCO_2$) of the university's total GHG emissions. Scope 1 emissions were 28,034 $MTeCO_2$, which were 37% of UAlbany's emissions. Together, these scope emissions accounted for 80% of the carbon footprint. Scope 3 emissions made up the remaining 20%, with total emissions of 14,996 $MTeCO_2$. A more detailed breakdown is available in Appendix B.

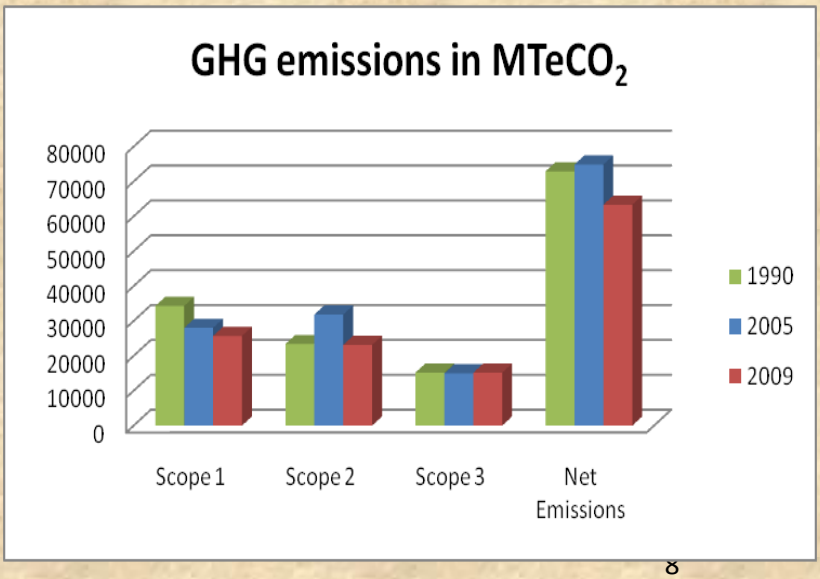


2009

The academic year 2009-2010, comprising our 2009 inventory, is being highlighted here as the most current year emissions. The 2010 inventory will be compiled at the conclusion of the academic and fiscal year in June of 2011. The results for this inventory showed that emissions fell to 63,351 $MTeCO_2$, a decline of 15% from 2005. Scope 1 emissions were the largest source with 41% (25,725 $MTeCO_2$) of UAlbany's total. Scope 2 emissions were 23,132 $MTeCO_2$ or 36% of the total. This represented a decrease of 7% from 2005. This drop is thought to be the result of preliminary energy efficiency projects and behavioral changes brought about by energy conservation campaigns on campus. Similar to 2005, Scope 1 and 2 emissions made up 77% of the inventory. Scope 3 emissions rose 4% from 2005 levels to account for 24% of GHG emissions, releasing 15,172 $MTeCO_2$ into the atmosphere. Further details of this year's inventory are in Appendix C.



Comparison of the years 1990 and 2005 to 2009



In the nearly twenty year time period covered by this report, the university has experienced an overall decline in our carbon emissions of 13%. The largest decrease was realized in our Scope 1 emissions. This is mainly due to the shift in the use of number 6 oil to natural gas as our main means of heat as well as efficiency projects. Scope 2 emissions increased from 1990 to 2005 but have declined dramatically in the last fours. The decrease from 2005 can be attributed to efficiency projects and behavioral and policy changes instituted on campus. Scope 3 emissions remained virtually unchanged over the time period. A more detailed breakdown of the percent changes can be found in Appendix D.

Methodology

In the initial stages of the GHG emission inventory, methodologies to calculate our carbon footprint were reviewed and it was decided to use the Clean Air Cool Planet calculator given its applicability for universities, its widespread use by other institutions in higher education and its adherence to GHG protocols. As is standard practice, a 12 month period was covered in the report over which data was collected and calculated. The base year for the greenhouse gas inventory was chosen as academic year 2005-2006 in accordance with the inception of the "Go Green" initiative coupled with the best available and accurate data, as previously discussed. This base year represents the emission levels which the university will use as a point of reference to reduce GHG emission levels in the future. The data for this report was collected in fiscal year formatting rather than by calendar year in order to simplify collection efforts. An example of the university's fiscal year formatting is as follows: the dates 7/1/90 to 6/30/91 would be entered in year 1990 for the inventory.

An operational control approach was chosen as the consolidation method to determine an organizational boundary meaning that only operations from an entity that is entirely owned and/or managed by the university are reported. The University at Albany does have some entities, most notably the College of Nanoscale Science and Engineering (Nanotech) and the School of Public Health on the East Campus, whose facilities are not managed by the university's physical plant. Therefore, the emissions from these externally managed properties are not included within the university's inventory.

As mentioned, the GHG emissions were determined using the Clean Air-Cool Planet calculator. The "Campus Carbon Calculator" was developed by Clean Air-Cool Planet, a science-based, non-partisan, non-profit organization whose sole mission is to help promote and find solutions to help stop global warming.[g] The calculator provides procedural protocols and a framework for investigation. The excel-based spreadsheet tools are based on workbooks by the Intergovernmental Panel on Climate Change (IPCC) for national inventories and have been adapted specifically for college and university campuses. It also complies with the standards of the Greenhouse Gas Protocol (GHG Protocol) created by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) and covers the accounting and reporting of the six greenhouse gases covered by the Kyoto Protocol. The emissions in the calculator are reported in metric tons carbon dioxide equivalents ($MTeCO_2$). This value takes into account the Global Warming Potential (GWP) of the individual gases recorded and converts their forcing power into carbon dioxide equivalent values.[h] The default emission coefficients supplied in Clean Air-Cool Planet Campus Carbon Calculator v6.5 were used for the inventory. The default emission factors are averages based on extensive data sets and are largely identical to those used by the Intergovernmental Panel on Climate Change. Version 6.5 of the Clean Air-Cool Planet (CA-CP) Campus Carbon Calculator uses the GWPs (global warming potential) from the Third Assessment Report, issued in 2001 by the IPCC.[i]

The university employed different collection efforts to furnish the data for the GHG Inventory, which included collecting institutional data and emission source data. Emission sources can be either direct or indirect and further broken down into three broad scopes discussed previously (Scope 1, Scope 2, and Scope 3 type emissions). The institutional data that was required for the inventory included budget, population and physical size data. The Office of Financial Management and Budget provided the Operating Budget; the Office of Facilities Management provided the Energy Budget; the Office of Institutional Research, Planning, and Effectiveness provided population data; and the Office of Finance and Business provided data for physical size. The data for the Scope 1 emissions was provided by the Office of Facilities Management and by the Office of Administrative Services and Grounds. Information for Scope 2 emissions were provided by the Office of Facilities Management.

Scope 3 Information came from various sources. Commuting figures were derived from a combination of institutional data and estimates about transportation behaviors. The Office of Institutional Research, Planning, and Effectiveness provided the population data that was used in the calculation for commuter miles. Within our mileage calculate assumptions were made on the amount of students that commute to campus (calculated by percentages derived from a campus wide survey); the number of times that a student, faculty or staff member travels to campus each week, the amount of weeks per year that faculty, staff, or student travel to campus and the average number of commuting miles (calculated from

survey and parking permit data). A comprehensive transportation survey was conducted in the fall of 2009 which garnered commuting patterns for the university. The percentages on modes of transportation and average distance travelled derived from this study were inputed in the Clean Air Cool Planet commuting calculator to determine the number of miles travelled and GHG emissions. In 2009, faculty and staff combined traveled approximately 14,043,098 by car and 554,333 by bus, emitting a total of 5,814 $MTeCO_2$. Students traveled approximately 7,810,500 miles by car and 5,029,200 by bus, emitting a total of 4,433 $MTeCO_2$.

Waste figures were provided by the Grounds Department. Wastewater figures were provided by the Office of Energy Management. Paper use figures were gathered from our Purchasing Department as reported for Executive Order 4. Transmission and delivery losses due to purchased electricity were calculated automatically by the CACP based on reported electricity usage.

An area of Scope 3 not included in the UAlbany inventory is academic travel. It was discovered that data did not exist to track the number of miles that employees travel for university-related business. Only the dollar amounts of travel are recorded with no indication of the destination. Since it would be a large undertaking to piece together the employee travel, it was decided to eliminate this section of the inventory at this time. Additionally, it was decided that since employee travel data was not included, study abroad travel data would also not be included. While it would be fairly feasible to obtain this data, it was determined that this would create an inequity in reporting activities of the campus population, unduly singling out student but not employee travel.

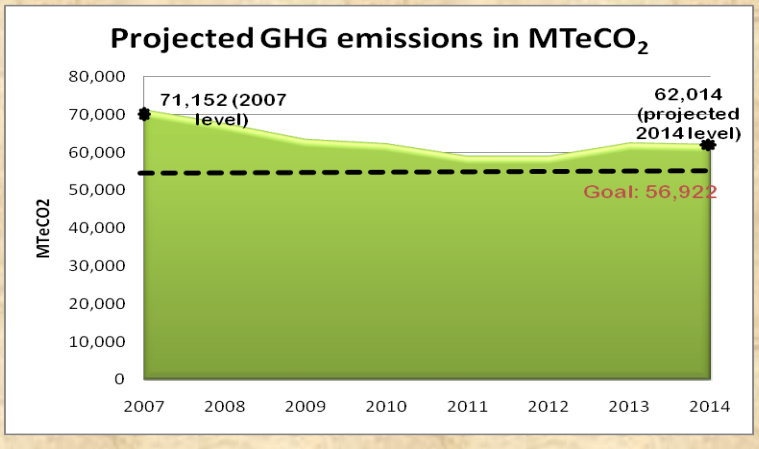
In 2009, the university made its first purchase of renewable energy credits and carbon offsets. These were made to account for the electricity and heat use of the campus administrative building, University Hall. Further details on the methodology are in Appendix E.

