Dickinson College
Greenhouse Gas Emissions Inventory 2011

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Dickinson

Summary

In 2007 Dickinson College President William G. Durden signed the American College and University President's Climate Commitment (ACUPCC). This commitment requires Dickinson to develop a comprehensive plan to achieve climate neutrality as soon as possible, create an inventory of greenhouse gas (GHG) emissions and update it every two years, initiate tangible actions to reduce greenhouse gases, and make our action plan, inventory and progress reports publicly available. Dickinson developed its Climate Action Plan and submitted it to the ACUPCC in September 2009. The plan sets targets to reduce gross emissions of greenhouse gases 25 percent from the 2008 level by the year 2020 and offset the balance of emissions to attain zero net emissions in that year. The plan also sets targets of 50% and 75% reductions in gross emissions from 2008 by the years 2025 and 2030, respectively.

Our first GHG emissions inventory—completed in Fall 2008—reports emissions data for fiscal years 2002 through 2008. This document updates emissions data through fiscal year 2011.[1]

In our FY 2010 update, gross emissions of GHGs from all sources were reported as increased by 5.5 percent from our 2008 baseline to 21,287 metric tons of carbon dioxide equivalent (mteCO_2). This was a miscalculation due to erroneous data entry in our energy management system, whereby natural gas bills were being double-counted and even triple-counted, inflating our total emissions increase. Numbers previously recorded in the 2008 and 2010 GHG emissions reports under the "on-campus stationary" natural gas column should be disregarded. This report provides corrected emissions data for 2008, 2009, 2010, and 2011.

The updated data reveals that gross emissions of GHGs from all sources increased 5.5% from 2010 to 2011, and the cumulative change from our 2008 baseline is +.6%. Total emissions in 2011 are 18,748.3 metric tons of carbon dioxide equivalent (mteCO_2). Faculty/Staff commuting account for most of the increase. To reiterate from last year's report, this growth in emissions during a period when commitment to combat climate change and promote sustainability have been highly visible on campus is a warning that meeting our emission target for 2020 will be a demanding challenge. Due to this increase, achieving our 2020 target (25% below 2008's total emissions) will now require a 25.5% reduction from 2011 emissions.

In contrast to the increase in gross emissions, net emissions decreased by 41.8% percent from 2008 to 2011. Net emissions represent gross emissions less emissions reductions that lie beyond the scope of emissions attributable to the college but which are enabled by actions taken by the college. Dickinson purchases of Renewable Energy Credits (RECs) to help finance the expansion of zero-emitting wind energy. The college increased its purchases of RECs from 8 million kwh in 2008 to 18 million kwh in 2010, which is equivalent to 100 percent of our electricity consumption. Our 2011 purchases of RECs offset 10,663.1 mteCO_2 of GHG emissions and brought our net emissions down to 8,051.1 mteCO_2. The offset from REC purchases represents 57 percent of our gross emissions.

Because of ongoing concerns about data quality and changes in methods from year to year, CSE interns will review the data and methods used to construct our GHG inventory during spring 2012 with the goal of producing a revised inventory for each year from 2002 to the present.

[1] Dickinson's 2011 fiscal year is July 1, 2010 through June 30, 2011.

Overview of Emissions

Emissions of GHGs result directly and indirectly from the actions taken by the college and members of the college community. The GHG Protocol defines three scopes of emissions according to the degree of control that an institution has over their sources and are categorized by the degree of control the institution has over their sources.

Scope 1 emissions occur from sources that are owned or controlled by the institution and include on-campus stationary combustion of fossil fuels, mobile combustion of fossil fuels by institution owned or controlled vehicles, and fugitive emissions from leakage of refrigerants, methane from college-owned livestock, and nitrous oxide from fertilizers.

Scope 2 emissions are indirect emissions generated in the production of electricity purchased by the institution.

