

SAINT JOHN'S UNIVERSITY
COLLEGEVILLE, MN
GREENHOUSE GAS EMISSIONS
INVENTORY
REPORT
2009-2010



Saint John's
UNIVERSITY

REPORT ISSUE DATE: JANUARY 2010

EXECUTIVE SUMMARY

The Office of Sustainability at Saint John's University (SJU) has completed the greenhouse gas (GHG) emission inventory (carbon footprint). Sustainability Fellows, Theo Eggermont and Nick Moe, and Sustainable Associate Lewis Grobe (Core Team) were responsible for data collection. Theo Eggermont served as the project coordinator and data analyst. This report includes the methodology used to determine the footprint as well as an analysis of footprint data for fiscal years 2009 and 2010.

Overall, the carbon footprint increased 2202.3 mtons; from 27,277.3 mtons CO₂e in 2009 to 29,354.7 mtons CO₂e in 2010. The Core Team chose to include data related to faculty, staff and student commuting from the previous inventory conducted in 2008 without change in this analysis. Increased emissions are attributed to an increase in coal and electricity usage, despite a decrease in study abroad air miles and a decrease in reporting of business air miles.

GREENHOUSE GAS EMISSIONS INVENTORY METHODOLOGY

PROTOCOL AND CALCULATION TOOLS

The GHG emissions inventory was conducted using the American College and University Presidents Climate Commitment (ACUPCC)'s Clean Air-Cool Planet (CA-CP) calculation tool, version 6.6, supplemented by the World Resources Institute's (WRI) GHG Protocol. The GHG Protocol is the most widely accepted international standard for GHG accounting and is the basis of the CA-CP tool. The inventory of emissions included those arising from electricity consumption, heating and cooling, vehicle fleet operations, business travel (by air and personal vehicle), waste management practices, refrigerants, fertilizer use, wastewater treatment and daily commuting to and from the campus.

BOUNDARY AND DATA

The Core Team met on November 19th, 2010 and agreed to set the boundary for the carbon footprint to include the SJU campus demographics (detailed in Table 1), the buildings and grounds of the campus related to University operations and activities located in Collegeville, MN; 2,740 acres, 1,345,089 and 1,388,536 square feet of building in 2009 and 2010 respectively, power generation and consumption, business and study abroad travel, fertilizer use, faculty, staff and student commuting, refrigerants, waste water processing and solid waste management, and paper consumption. In several operations that are split among Saint John's Enterprises, such as the Abbey, HMML, Ecumenical institute, etc., the total figure was multiplied by 69.20% (the percentage of square footage that the University occupies). When this method of quantification is used, it is noted. The energy embedded in goods and products consumed in the regular course of doing business, and the capture and storage of carbon were not included in this analysis with the exception of paper due to its ease of quantification.

Table 1. Campus demographics for 2009 and 2010

Sector	Status	2009	2010
Students	Full Time	1906	1886
	Part Time	110	115
	Full time equivalent*	1935	1943
Faculty	Full time	137	133
	Part Time	29	28
	Full time equivalent*	151.5	147
Staff	Full time	306	306
	Part Time	14	25
	Full time equivalent*	313	318.5

*2 part time = 1 full time

All data used in the calculation of the carbon footprint were supplied by Office of the Registrar (Table 2)

Table 2. Sources of Data for the Carbon Footprint

Data Type	Data Provider	Data Source
Budget	Ken Osborne	Business Office
Students	Jane Stromme	Office of the Registrar 10 th Day Reports
Faculty and Staff	Jane Stromme	Office of the Registrar 10 th Day Reports
Building square footage	Tammy Huston	TMA Bldg Abbrev.
Heating Oil and Natural Gas	Nick Moe	Physical Plant Records
Campus Fleet	Pam Kotzenmacher, Dan DeMars	Receipts
Refrigerants	Gail Lancour, David Schlumpberger	Minnesota Central Refrigeration and Receipts
Electricity Consumption	Nick Moe	Physical Plant Records
Faculty, Staff, Student Commuting	Jean Lavigne	2008 GHG Report
Study Abroad Air Travel	Peggy Retka	Study Abroad Excel Spreadsheet
Admission-related air travel	Mary Ruble	Admissions Excel Spreadsheet
Fertilizer	Br. Mark Kelly	Receipts
Solid Waste	Lew Grobe	2008 Waste Audit
Wastewater	Paul Stock	WWTP Records

