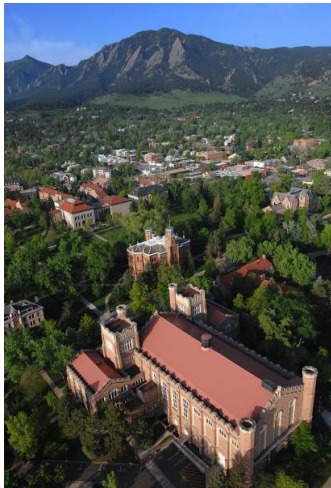




University of Colorado at Boulder Greenhouse Gas Emissions Inventory

FY2007-08

*In Accordance with Protocols of the
American College and University
Presidents Climate Commitment (ACUPCC)*

September 15, 2008

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University of Colorado at Boulder

Environmental Center

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September 15, 2008

American College and University Presidents Climate Commitment
c/o Toni Nelson, Climate Program Manager
Association for the Advancement of Sustainability in Higher Education
213 ½ N. Limestone
Lexington, KY 40507

RE: Transmittal and Attestation of 2008 UCB GHG Inventory

To Whom It May Concern

This is to transmit the University of Colorado at Boulder's 2008 Greenhouse Gas Inventory to the ACUPCC registry per the university's commitment. As the university's designated ACUPCC Implementation Liaison, it is also my pleasure to attest that the data and analysis contained herein represent our best knowledge and understanding of the university's carbon position.

Per the ACUPCC reporting guidelines, we have chosen to exclude certain de minimis sources from inclusion in the final tally. For instance, we are excluding HFC refrigerants as they are estimated at less than one percent and not an immediate focus of mitigation efforts. On the other hand, we have chosen to include other de minimis sources such as fleet emissions and waste disposal because they are important campus sustainability processes that engage broader interest and activity and serve as important benchmarks of campus implementation of carbon reduction programs.

In terms of analytical error, we are very confident in our Scope 1 emission calculations as they can be directly quantified. Scope 2 emissions are also easily quantified although as noted in the report we are using 2004 eGrid emission factors as the latest available. Scope 3 emissions are best thought of as an estimate, not a calculation, as they depend heavily on surveys and interpolation from surrogate parameters. Overall, we are confident that the Scope 1 and 2 calculations are within the five percent tolerance recommended by the US EPA ClimateLeaders.

Finally, we are fortunate to have very dedicated staff in all the reporting departments we worked with to secure the relevant data. We are also fortunate to have to expert energy and climate analysts with decades of experience in the public and private sectors performing these sorts of process observations and energy and climate calculations. We thank Moe Tabrizi and Rob Hall for their diligent pursuit of excellence.

Respectfully submitted,

A handwritten signature in dark ink that reads "Dave Newport".

Dave Newport, Director
ACUPCC Implementation Liaison

Acknowledgements

This report was prepared in response to the commitment and leadership of:

Chancellor G.P. 'Bud' Peterson

The ACUPCC designated institutional body overseeing development of the University of Colorado at Boulder's carbon neutrality effort is the Chancellor's Committee for Energy, Environment and Sustainability (CCEES) chaired by:

Vice Chancellor for Administration Frank Bruno

The CCEES is supported by the Carbon Neutrality Working Group:

*Doug Arent, National Renewable Energy Laboratory
Ghita Carrol, Boulder Valley School District
Paul Chase, Student
Rob Hall, Environmental Center
Curt Huetson, Housing and Dining Services
Casey Jones, Parking and Transportation Services
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GHG inventory data research and analysis performed by:

*Rob Hall, Environmental Center
Moe Tabrizi, Facilities Management
Dave Newport*, Environmental Center*

* Designated ACUPCC Implementation Liaison

Overview

The University of Colorado at Boulder's total greenhouse gas (GHG) emissions from all sources during the Fiscal Year 2007-2008 was 170,240 Metric Tons CO₂e. To put that number in some context, the US Environmental Protection Agency estimates an average of 19 metric tons CO₂e for a household of two people per year¹. Accordingly, CU's total emissions are equal to the yearly total emissions from about 8,960 US households.