Scope 3 emissions are all other indirect emissions that are consequences of activities by the institution but occur from sources not owned or controlled by the institution. ACUPCC signatories are required to report only Scope 3 emissions from air travel paid for by or through the institution and regular commuting to and from campus. Scope 3 emissions reported by Dickinson College include these required emission sources plus emissions resulting from solid waste management and study abroad travel.

Total GHG emissions from all sources in 2011 was 18,748.3 mteCO_2. Scope 2 emissions—purchased electricity—is the largest source of emissions at Dickinson, accounting for 10,668.2 mteCO_2, or 57% of the total (see Figure 1). Scope 3 emissions from commuting and air travel represent 28% percent of total emissions. Scope 1 emissions from stationary combustion, mobile combustion, and fugitive emissions account for the balance.

GHG emissions grew 116.4 mteCO_2, or .6% percent from 2008 to 2011, as shown in Table 1 and Figure 2. Scope 1 emissions decreased 137 mteCO_2 from 2008 to 2011, or 7.3% percent, while Scope 2 emissions revealed a modest decrease (-1.3%) and Scope 3 emissions increased by 1.6%. Despite the increase in gross emissions, net emissions declined 41.8% due to an increase in the purchases of RECs. These changes are detailed below.

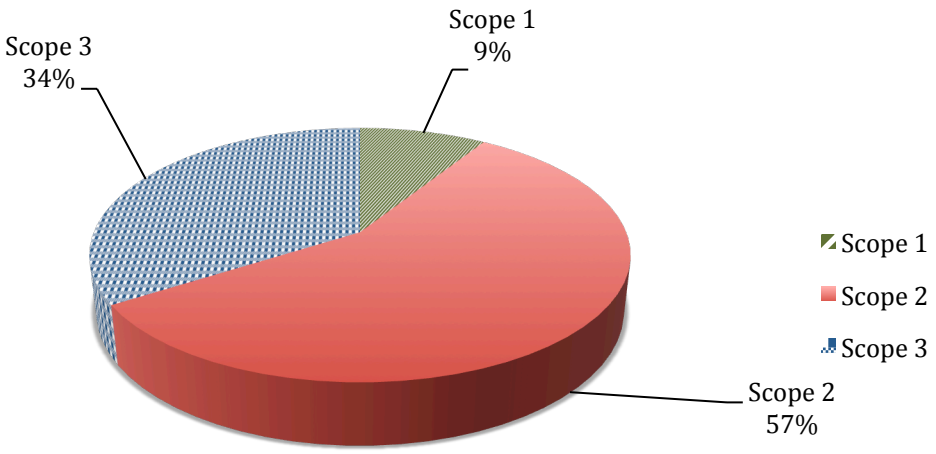
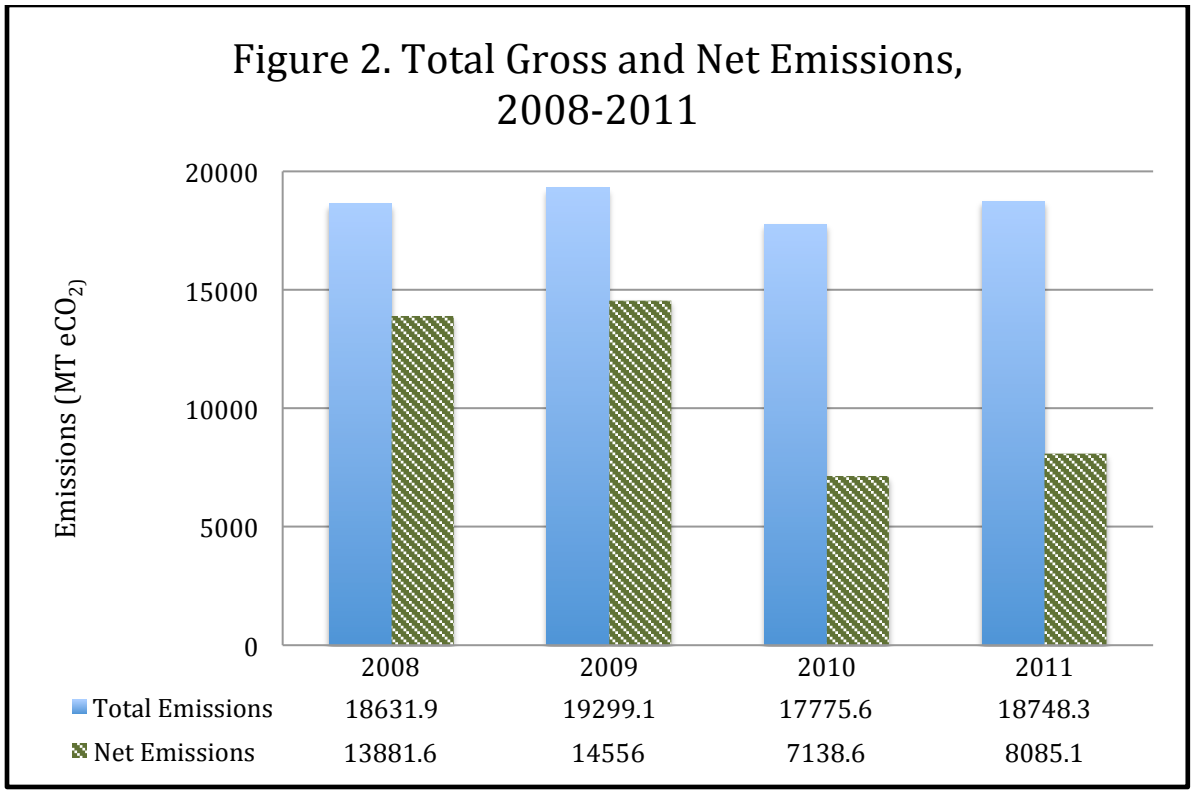


