July
2012

2011 Greenhouse Gas Inventory

Jamestown Community College

A GHG inventory is a tool to record overall emissions resulting from an institutions daily operations, identify sources of those emissions, and track progress toward reducing them over time. Recognizing this, SUNY Jamestown became a signatory to the American College & University Presidents Climate Commitment on April 23rd, 2008. The commitment requires the college to develop and implement strategies to reduce GHG emissions. This inventory identifies, quantifies, and categorizes sources of GHG emissions at all three campuses of Jamestown Community College.

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Executive Summary

Following the advice that, 'You can't manage what you don't measure', this edition of the SUNY Jamestown Greenhouse Gas Inventory is the result of an effort to build upon the work done on the initial GHG Inventory in 2008. The intent was to formalize the collection of data for more precise tracking of college emissions using consistent and repeatable processes. In addition, every effort was made to collect data for 2009 and 2010 to have a complete set of data from the 2008 baseline inventory through 2011. The purpose of this approach was two-fold: to simplify the collection of data in a way that is accurate and less burdensome than a bi-annual inventory, and to capture the data for at least the major emission sources to produce trending from 2008 to the present. This approach should allow us, with minimal effort, to report the trending going forward on a regular basis.

The following table outlines the college's 2011 GHG emissions by sector and compares current emissions with the 2008 baseline data.

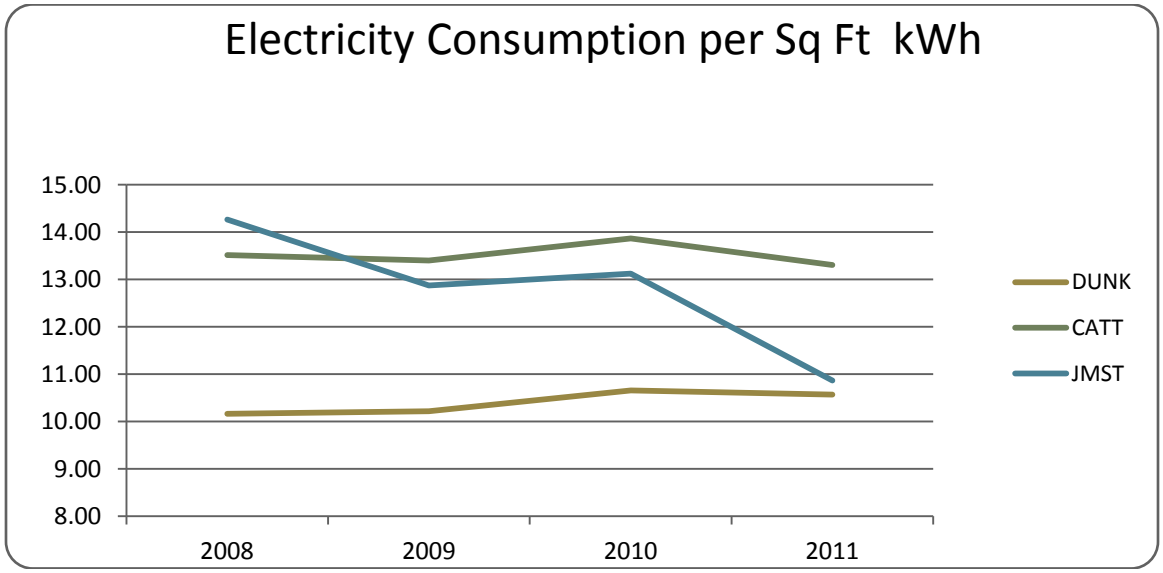
	Metric Tons of CO_2 Equivalent		Percent of Total 2011 Emissions
Scope 1	2008	2011	
On campus stationary (Natural Gas)	1863.2	2064.2	20%
Direct Transportation (Campus Fleet)	93.7	106.7	1%
Fertilizer Application:	0.1	1.1	< 1%
Refrigerants (R-22):	166.6	31.2	< 1%
Scope 2			
Purchased Electricity:	4522.3	2442.7	24%
Scope3			
Faculty and Staff Commuting:	1234.1	1093.9	11%
Student Commuting	6426.3	4058.2	39%
Directly Financed Air Travel	10.9	123.8	1%
Directly Financed Outsourced Travel:	37.6	6.2	< 1%
Solid Waste:	30.9	128.4	1%
Paper	41.3	80.3	< 1%
Scope 2 T&D Losses	447.3	241.6	2%
Total	14874.3	10378.2	100.00

At first glance, it appears that a reduction over four years of 4496 tons of e CO_2 would be cause for celebration. However, most of that reduction can be attributed to a different method for collecting commuting mileage and a more accurate measure of the emissions of purchased electricity.

The previous inventory used a survey to estimate commuter mileage, whereas the most recent inventory employed a method of using student, faculty, and staff data files and a mileage estimate calculated from the distance between home zip code and primary campus zip code. Since we do not believe any real progress was made in ride sharing or use of alternative transportation gasoline consumption will directly correlate with enrollment. The new data is lower only because it is more accurate.

When calculating the emissions from purchased electricity, we assumed the previous inventory used the fuel mix for the NYUP region, which is the default in the Carbon Calculator for our area. However, BPU purchases only 85% of its supply from the NYUP grid, with the other 15% generated by their natural gas turbines. Since JCC purchases 70% of its electricity from BPU, a custom fuel mix was used in the 2011 inventory providing a more accurate representation of JCCs carbon emissions.