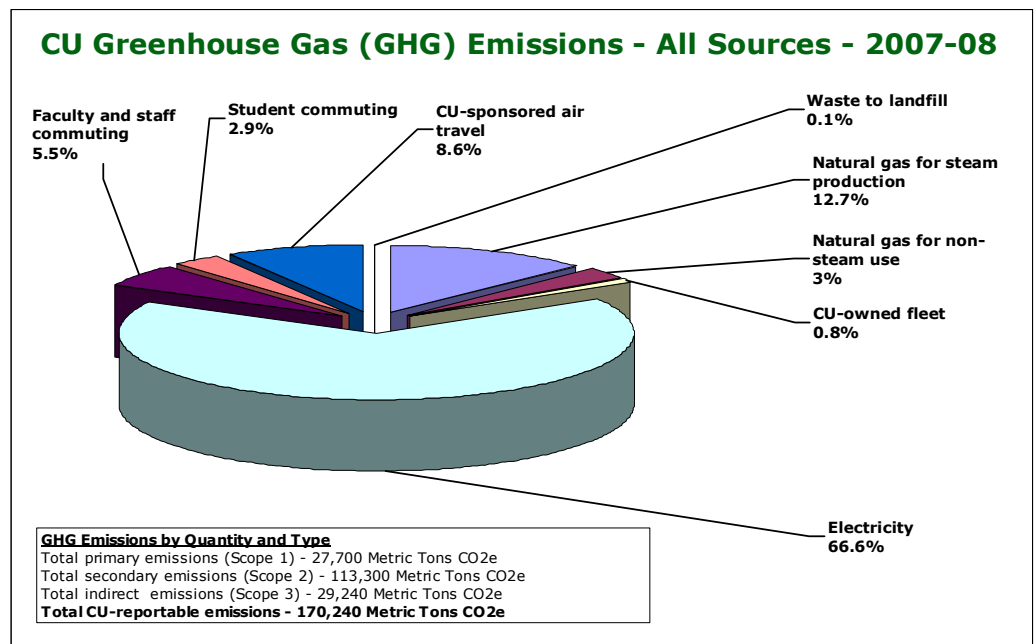


Table 1 UCB Total GHG Emissions by Source

About 16 percent of total GHG emissions result from CU-owned assets such as vehicle-fleet fuel combustion or natural-gas boiler operations. Over two-thirds of CU's total emissions are the result of energy purchased from secondary sources such as Xcel Energy's electrical generating plants. The balance of CU's reportable GHG emissions (17%) come from indirect, non-owned sources such as commuting, air travel, and solid waste disposal.

¹ http://www.epa.gov/climatechange/emissions/ind_calculator.html

The relative proportion of CU's GHG emission sources are consistent with typical campus GHG emission profiles at similar institutions of higher education nationwide. Energy used to light and heat major university campus buildings can range from 60->80%². The balance is typically spread across transportation, waste management, and other sources.

2008 GHG Intensities at Selected Public Universities³				
<i>Campus</i>	<i>FTE enrollment</i>	<i>GHG emissions per FTE student (Metric Tons CO₂e)*</i>	<i>GHG emissions per 1,000 square feet (Metric Tons CO₂e)*</i>	<i>Per cent offset (%)</i>
University of Arkansas	14,939	9.7	27.1	0%
University of Maryland at College Park	32,467	8.6	27.7	0%
Colorado State University**, ⁴	24,700	7.1	22.9	0%
Oregon State University**	18,793	7.0	18.7	0.9 %
University of New Mexico	20,559	5.7	17.7	0%
University of Colorado at Boulder	29,998	4.7	14.6	4.1%
Boise State University	14,314	3.5	16.1	0%
* Scope 1 and 2 emissions ** 2007 latest available				

Table 2 GHG Intensity Data from Selected Public Universities

² Derived from reviews of select major universities GHG inventories at http://www.aashe.org/resources/ghg_inventories.php, retrieved 9/8/2008

³ Derived from GHG inventories filed in compliance with ACUPCC and found at <http://www.aashe.org/pcc/reports/>, retrieved 9/12/2008. Readers are cautioned that making fair comparisons between higher education institutions is always challenging due to the diversity of higher education types. The unverified nature of the information in the ACUPCC database and unavailability of unbiased normalization metrics means such comparisons are even more difficult. Users should therefore approach direct institution to institution comparisons with caution and recognize that all comparisons between institutions are inherently biased.

⁴ Derived from published GHG inventory (2007), enrollment (2008), and facilities data (2004) found at: <http://www.fm.colostate.edu/sustain/index.cfm?page=about/reports>, <http://www.colostate.edu/features/facts-figures.aspx>, and http://www.facilities.colostate.edu/files/forms/Campus_Master_PlanWEB_SM.pdf, respectively. Retrieved 9/12/2008.