Figure 1. GHG Emissions by Scope, 2011

Table 1. Gross and Net Emissions from all Sources

GHG Emissions Category	*2008 (mteCO2)*	*2009 (mteCO2)*	*2010 (mteCO2)*	*2011 (mteCO2)*	*% Change '10-'11*	*% Change '08-'11*	*Trend*
Scope 1	1864.3	2060	1749.5	1727.4	-1.3	-7.3	☺
Scope 2	10517	10432.1	10225.8	10668.2	4.3	1.4	☹
Scope 3	6250.4	6807	5800.2	6352.7	9.5	1.6	☹
Total Gross Emissions	18631.9	19299.1	17775.6	18748.3	5.5	.6	☹
Offsets	4750.3	4743.1	10637	10663.1	124	.2	☺
Net Emissions	13881.6	14556	7138.6	8085.1	13.3	-41.8	☺



Note: The increase in Total Emissions from 2010 to 2011 is 5.5%. Between these years, two source emissions account for most of this increase: Purchased electricity rose 1.15%, and study abroad air travel increased by 14.4%.

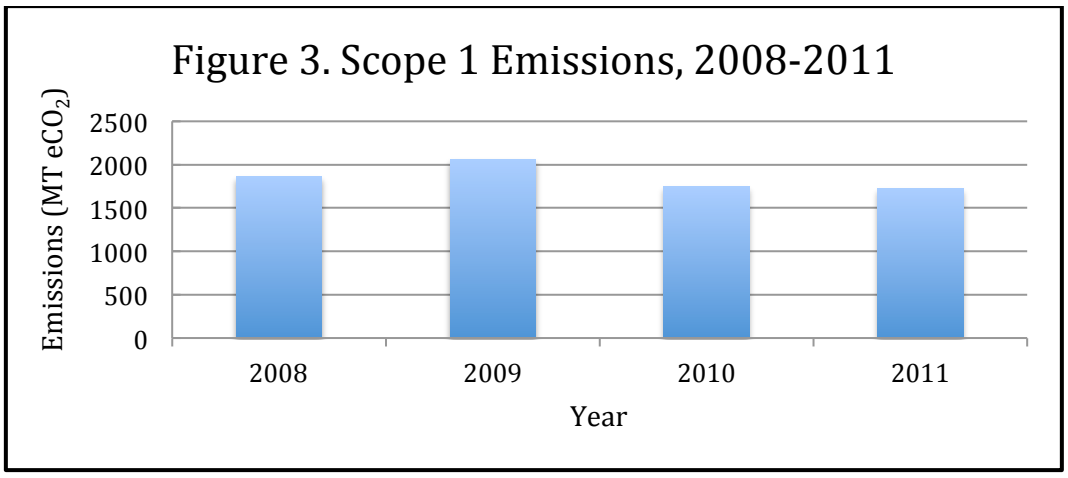
Scope 1 Emissions

Scope 1 emissions decreased 7.3 percent from 2008 to 2011. The minimal decreases were due to reductions in both natural gas usage and fuel used in fleet vehicles. Reported fugitive emissions increased, but this is due to better record keeping and statistical analysis and does not reflect an actual increase in emissions.

Scope 1 Emissions have essentially flat-lined, but the college is taking proactive steps to see further reductions. One such change made this winter 2012 will aim to reduce Scope 1 emissions via the substitution of Viesel for natural gas to fire boilers in the central energy plant. Viesel is a fuel derived from recycled vegetable oil that produces zero net emissions of greenhouse gases that are attributable to the college under GHG Protocol reporting guidelines.

Table 2. Scope 1 Emissions

GHG Emissions Category	*2008 (mteCO2)*	*2009 (mteCO2)*	*2010 (mteCO2)*	*2011 (mteCO2)*	*% Change '10-'11*	*% Change '08-'11*	*Trend*
Stationary Combustion	1487.4	1688.6	1388.4	1379.6	-.6	-7.3	☺
Mobile Combustion	341	352.5	196	192.9	-1.6	-43.6	☺
Refrigerants/Agriculture	36.1	19	165.5	154.9	-1.6	329	☹
Total Scope 1	1864.3	2060	1749.5	1727.4	-1.3	-7.3	☺

