

ACUPCC Climate Action Plan Interim Report

University of Massachusetts Lowell - 2013



Submitted:
December 20th, 2013

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Note: Most text responses had a character limit of 1000 characters there were limitations on numeric responses

Section A: General Statement of Progress

General Statement of Progress

Section B: GHG Emissions & Reduction Targets

Brief Climate Action Plan Summary

Climate Neutrality Target Date 2050

Steps towards climate
neutrality- Interim Targets
(Emission type(s), Year,
percent reduction, Baseline
year)

[Click to view the Climate Action Plan official document](#)

[Click to view the ACUPCC Climate Action Plan Reporting Page](#)

These are the University's GHG Mitigation Interim Milestones as stated in the

Climate Action Plan (v. Jan. 6, 2012):

Time Frame	Scope 1 + 2 Performance Standard (MT eCO2/1000 SF)	Scope 3 Performance Standard (MT eCO2/FTE)	Goal Net GHG Emissions (MT eCO2)
FY 2020	8.0	1.9	60,565
FY 2030	6	1.5	47,100
2050	0	0	0

Due to limitations we had to publish a less specific plan on the web. It is listed as follows:

Emissions	Target Date	Target % Reduction
Scope 1, 2, 3 Emissions	2020	20%
	2030	38%
	2050	100%

- Note: % Reduction is relative to 2011 Baseline

See [Appendix A](#) for a detailed breakdown of our interim emissions relative to the 2011 baseline

GHGs for University of Massachusetts Lowell

Year	Gross Emissions	Net Emissions	FTE	Total Bldg. SF	[action]
2007	47,438.3	44,956.3	7,723.0	2,642,569.0	[view]
2010	47,737.0	47,737.0	9,255.0	2,911,773.0	[view]
2011	51,136.8	51,136.8	11,246.0	3,417,134.0	[view]
2013	50,217.0	50,217.0	12,377.0	3,640,134.0	[view]

GHG Summaries

Change in GHG gross emissions

2778.7 MTCDe increase

There has been 920 MTCDe reduction in FY13 overall since FY11. Scope1+2 MTCDe decreased by 439; Scope 3 decreased by 481. We have had several GHG mitigation projects including a North Campus Steam Plant renovation and fuel switch from burning #6 FO to Natural Gas; and reducing GHGs by replacing four steam absorbers with Hi-eff. electric chillers on South Campus.

Change in GHG emissions per 1000 sq. ft. building space

-4.15621296559

In FY 13, 1.17 MTCDe/1000 SF; a reduction of 7.8% from FY11. Refrigerants emissions increased by 280 MTCDe; proportional to all HVAC construction. Stationary heating plant dropped 576 MT due to fuel switching projects replacing steam absorbers with high eff. electric chillers. Purchased electricity dropped 254 MT from Grid clean-up and fuel switching to cleaner, to efficient gas from

electric heat. We have expanded campus from 2.64 MSF in 2007 to 3.64MSF in 2013 by purchase of Tsongas Arena, Doubletree Hotel; St. Joseph Hospital and converting them to viable space. Also UML built two LEED buildings, Saab ETIC research building and HSSB academic building.

Change in GHG emissions per full time enrollment (FTE)	-2.08518687121
	0.19 MTCDe/FTE; reduction of 11.4% Enrollment is up 4654 from 2007 (over 60%). In 2013, enrollment is 12,377. In 2007 there were 7723 FTE students. FTE Student commuting increased GHG emissions by 790 MT. Air travel reduced by 1226; reduced paper and T&D loss (176 MT reduction).

Section C: Education Research and Community Engagement

Education

How is your institution making climate neutrality and sustainability a part of the curriculum and other educational experiences for all students?