CU's GHG emissions per student are 4.7 Metric Tons CO₂e per full time equivalent (FTE) student. This is lower than some similar campuses and higher than others. Likewise, CU's per square foot GHG emission intensity is lower than some similar campuses. However, while some context can be seen in these data, caution should be observed as the data are not corrected for seasonal conditions or variations in the types of facility use, among other factors. The ACUPCC does not require the data be reported in that manner.

UCB GHG Emission Trend				
<i>Year</i>	<i>(Metric Tons CO₂e)*</i>	<i>Percent change</i>	<i>Campus gross square feet</i>	<i>Percent change</i>
2005	129,000	-	8,648,728	-
2008	141,000	+8.5%	9,685,160	+10.3%
<i>* Scope 1 and 2 emissions</i>				

Table 3 Growth in UCB GHG Emissions and Facility Size

CU's 2008 GHG emissions are 8.5% higher than the 2005 reference year. Growth in the campus physical plant of 10.3% combined with a transition away from a natural-gas fired on-campus cogeneration system account for the growth in emissions from the reference year. Growth in GHG emissions was moderated somewhat by the construction of high-performance LEED-Gold buildings during the period.

Under Colorado Governor Bill Ritter's Executive Orders⁵, CU is seeking to meet a 20% per square foot energy conservation goal by 2012, a 20% GHG reduction goal by 2020, and an 80% GHG reduction goal by 2050. The 2005 reference year cited above is the baseline under the Colorado Executive Orders. Additionally, as a signatory of the ACUPCC, CU is currently preparing a feasibility plan in accordance with ACUPCC requirements that will identify a date by which the university seeks to attain carbon neutrality. That plan will be published by September 15, 2009.

⁵ <http://www.colorado.gov/cs/Satellite?c=Page&cid=1199121589584&pagename=GovRitter%2FGOVRLayout>

Methodology

1. Start date of 12-month period

July 1, 2007

2. Consolidation methodology used

Equity reporting. CU is reporting for emissions from university-owned assets only.

3. Omitted buildings

The Mountain Research Station

4. Emissions calculation tool used

Custom tool was used.

5. Why was tool selected?

To enable enhanced data consolidation, tracking and analysis, CU chose to create its own basic emissions calculation spreadsheet tool. This custom tool does, however, adhere to the same basic GHG accounting principles, methodologies and emissions factors used in the CA-CP Calculator.

6. Source of emissions coefficients used

Same source as the CA-CP Calculator: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2004 (April 2006) USEPA #430-R-06-002; Annex 2

7. Version of IPCC GWP used

IPCC Third Assessment Report

8. Who primarily conducted emissions inventory?

Sustainability Office Staff, Energy Program Manager in cooperation with the Campus Conservation Resource Officer and numerous organizational units that supplied data.

9. Describe process of conducting inventory

Data collection for emissions inventory was compiled from pre-existing campus data aggregation and tracking systems in various departments including Accounting, Facilities Management, Parking and Transportation Services, Purchasing, and Human Resources.

Once per year these data are collected by the inventory manager. Emissions are calculated by multiplying the energy usage and other data by their coefficients.

10. De minimis sources and why determined

Identified de minimis sources are: CH₄ and N₂O from fossil fuel and electricity usage; HFCs from cooling equipment; CO₂, CH₄ and N₂O from fleet transportations fuels; and waste landfilling.

The University of Colorado has several programs and initiatives to reduce emissions in university-owned fleet and waste landfilling (composting and recycling). Although de minimis, we are including emissions from university-owned fleet and waste landfilling in order to measure progress in reductions in these emissions categories.

These sources individually make up less 1% of the total inventory and cumulatively less than 5%. Using standard emissions factors we determined CH₄ and N₂O from all fossil fuel usage was de minimis, including for electricity. Similarly, using the CA-CP factors for waste we determined these emissions to be less than 1% of the University total.

Using upper-bound calculations of cooling equipment used and building space cooled, we determined HFCs to be less than 1% of the University total. We have not included the refrigerators used in laboratories or dining services as the maintenance and end of life coolant disposal is handled by outside vendors. Even if included in the inventory, we determine these emissions would not be more than 1% of university total.