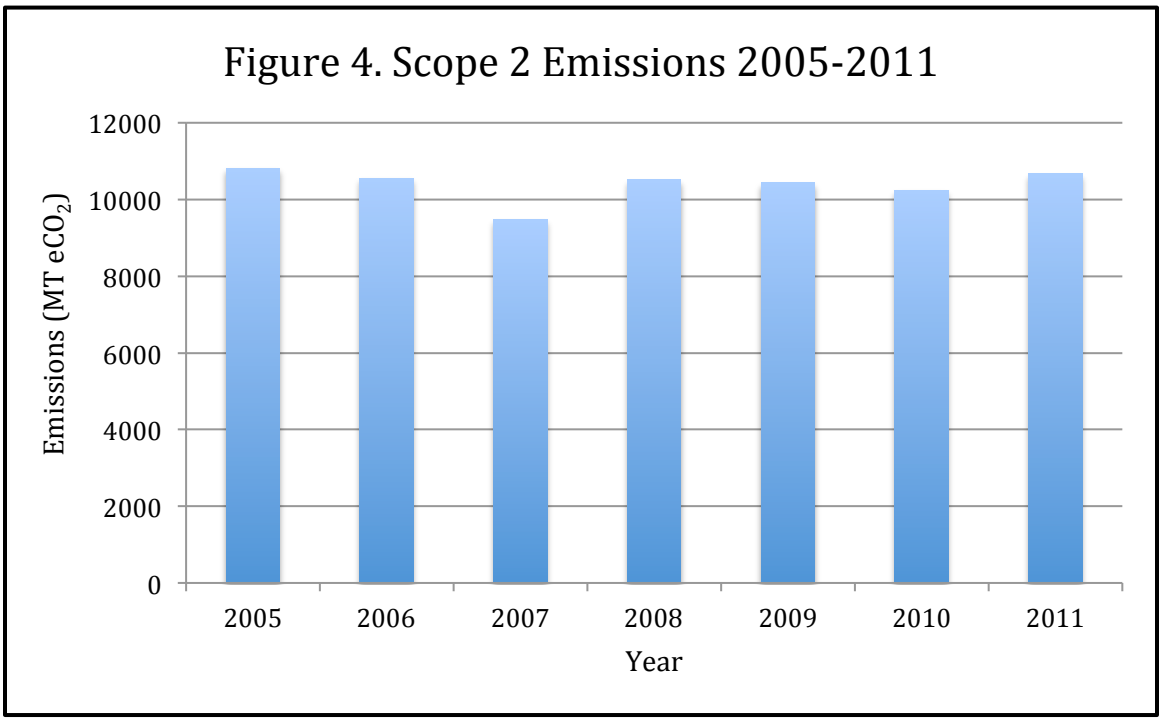


Scope 2 Emissions

Purchased electricity and associated emissions decreased 1.3% from 2008 to 2011. Scope 2 emissions are similar to Scope 1 in that fluctuation is minimal, but not much has been done to further address reduction strategies.

Table 3. Scope 2 Emissions

GHG Emissions Category	*2008 ($mteCO_2$)*	*2009 ($mteCO_2$)*	*2010 ($mteCO_2$)*	*2011 ($mteCO_2$)*	*% Change '10-'11*	*% Change '08-'11*	*Trend*
Purchased Electricity	10810.8	10723.5	10511.5	10668.2	1.5	-1.3	☺
Total Scope 2	10810.8	10723.5	10511.5	10688.2	1.5	-1.3	☺



Scope 3 Emissions

Total Scope 3 emissions increased 1.6% from 2008 to 2011. Reported emissions from faculty and staff commuting and study abroad travel increased while solid waste has trended downward in mteCO2 from 2008 to 2011. The increase in emissions from commuting primarily reflects an increase in employees from 2008 to 2011. In the future, we intend to improve the accuracy of our commuting data by conducting a survey of employees' travel modes, frequency of trips and travel distances. The Psychology Department is in the preliminary stages of performing such a survey, and in Spring 2012, we should have a more definitive strategy for this emissions statistic for FY 2012.

Records of financed air travel are not collected centrally and associated emissions were estimated with a high degree of uncertainty for 2008 using incomplete data. It is likely that the estimates understate actual emissions. Estimates of financed air travel emissions have not been updated and the 2008 estimates are used as a proxy for 2009, 2010, and 2011. More complete data collection efforts are needed to improve the accuracy of emissions from financed air travel for future inventories. Our GHG emissions inventory intern will be tasked with finding better data on air travel in Spring 2012.

