Oregon State Board of Higher Education

Meeting of the
Board Committee on
Finance & Administration
June 20, 2013

Table of Contents **Page**

OUS, Contracting and Purchasing with Historically Underrepresented Businesses 1
Adoption of Optional Retirement Plan Eighth Amendment... 5
OUS, Proposed 2012-13 "Settle-Up" of Operating Budget Allocations.. 7
Internal Bank Update 13
Climate Action Plan/Carbon Emissions Update 16

Oregon State Board of Higher Education

Finance & Administration Committee
June 20, 2013
9:00 a.m.—12:30 p.m.
Boardroom (ASRC 515), 1800 SW 6th Ave, Portland, Oregon

AGENDA

1. **CALL TO ORDER/ROLL CALL/WELCOME**

2. **CONSENT ITEM**

   a. Approval of Minutes, May 24, 2013 .... (separate cover)

3. **AGENDA ITEMS**

   a. OUS, Contracting and Purchasing with Historically Underrepresented Businesses (Bounds) 9:00-9:30

      Per the OUS Equity Purchasing Policy and Procedures that became effective on November 15, 2011, staff compiled an annual report for presentation at the Finance and Administration Committee meeting.

   b. Adoption of Optional Retirement Plan Eighth Amendment (Yunker) 9:30-9:45

      Employer contribution rates for the Optional Retirement Plan (ORP) are established each biennium based on the Public Employees Retirement System (PERS) employer contribution rates for state agencies. The next rate change, scheduled to take effect July 1, 2013, may be delayed due to legislative actions to reduce 2013-2015 employer contribution rates. This amendment is required to ensure there is adequate time to adopt and apply revised rates retrospectively to July 1, 2013.

   c. OUS, Proposed 2012-13 "Settle-Up" of Operating Budget Allocations (Lewis) 9:45-10:00

      The Fiscal Year 2012-13 budget allocation of the state General Fund was originally approved by the Board on August 3, 2012, with a supplemental distribution of incentive funding approved on January 11, 2013. The enrollment-based components used projected FTE for all academic terms. The revised allocation being proposed here uses actual end-of-term enrollments for summer, fall, and winter terms with spring estimated using winter end-of-term data.

   d. Internal Bank Update (Green/Levear) 10:00-10:30

      Chancellor's office staff will update the Finance and Administration Committee on the results of the implementation of the internal bank relative to its stated goals and objectives.

e. Climate Action Plan/Carbon Emissions Update (Good Company/Wiewel)............10:30-11:00

f. Update on the Outcome-based Budget Project (Kenton) 11:30-12:30

4. ADJOURNMENT 12:30

Note: All docket materials are available on the OUS website at: http://www.ous.edu/state_board/meeting/dockets. Please contact the Board's office at 541.346.5749 if you have any questions regarding these materials. This agenda may be amended at any time prior to 24 hours before the Committee meeting. Estimated starting times for the agenda items are indicated; however, discussions may commence, or action may be taken, before or after the suggested times. Any item on the agenda may be considered at any time out of order at the discretion of the Committee chair.

OUS, Contracting and Purchasing with Historically Underrepresented Businesses

INTRODUCTION

Per the OUS Equity Purchasing Policy and Procedures (policy) that became effective on November 15, 2011, staff has compiled an annual report (report) for presentation at the Finance and Administration Committee meeting. The report consists of data collected from each Institution relating to their contracts and expenditures with Minority-owned, Women-owned, and Emerging Small Businesses (collectively referred to as Historically Underrepresented Firms or MWESB) for Fiscal Year 2012 (FY12). Institutions also included Outreach Plans, per the terms of the policy, and other information determined by Institution staff to be relevant to the issue for Board review. The policy and resulting reports will allow the Committee the opportunity to evaluate the progress of the institutions towards meeting the Board's dual goals of increasing both the number of Historically Underrepresented Firms who work with our institutions and the value of that work in a way that builds capacity and contributes to the success of these sectors of the Oregon business community.

OUS OUTREACH

During 2012, staff continued to increase their outreach activities and made dedicated efforts to participate in the Oregon small business community with a focus on increasing awareness of business opportunities for Historically Underrepresented Firms at OUS institutions and building relationships within the community. Below is a non-exhaustive list of sponsorships and memberships in which staff participated:

Title Sponsor and Planning Committee Member, Governor's Marketplace
Sponsor and Planning Committee Member, Business Diversity Institute Leadership Recharge
Sponsor, Oregon Association of Minority Entrepreneurs Tradeshow
Sponsor, Minority Entrepreneur Development Week
Sponsor, Hispanic Chamber of Commerce Awards
Member of the Board, Business Diversity Institute
Member, Oregon Association of Minority Entrepreneurs
Partner, National Association of Minority Contractors of Oregon

In addition to increased Systemwide outreach, the institutions have undertaken new efforts to increase the number of Historically Underrepresented Firms doing business with their particular institution, including trade-shows and one-on-one relationship building. These efforts are outlined in the attached Institution reports.