There is good news in the data. Actual electricity consumption was reduced by 3% since 2008 college-wide. This is an especially positive improvement when you consider that three new buildings were added to the Jamestown campus since the last inventory (two residence halls and the Science Center). Electricity consumption per 1000 square feet (an ACUPCC metric) shows the Jamestown campus reduced electricity per square foot use by 24% and JCC as a whole by 18%.

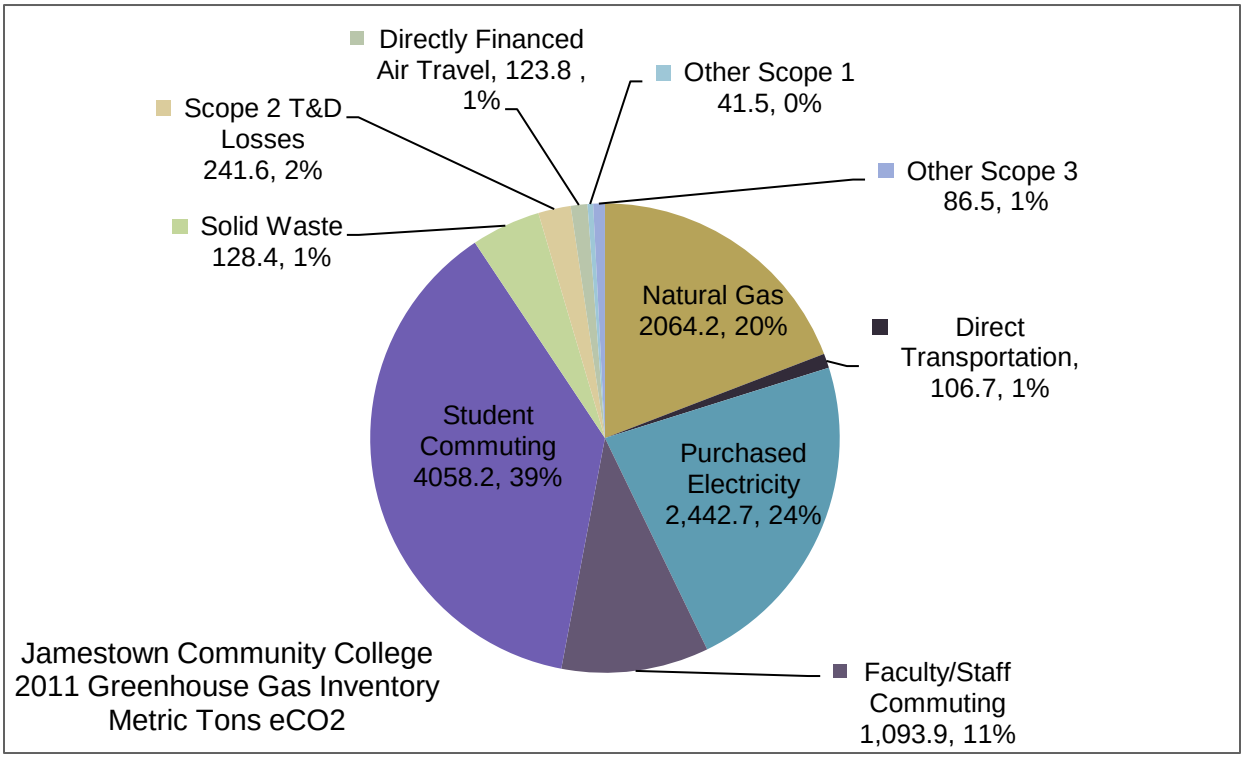


Analysis needs to be done to determine what percentage of the drop can be attributed to energy conservation measures and what percentage is due to the relative efficiency of newer construction.

Natural gas usage for heating shows an overall increase of 30% since 2008. Part of this increase can be attributed to the new construction on the Jamestown campus. But the measure of MBTU per square foot, which equalizes the effect of the construction, still shows an increase of 7% over 2008. Natural gas usage for heating is more dependent on weather than electricity use and the winter of the 2011 inventory was particularly cold. Data for the 2012 inventory is not complete but the trend indicates that 2012 will show a reduction from 2011 and be more in-line with consumption totals of 2008.

The commuting emissions caused by daily travel to and from campus by faculty, staff, and students, though not directly under the control of the college, are still a very large percentage (50%) of total emissions and an area of concern.

The following graph shows the percentage breakdown of emissions by major category. It clearly indicates, as did the 2008 inventory, the three major sources of GHG emissions that need to be addressed.



The results of the 2011 inventory cast JCC in a favorable light when compared to similar institutions in New York. This can be attributed to the good work of the faculty and staff, and especially Building and Grounds, in promoting sustainable practices and implementing energy conservation measures that have a direct impact on reducing GHG emissions.

College	MT CO_2e/ student
Monroe Community College	1.4
Broome Community College	3.0
Jamestown Community College	3.4
Onondaga Community College	3.5
Tompkins Cortland Community College	4.0
Sullivan County Community College	4.6
SUNY Geneseo	4.9
Finger Lakes Community College	5.5
Alfred State College	6.0
SUNY Fredonia	7.2

However, the purpose of the inventory is to measure emissions and their reduction resulting from concrete and transformational actions. The reductions measured by JCC over the past four years are largely the result of improved data collection. Those tangible actions that did result in reducing emissions have been relatively painless changes in building operations such as more efficient lighting and HVAC controls. Using highly efficient construction methods for the new buildings was effective and commendable, but we cannot build our way to sustainability. If Jamestown Community College is to meet its American College and University President's Climate Commitment of carbon neutrality by 2030, just 18 years from now, much more has to be done to reduce emissions from commuting, electricity usage, and natural gas consumption for heating. That work needs to begin in 2013.