Through the Climate Change Initiative faculty are working on a proposal for a Climate Change and Sustainability Minor. A minor called Environment and Society already exists which focuses on the connection between environmental and social issues. Furthermore, the Francis School of Engineering also offers multiple degree programs and sustainability related courses. Students are also allowed and sometimes encouraged to address issues related to a sustainable society for Capstone projects. In other departments students can choose to perform Capstone projects or Directed Studies related to sustainability and climate neutrality. Furthermore, the University has made a large push to further service learning opportunities and many of those have had a direct correlation to climate and our sustainability in the real world.
(More details below)

Has your institution utilized any of the following education methods?

- | | |
|-----|--|
| No | Included sustainability learning outcomes, tracks, or certificates in every academic major. |
| No | Included sustainability in fulfilling regional accreditation requirements. |
| No | Included sustainability in fulfilling state accreditation requirements. |
| No | Included sustainability learning outcomes into institutional General Education Requirements. |
| Yes | Offered professional development to all faculty in sustainability education. |
| No | Other: |

A Sustainability Workshop is being offered to faculty who would like to learn how to introduce Sustainability and Climate Change into courses from all

colleges.

No None of the above

Associate College Degree Programs
This question is specifically for Associate/ 2-year Colleges.
For guidance on each of the listed degree programs please visit the [SEED Center](#)

*My institution offers a degree program /professional certificate in:
 Please check all that apply:*

- No - Solar
- No - Wind
- No - Energy Efficiency
- No - Sustainable Agriculture, Food, and Land
- No - Transportation and Fuels
- No - Green Building
- No - General Sustainability
- No - Other

Only a few (four) Associate's Degrees are offered via the Division of Online and Continuing Education. (see: <http://www.continuinged.uml.edu/degrees/>)

Sustainability Education & Economic Development Center

No - My institution is not a member of SEED

Curriculum

Does your institution offer an undergraduate degree program(s) related to climate change/sustainability?

Yes

If yes, please provide the name(s) and website URLs of the climate change/sustainability-focused undergraduate degree program(s):

Undergrad Degree Programs Related to Climate Change/Sustainability:

- Minor in Energy Engineering
- A lot of the Undergrad Degrees in the Francis College of Engineering have a particular focus in sustainability
- College of Sciences: B.S. Environmental Science: Environmental Studies Concentration (<http://www.uml.edu/Sciences/EEAS/Program-of-Study/Overview.aspx>)
- B.S. Environmental Science, Atmospheric Science Concentration (See above)
- B.S. Biological Science: Ecology Concentration (<http://www.uml.edu/Sciences/biology/Programs-of-Study/Undergraduate.aspx>)
- School of Health & Environment: B.S. Work Environment Policy (<http://www.uml.edu/Health-Sciences/WE/Programs/default.aspx>)
- B.S. Environmental Health (<http://www.uml.edu/health-sciences/CHS/Programs/Environmental-Health-Programs.aspx>)
- College of Fine Arts, Humanities, & Social Sciences: Concentration in Environment and Society – B.A. program with a concentration in

Environment and Society
(<http://www.uml.edu/Catalog/Undergraduate/FAHSS/Interdisciplinary-Programs/Environment-and-Society-minor.aspx>)

Does your institution offer a graduate degree program in climate change/sustainability?

Yes

If yes, please provide the name(s) and website URLs of the climate change/sustainability-focused graduate degree program(s):

Grad Degree Programs Related to Climate Change/Sustainability:

- M.S. & Ph.D. Cleaner Production & Pollution Prevention (<http://www.uml.edu/health-sciences/WE/Programs/CleanerProd-PollutionPrev.aspx>)
- School of Health & Environment: M.S. Work Environment Policy (<http://www.uml.edu/Health-Sciences/WE/Programs/default.aspx>)
- M.S. Environmental Science: Environmental Studies Concentration (<http://www.uml.edu/Sciences/EEAS/Program-of-Study/Overview.aspx>)
- M.S. Environmental Science, Atmospheric Science Concentration (See above)
- College of Engineering: M.S & Ph.D. Energy Engineering (<http://www.uml.edu/Catalog/Graduate/Engineering/Energy-Engineering/Default.aspx>)
- Graduate Certificate Energy Conversion (<http://www.uml.edu/Catalog/Graduate/Engineering/Electrical-Computer-Engineering/Graduate-Certificates.aspx - Energy>)
- College of Engineering- in general a lot of the Graduate degrees have a particular focus on sustainability