4. Reduction targets

Over the last few years, there has been growing efforts to create carbon reduction targets on the state, national and international levels. These include the previously discussed Kyoto Protocol, Copenhagen Accord, Executive Order 24, American Clean Energy and Security Act and EPA actions. At the state level two definitive targets have been set which would apply to the University at Albany. The first was developed under the SUNY Plan issued in November 2007 and the second is Governor Paterson's executive order issued in August 2009. These two mandates, detailed below, will serve as our guide in cutting carbon emissions over the next several decades.

SUNY Plan

Target reduction: 20% carbon reduction from 2007 levels by 2014.

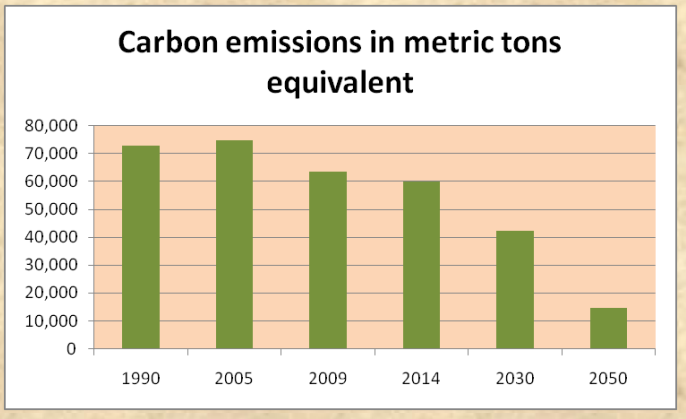


This plan calls for a 20% reduction in current (at that time 2007) GHG levels by 2014 and a 37% reduction in energy use (BTU/SF basis) from 1990 levels by 2010. A copy of this plan can be found in Appendix H. We have determined our 2007 baseline data in order to mark our progress towards a 20% reduction goal by 2014. Future emissions were projected to include expected decreases from planned efficiency projects and expected increases due to expansion on campus. This trend is illustrated in Appendix F. This shows that our emissions in 2007 equaled 71,152 $MTeCO_2$. A 20% reduction sets a goal of 56,922 $MTeCO_2$. Current estimates predict that the university will emit 62,014 $MTeCO_2$ in 2014, which would make us short of our goal. However, this amount will vary depending on the accuracy of estimates, the energy use and source mix of new buildings and unanticipated efficiency or renewable energy projects, making the 20% goal within reach.

Executive Order 24

Target reduction: 80% carbon reduction from 1990 levels by 2050.

In August 2009, Governor David Paterson issued Executive Order 24 which calls for an 80% reduction of carbon emissions from 1990 levels by 2050. A copy of this directive is in Appendix I. This is a highly aggressive goal that is in line with what environmental scientists recommend to avoid irreversible climatic changes. Appendix G calculates the level of carbon emissions in MTeCO2 for the university to meet this order along with other relevant targets. As this illustrates, a drastic reduction will need to be achieved in order to comply with this goal. This implies future energy and electricity use based on non-carbon sources (i.e. renewable).and/or the purchase of carbon offsets and renewable energy credits as the university will not be able to reach an 80% decrease from the combination of efficiency projects and behavioral changes. Further analysis on how to achieve this reduction will need to be undertaken.



ACUPCC carbon neutrality requirements

As signatories of the ACUPCC commitment, the university has pledged to take interim actions to reduce carbon emissions, calculate and track our greenhouse gas emissions, and develop a carbon neutral plan. Even reaching the target of Executive Order 24, the university will still need to reduce its carbon emissions by 14,568 metric tons to achieve zero carbon emissions (assuming all scope 3 emissions currently calculated are included).

American College & University Presidents Climate Commitment

In order to continue to develop a climate action plan, a more comprehensive definition of carbon neutrality for the university will need to be determined. This will include decisions on what emissions to calculate and include in our inventory. Currently Scope 1, 2 and 3 emissions are incorporated. The university may choose to include only those activities over which the university has direct control. There will also need to be a determination as to whether emissions from academic travel should be calculated and included. Under the current methodology, facilities that are not under the direct management of the institution are not included in the GHG inventory. For UAlbany, this would include the activities of the College of Nanoscale Science and Engineering as well as the East Campus. If these entities are included, a recalculation of the inventory would occur, an increase in the reduction necessary would take place and carbon reduction initiatives in line with our targets would need to be put in place by the administration and facility managers of those campuses. Finally, while the university is affected by the guidelines set out in the SUNY Plan and Executive Order 24, it has the opportunity to set more aggressive targets with an accelerated date of reaching carbon neutrality.

5. Recommendations

There are a variety of actions that can be taken to achieve carbon neutrality which will come from a combination of sources. These include the implementation of conservation measures and educational programming, energy efficiency projects, onsite renewable power and electricity generation and the purchase of carbon offsets, renewable energy credits and green energy. The applicability of these will need to be examined in order to prioritize and implement effective strategies. The aggressive carbon reductions targets will require a university-wide approach with significant financial and human investment. A portfolio approach towards payback should be taken when implementing actions. Focus should not just be on financing the low hanging fruit or those with a quick payback, but simultaneously addressing and investing in those carbon neutral techniques with longer term requirements in order to have those initiatives in development for the time when the projects with quick returns run out.

To fully develop a comprehensive sustainability plan that will incorporate our climate action goals, the Office of Environmental Sustainability and Office of Energy Management are recommending the formation a formal sustainability and climate action plan. Specifically this would include:

- Establishing the sustainability and climate action plan as a directive of the President's office.
- Convening a steering committee that will oversee the development of the plan. This should have diverse representation from senior staff, faculty, administrative staff and students. Sub committees should be formed in addition to this group to develop strategies for major sustainability components.
- Financing a consultant to guide the process and create the document. The consultant will report to and take directives from the steering committee. As part of their duties, the consultant will:
    - Host charrettes to develop shared values and visions, hold town halls and/or discussion forums to gather input from a wider range of university participants and develop an electronic medium for communicating and gaining input.
    - Provide life cycle costing and estimated carbon reductions from action items identified within the plan and help prioritize implementation items.
    - Review existing and concurrent studies, such as the lighting master plan, landscaping master plan, energy master plan, facilities master plan and the high performance building guidelines and coordinate them with the goals of the climate action plan. Updates to completed plans should be made if necessary.
- Identifying financing streams to fund action items.
- Ensuring that widespread dissemination of this plan with specific responsibilities and timelines for implementation are developed across the university departments and divisions.
- Developing a process whereby interim reports on carbon reductions are presented to senior staff and the campus community ensuring appropriate reflection and identifying corrective measures to reach goals.

6. Areas of Action to reduce carbon emissions

There exists a myriad of options to work towards creating a carbon neutral campus. Those implemented will be determined within the formal planning process. Specifically, identifiable action items should be developed in the following areas:

- Buildings
- Educational campaigns
- Environmental landscape
- Energy
- Food and dining
- Information Technology
- Purchasing
- Transportation
- Waste diversion
- Water use

Rather than identifying specific actions, which would be one of the goals of our sustainability and climate action plan, this section seeks to identify special challenges that the university should examine in order to develop and strengthen sustainability programs and create a carbon neutrality roadmap. One of our main challenges will be to develop strategies that will more aggressively incorporate renewable energy techniques that have zero carbon emissions. Given that our power plant currently relies on fossil fuels and the university purchases nearly all of its electricity as part of a buying group, these present our most significant challenges to carbon neutrality. The higher cost of renewable energy systems, technical limitations and little to no control over our electric generation mix hinder our ability to achieve significant carbon reductions. Addressing our source of energy and electricity sources provides us the greatest opportunity to lower our carbon footprint. This will be even more apparent as we continue to build and expand on our campus. On a related noted, we will be challenged to preserve and utilize the green space we have remaining in order to maintain a connection to our ecosystem for our campus community.

The university also faces challenges that have larger sustainability implications but less potential for carbon reductions. One of these issues is reducing the amount of waste sent to the landfill and increasing our recycling rates. Specifically, the university needs to implement techniques that divert food waste from the landfill. A trickier challenge is affecting behavioral change. Increased resources are needed to provide effective communication and training on sustainability initiatives to ensure they are implemented effectively. Success in this area can reap benefits by helping to achieve carbon reductions in many areas through higher recycling rates, lower waste rates, lower energy and water consumption. In addition, a concerted effort on encouraging less reliance on single occupancy vehicles when commuting to campus and educating about the alternative options can achieve a more significant decrease in our footprint as commuting is the third largest source of our carbon emissions. A comprehensive sustainability plan will help guide the growth of our campus community to one that is aware of and expects environmentally responsible behavior from its members. A final challenge is to better identify the purchasing behaviors of our employees and develop processes that support a culture that makes better environmental decisions when purchasing products.