OUS RETAINER PROGRAM

Since 2010, the OUS Retainer Program for Construction Related Services has been a maintained in an electronic database that allows campuses to easily target outreach to firms certified by the state as Minority-owned, Woman-owned or an Emerging Small Business. The electronic database has led to increases in the efficiency of the application process encouraging more small businesses to participate and allowing staff to accept applications on a continual basis rather than restricted to specific open periods. In conjunction with the electronic nature of the database and in light of increased flexibility as a result of Senate Bill 242, staff and institution capital construction staff have determined this program can better serve as a contracting vehicle for new Historically Underrepresented Firms to get work on capital projects. Staff continues to participate in outreach specifically focused on this program in order to educate Historically Underrepresented Firms on these opportunities.

FY 2012 DATA NARRATIVE
The policy became effective during FY12, and institutions began collecting data near the beginning of FY12. Institutions were requested to note any gaps in the data in order to facilitate Board review.

Unless otherwise noted in the report, institutions are unable to collect data for spend made via procurement cards (P-Cards). Staff are exploring ways to collect that data going forward, but institutions were advised to not include it in their reports if not properly tracked. In addition to P-Card spend, staff developed a list of excluded expenditure categories to be used to determine the amount of total available expenditure for capital construction and goods and services, which was used as the basis for the attached percentage calculations.

Campus Reports (see http://www.ous.edu/state_board/meeting/dockets or see appendices)

1. Eastern Oregon University Annual Report
2. Oregon Institute of Technology Annual Report
3. Oregon State University Annual Report
4. Portland State University Annual Report
5. Southern Oregon University Annual Report
6. University of Oregon Annual Report
7. Western Oregon University Annual Report
8. Chancellor's Office Annual Report
9. Equity Contracting and Purchasing Policy, Effective: November 15, 2011

FISCAL YEAR 2013: NEXT STEPS FOR OUS
Staff is continuing to work with General Contractors to ensure that the subcontractor data is complete, and campus and Board staff are also communicating our priority to General Contractors to use subcontractors across all categories for all projects rather than relying more heavily on women-owned business or emerging small businesses, as we saw in the past. We are also planning to implement subcontractor data collection for professional consultants on large capital projects (architects, engineers, etc.). This sector of the industry has not historically had the same level of advocacy as construction, but there is a lot of potential to get new firms working on our projects in this growing industry.

In addition, some campuses are working on campus-specific policies that will help them both address the priorities set by their campus leadership and improve internal communication with department purchasing representatives.

An area of concern noted by Board staff are capital projects whose contracts were bid and signed prior to the implementation of the OUS policy requiring 10 percent of points be awarded on the basis of Management Plans indicating the general contractors obligations to encourage participation through outreach, creation of small bid packages, and other strategies or relationships proposed by the contractor during the solicitation process. These projects, which are starting construction as late as this summer, do not require the contractor to make the use of Historically Underrepresented Firms a priority. Campus staff should be encouraged by campus leadership to communicate their interest in having meaningful participation on these projects even if they are not contractually obligated to do so. Board staff is available to discuss with project managers or campus leadership, as necessary.

(This page intentionally left blank.)

Adoption of Optional Retirement Plan Eighth Amendment

SUMMARY

Employer contribution rates for the Optional Retirement Plan (ORP) are established each biennium based on the Public Employees Retirement System (PERS) employer contribution rates for state agencies. The next rate change, scheduled to take effect July 1, 2013, may be delayed due to legislative actions to reduce 2013-2015 employer contribution rates. This amendment is required to ensure there is adequate time to adopt and apply revised rates retrospectively to July 1, 2013.

BACKGROUND

The 2008 restatement of the ORP responded to direction from the Internal Revenue Service to provide an express employee benefit formula that does not involve employer discretion and a definitely determinable employer contribution rate. The OUS' retained pension counsel developed and submitted such Fifth Amendment to the IRS for review on January 13, 2011. This amendment was accepted by the IRS, and was adopted by the Oregon State Board of Higher Education without modification on August 3, 2012. The Fifth Amendment established employer contribution rates until June 30, 2013.