Co-Curriculum

Research

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

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

Center for Electric Car and Energy Conversion
(<http://www.uml.edu/centers/ECEC/Default.html>)

Community Engagement

<https://www.facebook.com/photo.php?fbid=487896954596674&set=pb.140661165986923.-2207520000.1386873414.&type=3&theater>

<https://www.facebook.com/media/set/?set=a.486730124713357.1073741828.140661165986923&type=3>

Section D: Energy & Finances

Energy Efficiency Projects

Number of Energy Efficiency Retrofit Projects planned, but not yet implemented	175
Expected annual emissions reductions from all planned EE Retrofit Projects not yet implemented (MTCOE avoided emissions)	6,000
Number of Energy Efficiency Retrofit Projects completed since signing the ACUPCC	At least 27
Please provide additional information or context on how you track and categorize projects and or provide case study on best practice of completed or planned Energy Efficiency projects. If available, please include a link to a webpage or press release.	<p>Projects are tracked on monthly basis by the Facility Management Dept. for Cost vs. Funding and Schedule vs. Completion. Projects are prioritized based on potential for energy conservation and GHG reduction; and simple payback. Also priority is given to deferred maintenance projects.</p> <p>Example of one of our best energy efficiency projects-- NCPP Boiler Upgrades: http://www.uml.edu/News/stories/2011-12/A-Greener-Warmth.aspx</p> <p>Chiller Retrofits- Largest overall GHG Reduction projects for the University in the past two years.</p>
Number of buildings that have received a green building certification since signing the ACUPCC	1
Number of green buildings planned or scheduled for completion in the next 2 years	4
For all buildings, the certification/rating used is	USGBC: LEED

Renewable Energy

The annual output capacity for each renewable energy system utilized by your campus (in kWh).	Solar Output	278,000
	Wind Output	0
	Biomass Output	0
	Fuel Cell Output	0
	Geothermal Output	0
	Landfill Gas Output	0
	Annual Renewable Energy Purchased	0

*NOTE: The solar output is FY13 Total Generation (Total Capacity = 250 kW DC)

Other GHG mitigation efforts that you would like to share or highlight. If available, please include a link to a webpage or press release.	<p>Other Misc. efforts: Recycled furniture and cooking oil; CCI; incentive fund, green tips; Transportation initiatives; Tree Campus USA; Green Guard Certification; DOT ECO Award; LBE Award http://www.lowellsun.com/green/ci_24416574/chelmsford-umass-lowell-manager-named-clean-awards; pretax transit passes; RideShare; Student Orientation; Alt. transportation; Shuttle; Freewheelers; carpooling; Access to Bike Repair; AEP; EnerNOC EEMS; CES Utility Tracker; Composting food waste in Dining Hall (http://www.uml.edu/News/stories/2013/CompostingProgram.aspx) Photos for composting here Zero Sort Recycling; Electric Car Fleet; CBECS Benchmarking; SEA growth; Earth Week activities; GIS IR Thermographic flyover.</p>
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Financial Data

Savings...

Has your Climate Action Plan and/or related sustainability efforts saved your institution money so far, e.g. by reducing operational expenses?	Yes
Estimate the total monetary amount spent on Climate Action Plan projects and/or related sustainability efforts at the time of this Progress Report	Dropdown List \$1-10 M Approx. \$4.8 Million.
Estimated money saved to date from implementing your CAP	Dropdown List \$1-10 M

Estimated total savings expected from implementing entire Climate Action Plan

Dropdown List ----

Please provide additional information or context to support your expected savings.

Cost avoidance developed by calculation for EE projects that have been executed plus average of rebates over the last two years amount to Annualized savings of about \$1.0 Million. In addition to another \$780K from Transportation Dept. for annual debt service and maintenance for structure parking. Brings our total annual savings for CAP Implementation to approximately \$1.78 Million.