7. Complementary Actions

In addition to those items that directly affect our operational aspects, it is important that the university also seek to teach and research sustainability and include this as part of our outreach. These principles are in line with the SUNY wide strategic plan that seeks to "teach, learn and serve." As with the previous section, the specifics of these concepts should be further developed within a comprehensive sustainability plan but a brief examination of the potential areas that will contribute to increased knowledge on reducing carbon emissions is provided. The following areas are highlighted:

- Curriculum development
- Research
- Student life (residential life, athletics, student organizations)
- Special events
- Community engagement
- Governmental relations
- Investments

Much of our past efforts have focused on sustainable operations leaving these complementary actions relatively undeveloped. Yet, these are very important in helping to lay the ground work, investigate emerging possibilities and provide a culture of support for sustainable practices. We face challenges in developing interdisciplinary academic collaborations in sustainability as well as identifying and highlighting our current research in the field. Burgeoning efforts have begun within student life and special sustainability events are being established but these have barely begun to meet their potential. We are unable to fully advocate our needs or conduct quality outreach programs due to lack of resources. Our investment decisions should also be in line with our sustainability initiatives.

Sustainability is not one person's job or a task to be checked off a list but a shared value that we all must seek to achieve. Carbon neutrality will only happen with careful thought, debate and consideration. The recommendations contained within this document will help put us on the path to creating a culture of awareness, participation and responsibility towards our environment and drafting a plan that will provide for a carbon neutral university.

8. Notes

a. Petra, Greta. “UAlbany’s Uptown Campus; a work of art.” *UAlbany Magazine.* Spring 2007. Magazine on-line. Available from http://www.albany.edu/pr/ualbanymagspring07/UAlbanysUptownCampus.pdf. Accessed on 20 August 2009.

b. United Nations Environment Programme website. Accessed on 17 August 2009 at http://www.unep.org/

c. Intergovernmental Panel on Climate Change (IPCC) website. Accessed on 20 August 2009 at http://www.ipcc.ch/

d. Sulfur Hexafluoride-Science Reference. *Science Daily*. Accessed on 21 August 2009 at http://www.sciencedaily.com/articles/s/sulfur_hexafluoride.htm

e. United Nations Framework on Climate Change website. Accessed on 17 August 2009 at http://unfccc.int/2860.php

f. American College and University Presidents Climate Commitment. (2007) *Implementation Guide,* V.1.0, p. 6

g. Clean Air-Cool Planet website. Accessed online 21 August 2009 at http://www.cleanair-coolplanet.org/about/

h. American College and University Presidents Climate Commitment. (2007) *Implementation Guide,* V.1.0, p. 11

i. Greenhouse Gas Protocol Initiative website. Accessed online 17 August 2009 at http://www.ghgprotocol.org/standards/corporate-standard

The climate action plans for the following campuses were reviewed for reference in compiling this report:

*Binghamton University
College of the Atlantic
Middlebury College
Oberlin College
State University of New York College of Environmental Science and Forestry
State University of New York at Fredonia
State University of New York at Geneseo
State University of New York at Oswego
State University of New York at Purchase
**Stony Brook University
**University at Buffalo
University of California at Berkeley
**University of California at Irvine
**University of California at Santa Barbara
**University of California at Santa Diego
*University of Colorado at Boulder
*University of Connecticut
University of Florida
*University of Hawaii at Manoa
University of Maryland
**University of Oregon
University of Wisconsin at Osh Kosh
*University of Vermont
Yale University

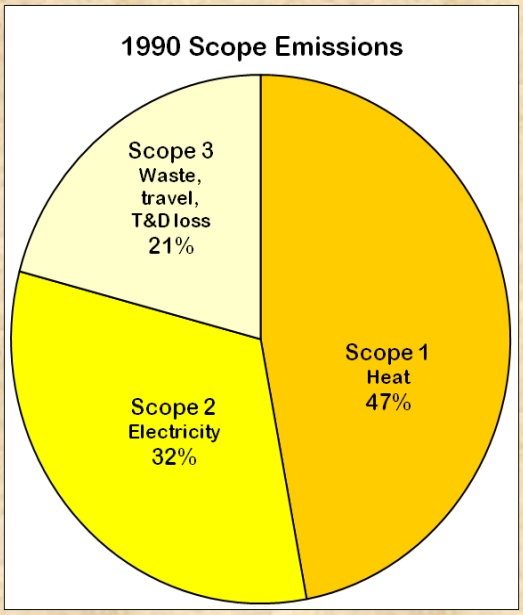
* indicates a peer institution
** indicates aspirational peer

9. Appendices

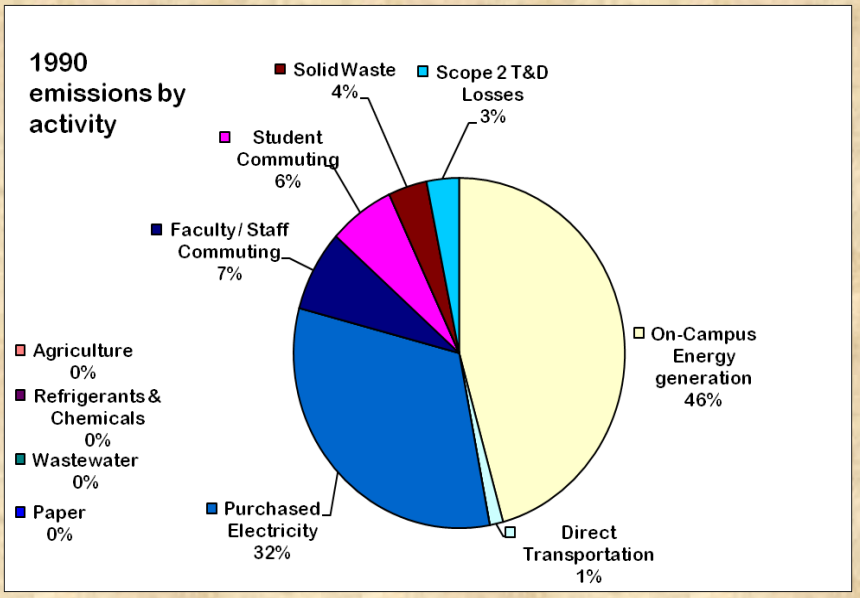
Appendix A: 1990 GHG Emissions

WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	University at Albany					
Select Year -->	1990	Energy Consumption	CO_2	CH_4	N_2O	eCO_2
		MMBtu	kg	kg	kg	Metric Tonnes
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	Other On-Campus Stationary	447,177.9	33,159,155.8	4,366.7	248.0	33,342.2
	Direct Transportation	13,144.0	936,593.3	129.5	46.8	953.8
	Refrigerants & Chemicals	-	-	-	-	-
	Agriculture	-	-	-	41.1	12.2
Scope 2	Purchased Electricity	316,208.3	23,319,090.8	217.7	239.2	23,395.8
	Purchased Steam / Chilled Water	-	-	-	-	-
Scope 3	Faculty / Staff Commuting	74,502.8	5,249,111.6	1,041.8	356.2	5,381.3
	Student Commuting	64,713.7	4,591,366.8	740.1	260.7	4,687.6
	Directly Financed Air Travel	-	-	-	-	-
	Other Directly Financed Travel	-	-	-	-	-
	Study Abroad Air Travel	-	-	-	-	-
	Solid Waste	-	-	110,031.4	-	2,750.8
	Wastewater	-	-	-	0.4	0.1
	Paper	-	-	-	-	-
	Scope 2 T&D Losses	31,273.3	2,306,283.7	21.5	23.7	2,313.9
Offsets	Additional					-
	Non-Additional					-
Totals	Scope 1	460,321.8	34,095,749.1	4,496.1	335.9	34,308.2
	Scope 2	316,208.3	23,319,090.8	217.7	239.2	23,395.8
	Scope 3	170,489.9	12,146,762.1	111,834.9	641.0	15,133.7
	All Scopes	947,020.0	69,561,602.0	116,548.8	1,216.1	72,837.7
	All Offsets					-
					Net Emissions:	72,837.7

Scope emission percentages



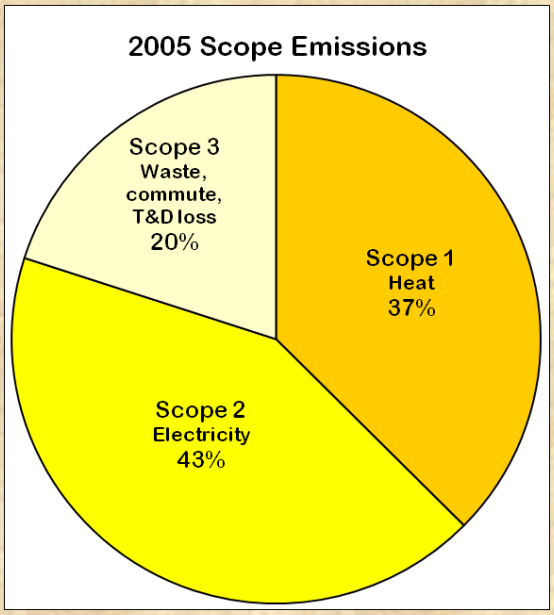
Percentages of emission variables within each scope