Acknowledgements

Completing the Greenhouse Gas Inventory for SUNY Jamestown Community College required participation from various operational areas and departments throughout the college. The GHG Inventory Project Team would like to thank the following individuals for their contribution to the inventory data collection and reporting process.

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Overview of Methodology

Introduction

Jamestown Community College and the President's Climate Commitment

On April 23, 2008, SUNY Jamestown Community College signed the American College and University's President's Climate Commitment (ACUPCC). With this signing, the college undertook a greenhouse gas (GHG) inventory for 2008 that serves as the baseline for all future inventories and a measure against which all energy reduction is compared. Also mandated by the commitment is the development of a comprehensive Climate Action Plan documenting the institutional plans, interim goals, deadlines, energy conservation measures, and tracking systems for achieving climate neutrality — reducing or offsetting all greenhouse gas production to create a "neutral" effect on global warming. The original Climate Action Plan was completed in 2009 and updated in 2010.

This inventory serves as the basis for measuring GHG emissions since 2008, and this report examines which actions undertaken by the college since then have had a positive or negative effect on emissions. It will also serve as the basis for updating the college's Climate Action Plan. The inventory was conducted by identifying sources of GHG emissions across all three campuses. These data were then converted to a common unit of measure, equivalent metric tons of CO_2, using the Clean Air-Cool Planet (CA-CP) Campus Carbon Calculator program. The Campus Carbon Calculator uses standard methodologies codified by the GHG Protocol Initiative, and employed by corporations, the state of California, The Climate Registry, and other entities to account for greenhouse gas (GHG) emissions. These methodologies are currently the most accurate and widely accepted amongst policy makers. The Calculator is also a preferred tool for the ACUPCC (American College and University President's Climate Commitment).

GHG Accounting and Reporting Principles

In order to conduct a truthful, fair, and consistent inventory of the college's GHG emissions the recommendation of the Association for the Advancement of Sustainability in Higher Education (AASHE) of using the Clean Air-Cool methodology was utilized. Certain principles were accepted as boundaries for whether to report various categories. These principles are as follows:

1. **Relevance**: Ensure that the GHG inventory appropriately reflects GHG emissions and serves the decision-making needs of users—both internal and external.

2. **Completeness**: Account for and report all GHG emission sources and activities within the defined inventory boundary.
3. **Consistency**: Using consistent methodologies to allow for meaningful comparisons of emissions over time.
4. **Transparency**: Address all relevant issues in a factual and coherent manner, based on clear data.
5. **Accuracy**: Ensure that the quantification of GHG emissions is neither systematically overstating nor understating your true emissions.

The Six Greenhouse Gases

As required by the ACUPCC, the college must report emissions of all six internationally-recognized greenhouse gases regulated under the Kyoto Protocol:

1. Carbon dioxide (CO_2);
2. Methane (CH_4);
3. Nitrous oxide (N_2O);
4. Hydrofluorocarbons (HFCs);
5. Perfluorocarbons (PFCs);
6. Sulfur hexafluoride (SF_6).

The commodities used by the college, such as gasoline, fertilizer, natural gas, and waste paper either directly emit GHG when used or are a source of GHG as they degrade such as in landfills. Each of these greenhouse gases has a different Global Warming Potential (GWP). The concept of a global warming potential (GWP) was developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The definition of a GWP for a particular greenhouse gas is the ratio of heat trapped by one unit mass of the greenhouse gas to that of one unit mass of CO_2 over a specified time period. Methane (CH_4), for example, has 21 times the capacity to trap heat in the atmosphere compared to carbon dioxide.

The composition of the various materials input into the Carbon Calculator are broken out by the calculator and converted into a common measure of equivalent metric tons of CO_2 or eCO_2. This is also referred to as MT CO_2e.

Inventory Scope

As is standard in the practice of GHG inventories for institutions like SUNY Jamestown, the calculations of greenhouse gases were organized into three levels, or scopes, to increase transparency and facilitate fair comparisons.

The CA-CP Campus Carbon Calculator was very helpful in discovering the sources of GHG emissions. It breaks down scopes 1, 2, and 3 into source categories. The following are the standard definitions for these scopes and the source categories at SUNY Jamestown.

Scope 1 refers to direct GHG emissions occurring from sources that are owned or controlled by the institution. For SUNY Jamestown, this includes the following:

- On campus combustion of natural gas for heating
- Refrigerants (specifically HCFC-22 or R-22) used primarily in air conditioning
- Chemicals containing hydrocarbons used in laboratories
- College Vehicle Fleet gasoline and diesel fuel combustion
- Fertilizer application across campuses

Scope 2 refers to indirect emissions generated in the production of electricity consumed by the institution.

- Purchased electricity

Scope 3 refers to those indirect emissions that are a consequence of the activities of the institution. This included the following:

- Commuting to and from the campuses by students, faculty and staff
- Directly financed outsourced travel
- Solid waste
- Paper
- Scope 2 Transmission & Distribution losses (calculated)

Source: CA-CP Carbon Calculator User Guide

Organizational Boundaries

When completing an inventory, organizational boundaries must be determined to identify which buildings and spaces are to be included in the inventory. In this case, SUNY Jamestown chose to complete this inventory using the control approach; more specifically, the operational control approach. This means that all buildings and spaces over which the college has power of management over the daily activities of business are to be included in the inventory. Two new residence halls and the new science center built on the Jamestown Campus since the 2008 inventory have been included. The third residence hall that will be commissioned for the fall 2012 semester was not. It will be included in the next inventory.