This proposed Eighth Amendment to the ORP is necessary for continuity and time to implement employer rate changes in such a way that each participant receives the contribution amount that would have been provided had the employer rate been known and implemented on July 1, 2013.

Attachment

Eighth Amendment to the 2008 Restatement of the OUS ORP

STAFF RECOMMENDATION TO THE COMMITTEE

Staff recommends acceptance of the Eighth Amendment to the 2008 Restatement of the Optional Retirement Plan by the Finance and Administration Committee with referral to full Board for adoption by consent.

(Committee and board action required.)

EIGHTH AMENDMENT TO THE 2008 RESTATEMENT OF THE OREGON UNIVERSITY SYSTEM OPTIONAL RETIREMENT PLAN

Effective January 1, 2013, the last sentence of each of Sections 3.2(b)(i)(C) and 3.2(b)(ii)(D) of the 2008 Restatement of the Oregon University System Optional Retirement Plan, as the 2008 Restatement has been amended through the Seventh Amendment to the 2008 Restatement, is replaced by the following two sentences:

> For the OPERS employer contribution rate change that will be effective for the period July 1, 2013, through June 30, 2015, the Board shall amend this Plan by December 31, 2013, to specify the percentage of the Participant's Compensation to be contributed by the Employer on behalf of the Participant as an employer contribution for that period. Before each later OPERS employer contribution rate change the Board shall amend this Plan to specify the percentage of the Participant's Compensation to be contributed by the Employer on behalf of the Participant as an employer contribution for the applicable period.

The reason for this Eighth Amendment is the provision in the following section 18 of Oregon Senate Bill 822 (2013) allowing a retroactive OPERS employer contribution rate change for the period July 1, 2013, through June 30, 2015:

> SECTION 18. (1) As soon as possible after the [May 6, 2013] effective date of this 2013 Act, the Public Employees Retirement Board shall recalculate the contribution rates of all employers, pursuant to ORS 238.225, to reflect the provisions of this 2013 Act.
>
> (2) The board shall issue corrected contribution rate orders to employers affected by recalculated rates under this section within 90 days after the effective date of this 2013 Act. The corrected rates are effective July 1, 2013.

IN WITNESS WHEREOF, the Board has caused this document to be duly executed on this __________ day of June, 2013.

FOR THE OREGON STATE BOARD OF HIGHER EDUCATION; AND
FOR THE OREGON STATE BOARD OF HIGHER EDUCATION
ON BEHALF OF THE OREGON UNIVERSITY SYSTEM

____
Jay D. Kenton, Vice Chancellor for Finance and Administration

OUS, Proposed 2012-13 "Settle-Up" of Operating Budget Allocations

State General Fund is distributed to the OUS institutions using the Resource Allocation Model (RAM). Part of the RAM calculation uses enrollment data, typically projected data at the beginning of the academic year but subsequently trued-up in a "settle-up" allocation using actual FTE (full-time equivalent) enrollment for the year. For those fiscal years when settle-up allocations have been done, they have occurred at different points in the year. Most recently, the settle-up allocation for 2011-12 was done as an offset to the original 2012-13 allocation. Given that pending legislation is likely to include changes in organizational structures for the 2013-15 biennium as well as changes to budget allocation authority and responsibility, an end-of-biennium settle-up is being proposed for 2012-13.

The Fiscal Year 2012-13 budget allocation of the state General Fund was originally approved by the Board on August 3, 2012, with a supplemental distribution of incentive funding approved on January 11, 2013. The enrollment-based components used projected FTE for all academic terms. The revised allocation being proposed here uses actual end-of-term enrollments for summer, fall, and winter terms with spring estimated using winter end-of-term data. Changes from projected spring term to actual spring end-of-term are not anticipated to be material.

ELEMENTS UNDERLYING THE CHANGES IN ALLOCATIONS

A number of factors drive how the allocations change. Because the allocation is a redistribution of existing funding, the impact to an individual institution is subject to what is occurring at all the other institutions.

- Volume (or Market Share) – changes in fundable FTE relative to changes at the other institutions

  An institution might be growing in fundable FTE but if its growth is the least compared to the others it could still see a funding decrease.

- Price – change in cell values

  As volume changes, cell values change to accommodate the total value of funds to be distributed. In this situation, since most campuses had lower fundable FTEs than projected, the cell values ("price") increased to distribute the same total available dollars.