Funding...

Financial resources (dollar amount) secured from outside sources to support mitigation efforts related to the Climate Action Plan (grants, gifts, etc...)

\$3,500,000

Any additional information on secured outside funding. If available, please include a link to a webpage or press release.

Out of the \$3.5M: See in box below for detailed breakdown.
 In addition we are including The future AEP, Accelerated Energy Program, which is a program to be funded by the state bond for an estimated \$25,000,000 performance contract. It will cover over 130 energy projects campus-wide and is scheduled to be completed in 2015.

Finance Methods...

Financing Methods utilized for Mitigation or Renewable Energy Projects

Please check all that apply:

- Borrowed against endowment
- Efficiency Services Agreement (ESA)
- Managed Utility Service Contract (MUSC)
- Power Purchase Agreement (PPA)
- Renegotiating Purchased Utilities Agreements
- Revolving Loan Funds
- Tax Exempt Lease Purchase Agreements (TELP)
- Student Green Fees
- Energy Performance Contract (EPC)
- Other

Please provide more information:

OTHER=

ARRA Grants=\$616,000 for PV arrays;\$595,000 for EEMS Project

DCAMM Grant \$1,830,342.68 This covered Weed Infrastructure Improvements (Chillers/Cooling Towers), North Campus Electrical Improvements, Olsen and Olney Cooling Towers

NOTE:

SRECs/Demand Resp. Payments.=\$127K (FY 12&13)

CES Virt. NMC Contract- \$22K

-\$266,344 Utility rebated /\$203,925 already invested in new energy projects.

Section E: Non-Public Data

Non-Public Data

<https://www.uml.edu/News/stories/2013/earthweek-2013.aspx>

<https://www.facebook.com/events/497306833666737/>

community (see the CCI's Faceboo

<https://www.facebook.com/UML.CCI>

bike transportation (<http://www.uml.edu/CampusRecreation/Bike-Shop/FreeWheelers.aspx>)

Has your institution identified its climate change and sustainability-focused course offerings and made them

Yes

If yes, please provide the website URL where the sustainability course inventory is posted.

<http://www.uml.edu/Research/Climate-Change/Academic-Programs.aspx>).

<http://climateinteractive.org/simulations/world-climate>

(water) health (Bob Giles-<http://www.uml.edu/Profiles/Robert-Giles.aspx>)

<http://www.uml.edu/Engineering/SLICE/Course-Offerings.aspx>

<http://www.uml.edu/Engineering/SLICE/Project-Examples/default.aspx>

<http://www.uml.edu/Today/Submissions/2013/2013-11-25-14-22-15-Faculty-Workshop-on-Cross-Disciplin.aspx>

information can be found here: <http://www.uml.edu/Research/Climate-Change/projects/default.aspx>

can be found here: [http://www.uml.edu/docs/Research Institute Guidelines_tcm18-105167.pdf](http://www.uml.edu/docs/Research%20Institute%20Guidelines_tcm18-105167.pdf)

AASHE's Sustainability Tracking Assessment & Rating System (STARS)

If you are STARS reporting institution, please enter the base URL (web address) of your most recent STARS report

We are not a STARS participant

[Click here to see the published report on the ACUPCC website](#)

Appendix A:

Summary of UMass Lowell FY 13 and FY 11 GHG Inventories For ACUPCC Progress Report

APPENDIX A: SUMMARY OF UMASS LOWELL FY13 AND FY11 GHG INVENTORIES FOR ACUPCC PROGRESS REPORT (REVISED 12/12/13)