11. Data limitations of inventory

One limitation is the emissions factor used to estimate CO₂, CH₄ and N₂O emissions from electricity purchased from our utility, Xcel Energy. As prescribed by the CA-CP tool we used the Department of Energy's eGRID database of regional emissions factors from electricity generating plants. However, these factors are released with a lag time of several years. The current factors used in our GHG inventory are from 2004. This limitation is common as most entities reporting GHG inventories depend on these factors.

With growing focus on GHG emissions, we expect that individual utilities will eventually be releasing official annual updates to the emissions intensity of their electricity. We will use these annual factors when they become available from the utility for public use.

However, with the passing of Amendment 37 (Colorado's Renewable Portfolio Standard) in 2004 and its strengthening in 2007, all Colorado investor-owned utilities must have 20% of retail electricity sales come from renewables by 2020. Since 2004, Xcel Energy, the utility that serves CU, has already installed or is scheduled to add several hundred MW of renewables. Because the most current eGRID factors use aggregated generation data from 2004, the carbon reduction benefits of these renewables are not captured in the electricity emissions factor used in the CU inventory filed in September 2008. By the next inventory reporting period in 2010, eGRID will release emissions factors that more accurately capture the lower carbon content of Xcel's electricity. This will be reflected in the CU's 2010 inventory as lower emissions in Scope 2 for purchased electricity, regardless of changes in electricity usage on campus.

12. Stationary Combustion: Emissions from natural gas usage

*Natural gas used for steam plant (heating, cooling and hot water):
21,700 metric tons CO₂*

Natural gas used for non-steam production: 4,700 metric tons CO₂

Total CO₂ from natural gas combustion: 26,400 metric tons

13. Mobile Combustion: Emissions from fleet fossil fuel combustion

Fossil fuels used for all University-owned transportation: 1,300 metric tons CO₂.

14. Process emissions

The University has no process emissions.

15. Fugitive emissions

HFCs from cooling are the University's only fugitive emissions. These have been estimated to be de minimis. An upper-bound estimate shows these emissions to be less than 1% of the University total.

Total Scope 1 emissions: 27,700 metric tons CO₂

16. Purchased electricity

Emissions from electricity purchased from Xcel Energy: 113,300 metric tons CO₂

17. Purchased Heating

The university does not purchase heat.

18. Purchased cooling

The university does not purchase cooling.

19. Purchased steam

The university does not purchase steam.

Total Scope 2 emissions: 113,300 metric tons CO₂

20. Commuting

Staff and faculty car and bus commuting: 9,400 metric tons CO₂

Student car and bus commuting: 5,000 metric tons CO₂

21. Air travel

University-sponsored staff and faculty air travel: 14,700 metric tons CO₂. Note: this does not include travel to and from airport for business-related travel.

22. Solid Waste

The landfill where the university delivers its waste flares its methane. CO₂ from landfilled waste is 140 metric tons CO₂

23. Custom sources

No custom sources emissions have been identified.

Total Scope 3 emissions: 29,240 metric tons CO₂

29. Carbon offsets purchased:

2,600 metric tons CO₂

30. Offset verification program

The Colorado Carbon Fund (CCF) is in the process of determining its certification/ verification standard. They will eventually select Gold Standard and/or Voluntary Carbon Standard, plus Green-e Climate certification.

31. Description of offsets

Metric tons of carbon reduction are purchased from the Colorado Carbon Fund (CCF). The CCF is a state-coordinated offset program designed to stimulate verifiable carbon reduction projects in the state.

<http://www.coloradocarbonfund.org/>

32. Total RECs purchased

Atlas: 800 MWh

Koelbel Business: 1500 MWh

Wolf Law: 1700 MWh

33. Percent of total electricity consumption mitigated with RECs

Total RECs purchases equal roughly 3% of total campus electricity usage.

34. Emissions reductions from RECs

Using eGRID regional electricity emissions factors for 2004 (latest available data) for the regions where our purchased RECs are generated, we estimate CO₂ reductions of 3,500 metric tons.

35. REC verification program

The University buys its RECs from Community Energy, Inc. This vendors' RECs products are certified by Green-e.

36. Description of RECs purchased

Wind energy RECs from Colorado and Minnesota projects. Vendor is Community Energy, Inc.

37. Sequestration due to forests owned by University: NA

38. Description of sequestration: NA

39. Gross square feet of building space

In FY 07-08 the University owned 9,685,160 square feet of building space.