Temporal Boundaries

A reporting year is the year in which the emissions occurred. In this case, the timeline for data gathered was September of 2010 through August of 2011. Because a majority of the emissions occurred within the year of

2011, the reporting year of this inventory is 2011.[1] In addition, data from the academic calendar years of 2009 and 2010 were collected wherever possible. Since this data was not comprehensive and required estimations in some areas they will not be considered full inventories and this report will only incorporate results from the 2011 inventory. However, data for the 'big three' emission sources, natural gas, electricity, and commuting was available in detail so trending of these emissions over a four year period starting with the baseline year of 2008 is possible and will be reasonably accurate.

Methodology

One student intern and the sustainability coordinator undertook the task of completing a total greenhouse-gas emissions inventory of the college. Using the 2008 inventory and the CA-CP Carbon Calculator as a guide, the data was collected in the following manner:

Collect the Data

1. Review and record utility consumption data from natural gas and electricity monthly invoices for all three campuses
2. Obtain an electronic data file of fall and spring semester student registrations and a current listing of faculty and staff on payroll including home zip code and primary campus. Using a data table and algorithms the estimated driving distances were calculated and tabulated into weekly mileage totals.
3. Contact relevant staff in various departments to identify sources of the materials listed below that are sources of GHG and review invoicing data in the Business Office from those sources to determine quantities.

Calculate Emissions

This data was then tabulated, checked for accuracy and consistency, then converted into standard units of measure. The data was then input into the Carbon Calculator spreadsheet which performs the conversion to determine the carbon content of the various materials into equivalent tons of CO_2.

Analyze and Summarize the Results

There is a brief analysis in this report but this process is on-going and needs to be conducted not only by the Office of Sustainability but all members of the college community.

[1] This timeframe was chosen because it follows the operating year of the college. A majority of the data available is listed by month and is therefore easy to process.

Current GHG Emissions by Scope

Scope 1 Emissions Sources

On-Campus Stationary Sources: Refrigerants

SUNY Jamestown currently uses multiple refrigerants to meet cooling demands, but only R-22 is considered an HCFC and should be included in this inventory. The college does not currently record information on refrigerant usage on campus or escaped emissions of refrigerants. Therefore, estimated escaped emissions of R-22 are based on a collection of work orders from the 2011 identified inventory timetable. These work orders are kept in Buildings & Grounds with invoices kept in the Business Office which list how much R-22 was purchased. It was assumed that what is added each year would be the escaped emissions for that same timeframe. The net R-22 added to the system during the 2011 inventory year was 52 lbs. This figure was then multiplied by the GWP number for R-22 and converted to $MTCO_2e$. R-22 has a GWP of 1700.

Total Refrigerants = 31.2 $MTCO_2e$, accounting for less than 1% of total.

Direct Transportation Sources: Vehicle Fleets

All direct transportation sources, including lawn care equipment, gasoline vehicles, and diesel fuel vehicles operated by Jamestown Community College comprise the Vehicle Fleets section. Emissions from vehicle fleets are based on total fuel consumption during the 2011 inventory year; these fuels emit carbon dioxide, methane, nitrous oxide, and hydro-fluorocarbons.

JCC uses Sunoco, Exxon Mobil, and other credit cards to purchase gasoline and diesel fuels for the vehicle fleet and lawn care equipment. The business office keeps a list of invoices from these credit cards, and from these invoices the total gallons of fuels purchased for the 2008 inventory year were summed. The buildings and grounds and staff assigned vehicles used a total of 11,434 gallons of gasoline and 456 gallons of diesel in the reporting year. The CA-CP calculator gave the following results:

Total Vehicle Fleet Emissions = 106.7 $MTCO_2e$; accounting for 1% of total emissions.

Building and grounds also operates several small electric vehicles and emissions from these also need to be included. However, since these vehicles never leave the campus and are charged from standard electric outlets these emissions are accounted from in the purchased electricity totals.

Chemicals

Lab chemicals, a common GHG emissions category in campus inventories, can potentially produce green house gases. Data on JCCs lab chemical disposal was provided courtesy of the senior lab technician. The amounts of lab chemicals that can potentially produce GHGs were found to be negligible and so were not included in the inventory. These chemicals were halogenated hydrocarbons and less than 300 ml was disposed of.

Fertilizer Application

Emissions from fertilizer application are based on the nitrogen content of each type and amount of fertilizer used on campus. JCC uses both synthetic and organic fertilizers but in very small quantities, typically only on the soccer fields. Sources of organic and inorganic fertilizer purchased, and therefore assumed to be used, were provided and invoices from those sources were viewed in the Business Office to determine quantities.

Most fertilizers are labeled with their chemical makeup using three numbers to represent the percentages of nitrogen (N), phosphorus (P), and potassium (K). So 15-10-10 fertilizer is 15% nitrogen. Using this percentage, the total N_2O emissions were calculated and converted to $MTCO_2e$.

Fertilizer = 1.1 $MTCO_2e$, accounting for less than 1% of total emissions.

Fertilizer application makes up such a small percentage of total GHG and N_2O emissions; it could be classified as an insignificant source.