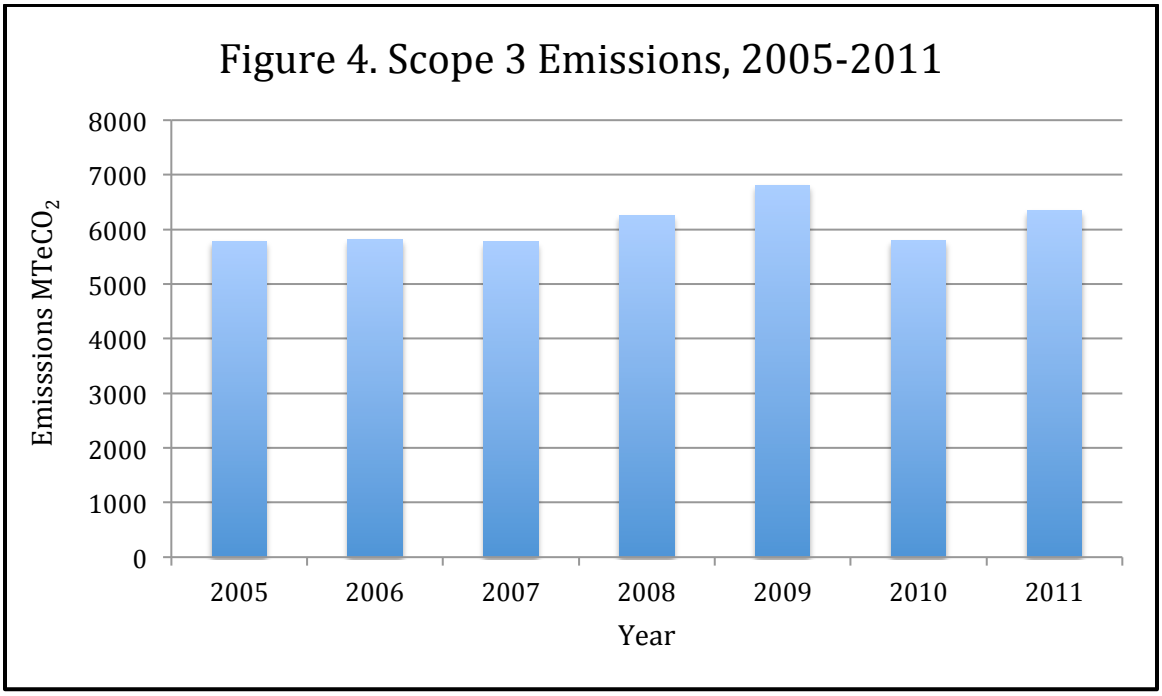
Data for air travel associated with study abroad are collected by the Office of Global Education and are more complete than data for financed air travel. Emissions associated with study abroad travel rose substantially from 2008 to 2009 and then decreased to 12 percent below the 2008 level in 2010. In 2011, emissions leveled off from our baseline year, reflecting an insignificant increase.

Decreases in emissions from solid waste are attributed to two factors. First, nearly all compostable waste generated in dining services are now diverted for composting at the college farm. Second, the landfill that receives our waste uses a methane recovery process for electricity generation, which offsets some of the GHG emissions from our solid waste.

Transmission and distribution (T&D) losses are proportional to our purchases of electricity. The decrease in T&D losses reflects the decrease in electricity purchases.

Table 4. Scope 3 Emissions

GHG Emissions Category	*2008 (mt eCO_2)*	*2009 (mt eCO_2)*	*2010 (mt eCO_2)*	*2011 (mteCO_2)*	*% Change '10-'11*	*% Change '08-'11*	*Trend*
Faculty/Staff Commuting	1699.4	1835.5	1765.7	1873.3	6.1	10.2	☹
Directly Financed Air Travel	118.6	118.6	118.6	118.6		0	😐
Study Abroad Air Travel	3175.8	3718.3	2791	3191.9	14.3	.5	☹
Solid Waste	195.1	86.0	98.8	99.2	.4	-49	☺
Wastewater	21.3	17.0	14.8	14.7	-.7	-31	☺
T&D Losses	1069.2	1060.6	1039.6	1055.1	1.5	-1.3	☺
Scope 3 Emissions	6250.4	6835.9	5828.5	6352.7	9	1.6	☹



Offsets

More than half of Dickinson's GHG emissions in 2010 were offset by the purchase of 18 million kwh of Renewable Energy Certificates (RECs) from WindCurrent at a cost of $42,000. WindCurrent's RECs are independently certified by Green-e, one of the strictest standards available on the REC market. Dickinson began purchasing RECs in 2002 and gradually increased the quantity of purchased RECs to equal nearly 50 percent of our electricity consumption by 2008. REC purchases were increased in 2010 to more than 100 percent of our electricity consumption. This action cut our net emissions by nearly one-third.