40. Assignable laboratory space: TK

41. Net assignable health care space:

Wardenburg Health Center is 29,738 square feet

42. Net assignable residential space:

3,026,081 sf

43. Total student enrollment

Fall 2007 student enrollment was 29,988

44. Residential students: 8,460

45. Full-time commuter students: Not reported

46. Part-time commuter students: Not reported

47. Non-credit students: Not reported

48. Full-time Faculty

Fall 2007 full-time Faculty was 3,797

49. Part-time Faculty: Not reported

50. Full-time staff

Fall 2007 full-time Staff was 3,105

51. Part-time staff: Not reported

52. Endowment size

The University of Colorado at Boulder had a total endowment on Dec. 31, 2007 of approximately \$366.7 million.

53. Description of circumstances providing context for understanding greenhouse gas emissions:

Emissions from commuting are based on commuting behavior survey data from 2005/2006. At the time of this reporting, commuter survey data from 2007/2008 are in the process of being aggregated and summarized but are not complete. Commuter emissions by category:

- Staff/faculty car and bus commuting: 9,400*
- Student car and bus commuting: 5,000*

57. Has inventory been verified or audited?

No external review. Internal peer review among reporting departments.

Appendix 1

2007/2008 UCB GHG EMISSION SOURCES DATA AND ANALYSIS									
SCOPES 1 AND 2									
ENERGY USE IN BUILDINGS	Collected units	Quantity	Converted Units	Quantity	CO ₂ factor (lbs/unit)	Total CO ₂ (lbs)	Total CO ₂ e (tons)	Total CO ₂ e (Metric tons)	%
Steam (heat, hot water, chilled water)	klbs	418,937	MMBtu	410,558	116.41	47,793,087	23,897	21,679	
Non-steam Natural gas	therms	895,486	MMBtu	89,549	116.41	10,424,353	5,212	4,728	
Electricity			kWh	124,922,499	2.0	249,844,998	124,922	113,330	
Total CO₂						308,062,438	154,031	139,737	98%
Building sf						9,685,160	9,685,160	9,685,160	
Total CO ₂ /sf						31.8077	0.0159	0.0144	
ENERGY USE IN TRANSPORTATION	Collected units	Quantity	CO ₂ factor (lbs/unit)	Total CO ₂ (lbs)	Total CO ₂ (tons)				
Unleaded gasoline	gallons	139,337	19.38	2,700,351	1,350				
Diesel	gallons	12,079	22.38	270,328	135		Tons	Metric tons	
Total CO₂					1,485		1,485	1,348	1%
EMISSIONS FROM REFRIGERANTS - HFCs *	Collected units	Quantity	CO ₂ e factor (tons/sf)	Total CO ₂ e (tons)					
Cooled building space (sf)	sf estimate	1,500,000	0.00092	1,380			Tons	Metric tons	
Total CO₂				1,380			1,380	1,252	1%
ENERGY USE IN BUILDINGS - DE MINIMIS GASES *	Units	Quantity	CO ₂ e factor (lbs/unit)	Total CO ₂ e (tons)	CH ₄ CO ₂ e factor (lbs/unit)	N ₂ O Total CO ₂ e (tons)			
Total natural gas	MMBtu	500,107	0.24	60	0.06	16			
Total electricity	MWh	124,922	0.55	34	8.88	555	Tons	Metric tons	
Total CO₂				94		570	665	603	0%
*Total Reportable Scope 1 and 2							155,516	141,085	98%
Total Scope 1 and 2							157,561	142,940	100%
<i>* De minimis: Not included in reported totals</i>									
SCOPE 3									
AIR TRAVEL	Units	Quantity	CO ₂ e factor (lbs/unit)				Total CO ₂ e (tons)	Total CO ₂ e (Metric tons)	%
Total miles travelled (FY 07)	miles	18,964,104	1.71				16,214	14,710	
Total CO₂							16,214	14,710	50%
STAFF FACULTY COMMUTING	Units	Quantity	CO ₂ e factor (lbs/unit)						
Car	miles	23,408,604	0.87				10,183	9,238	
Bus	miles	554,836	0.56				155	141	
Total CO₂							10,338	9,379	32%
STUDENT COMMUTING	Units	Quantity	CO ₂ e factor (lbs/unit)						
Car	miles	11,333,940	0.87				4,930	4,473	
Bus	miles	1,882,878	0.56				527	478	
Total CO₂							5,457	4,951	17%
SOLID WASTE	Units	Quantity	CO ₂ e factor (lbs/unit)						
Tons waste to landfill (with methane capture and flare)	tons	4,215	74.10				156	142	
Total CO₂							156	142	<1%
Total Scope 3							32,166	29,181	100%
TOTAL ALL SCOPES									
							Total CO ₂ e (tons)	Total CO ₂ e (Metric tons)	
Total Reportable* Scope 1 and 2							155,516	141,085	98%
Total Scope 3							32,166	29,181	100%
Total Reportable* All Scopes							187,682	170,266	99%
Total All Scopes							189,727	172,121	100%
<i>* De minimis: Not included in reported totals</i>									