Energy Suppliers

The office of Buildings & Grounds maintains records of the electric and natural gas consumption for the Jamestown, Cattaraugus (Olean), and North County (Dunkirk) campuses. In several cases there are two companies involved, one delivering the energy and another providing the energy. For example; Nation Grid delivers the electricity to the Dunkirk campus but the power is purchased from Constellation Energy. When delivery and source was divided we used quantities from the source supplier.

Jamestown	Olean	Dunkirk
Electric Supplier – Jamestown Board of Public Utilities	Electric Supplier- Constellation Energy	Electric Supplier – Constellation Energy
Natural Gas Supplier – National Fuel Resources	Natural Gas Supplier – National Fuel Resources	Natural Gas Supplier – National Fuel Resources

According to the concepts outlined in the paragraph on organizational boundaries, only those buildings under the control of JCC were included in the inventory. For example, the Warren Center was not included. Hillside North and South were included in this inventory but not the new residence hall, since it is still nearing completion. The buildings included are as follows:

Jamestown	Olean	Dunkirk
Collegiate Center	Library & Liberal Arts Center	North County Training Center
Hultquist Library	College Center	North County Center
Carnahan Center	Cutco Technology Center	
Arts and Science Center	Dresser Rand Training Ctr	
Manufacturing Technology Institute	Allied Health & Science Center	
Physical Education Complex		
Science Education Center		
Hillside Suites North		
Hillside Suites South		
Community Services Center		
Sheldon House		
President's House		

Based on the documents received from the office of Buildings & Grounds, it was determined that JCC used a total of 39,006 MMBTU of natural gas.

Natural gas is a scope 1 emission resulting from on-site combustion of the gas which resulted in the emission of 2,064 $MTCO_2e$ or less than 20% of total emissions.

Scope 2 Emissions Sources

Purchased Electricity

The primary Scope 2 emissions are from purchased electricity with two variables measured: total kilowatt hours consumed by the college and the fuel mix used in generating that electricity. The consumed power is tabulated from the monthly invoices from each of the electricity suppliers. The fuel mix is a more complicated variable and depends upon the electricity suppliers in the region or the fuel used if you generate your own electricity. The EPA maintains an annual survey of the source of power generation for each region and provides fuel mix table with the percentages generated by the various fuels from power plants in the region. These are listed on the eGRID website with percentages broken down by gas, oil, coal, solar, wind, biomass, hydropower, and nuclear. Jamestown Community College is located in the NYUP region. This region is favored with a 'clean' fuel mix compared to other regions of the country because of a large component of

hydropower from Niagara. In Jamestown, the Board of Utilities in 2011 purchased 85% of its electricity and generated the other 15% from a natural gas powered turbine. This data was used to produce a custom mix that was used to calculate the 2011 emissions.

Total Purchased Electricity Emissions = 7,223,858 kWh accounting for 2442.7 $MTCO_2e$ (23.5%) of total emissions.

The new Science Education Center on the Jamestown campus has solar photovoltaic panels on the roof generating electricity. Output from this source would normally be included as an offset. However, for the time period covered the panels were not connected to the grid and the offset could not be included in this inventory.

Scope 3 Emissions Sources

Student and Staff Commuting

For many colleges, commuting can be one of the largest sources of emissions. It can also be one of the most difficult sources to measure because commuting patterns are not controlled by the college itself. It is also the largest single source of emissions, so care must be taken to calculate the totals as accurately as possible. All emissions from commuting are an estimate. In order to obtain an accurate and consistent estimate, a methodology was applied that calculates the distance travelled based on the home address zip code of all students, faculty, and staff with different assumptions applied to each group.

Driving distance was calculated using a table created from the Google Maps average driving distance between the student/staff home zip code and the primary campus zip code. The college IT department and Institutional Research provided lists of all staff on payroll and semester students. Identified on these lists was the full or part time status, primary campus or workplace, and whether or not the students were on-campus residents.

Once the one-way mileage was calculated, assumptions were applied to each category based on:

1. Average distance traveled
2. Average number of trips per week
3. Average miles per gallon

Full-time fall and spring semester students were assumed to travel to school four times per week while part-time students traveled two during the 15 week semester. Summer students were assumed to travel only during 8

week sessions. Faculty and staff were assumed to travel to their primary workplace five times per week for full-time and three times per week for part-time staff and adjuncts. It was assumed faculty commute for 36 weeks and staff for 48 weeks. 22.1 miles per gallon was used and is the default from the Carbon Calculator and based on the national fuel economy average for light duty cars and trucks.

Every estimate includes inaccuracies and this one is no exception. However, this number is as close as can reasonably be obtained and the method is repeatable allowing the consistent measurement of data over time. As better data becomes available we can refine the assumptions and calculations. One assumption, that the number of students and staff who rideshare, walk, or take public transportation is minimal, will be challenged in the future. With 13 million total miles driven there is certainly room for improvement. Here, a survey of commuting patterns would be in order to determine what percentage use alternate transportation and there are plans to incorporate one in 2013.

Total Commuting Emissions = 5,152.4 $MTCO_2e$, accounting for of total of 50% of campus emissions.

Directly Financed Outsourced Travel

Travel by staff and faculty members at JCC produces a small but measurable amount of CO_2 and other GHGs. It was assumed that any travel reimbursed or paid for by the college falls within the ACUPCC mandated ownership boundaries. This includes all travel reimbursement for air travel, personal and rental cars for the 2011 inventory year. Also included was mileage from bus rentals for team sports travel. The business office keeps a record of all travel reimbursements as it is policy for all travel reimbursed to be reported and authorized by an administrative supervisor.