CARBON FOOTPRINT TIMEFRAME

Because SJU operates on a fiscal year that runs from July 1 through June 30, the team agreed to compile data from the fiscal years of 2009 through the 2010 fiscal year. As the previous GHG inventory accounted for recorded emissions until 2008, we continued where the previous inventory ceased. However, the total greenhouse gases have significantly decreased as only University emissions were calculated in this footprint, whereas in previous years emissions from all of Saint John's were included.

CARBON FOOTPRINT GASES AND UNIT OF MEASURE

The carbon footprint is measured in metric tons of carbon dioxide equivalent (mton CO₂e). A metric ton is 2,205 pounds. The carbon dioxide equivalent is the unit of multiple greenhouse gases emitted within the footprint boundary converted to standard terms by use of the Global Warming Potential (GWP).

The GWP is a measure of how much a gas contributes to global warming over a period of time (100 years) compared to carbon dioxide and allows comparison of the impact of the concentrations of GHGs to each other. Carbon dioxide has been assigned a GWP of 1 since it is the most prevalent GHG.

Although some GHGs may be present in the atmosphere in lesser quantities than carbon dioxide, they may have a longer lifespan in the atmosphere and may, in the long run, be much more detrimental. A higher GWP indicates that gas is a more potent GHG. Table 3 compares the GWP for the six major GHGs included in a carbon footprint.

Table 3. Comparison of the global warming potential (GWP) of the six greenhouse gases

GHG	Symbol	GWP*
Carbon Dioxide	CO ₂	1
Methane	CH ₄	25
Nitrous Oxide	N ₂ O	296
Hydrofluorocarbons	HFCs	120-12,000
Perfluorocarbons	PFCs	5,700-11,900
Sulphur Hexafluoride	SF ₆	22,200

EMISSIONS INVENTORY DETAILS

Overall, SJU emissions emitted 27,277.3 mtons CO₂e in 2009 to 29,354.7 mtons for 2010. Table 4 provides a summary of emissions from operations and Table 5 compares CO₂e by different metrics; per student, per person and per square foot of building.

Table 4. Greenhouse Gas Emissions (mtons CO₂e) by Category, 2009 and 2010

Activity	2009	% of Total	2010	% of Total
Cogeneration Electricity	1,166.1	4.25	752.3	2.55
Co-Generation Steam	12,722.5	46.43	15,468.3	52.47
Campus Fleet	750.6	2.74	816.0	2.77
Refrigerants	31.4	0.11	36.8	0.13
Fertilizer	14.0	0.05	14.0	0.05
Purchased Electricity	4,431.6	16.17	5,362.1	18.19
Faculty/Staff Commuting	2,826.0	10.31	2,826.0	9.59
Student Commuting	371.6	1.36	371.6	1.26
Air Travel for campus business and Alternative Break Experiences	1,963.0	7.16	1,052.4	3.57
Study Abroad Air Travel	1,720.3	6.28	1,391.9	4.72
Solid Waste*	166.6	1.06	166.6	0.99
Wastewater	15.7	0.06	17.3	0.06
T&D Losses	438.3	1.60	530.3	1.80
TOTAL	27,277.3		29,354.7	

*Much of the waste is combusted to generate electricity which results in a credit to total emissions. Please refer to details below under the Solid Waste heading.