Appendix 2

ACUPCC TWO-MONTH REPORTING FORM

Please use Adobe Reader (version 6 or higher) to complete and submit this form in a paperless fashion.
Adobe Reader is free.



GET
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Today's Date: October 25, 2007	
INSTITUTION INFORMATION	
Institution Name: University of Colorado at Boulder	
FCE Number: 001370 (Look up your institution's FCE Number .)	
Are you a system office? ☐ Yes ☒ No	If yes, input the other signatory campuses in your system: Are you reporting for the entire system or will each campus report individually? ☐ Reporting for entire system ☐ Each campus will report individually
Main Web Site: www.colorado.edu	Sustainability Web Page: ecenter.colorado.edu
Total Enrollment (Head Count): 30,000	

INSTITUTIONAL STRUCTURE			
Implementation Liaison			
First Name: Dave	Middle Initial(s):	Last Name: Newport	
Title: Director, Environmental Center	Email: dave.newport@colorado.edu	Direct Phone:	ext:
What is the format of your institutional structure for implementing the ACUPCC (select one)? ☐ Task Force ☒ Committee ☐ Individual ☐ Center- or Institute-led ☐ Other:			
How many individuals are part of your institutional structure? 11			
Which stakeholder groups are represented (select all that apply)? ☐ Board ☒ Executive ☒ Faculty ☒ Staff ☒ Students ☐ Alumni ☒ Community Leaders ☐ Community Members ☐ Other:			
Please describe how you created your institutional structure (max. 100 words): The Chancellor's Committee on Energy, Environment and Sustainability (CCEES) was created by Chancellor Peterson on February 22, 2007 and charged with executing the ACUPCC process.			

TANGIBLE ACTIONS
Please indicate and describe which of the following tangible actions you will be implementing (or have already implemented) while you are developing your Climate Action Plan (select all that apply -- a minimum of two are expected):
☒ Establish 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. Please describe: The LEED requirements have been officially added to the campus building codes that apply to all new construction and renovation. All construction projects are now targeting LEED Gold. Three have been approved in the last year.
☒ Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist. Please describe: Consistent with Colorado Governor's Executive Order D0012-07, dated April 16, 2007, the University promulgated a guidance document informing campus buyers of the Energy Star preference.

- ☐ Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
Please describe:
- ☒ Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution.
Please describe:
In 1991 students voted to allocate student fees to pre-pay for RTD transit passage. This Eco Pass applies to all local and regional transit. A similar measure is funded for faculty and staff. The University also directly funds several local transit routes to enhance the level of service to the campus.
- ☐ Within one year of signing this document, begin purchasing or producing at least 15% of our institution's electricity consumption from renewable sources.
Please describe:
- ☐ Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution's endowment is invested.
Please describe:
- ☒ Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste. Please describe the 3 or more associated measures you have or intend to adopt:
Yes, we have participated in this component for the last two years. 1) We have implemented a zero-waste events system. 2) The Athletics department has committed to a zero-waste goal and begun to significantly increase recycling rates at sporting events. 3) Our ECO-MUGS mugs program provide reduced rates for beverages dispensed in reusable mugs. 4) We captured over 10 tons of reusable materials just in last year's Move-Out campaign conducted at the end of the term.

SUBMISSION INSTRUCTIONS

1) Before you submit this report, you can save a copy for your own records using the File >> Save As... menu option.

2) When you press the "Submit by Email" button below, you may or may not receive a confirmation that the form has been sent, depending on what e-mail application you use. If you want to ensure that the form has been submitted, you can check the "Sent Mail" folder in your default e-mail application.

Submit by Email

If you have any questions about reporting, please contact Michelle McKay,
Senior Fellow at Second Nature at mmckay@secondnature.org or 617-477-9776.