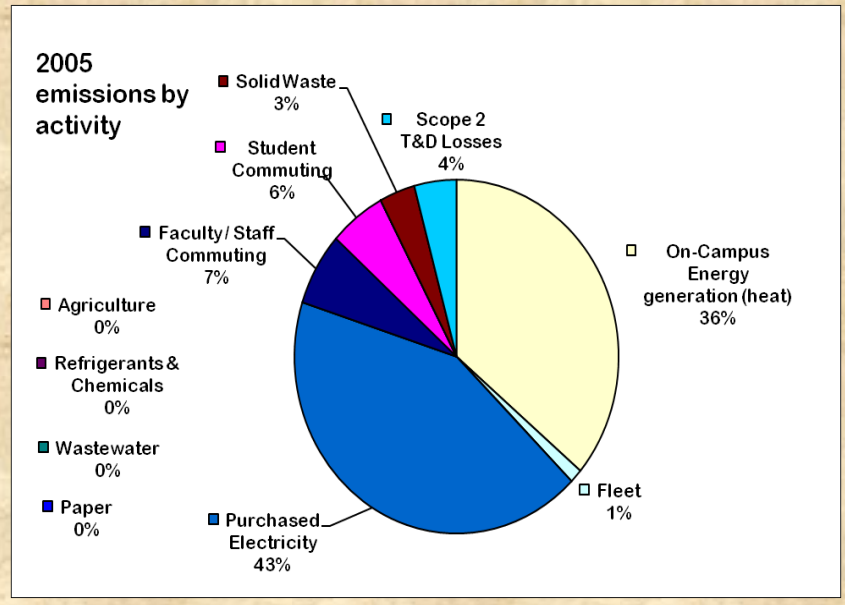
Appendix B: Base year 2005 GHG Emissions

WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	University at Albany					
Select Year -->	2005	Energy Consumption	CO_2	CH_4	N_2O	eCO_2
		MMBtu	kg	kg	kg	Metric Tonnes
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	Other On-Campus Stationary	510,762.1	26,995,338.9	2,708.1	55.3	27,079.5
	Direct Transportation	13,178.7	937,272.5	126.8	46.3	954.2
	Refrigerants & Chemicals	-	-	-	-	-
	Agriculture	-	-	-	-	-
Scope 2	Purchased Electricity	430,397.0	31,740,055.4	296.4	325.6	31,844.5
	Purchased Steam / Chilled Water	-	-	-	-	-
Scope 3	Faculty / Staff Commuting	69,371.3	4,868,076.0	956.6	330.0	4,990.3
	Student Commuting	58,129.6	4,113,345.4	651.0	231.5	4,198.6
	Directly Financed Air Travel	-	-	-	-	-
	Other Directly Financed Travel	-	-	-	-	-
	Study Abroad Air Travel	-	-	-	-	-
	Solid Waste	-	-	106,307.1	-	2,657.7
	Wastewater	-	-	-	0.4	0.1
	Paper	-	-	-	-	-
	Scope 2 T&D Losses	42,566.7	3,139,126.4	29.3	32.2	3,149.5
Offsets	Additional					-
	Non-Additional					-
Totals	Scope 1	523,940.8	27,932,611.3	2,834.9	101.5	28,033.7
	Scope 2	430,397.0	31,740,055.4	296.4	325.6	31,844.5
	Scope 3	170,067.7	12,120,547.7	107,944.1	594.1	14,996.2
	All Scopes	1,124,405.5	71,793,214.4	111,075.3	1,021.2	74,874.4
	All Offsets					-
					Net Emissions:	74,874.4

Scope emission percentages



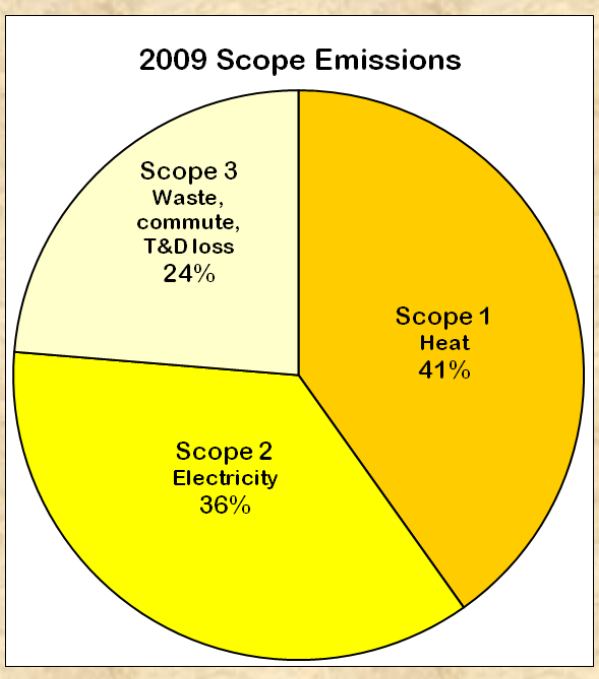
Percentages of emission variables within each scope



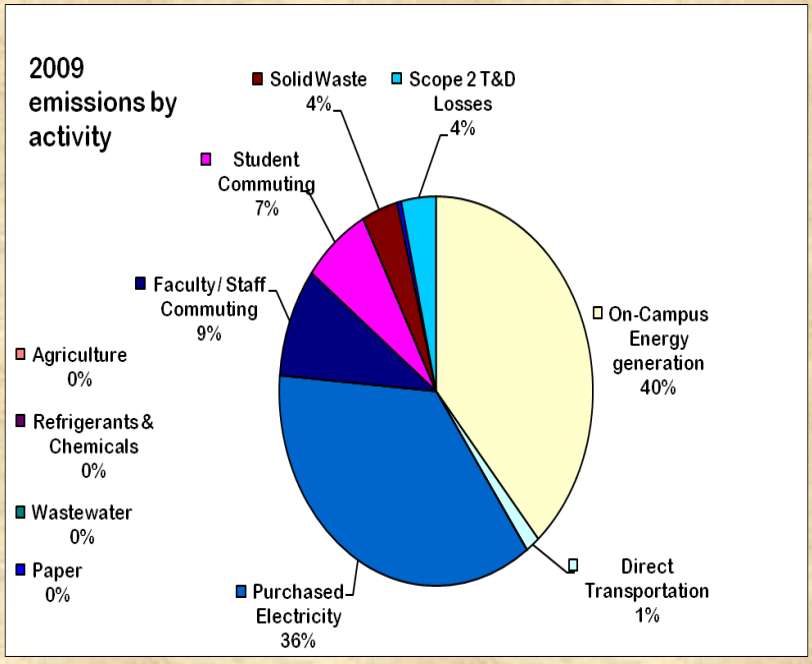
Appendix C: 2009 GHG Emissions

WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	University at Albany					
Select Year -->	2009	Energy Consumption	CO_2	CH_4	N_2O	eCO_2
		MMBtu	kg	kg	kg	Metric Tonnes
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	Other On-Campus Stationary	462,308.0	24,702,779.3	2,523.2	57.2	24,782.9
	Direct Transportation	12,992.4	910,331.7	119.5	44.0	926.4
	Refrigerants & Chemicals	-	-	-	-	-
	Agriculture	-	-	-	52.6	15.7
Scope 2	Purchased Electricity	290,247.6	23,040,282.4	258.9	284.5	23,131.5
	Purchased Steam / Chilled Water	-	-	-	-	-
Scope 3	Faculty / Staff Commuting	80,828.1	5,672,044.6	1,114.6	384.5	5,814.5
	Student Commuting	61,377.3	4,343,156.5	687.4	244.4	4,433.2
	Directly Financed Air Travel	-	-	-	-	-
	Other Directly Financed Travel	-	-	-	-	-
	Study Abroad Air Travel	-	-	-	-	-
	Solid Waste	-	-	94,427.1	-	2,360.7
	Wastewater	-	-	-	0.4	0.1
	Paper	-	-	-	-	276.2
	Scope 2 T&D Losses	28,705.8	2,278,709.2	25.6	28.1	2,287.7
Offsets	Additional					-
	Non-Additional					(677.6)
Totals	Scope 1	475,300.4	25,613,111.0	2,642.7	153.9	25,725.0
	Scope 2	290,247.6	23,040,282.4	258.9	284.5	23,131.5
	Scope 3	170,911.2	12,293,910.3	96,254.7	657.5	15,172.4
	All Scopes	936,459.2	60,947,303.7	99,156.3	1,095.8	64,029.0
	All Offsets					(677.6)
					Net Emissions:	63,351.4