Table 5. Comparison of metric tons CO₂e by demographics and square footage

Year	Category	Number of units	Metric tons CO ₂ e by Category
2009	Number of Students	1935	14.10
	Number of Students, Faculty, Staff	2399.5	11.37
	Square Feet of Buildings	1,345,089	0.02
2010	Number of Students	1943	15.17
	Number of Students, Faculty, Staff	2408.5	12.24
	Square Feet of Buildings	1,388,536	0.02

Figure 1. A comparison of Emissions (mtons CO₂e) for 2009 and 2010

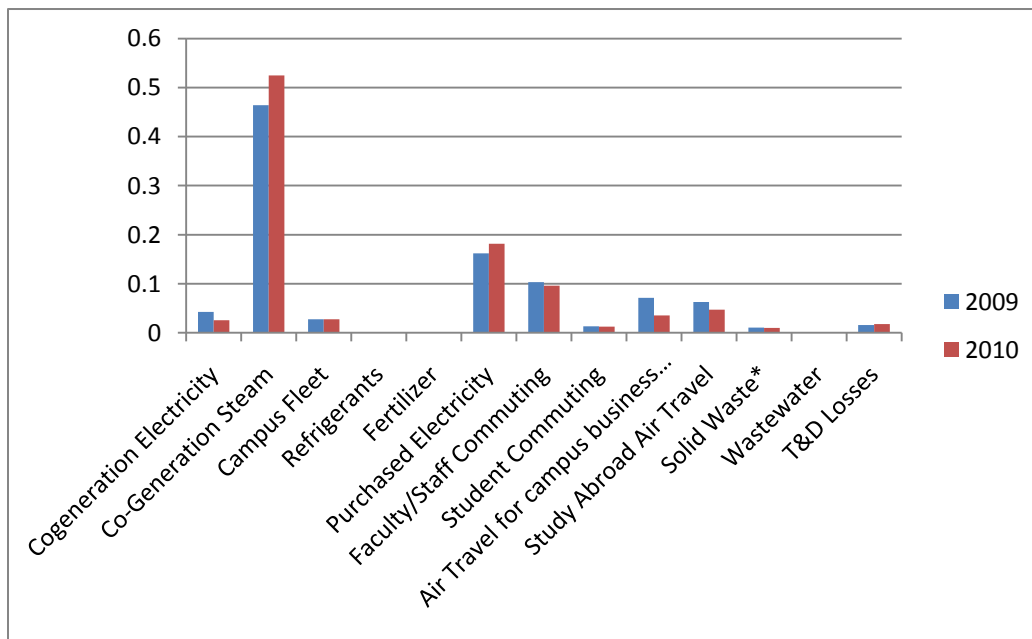


Figure 2. Percent of the 2009 total emissions by activity

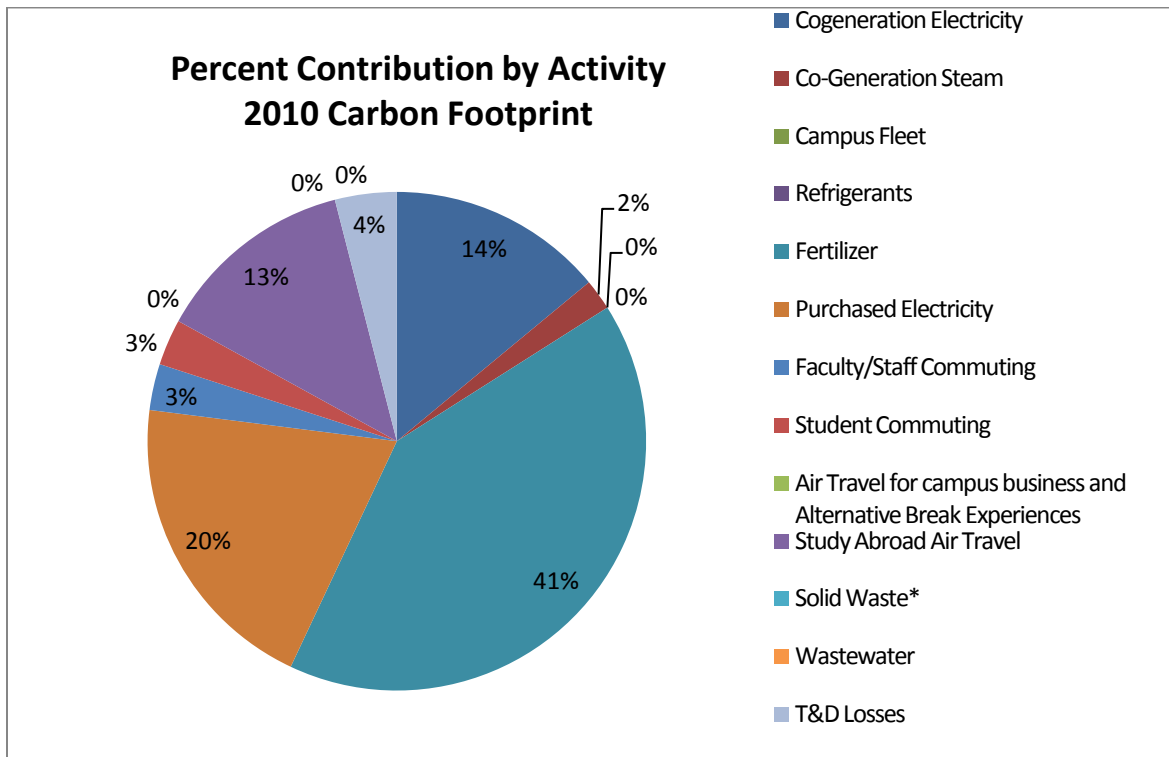
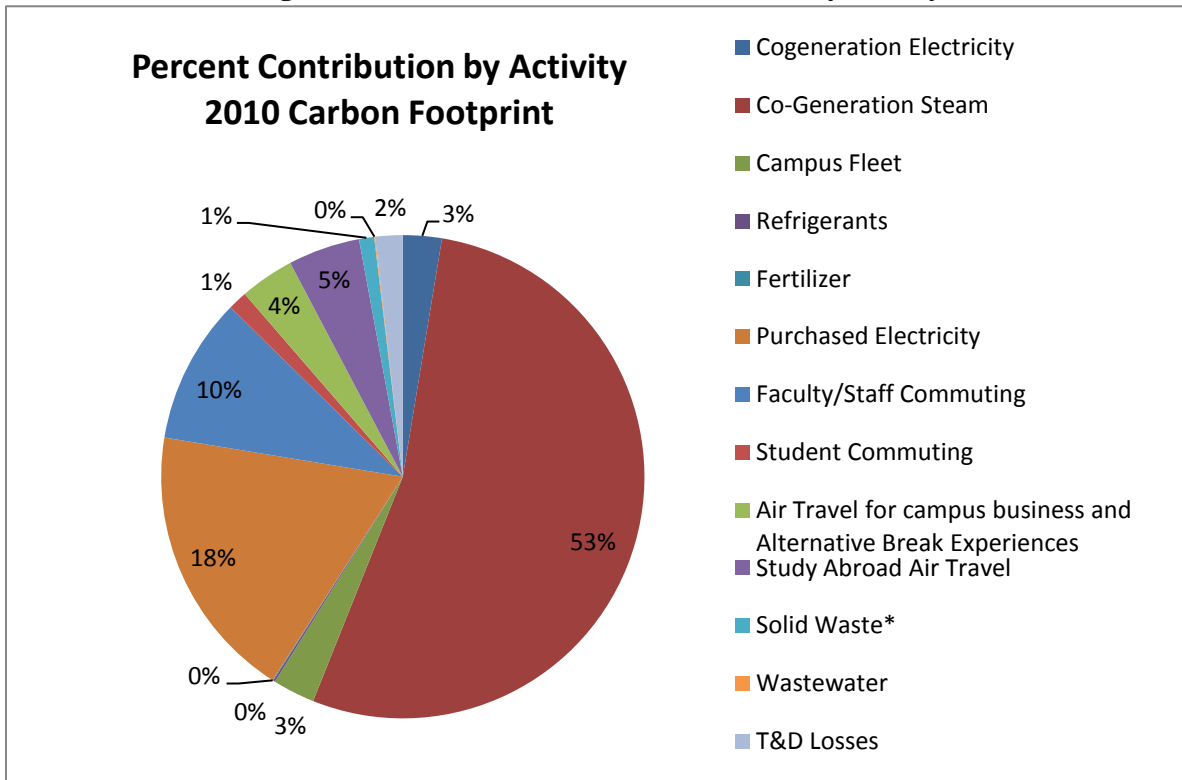