This section encompasses air, auto and train travel. Auto and air travel emissions are calculated in the same way as the Vehicle Fleet and Commuting sections. The total auto mileage reimbursed by the college was 2,950 miles. The total air travel reimbursed equals 159,406 miles. Rental bus travel was totaled at 20,373 miles.

Total Directly Financed Outsourced Travel Emissions = 130 $MTCO_2e$ or about 1% of total emissions.

Solid Waste

Waste disposal produces methane gas emissions during the decomposition of organic matter. Data on JCC's solid waste disposal was provided by invoicing records from Jamestown BPU, Westfield Disposal/ Casella Waste Systems

and SDS of Olean (an affiliate of Casella). The College coordinates with each of these sources for pickup and disposal of mixed solid waste. Volume is measured by the size of each container in cubic yards and the number of times per month the containers are emptied. It was assumed that on average, containers were 60% full. The cubic yardage of waste is then converted to tons using a national average estimate of 500 lbs of mixed solid waste per cubic yard.

The amount of solid waste can be cut by reducing the amount of packaging included with each product purchased, reducing the amount of products purchased, and by recycling. JCC instituted a single source recycling program which does reduce the volume of waste sent to landfills.

The table below lists the solid waste collection company by campus location.

Campus	Collection Company	Amount of Waste
Jamestown	Jamestown BPU	218.4 tons
Catt County	SDS of Olean	85.8 tons
North County	Westfield Disposal	54.6 tons

Solid Waste Assumptions

When matter decomposes it releases both CO_2 and CH_4. Generally, CO_2 is produced through the decomposition of organic materials derived from biomass sources (e.g., crops, forests). In the U.S. these sources are grown and harvested on a sustainable basis in order to maintain farmers' livelihood. Sustainable harvests imply that photosynthesis (which removes CO_2 from the atmosphere) is equal to decomposition (which adds CO2 to the atmosphere). As a result, CO_2 emissions from biogas or CH_4 oxidation are not counted in this GHG inventory.

A carbon offset is applied for the solid waste collected from the Jamestown and Dunkirk campuses whose waste is delivered to the Chautauqua County Landfill. As mentioned earlier, decomposing solid waste produces methane, a particularly harmful GHG. The landfill recently began harvesting their methane emissions to produce electricity rather than venting it into the atmosphere. The county now has the capacity to generate 6.4 Megawatts of electricity which is feed into the electrical grid.

It was undetermined at the time of this inventory whether Cattaraugus County has the same capacity.

Total Solid Waste Emissions = 128.4 MT CO_2e, accounting for less than 1% of total emissions

Offsets

What are Offsets

A carbon offset is a reduction or removal of carbon dioxide equivalent (CO_2e) greenhouse gas (GHG) emissions that is used to counterbalance or compensate for ("offset") emissions from other activities. Generally, offsets fall into two categories: 1) emissions reductions or avoidance, such as replacing a diesel generator with solar panels, and 2) sequestration, or removing GHGs from the atmosphere, such as planting trees that will absorb CO_2 as they grow. There are many different types of projects that generate offsets in both categories; however, different offset markets and offset standards only recognize certain project types as acceptable. JCC does not currently purchase offsets, but they are involved in both recycling and tree preservation.

Recycling

Jamestown Community College in 2010 initiated a single-stream recycling program on the Jamestown and Olean Campuses in cooperation with Casella Waste Management. Though important and necessary for both awareness of sustainability issues and the reduction of human waste, the contributed amount of recycled material that can be applied to the reduction of carbon emissions is negligible.

Forest Preservation: Tree-Campus USA

The purpose of the Tree-Campus USA program is to establish and sustain healthy community forests for the benefit of current and future residents. It is a program that requires a college or university to complete an inventory of the trees located on a campus and to maintain them. As it relates to this inventory, the Tree-Campus USA program will have little impact on overall college emissions.

As mentioned in the Solid Waste section of this inventory report, photosynthesis removes CO_2 from the atmosphere. When a college chooses to maintain individual trees or a woodlot like the "100 Acre Woods", they are effectively offsetting the carbon equivalent that is being emitted into the atmosphere. Unfortunately, the quantity of trees required to offset the 10,000 tons of CO_2 emitted by the college annually is formidable.

Trees throughout their lifespan will absorb a certain amount of CO_2 from the atmosphere. While trees are very young, they only absorb little carbon, but this clearly accelerates as the tree grows. Depending on the type of tree planted, a single tree can only remove limited amounts (on average about 50 pounds) of CO_2 from the atmosphere per year.

A Recommendation on How to Account for Carbon Sinks in Campus Forests or Lands
- Clean Air – Cool Planet

Consider: the reason ACUPCC signatories are asked to count carbon is so that they will be able to develop transformative carbon management strategies. Institutional GHG inventories report carbon dioxide, methane, and other annual GHG emissions because these additions continue to destabilize the already-unbalanced current atmospheric carbon "equation." The institutional GHG inventory is not meant to be an inventory of *all* existing institutional carbon exchange, but rather, a snapshot of the ways in which institutional activities are *further altering* the equation of global atmospheric carbon exchange in any given year.