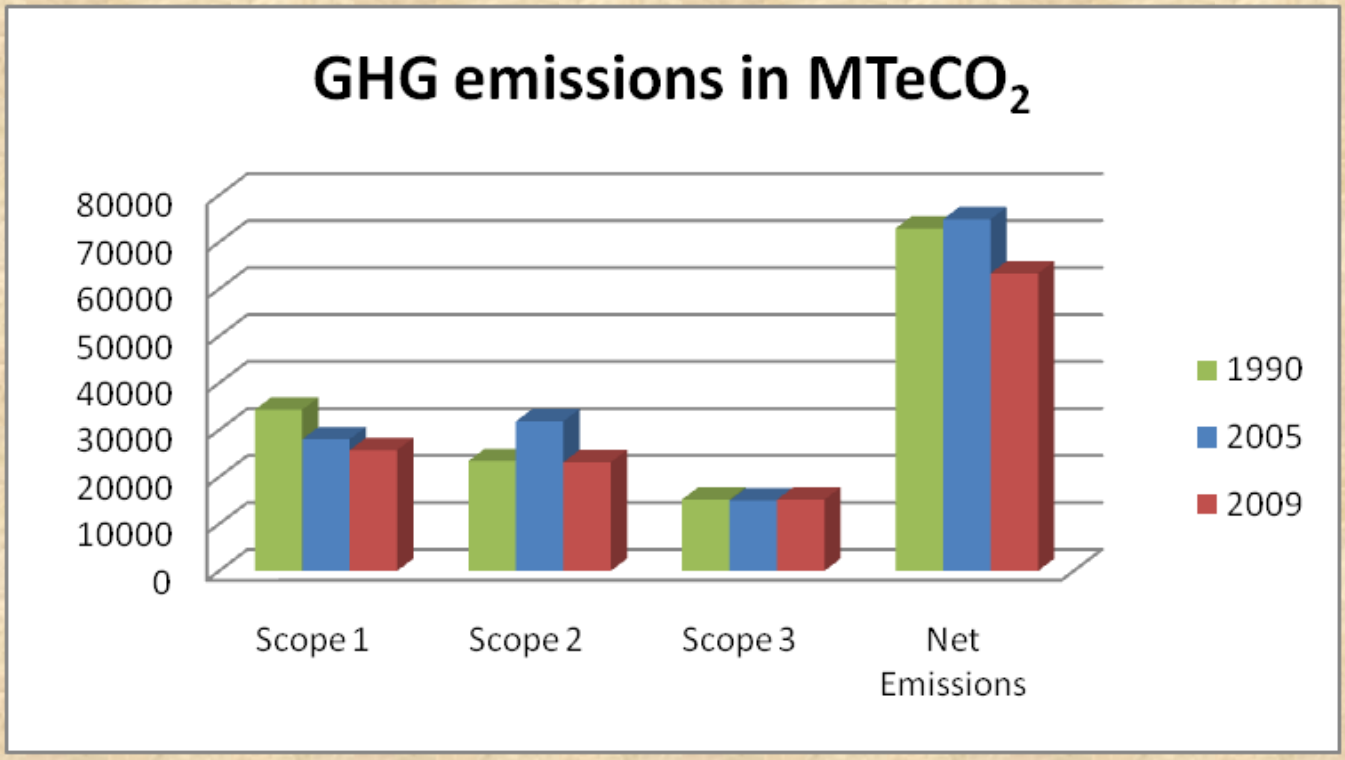
Scope emission percentages



Percentages of emission variables within each scope



Appendix D: Comparison of GHG emissions between 1990, 2005 and 2009



Scope emissions in $MTeCO_2$	1990	2005	2009	% change from 1990 to 2009	% change from 2005 to 2009
Scope 1	34,308	28,034	25,725	-25%	-8%
Scope 2	23,396	31,845	23,132	-1%	-27%
Scope 3	15,134	14,996	15,172	0%	1%
Total	72,838	74,875	64,029	-12%	-14%
Offsets	0	0	678	N/A	N/A
Net emissions	72,838	74,875	63,351	-13%	-15%

Source emissions in $MTeCO_2$	1990	2005	2009	% change from 1990 to 2009	% change from 2005 to 2009
Heat	33,342	27,080	24,783	-26%	-8%
Fleet	954	954	926	-3%	-3%
Electricity	23,396	31,845	23,132	-1%	-27%
Employee commuting	5,381	4,990	5,815	8%	17%
Student commuting	4,688	4,199	4,433	-5%	6%
Waste	2,751	2,658	2,361	-14%	-11%
T & D losses	2,314	3,150	2,288	-1%	-27%

Appendix E: Methods and Source of Data Collection for GHG Inventory

Institutional Data

Budget

Denise Hoecker, Associate Director for Financial Management and Budget provided the operating, research and energy budget data.

Population

Bruce Szelest with the Office of Institutional Research, Planning, and Effectiveness provided the initial information for the University's population. The faculty and staff data were used as is. However, the population data for the faculty and staff were not available for all of the fiscal years. Missing population data was estimated using the data from the previous and post fiscal years. An average was found between the two and the corresponding number was used for each missing set of faculty and staff population. The Nanotech and East Campus population were not included. The student population data for Nanotech and the East Campus were taken out of the total population data for each fiscal year using undergraduate and graduate enrollment information for the individual programs within each of the schools. The enrollment data used for this was found on the homepage of Office of Institutional Research, Planning, and Effectiveness.

Physical Size

Stacy Stern, Assistant to the Vice President, Division of Finance and Business provided research/non-research square footage data. Nanotech and the East Campus square footage were not included in final data.

Scope 1 Data

Energy

Indu, University Energy Officer for Facilities Management provided data for fuel consumption and purchasing by type. This usage and energy budget includes Uptown campus (incl. CESTM), Downtown campus and Whiteface but excludes Nanotech, East Campus and Empire Commons. Data for Empire Commons was only available for 2005 -2008 and 2009 will be added when that is available. We did not input data for an on-campus Cogeneration Plant because at this time, the University at Albany does not have or utilize the services of a cogeneration facility.

On-Campus Cogeneration Plant(s)

Currently, the university does not use any energy from a co-generation plant (Residual Oil #5-6, Distillate Oil #1-4, LPG, Coal/Steam, Incinerated Waste, Wood Chips, Wood Pellets, Grass Pellets, Residual BioHeat, or Distillate BioHeat).

On-Campus Stationary Sources

The university uses or has used Natural Gas and Residual Oil #6 and Distillate Oil #2, and LPG. We do not use: Coal/Steam, Incinerated Waste, Wood Chips, Wood Pellets, Grass Pellets, Residual BioHeat, or Distillate BioHeat.

Direct Transportation Sources-University Fleet

Angelo Chrisomalis and Vincent Marini, Facilities Management and Administrative Services- provided the fleet information including fleet vehicles by fuel type: gas, diesel, natural gas, E85, biodiesel blends, and electric.

Refrigerants & Chemicals

John C. McCormick, Refrigeration Shop Supervisor, provided information on refrigerant use in chillers and coolers. This data was concluded to have such a minimal impact (de minimis emission) that it was excluded from our calculations.

Agriculture Sources-Fertilizer

Nancy Dame and Tim Reilly from the grounds department provided information for fertilizer usage on campus.

The percentage of nitrogen in the fertilizer was estimated by Mary Ellen Mallia, the Director of Environmental Sustainability. The concentration was derived from the weighted average of all applications of the different nitrogen concentrations.

Agriculture Sources-Animal Husbandry

Agriculture data was not included because the University at Albany does not currently have an animal husbandry program.

Scope 2 Data

Purchased Electricity, Steam, and Chilled Water

The University at Albany only purchases electricity. Electricity is purchased by Joe Fox, SUNY Administration, Director of Energy, Planning, and Management. Indu, the University Energy Officer, provided the data on purchased electricity.

Scope 3 Data

Commuting

A comprehensive transportation survey, tracking the commuting modes, patterns and behavior was completed in the fall of 2009. This provided the percentage of modal travel and average commute information. The assumptions as to the frequency of commuter travel ais as follows:

1. Students traveled to school 4 days a week, 30weeks/year, 10 miles round trip..

2. Faculty traveled to school 4 days a week, 30 weeks/year, 30 miles round trip

3. Staff traveled to school 5 days a week, 50 weeks/year, 30 miles round trip.

Directly Financed Outsourced Travel and Study Abroad Travel

Air Travel mileage related to academic endeavors such as conferences for faculty and staff and students studying abroad were not included in the inventory.

Lauren Effinger, who tracks all the billing from academic travel through our travel agencies, was consulted on data gathering for academic travel. All employees of UAlbany must book travel through the agencies to get reimbursed. Unfortunately, billing only gives cost of travel but does not indicate where the person is traveling to and from. Therefore, it is extremely difficult to track mileage in this category.

Per conversations with Ray Bromley, head of the study abroad program, current mileage from travel is not tracked. The office does maintain data on the number of students studying abroad and their country of travel. Therefore, it would be possible to calculate the mileage from study abroad. However, given that faculty and staff academic travel was not going to be included, it was decided to not include study abroad travel. The belief behind this decision is that either all types of academic travel should be included or none so as to not single out one sector of the university. This philosophy applied to other areas of the calculator as well. For example, all forms of commuting were included and not simply faculty/staff commuting.

Reason for not including the air travel mileage:

1. Difficulty in getting accurate data (especially in the case of academic travel)

2. The goal is to measure and target those categories which we wish to reduce. While the University will promote the use of teleconferencing, webinars and other avenues for employee enrichment, we do not wish to discourage this form of travel. We also do not wish to discourage the experience of studying abroad, which does not have a viable alternative.