Figure 3. Percent of the 2010 total emissions by activity



POWER PRODUCTION AND CONSUMPTION

NATURAL GAS AND ELECTRICITY

Data for coal is reported in short tons. Natural gas is reported in MMBtu. Steam is reported in pounds of steam and is converted to MMBtu. The conversion, according to the EPA, from pounds of steam to kbtu is $\times 1.094$. To convert from kbtu to MMBtu, the number is divided by 1000.

Data for power generation is cogeneration and is composed of cogeneration from coal (9600 BTU per pound), natural gas, Res Fuel Oil and purchased electricity is detailed in Table 6. All figures are multiplied by 69.20% to account solely for the University and not for other Saint John's Enterprises.

Emission factors for carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) from the WRI GHG Protocol, Stationary Combustion spreadsheet are used to calculate GHG emissions from natural gas consumption. Methane and N₂O emissions are converted to carbon dioxide-equivalents using the Global Warming Potentials from the Intergovernmental Panel on Climate Change's Third Assessment Report.

Emissions from purchased electricity from Xcel Energy were calculated using emission factors representing the power pool average for kilowatt hours consumed in the MROW sub-region. The use of power pool average emission factors is a standard method incorporated into CA-CP and is used by the WRI in their GHG Protocol, and the U.S. Department of Energy in the recently revised 1605(b) Voluntary Reporting of Greenhouse Gas Emissions Program.

Table 6: Cogeneration from Coal (short tons), Natural gas (MMbtu), Res Fuel Oil as well as electricity generated and purchased in 2009 and 2010

	2009	2010
Coal (short tons)	6,791	7,400
Natural Gas (MMbtu)	15,099	36,937
Res Fuel Oil (gallons)	125	353
Generated Electricity	3,211,823	2,143,989
Purchased Electricity (kWh)	7,306,911	8,841,104

TRANSPORTATION

Table 7 details the number of miles and gallons by program or group. The diesel fuel for the inter-campus busing system, "The Link" between the College of Saint Benedict and Saint John's University and the miles driven by contracted bus company, Trobec's. To determine the gallons of diesel used by Trobec's miles were divided by 5.5 (the average number of miles per gallon according to the Link Transportation Director). The total number of gallons was then divided by two, accrediting half of the emissions to the College of Saint Benedict as approximately half of all riders are enrolled at Saint John's

and half at Saint Ben's. Half of busing emissions are accounted for in St. Ben's GHG Inventory. The gasoline gallons used directly on Saint John's campus, such as fuel for Life Safety vehicles and grounds equipment, is included as well.

Table 7: Mileage and gallons for transportation and group, 2009 and 2010

Activity		2009		2010	
Air Miles	Miles	Gallons	Miles	Gallons	
Study Abroad Travel	1,342,176		1,291,826		
Reimbursed Air miles	2,280,256		1,254,828		
ABE trips	100,760		113,395		
Admissions	134,837		167,661		
Vehicle Commuting					
Faculty and Staff	6,994,728		6,994,728		
Student Commuting	919,815		919,815		
Busing Miles					
Link	39,173	13,641	38,415	13,761	
Trobec's	8,568	3,161	6,761	2,459	
Campus Gas and Diesel					
On Campus Gasoline		52,207		69,098	
Diesel		28,221		19,755	

DIRECT TRANSPORTATION SOURCES

COMMUTING

Commuting is broken up into two categories, student and staff. Student emissions include the Link Bus Service and daily commuting by students. For the number of miles driven by students we used the miles from for 2008 from the CACP which generated the 2008 GHG report. We don't expect commuter habits to have changed in the past 2 years. The Introduction to Environmental Studies class will conduct a survey of student transportation in the spring and this report will be updated accordingly.