Scope	Description	FY13 (CACP v6.9)		FY11 (CACP v6.7)		Change		Explanation
		eCO2	Raw Data	eCO2	Raw Data	eCO2	eCO2	
		Metric Tonnes	As noted	Metric Tonnes	As Noted	Metric Tonnes	%	
Scope 1	Other On-Campus Stationary	14,416.5	880 gal #6; 1,134 gal #2; 270,665 MMBtu NG	14,992.7	8,896 gal #6; 4,252 gals #2; 280,529 MMBtu NG	(576.18)	-3.8%	North campus heating plant upgrades; energy efficiency improvements & Green Building standards
	Direct Transportation	985.0	63,404 gal gasoline; 39,44+D18 gal diesel	875.4	52,453 gal gasoline; 40,387 gal diesel	109.69	12.5%	Increased gasoline usage in fleet vehicles
	Refrigerants & Chemicals	969.7	FY11 revised 11/13 using screening method; 1480 lbs of 134a & 12.5 lbs 410A	689.6	FY11 revised 11/13 using screening method; 1061 lbs 134a	280.10	40.6%	FY13 and FY11 refrigerant emission estimates revised November 2013; implemented screening method for both years (mass balance previously used for FY13) based on more accurate inventory of equipment on site. Note: emissions based % of full charge lost during normal operation per screening method. Note that GWP of 134a changed from 1300 to 1430 per CACP reference source.
	Agriculture	8.4	8,900 lbs 22.4%N	6.6	6,600 lbs 24% N	1.72	25.9%	Increase in fertilizer purchases
Scope 2	Purchased Electricity	15,113.1	45,292,592 kWh; eGRID factor of 0.000338 MT/kWh	15,367.5	40,665,495 kWh; eGRID factor of 0.000378 kWh	(254.36)	-1.7%	Overall decrease in emissions; electricity consumption up 11.38% but the eGRID factor decreased by 10.58%
Scope 3	Faculty / Staff Commuting	2,231.7	Auto 5.8 million miles; Bus 127,557 miles; Avg. one way distance 11.76 miles; Auto 24.17 MPG; Bus 31.93 MPG	2,105.4	Auto 5.1 million miles; Bus 112,359 miles; Avg. one way distance 11.6 miles; Auto 22.10 MPG; Bus 39.67 MPG	126.30	6.0%	Overall increase in emissions; auto miles up 13.7%; avg. one way distance up slightly; fuel economy also up 9% (lower emissions per mile)
	Student Commuting	12,555.1	Auto 29.06 million miles; Bus 4.99 million miles; Avg. one way distance 12.3 miles; same MPG as above	11,765.3	Auto 26.7 million miles; Bus 3.78 million miles; Avg. one way distance 12.7 miles; same MPG as above	789.75	6.7%	Overall increase in emissions; auto miles up 8.8%; one way distance down slightly; number of students up 4.7%; fuel economy also up 9% (lower emissions per mile)
	Directly Financed Air Travel	1,649.4	3.1 million miles; 0.52 kg CO2/mile	2,640.7	3.4 million miles; 0.77 kg CO2/mile	(991.24)	-37.5%	8.8% decrease in passenger miles; 48% decrease in kg CO2 per passenger mile (airlines consuming less fuel per passenger mile)
	Study Abroad Air Travel	644.0	1,222,720 miles; 0.52 kg CO2/mile	879.1	1,132,328 miles; 0.77 kg CO2/mile	(235.10)	-26.7%	FY13 emissions revised November 2013 to account for group travel based on "passenger miles" (not trip miles); overall decrease in emissions; 7.4% increase in passenger miles; 48% decrease in kg CO2 per passenger mile (airlines consuming less fuel per passenger mile)
	Solid Waste	(37.2)	929 tons; -40 kg CO2/ton for mass burn incinerator	(42.8)	1071 tons; -40 kg CO2/ton	5.60	-13.1%	Total tons of solid waste down 12%; emissions revised December 2013 to reflect "mass burn" incinerator (previously tracked as "refuse derived fuel") & current CACP emission factor of -40 kg/short ton for FY11 & FY13 per CACP v. 6.9. The emission factor is negative (i.e. GHG "savings") because the waste would otherwise break down over time and release methane, which is a stronger greenhouse gas than CO2 from incinerator. Instead, the waste is used instead of fossil fuels to generate heat or electricity. Therefore, this results in fewer emissions than would have been emitted by standard utility generation.
	Paper	186.6	134,361 lbs 0% recycled & 2,542 lbs 30% recycled	337.4	247,000 tons 0% recycled (FY11 erroneously reported all paper as 30% recycled)	(150.80)	-44.7%	45% reduction in paper purchases likely due largely to new printing policy implemented in 2012 (double sided printing and student charged for paper); FY11 recycled content also changed from 30% to 0% as the majority of paper purchased in both FY13 and FY11 is 0% recycled.
	Scope 2 T&D Losses	1,494.7	9% loss	1,519.9	9% loss	(25.16)	-1.7%	Overall decrease which accounts for increased consumption in kWh and decrease in eGRID emission factor
Offsets	Additional	-		-		-		
	Non-Additional	(93.1)	SRECs	-		(93.09)		Solar renewable energy credits (non-additional)