Solid Waste

Tim Reilly, Head of Grounds, provided data and type of landfill disposal method.

Data was calculated based off of Albany County Landfill Contract measurements.

Data on waste for 2005:

Data was received from Tim Reilly during the time period 12/04 to 6/05. The total for these months were added together to achieve a result of 1,332 tons. An estimate of waste for the months of July, August, Sept, Oct and November was made in the following manner. The total of 7/05 to 11/05 was generated (1,005 tons). Given the trend of a 10% increase in waste from previous data, it was estimated that there would be 10% less waste between 7-11/05. Therefore 100 tons was subtracted from 1,005 with a remainder of 905 tons. This was added to the 1,332 from 12/04-6/05 to obtain a final number of 2237 tons for 2004 fiscal year.

Wastewater

Indu, University Energy Officer/Facilities Management, provided wastewater usage. The university does not measure waste water, but assumes it to be equal to the city water it uses. This information is derived from the water bills issued by the City of Albany based on water meter readings. Tim Reilly, Head of Grounds, provided type of water filtration method.

Paper

Alicia Kowsky, Graduate student collected the information on paper use on campus in 2008 and Mary Ellen Mallia calculated the use of paper in 2009. The purchasing office collects data on the dollar value of the paper purchased for our EO 4 report (NYS Executive Order 4). This data is segregated into virgin and recycled content. The varieties of paper will vary between offices.

To determine the pounds for each type (0% and 30% recycled content), the dollar value was obtained from the EO 4 report. This was divided by the price per case to obtain the number of cases purchased. The number of cases was then multiplied by the shipping weight per case to obtain the total number of pounds.

Offsets with Additionality

The university does not engage in on-campus composting or purchase carbon offsets. Alicia Kowsky analyzed data collected by George Robinson, professor of Biology. There exists on the equivalent of 88 acres of forested land on the uptown and downtown campus before 2006 and 70.4 acres after 2006, plus additional acreage at the Whiteface campus. (Note; in 2006, the Nanotech campus was developed, thus reducing the number of forested areas) These numbers were then translated into metric tons of CO2 using the following steps. Using 2,000 kg CO2/ha/yr, the number of kg of CO2 was calculated and translated to metric tonnes of CO2. This resulted in 57 metric tonnes after 2006 and 71 metric tonnes prior to 2006. However, these areas are not specifically set aside for forest preservation and do not meet the definition described in the Clean Air Cool Planet user's guide to be considered for inclusion in the inventory.

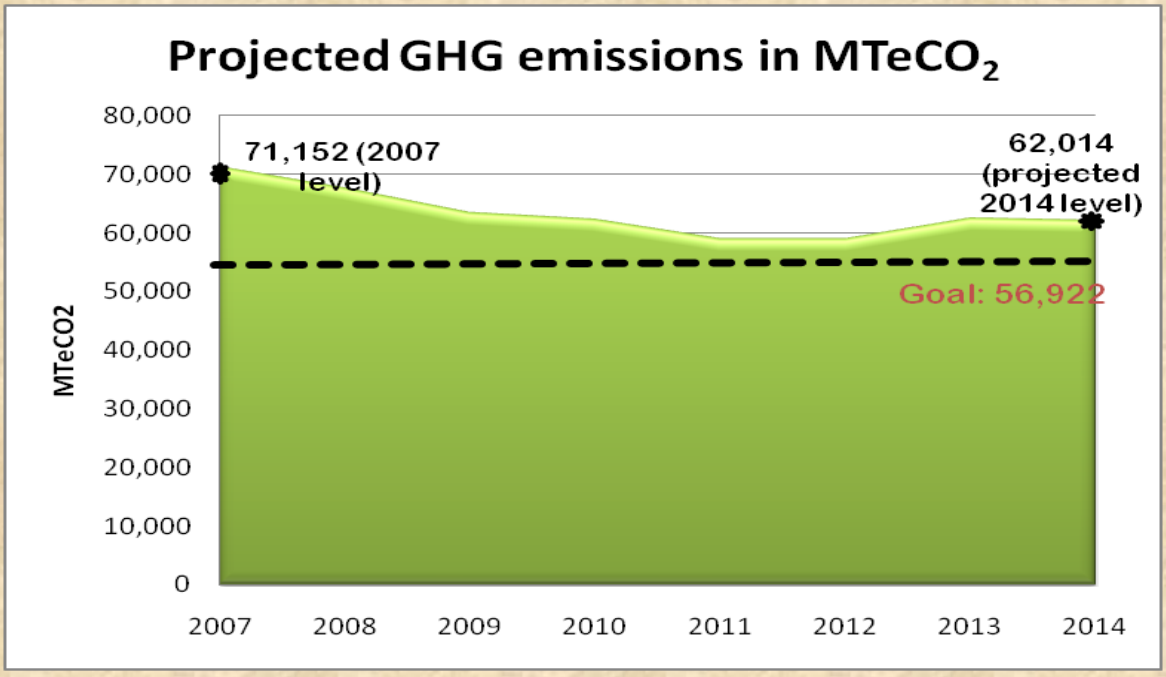
Non-Additional Renewable Energy Credits (REC)/ Offsets

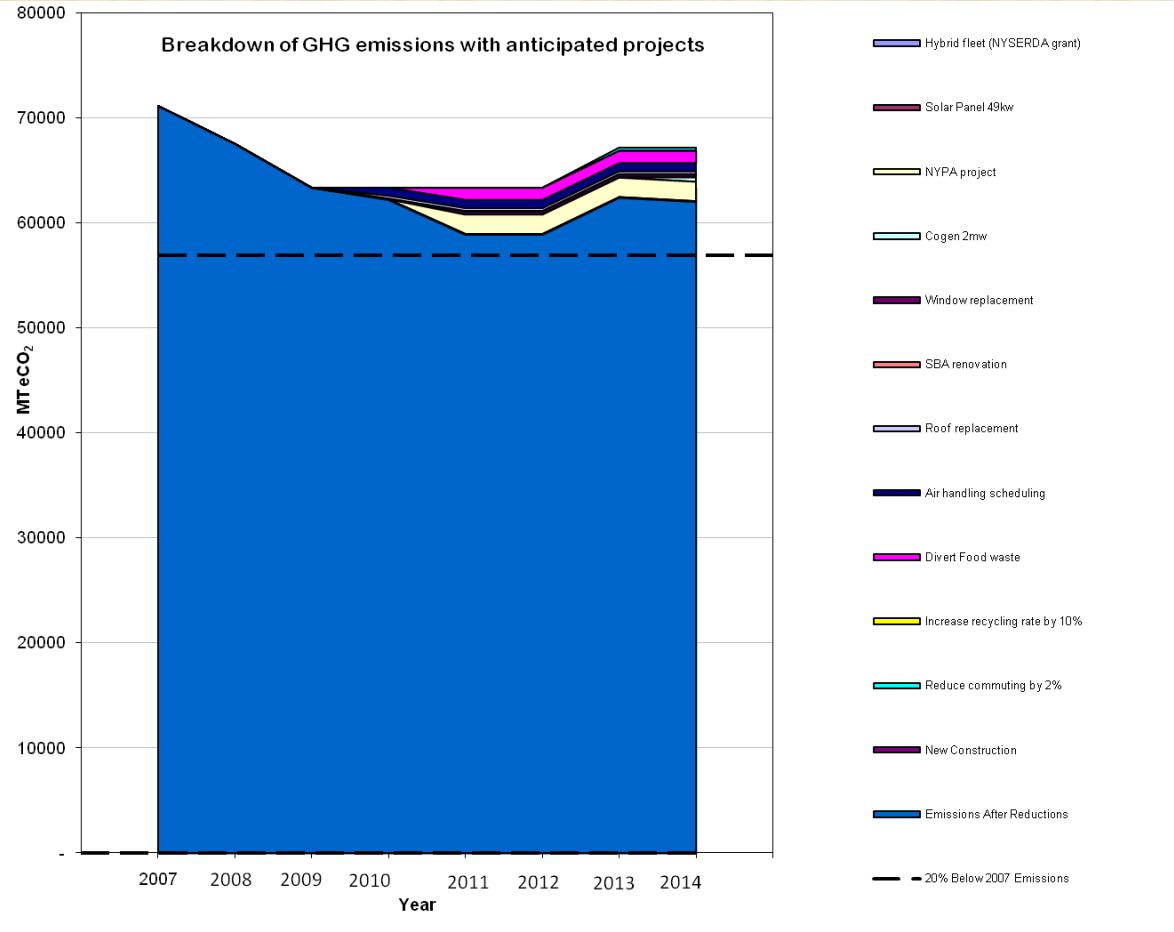
In 2009, the university made its first purchase of renewable energy credits and carbon offsets in accordance with the amount of electricity and heat used in the main administrative building on campus (University Hall). The amount of REC's and offsets were derived from the contract with the wind energy company from which the products were purchased.