There is some debate whether an existing tree or woodlot like the 100 Acre Woods should be included in a GHG inventory. For the purposes of this report, it is not. Since an average tree can absorb about 50 pounds of carbon per year it would take 40 trees to absorb 1 ton. An average Eastern forest contains from 500 to 700 trees per acre and therefore, can absorb 12.5 to 17.5 tons of CO_2 per year. JCCs 100 Acre Woods is actually about 35 acres so if it were to be included as an offset in the GHG inventory, it would offset approximately 600 tons. Since this is roughly 6% of total emissions and does not include all of the other trees on the three campuses it is worthwhile to document the woods value to the university if we are not to include it as an offset.

Recommendations

Committing to climate neutrality by 2030 is a truly aspirational goal that will require considerable hard work, creativity, and sacrifice if we are to achieve it. The journey will be filled with challenges as the full effects of increasing GHG emissions are made more apparent.

The wisdom of the ACUPCC in challenging the educational community in 2006 to exhibit leadership in committing to reducing emissions is apparent as there is increasing awareness of the realities of climate change. However, we are now approaching a time when we, like everyone else, will be forced to change in reaction to a climate that is different from the one with which we are familiar. There is still time to lead but that time is now. Climate change is real, it is here, and we need to change our behavior to be able to respond to it. We are beginning to see government at the state, national, and international level react with policies that will affect many aspects of our society. Climate change and rising energy prices will affect economy in ways that will apply further stress to college operations. Every effort the college makes toward reducing GHG emissions will help prepare if for the challenges ahead.

Why "climate neutrality" and why act now?

The re-stabilization of the earth's climate is the defining challenge of the 21st century. The unprecedented scale and speed of global warming and its potential for large-scale, adverse health, social, economic and ecological effects threatens the viability of civilization. The scientific consensus is that society must reduce the global emission of greenhouse gases by at least 80% by mid-century at the latest, in order to avert the worst impacts of global warming and to reestablish the more stable climatic conditions that have made human progress over the last 10,000 years possible. Without preventing the worst aspects of climate disruption, we cannot hope to deal with the other social, health and economic challenges that society is facing and will face in the future.[2]

These recommendations suggest how we may get from where we are, as defined by the GHG Inventory, to where we want to go, as defined by the president's climate commitment. The following assumptions were made:

- Having made the commitment, the college needs to develop a plan for achieving carbon neutrality within the next 17 years. Funding is limited so any change must pay its own way.

[2] ACUPCC.org, Frequently Asked Questions

- Climate change is real and its effects could be severe with rising energy prices likely to be one result. We are beyond the point where sustainability is "the right thing to do" and need to develop resilience to the effects of a changing world. Having such resilience could present opportunities for the college

- Building such resilience will require changes in behavior of both students and staff. A priority must be placed on creating the awareness and knowledge of sustainability since that will be required in the future.

Climate Action Plan

The Climate Action Plan or a Plan for Climate Neutrality for Jamestown Community College was last revised in 2010. Updating this plan and laying out a path toward carbon neutrality, should be the next task that the college as a whole undertakes. Several of the recommendations below are taken almost verbatim from that original plan; they are excellent and most have not been implemented. However, there has been progress and some of the recommendations have been implemented partially or on an informal basis.

Good intentions and informal actions are commendable. They are often quite effective in a cooperative and caring community like JCC, but in order to create a college-wide awareness of the critical nature of climate change recommended actions need to be adopted as written policy. Written policies and detailed plans will provide the guiding documentation and institutionalize the practices necessary to meet our climate commitment.

Based on the results of this inventory, it is recommended that the following be included in this plan:

- Creation of a sustainability awareness task force
- A timeline and plan for a Transportation Conservation campaign
- An energy reduction task force with measurable goals and outline for enforcement
- A multi-department sustainability in education task force
- A written green purchasing policy
- A waste composition study to determine the effectiveness of zero-sort recycling

Sustainability Awareness Task Force

Apathy is the most difficult challenge to overcome. Among students there is insufficient understanding of sustainability or appreciation of the realities of climate change. Any awareness is countered, as it is in the rest of society, by reluctance to change and complacency that meaningful actions can be

deferred. This attitude is reinforced in the mass media by powerful and influential organizations that have a vested interest in the status quo. Overcoming this reluctance must involve staff, faculty, and student leadership.

The world with which we are familiar, one based on inexpensive and readily available energy, is an anomaly; it did not exist before the early 20th Century and it cannot continue both for environmental and economic reasons.

There is likely to be an increase the cost of all forms of energy because;

1. There is an increasing acceptance of the scientific reality that burning fossil fuels is contributing to climate change
2. Easily accessible energy sources are being depleted as evidenced by the increasing use of tar sands, deep water drilling, arctic drilling, and high volume hydraulic fracturing
3. Global demand for energy is increasing driven primarily by the growing economies of China and India.

The effect of these forces will stress the economic, social, and environmental components that define a sustainable society. It will be exceedingly difficult to change our behavior to respond to these stresses unless we have an appreciation of our responsibility to future generations. If we are to effectively respond to the changes we face we must increase awareness of the principles of sustainability. It is imperative that we make every attempt to educate the students on the facts, causes, and impacts of climate change. If they leave us without an understanding of what sustainability is, how unsustainable practices will affect them, and how they can adapt to living more in concert with nature, then we, as teachers, have failed to prepare them with the basic knowledge and skills needed for a successful future.

Is the ACUPCC just about greenhouse gas emissions from campus operations?