APPENDIX A: SUMMARY OF UMASS LOWELL FY13 AND FY11 GHG INVENTORIES FOR ACUPCC PROGRESS REPORT (REVISED 12/12/13)

Scope	Description	FY13 (CACP v6.9)		FY11 (CACP v6.7)		Change		Explanation
		eCO2	Raw Data	eCO2	Raw Data	eCO2	eCO2	
		Metric Tonnes	As noted	Metric Tonnes	As Noted	Metric Tonnes	%	
Totals	Scope 1	16,379.6		16,564.3		(184.67)	-1.1%	Decrease in Scope 1 emissions
	Scope 2	15,113.1		15,367.5		(254.36)	-1.7%	Increase in Scope 2 emissions
	Scope 3	18,724.2		19,204.9		(480.65)	-2.5%	Increase in Scope 3 emissions
	All Scopes	50,217.0		51,136.6		(919.69)	-1.8%	Overall increase in gross emissions
	All Offsets	(93.1)		-		(93.09)		SRECs purchased in FY13 but not in FY11
Total	With Additional Offsets	50,217.0		51,136.6		(919.69)	-1.8%	
Normalized	Scope 1+2 per 1000 GSF	8.7		9.3		(0.69)	-7.4%	Decrease in normalized Scope 1 & 2
	Scope 3 per FTE	1.5		1.7		(0.19)	-11.4%	Decrease in normalized Scope 3
GSF	1000 SF	3,640.1		3,417.1		223.03	6.5%	Increase in square footage
FTE Students	FTE	12,377.0		11,246.0		1,131.00	10.1%	Increase in student population

*Note: FY13 & FY11 refrigerant emissions revised November 2013 using The Climate Registry *General Reporting Protocol* "screening method" to maintain consistent methodology for ACUPCC progress reporting.

Emissions Relative to 2020 Goals (MTCO_{2e})

SCOPE	2020 Goal	FY13	FY11	Change	% Change
Scope 1&2 per 1000 CSF	8.0	8.65	9.34	(0.69)	-7.4%
Scope 3 per FTE	1.9	1.51	1.71	(0.19)	-11.4%

Total Emissions Per 1000 SF & Per FTE (MTCO_{2e})

TOTAL 1+2+3	FY11*	FY13	Change	% Change
Total All Scopes	51,136.65	50,216.96	(919.69)	-1.8%
Total per 1000 SF	14.96	13.80	(1.17)	-7.8%
Total per FTE	4.55	4.06	(0.49)	-10.8%

*Note: The FY11 emissions uploaded to the ACUPCC site = 56,686 MTCO_{2e}. This figure was revised to reflect more accurate commuting data, actual FY11 No. 6 oil burned (8,896 gallons), revised refrigerant emissions based on more accurate inventory of refrigeration equipment (screening method), 0% recycled content paper (rather than 30%), and 0 emissions for landfilled solid waste (for consistency with FY13 CACP emission factors attributing solid waste emissions to landfills only (not incinerators/waste to energy plants)).