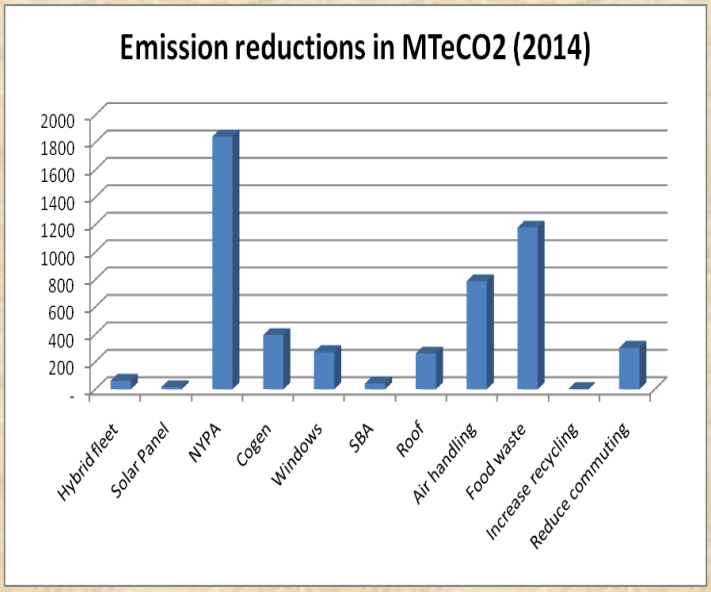
Appendix F: Emissions Projection 2007 – 2014, expected projects vs. cuts needed to meet SUNY Plan

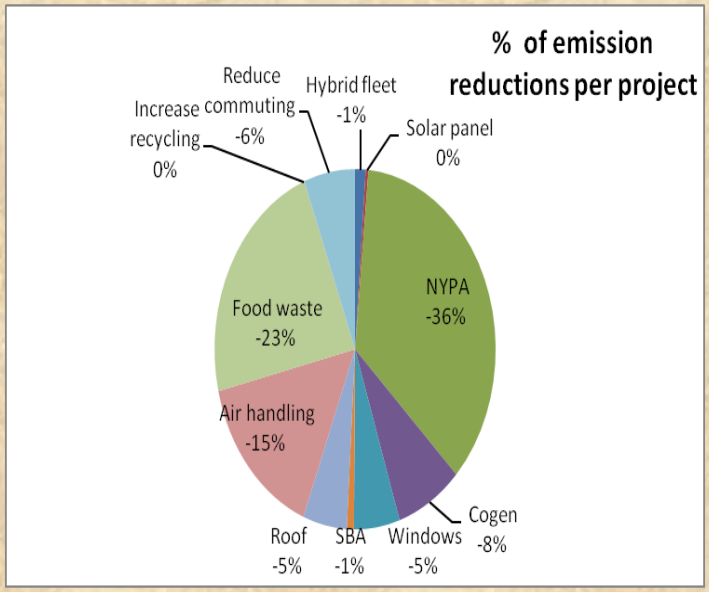
Projected Emissions 2007 to 2014
University at Albany
Table of planned projects and expected reductions

Project Name	2007	2008	2009	2010	2011	2012	2013	2014
Hybrid fleet (NYSERDA grant)	-	-	-	(61.99495)	(61.99495)	(61.99495)	(61.99495)	(61.99495)
Solar Panel 49kw	-	-	-	-	(16.41221)	(16.41221)	(16.41221)	(16.41221)
NYPA project	-	-	-	-	(1842.168)	(1842.168)	(1842.168)	(1842.168)
Cogen 2mw	-	-	-	-	-	-	-	(395.0848)
Window replacement	-	-	-	-	(271.4967)	(271.4967)	(271.4967)	(271.4967)
SBA renovation	-	-	-	(41.92066)	(41.92066)	(41.92066)	(41.92066)	(41.92066)
Roof replacement	-	-	-	(260.9129)	(260.9129)	(260.9129)	(260.9129)	(260.9129)
Air handling scheduling	-	-	-	(787.7862)	(787.7862)	(787.7862)	(787.7862)	(787.7862)
Divert Food waste	-	-	-	-	(1178.571)	(1178.571)	(1178.571)	(1178.571)
Increase recycling rate by 10%	-	-	-	-	-	-	(1.178571)	(1.178571)
Reduce commuting by 2%	-	-	-	-	-	-	(303.2384)	(303.2384)
New Construction	-	-	-	-	-	-	3823.6323	3823.6323
Total reductions				(1152.615)	(4461.263)	(4461.263)	(4765.68)	(5160.764)
Additional annual reduction				(1152.615)	(3308.648)	-	(304.417)	(395.0848)
Additional annual increase				-	-	-	3823.6323	-
Projected Emissions	71,153	67,545	63,351	62,198	58,890	58,890	62,409	62,014



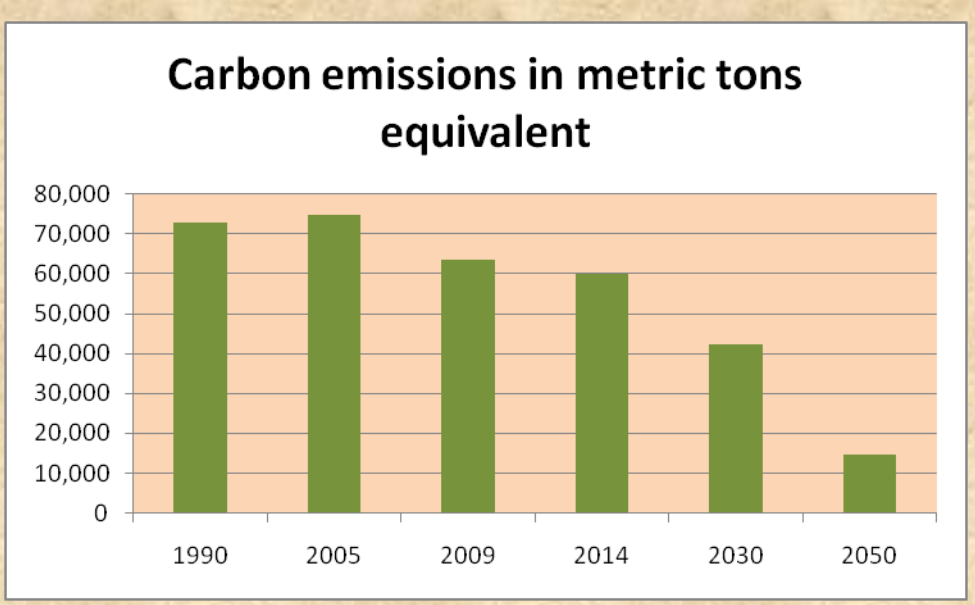

Breakdown of GHG emissions with anticipated projects
80000
70000
60000
50000
40000
30000
20000
10000
-
MT eCO2
2007
2008
2009
2010
2011
2012
2013
2014
Year
Hybrid fleet (NYSERDA grant)
Solar Panel 49kw
NYPA project
Cogen 2mw
Window replacement
SBA renovation
Roof replacement
Air handling scheduling
Divert Food waste
Increase recycling rate by 10%
Reduce commuting by 2%
New Construction
Emissions After Reductions
20% Below 2007 Emissions


Emission reductions in MTeCO2 (2014)
2000
1800
1600
1400
1200
1000
800
600
400
200
-
Hybrid fleet
Solar Panel
NYPA
Cogen
Windows
SBA
Roof
Air handling
Food waste
Increase recycling
Reduce commuting


% of emission reductions per project
Reduce commuting -6%
Hybrid fleet -1%
Increase recycling 0%
Solar panel 0%
NYPA -36%
Food waste -23%
Air handling -15%
Cogen -8%
Roof -5%
SBA -1%
Windows -5%

Appendix G: Emissions level required from 1990 to 2050 to meet Executive Order 24 and other targeted goals

Carbon neutrality targets			
Year	$MTeCO_2$ emissions or target	Reduction goal	Significance of year
1990	72,838	n/a	EO 24 base year
2005	74,874	n/a	University base year
2009	63,351	n/a	Current year
2014	59,922	20%	SUNY plan target reduction
2030	42,246	42%	Copenhagen accord target reduction
2050	14,568	80%	EO 24 target reduction
TBD	0	100%	Carbon neutrality



STATE UNIVERSITY OF NEW YORK

ENERGY AND SUSTAINABILITY POLICY

I. INTRODUCTION

Based on the recommendations of the University Strategic Energy Planning Task Force, this establishes the State University of New York's Policy on Energy Conservation and Sustainability.

The supply of oil and natural gas is dwindling, greatly increasing costs and making prices volatile. The environmental damage from air pollution and greenhouse gases is changing world climates and adversely affecting society. The State University of New York must take action now to reduce its environmental impact and assume a national leadership in the transformation to sustainability through its actions, teaching, research, and the analysis and enactment of good public policy.

II. MISSION/OBJECTIVE

SUNY will assume a national leadership role in energy sustainability, education, technology, economics, and public policy through the integration of practice, teaching, and research. SUNY will meet and exceed the requirements of Executive Orders 111 and 142.