AIR TRAVEL AND BUSINESS TRAVEL

The air miles from admissions (FY09-10), and study abroad (FY09-10) are divided by two as half are accredited to Saint Ben's, and staff travel miles (FY09-10) which is not divided by two as these miles solely account for Saint John's staff.

Alternative Break Experiences are programs offered through "CSB Campus Ministry that work hard to provide meaningful trips, both nationally and internationally." Resulting emissions are divided by two as participants are from both Saint Ben's and Saint John's.

Personal miles for on campus vehicles are not included nor are the vehicle miles reimbursed by CSB. A protocol was initiated in 2008 requiring employees to write in the number of miles traveling by air and

by car. A significant drop was seen in the number of miles reported by air travel in FY 2010. This is attributed to employees leaving the number blank. The business office will be contacted to encourage employees to accurately report their mileage.

WASTEWATER

Table 8: Gallons of wastewater disposed 2009 and 2010

	2009 (Gallons)	2010 (Gallons)
University	30,352,415	33,548,756
Other	13,414,585	14,827,244
Total	43,767,000	48,376,000

Wastewater generated on campus is processed by Saint John's Wastewater Treatment Plant and is overseen by Paul Stock and Gary Jorgenson.

Table 8 outlines the estimated gallons of wastewater disposed. The total number of gallons of wastewater is multiplied by 69.20% as that is the amount of square footage at Saint John's is attributed to St. John's University. A more accurate number may be derived based on people and guests, however wastewater is a relatively minor component of the greenhouse gas inventory so an estimate based on square footage will suffice.

REFRIGERANT USE

Refrigerants calculated for this report include the ones used in the campus wide dining facilities and from David Schlumpberger (HVAC Technician). SJU contracts with Central MN Refrigeration to maintain dining service refrigerants. Central MN Refrigeration provided the resupply data for SJU each year. Refrigerants used by Central MN Refrigeration include resupplied at SJU include 5.5 pounds of R-409A, 3 pounds of R-404A, 5.32 lbs of R-22, and 4 pounds of MP-39 annually. David Schlumpberger used 30 pounds of R-22 in 2009, and 37 lbs in 2010 as well as 5 pounds of R-410 in 2010. Of all the refrigerants we use the Calculator 6.6 only includes R-404A and R-22. The other refrigerants are not accounted for in this report. They contribute a small portion of the total emissions.

Although refrigerants contribute little to the emission total, one metric ton of R-22 has a global warming potential of 1,700 mton CO₂e. The calculated impact of refrigerant use on the carbon footprint was quite small compared to other sources of emissions, it is important to keep in mind that refrigerants are classified as hazardous waste and do pose a significant threat to the environment in very small quantities.

FERTILIZER USE

The GHG nitrous oxide (N₂O) is formed from fertilizer application through oxidation processes that convert a small portion of the nitrogen to small amounts of N₂O. SJU Grounds applies fertilizer on campus to maintain an aesthetic landscape. We use three types of fertilizer, 25% nitrogen, 12%

nitrogen, and organic 13% nitrogen. Since there is not a category for 12% synthetic, the amount of fertilizer was multiplied by 12/25 and placed in the 25% category.

Table 9: Fertilizer type and nitrogen content, 2009 and 2010

Year	25% N	12% N	Organic 13% N
2009	10,454.4	3,000	2,750
2010	10,454.5	3,000	2,750

Fertilizer use is a minor contributor to the total emissions; 14 metric tons contributing 0.05% in 2009 as well as in 2010.

SOLID WASTE MANAGEMENT

Table 10: Solid waste generated (short tons) and methods processed, 2009 and 2010

Solid waste refers to garbage accumulated on campus. Waste Management transports the school's waste to Elk River Landfill or the Elk River Burner depending on the capacity of the burner that day. As such, we are unable to accurately determine if our waste is burned or sent to the landfill. Our waste is put in the CH₄ recovery and electric generation category.

Currently our waste is not measured and recorded. The number of tons is based on the St. John's University Waste Audit done in 2008. During Recyclemania, waste will be quantified over 10 weeks. This will provide us with tipping weights of recycling and waste, this inventory will be updated with more accurate information after Recyclemania.