No. An important aspect of the ACUPCC is that signatories commit to taking "actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students," and "actions to expand research or other efforts necessary to achieve climate neutrality." While higher education only represents about 2-3% of the country's carbon footprint, it represents 100% of the "education footprint," in that our institutions teach not only our college students, but also the teachers who need to be equipped with the knowledge and skills to adequately prepare our K-12 students for the new challenges of the 21st century.[3]

[3] ACUPCC.org, Frequently Asked Questions

Transportation Conservation Campaign

The emissions from gasoline combustion for commuting to the college by students, faculty, and staff are the largest single cause of greenhouse gases at JCC. The solution is really very simple but it will not be easy to implement; the means to solve the problem are readily at hand. It requires no large investment or technological breakthroughs. What is required is awareness of the problem and the will to change behavior. Though the college is not in direct control of commuting, it is in a position to influence it.

A transportation campaign should:

- Have the goal of reducing the number of commuting miles by faculty, students, and staff
- Have the backing of the college administration and board
- Have faculty and staff leading by example
- Have the ability to provide incentives for driving less and have disincentives for driving more
- Include the vehicles in the college fleet
- Have the authority to include other college resources
- Be creative and fun

An active, visible, and widespread campaign can effect a meaningful reduction in carbon emissions from commuting. In addition to meeting GHG emissions targets the college needs to understand what impact rising gasoline prices will have on enrollment and have a plan ready to respond if, and when it should happen. A transportation campaign that reduces commuting would be a good first step.

Energy Reduction Task Force

Having an energy reduction task force will communicate the commitment of SUNY Jamestown to the ongoing management and reduction of energy.

The mission of the task force should be to develop a detailed understanding of energy use and a plan for energy reduction. The term for the task force should be short and focused on developing a building by building review of energy usage resulting in evaluations of what is possible and what is practical for energy reductions. A priority would be to improve visibility into not just how much energy is being used but where it is being used. This will allow the college to identify where energy management can become most effective since a measurable reduction in energy use will require a financial commitment. Knowing what actions will have the most payback is vital since legacy infrastructure will be difficult and expensive to retrofit. The

college needs to quantify what can reasonably be accomplished so it can research the need for offsets to meet their climate commitment.

The task force should result in the development of an energy policy that will institutionalize energy efficiency and provide detailed guidance to the Capital Facilities Plan.

The task force charter should include:

- A statement of commitment from the college administration signed by a dean or the president of the college
- A list of objectives to include sources of energy use, metrics to measure progress, practical recommendations for reduction, and a 2030 energy 'target'
- A fixed schedule with an implementation plan detailing how the objectives will be met including a timeline with detailed milestones
- Membership with defined roles that is multi-level, multi-departmental that has the authority to make decisions

The task force should deliver:

- An energy monitoring system or process that provides an understanding of energy consumption by building
- List of realistic energy reduction goals based on energy consumption data from 2008 to the present and in line with the climate neutrality commitment
- Recommendations coordinated with the Capital Facilities Plan to prioritize needs and opportunities
- Recommendations for offsets to close the gap between best case energy consumption goals and carbon neutrality

Green Purchasing Policy

Because people tend to resist change and don't necessarily take into account environmental impact, it is not always the best solution to rely on environmental education. Sometimes written policy is necessary to institute change and should contain the following:

1. All products purchased should be ENERGY STAR compliant where possible
2. New campus fleet vehicles should be at or preferably above current Corporate Average Fuel Economy (CAFÉ) standards or utilize alternative fuels (electric, hybrid electric, or CNG)
3. Purchase of products that contain toxins detrimental to human health and to the environment should be eliminated where possible

4. Purchased products should contain the highest possible percentage of post-consumer recycled content
5. Products with minimal packaging should be encouraged
6. Products that are reusable or contain reusable parts (rechargeable batteries, refillable pens, etc.) be preferred
7. Products that are multifunctional (i.e., scanner/copier/printers, multipurpose cleaners) and serve to decrease the total number of products be preferred

Waste Composition Study

As evidenced by the inventory data, solid waste accounts for only 1% of total college greenhouse gas emissions. However, the detrimental effects of the waste stream on the environment are severe and a waste reduction strategy needs to be part of any plan. In addition, a waste reduction plan is very visible and it can play an important role in any sustainability awareness campaign.

In order to institute change, the college must first know what to change. A Waste Composition Study will identify the types of waste that SUNY JCC disposes. Once identified, plans can be made to target specific waste reduction goals.

Creating an awareness of waste and recycling will make you more cognizant of consumption which will create a greater understanding of sustainability. It helps relate big concepts like global warming to everyday life and is an opportunity to directly engage the student body in tangible actions.

List of Abbreviations

AASHE – Association for the Advancement of Sustainability in Higher Education

ACUPCC – American College & University Presidents Climate Commitment

BPU – Jamestown Board of Public Utility

BTU – British Thermal Unit

CA-CP – Clean Air - Cool Planet

CH_4 – Methane

CNG – Compressed Natural Gas

CO_2 – Carbon Dioxide

eCO_2 – Carbon Dioxide Equivalents

FTE – Full-time equivalent of students and staff

GHG – Greenhouse Gas

GWP – Global Warming Potential

HFC – Hydro-Fluorocarbon

kWh – Kilowatt hours

Metric Ton = 1,000 kg or 2,204.62 lbs

MBTU – One Thousand Btu

MMBtu – One million Btu

MT CO_2e – Metric Tons Carbon Dioxide Equivalents

N_20 – Nitrous Oxide

NYUP – Upstate New York Power Sub-region

T&D Losses – Calculated Transmission and Delivery Losses