Table 5. GHG Offsets

Renewable Energy Certificates and Offsets	*2008 ($mteCO_2$) and kWh*	*2009 ($mteCO_2$) and kWh*	*2010 ($mteCO_2$) and kWh*	*2011 ($mteCO_2$) and kWh*	*% Change '10-'11*	*% Change '08-'11*	*Trend*
Wind Current	4715.1 *(8,000,000 KwH)*	4175.1 *(8,000,000 KwH)*	10608.9 *(18,000,000 KwH)*	10608.9 *(18,000,000 kWh)*	125	125	☺
Composting	35.2	28.0	28.1	54.2	93	54	☺

2011 GHG Inventory Statistical Input Chart			
Category	**Statistic**	**Contact Person(s)**	**E-mail(s)**
BUDGET DATA			
Operating Budget	$98,285,473.00	Margaret Stafford	stafford@dickinson.edu
Research Budget	$1,127,788.37	Joanne Gingrich	gingricj@dickinson.edu
Energy Budget	$2,734,118.63	Kristen Williams	williakr@dickinson.edu
INSTITUTIONAL DATA			
FT Students	2,373	Lori Sinkovitz	sinkovit@dickinson.edu
PT Students	41	Lori Sinkovitz	sinkovit@dickinson.edu
FT Faculty	213	Lori Sinkovitz	sinkovit@dickinson.edu
PT Faculty	60	Lori Sinkovitz	sinkovit@dickinson.edu
FT Staff	564	Lori Sinkovitz	sinkovit@dickinson.edu
PT Staff	83	Lori Sinkovitz	sinkovit@dickinson.edu
Total Building Space (sq. ft.)	1,878,668 sq. ft.	Kristen Williams	williakr@dickinson.edu
Total Research Building Space (sq. ft.)	607,405 sq. ft.	Kristen Williams	williakr@dickinson.edu
Purchased Electricity (kWh)	18,100,614 kWh	Durwin Ellerman	ellermad@dickinson.edu
ON CAMPUS STATIONARY SOURCES			
Distillate Oil	16,935 gallons	Kristen Williams	williakr@dickinson.edu
Natural Gas	22,765 MMBtus	Daniel Webster	websteda@dickinson.edu
UNIVERSITY FLEET			
Gasoline	20,404.2 gallons	Susie Thorn	thorn@dickinson.edu
Diesel	1,054.2 gallons	Susie Thorn	thorn@dickinson.edu
Biodiesel	840 gallons	William Shoemaker	shoemakw@dickinson.edu
UNIVERSITY TRAVEL			
F&S Business Air Travel	152,000 miles	no contact	no contact
Student Air Travel	4,111,280 miles	Marlee Meikrantz	meikranm@dickinson.edu
F&S Commuting	4,846,595 miles	Michelle Spencer	spencer@dickinson.edu
GROUNDS/FARM			
Synthetic Fertilizer	24,390 lbs	Randall Nenninger	nenninge@dickinson.edu
Synthetic Fertilizer %Nitrogen	20.0%	Randall Nenninger	nenninge@dickinson.edu
Composting (counts as offset)	141 tons	Andrew Sweger	swegera@dickinson.edu
Animal Agriculture	5 beef cows, 15 sheep, 73 poultry	Jennifer Halpin	halpinj@dickinson.edu
WASTE AND WASTE MINIMIZATION			
Refrigerants	162 lbs.	Michael Kiner	kinerm@dickinson.edu
CH4 Recovery and Electric Generation	568 tons	Interstate Waste Services	Kevin Bush ph: 1866-DIAL-IWS
Wastewater	30,251,930 gallons	Daniel Webster	websteda@dickinson.edu
RENEWABLE ENERGY CERTIFICATES			
Green Power Certificates	18,000,000 kWh	Kristen Williams	williakr@dickinson.edu

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