III. GOALS

A. **Conservation and Sustainability:**

1. Reduce energy use to lowest level possible. By 2010 reduce energy use in buildings by 37% as compared to FY 89-90 on a BTU/sq. ft. basis. (Campus specific goals are attachment A)
2. Cap green house gas emissions to current levels and reduce emissions of carbon dioxide by 20% by 2014.
3. Increase the use of renewable electricity (purchased or generated on-site) to 30% by 2014.
4. Increase the use of bio diesel to 10% of total usage by 2008.
5. Increase the use of bio heating oil to 10% of number 2 oil use by 2010.
6. Develop five new combined heat and power projects by 2010.
7. Design new buildings and rehab existing ones in accordance with Leadership in Energy and Environmental Design (LEED) silver rating, higher standards are encouraged.
8. Procure energy and fuel at competitive prices, while managing price risk.
9. Continue to take a proactive role in rate cases before the New York State Public Service Commission and the Federal Energy Regulatory Commission, to protect the University's interests.

B. **Transformational Opportunities:**

1. Advance SUNY's educational mission in energy and the environment.
   a. Academic Programs - Develop and expand energy related curriculum and cross-disciplinary programs.
   b. General Education - Develop curriculum within campus general education programs related to energy and the environment.
   c. K-12 Teacher Education - Support Teacher Education Programs to strengthen their offerings in the energy-environment area.
   d. Work Force Training - Develop academic programs at the technical level through Continuing Education Programs to meet the needs of SUNY, energy service companies, regulators, and Local Delivery Companies.
   e. Raising Awareness - Utilize capabilities of the University to educate students, faculty, staff, local community and global community about the nexus between energy and the environment.
2. Expand energy related research to achieve national leadership in the development and use of renewable energy.
3. Build strategic alliances with public and private sector partners by providing research and analysis to regulators, elected officials, private industry, and New York's citizens.

C. **Management and Planning:**
1. Use SUNY's size and individual campus expertise to the benefit of all campuses. Encourage and facilitate cooperation regarding best practices, campus based initiatives, and externally funded projects
2. Procure energy and fuel at competitive prices while managing price risk in accordance with a prudent, clearly defined, and documented University Risk Management Policy that utilizes financially sound market based products.
3. Take a proactive role in rate cases before the New York State Public Service Commission and the Federal Energy Regulatory Commission to protect the University's interests.

IV. EXECUTION

A. Energy Conservation and Sustainability plans and procedures will be based on attachment B Energy Conservation and Sustainability Implementation Plan. Reporting on mile stones will be to SUNY Energy Office.

B. Transformational Opportunities planning and reporting will be developed on campuses and coordinated with the Office of the Provost.

Appendix I: Executive Order 24

State of New York

Executive Chamber

No. 24

EXECUTIVE ORDER

ESTABLISHING A GOAL TO REDUCE GREENHOUSE GAS EMISSIONS EIGHTY PERCENT BY THE YEAR 2050 AND PREPARING A CLIMATE ACTION PLAN

WHEREAS, an emerging scientific consensus recognizes that the increased concentration of carbon dioxide in the atmosphere, along with other heat-trapping greenhouse gasses, resulting from the combustion of fossil fuels and other human sources, warms the planet and changes its climate; and

WHEREAS, many scientists warn that unmitigated climate change is expected to result in significant adverse impacts to our communities, economy and environment; and

WHEREAS, according to the scientific assessments of the United Nations Intergovernmental Panel on Climate Change, and other work, substantial reductions in greenhouse gas emissions by mid-century have the potential to minimize the most severe climate change impacts currently predicted; and

WHEREAS, the reduction of global warming and limitation of climate change effects requires a collaborative, international effort to reduce the emission of greenhouses gases around the globe; and

WHEREAS, New York and other states should work collaboratively with the federal government to develop and implement plans and policies that will achieve reductions in greenhouse gas emissions in the United States; and

WHEREAS, expanding and advancing energy efficiency and renewable energy projects will reduce greenhouse gas emissions and create new jobs; and

WHEREAS, New York State has demonstrated leadership in this effort by undertaking actions such as:

- Executive Order No. 2 (2008): Establishing a State Energy Planning Board and Authorizing the Creation and Implementation of a State Energy Plan;
- Executive Order No. 4 (2008): Establishing a State Green Procurement and Agency Sustainability Program;
- Creation of the Governor's Smart Growth Cabinet;
- Adoption of goals and practices for energy efficiency and green building technology in State buildings, and for the use of biofuels in State vehicles and buildings;

- Creation of the New York State Office of Climate Change in the New York State Department of Environmental Conservation;
- Participation in the Regional Greenhouse Gas Initiative, a ten-state cooperative effort to reduce greenhouse gas emissions from electric power plants by means of a cap and trade system;
- Creation of an Energy Efficiency Portfolio Standard, which is intended to reduce the State's electricity consumption by 15 percent below projected levels by 2015, complementing the State's System Benefit Charge and Renewable Portfolio Standard;
- The formation of a Renewable Energy Task Force and a Sea Level Rise Task Force;
- Collaboration with other northeastern and mid-Atlantic states on the development of a regional low carbon fuel standard;
- Establishment of a "45 x 15" Initiative, which set a goal to meet 45% of New York's electricity needs through improved energy efficiency and clean renewable energy by 2015;
- Adoption of regulations establishing greenhouse gas exhaust emission standards for motor vehicles;
- Enactment of legislation requiring new motor vehicles to bear labels disclosing information to consumers about vehicle greenhouse gas emissions;
- Enactment of legislation establishing "green" residential and State building programs;
- Enactment of legislation expanding the State's "net metering" laws, allowing increased development of renewable energy by electricity customers;
- Enactment of Legislation expanding energy efficiency and clean energy initiatives of the New York Power Authority to public entities; and
- Investment of billions of dollars by the New York State Energy Research and Development Authority, the New York Power Authority and the Long Island Power Authority in existing, expanded and new energy efficiency and renewable energy programs; and

WHEREAS, it is appropriate to build upon the important environmental benefits obtained through these actions and to establish a State-wide goal for the reduction of greenhouse gasses, and to develop a plan that enables New York to participate fully in the national and international efforts to combat climate change.

NOW, THEREFORE, I, David A. Paterson, Governor of the State of New York, by virtue of the authority vested in me by the Constitution and laws of the State of New York, do hereby order as follows:

1. It shall be a goal of the State of New York to reduce current greenhouse gas emissions from all sources within the State eighty percent (80%) below levels emitted in the year nineteen hundred ninety (1990) by the year two-thousand fifty (2050).

2. There is hereby created a Climate Action Council ("Council") consisting of the Commissioners of Agriculture and Markets, Economic Development, Environmental Conservation, Housing and Community Renewal, and Transportation; the Chairs of the Public Service Commission, and Metropolitan Transportation Authority; the Presidents of the New York State Energy Research and Development Authority, Long Island Power Authority, New York Power Authority and Dormitory Authority of the State of New York; the Secretary of State; the Director of the Budget; the Director of State Operations; and the Counsel to the Governor. The Director of State Operations shall serve as the Chair of the Council.

3. The Council shall prepare a draft Climate Action Plan on or before September 30, 2010. The Council shall hold regional public comment hearings on the draft Plan, and shall allow at least 60 days for the submission of public comment. Thereafter, the Council shall prepare a final Climate Action Plan which shall be reviewed and, if warranted, adjusted annually by the Council.

4. In aspiring to meet the greenhouse gas emission reduction goal, the Council, in preparing the Climate Action Plan, shall:

a. inventory greenhouse gas emissions within the State, including the relative contribution of each type of emission source;

b. identify and assess short-term and long-term actions to reduce greenhouse gas emissions and adapt to climate change across all economic sectors, including industry, transportation, agriculture, building construction and energy production;

c. identify and analyze the anticipated reductions, and the economic implications thereof, as a result of each action;

d. identify the anticipated life-cycle implications, consequences, benefits and costs of implementing each action, including implications, consequences, benefits and costs to the State, local governments, business and residents from implementation of each option and action;

e. identify whether such actions support New York's goals for clean energy in the new economy, including specific short-term and long-term economic development opportunities and disadvantages related to greenhouse gas emission reductions and the development and deployment of new and emerging technologies and energy sources;

f. coordinate its activities with the State energy planning process of the State Energy Planning Board;

g. identify existing legal, regulatory and policy constraints to reducing greenhouse gas emissions, assessing the impacts of climate change, and adapting to climate change, and recommend ways to address any such constraints;

h. establish estimated timelines for considering and implementing actions; and

i. undertake such actions, and compile such additional material, as deemed appropriate by the Council in carrying out its responsibilities under this Order.

5. Members of the Council may designate an executive staff member to represent them and participate on the Council on their behalf, subject to the approval of the Chair. A majority of the members of the Council shall constitute a quorum, and all actions and recommendations of the Council shall require approval of a majority of the total members or their representatives.

6. The entities represented on the Council are authorized to provide the primary staff and other resources that are necessary for the Council to comply with this Order. In addition, every other agency, department, office, division and public authority of this State shall cooperate with the Council and furnish such information and assistance as the Council determines is reasonably necessary for it to comply with this Order.

7. The Council may convene advisory panels to assist or advise it in areas requiring special expertise or knowledge.

8. The Climate Action Plan is not intended to be static, but rather a dynamic and continually evolving strategy to assess and achieve the goal of sustained reductions of greenhouse gas emissions.

GIVEN under my hand and the Privy Seal of the State in the City of Albany this sixth day of August in the year two thousand nine.

BY THE GOVERNOR

/s/ Lawrence Schwartz

Secretary to the Governor

/s/ David A. Paterson