- Mix – changes across fundable FTE programs

  Because the cell values in the RAM place a higher value on higher cost programs, as enrollments shift across differently valued programs, funding can increase or decrease.

CHANGES PER CAMPUS

TABLE 1

Fundable FTE Change	Original Projections	Settle-Up Actual FTE[1]	FTE Change	% Change
EOU	3,257	3,115	(142)	-4.4%
OIT	2,280	2,330	50	2.2%
OSU	17,930	18,066	135	0.8%
OSU-Cascades	493	452	(40)	-8.1%
PSU	19,106	18,086	(1,020)	-5.3%
SOU	3,722	3,439	(283)	-7.6%
UO	15,371	14,679	(692)	-4.5%
WOU	4,476	4,216	(260)	-5.8%
Total	**66,636**	**64,383**	**(2,253)**	**-3.4%**

[1] *End-of-term actual FTE for summer, fall, winter; spring projected*

FY13 General Fund Allocation Change	Current Allocation	Proposed Allocation	Dollar Change	% Change
EOU	13,586,475	13,526,889	(59,586)	-0.4%
OIT	15,660,392	16,290,648	630,256	4.0%
OSU	75,775,852	77,557,069	1,781,217	2.4%
OSU-Cascades	4,292,531	4,183,887	(108,644)	-2.5%
PSU	55,264,031	53,988,262	(1,275,769)	-2.3%
SOU	13,373,666	13,113,452	(260,214)	-1.9%
UO	46,885,124	46,401,745	(483,379)	-1.0%
WOU	13,943,665	13,719,784	(223,881)	-1.6%
Total	**238,781,736**	**238,781,736**	**-**	**0.0%**

PROPOSED FINAL ALLOCATION OF STATE FUNDING FOR FY13

Table 2 reflects the proposed allocation of the state appropriation for General Fund and Lottery Funds.

Table 2
2012-13 OUS OPERATING BUDGET
ALL SOURCES
Includes Incentive Funding Distributed to Campuses and FY 12 and FY 13 Settle-up

	Allocation of State Funding		Estimated Campus Revenues		Total All Funds
	General Fund	Lottery Funds[1]	E&G Other Funds[2]	Other Funds[3]	
Education and General Program					
EOU	13,526,889	322,771	20,336,385	20,092,000	54,278,045
OIT	16,290,648	322,771	22,679,823	21,919,968	61,213,210
OSU - Corvallis	77,557,069	906,764	295,654,093	402,500,638	776,618,564
OSU-Cascades	4,183,887	-	4,993,015	550,000	9,726,902
PSU	53,988,262	811,487	217,907,000	218,159,946	490,866,695
SOU	13,113,452	322,771	38,116,000	43,599,288	95,151,511
UO	46,401,745	940,400	381,756,267	436,415,000	865,513,412
WOU	13,719,784	412,214	40,492,800	54,328,400	108,953,198
CO	5,589,996	-	4,250,000	18,557,000	28,396,996
Industry Affairs/OMI/ETIC/Other	3,914,618	-	-	-	3,914,618
Subtotal Education and General Program	248,286,350	4,039,178	1,026,185,383	1,216,122,240	2,494,633,151
Statewide Public Services:					
Agricultural Experiment Station	26,414,682	-	5,900,000	58,000,000	90,314,682
Extension Service	19,106,335	-	12,048,899	5,300,000	36,455,234
Forest Research Laboratory	2,906,329	-	4,300,000	12,000,000	19,206,329
Subtotal Statewide Public Services	48,427,346	-	22,248,899	75,300,000	145,976,245
2012-13 Total Operating Budget	**296,713,696**	**4,039,178**	**1,048,434,282**	**1,291,422,240**	**2,640,609,396**
2012-13 Debt Service	43,419,460	7,506,769	-	93,502,699	144,428,928
2012-13 Capital Construction[4]	-	-	-	-	-
2012-13 Total Budget	**340,133,156**	**11,545,947**	**1,048,434,282**	**1,384,924,939**	**2,785,038,324**

1) SB 5702 directed specific reductions to the athletics portion of UO and OSU Sports Lottery funding:

Original Biennial Lottery Funding		8,825,680
Less specific reductions in SB 5702:		
UO	(118,613)	
OSU	(114,347)	(232,960)
Less FY12 distributions		4,366,310
Available for FY13		4,226,410

In addition to the SB 5702 adjustments, the March economic forecast lottery projections were lower than previous lottery Through HB 5052 and HB 2837 "rebalancing bills," OUS lottery allotment was reduced Systemwide by $187,232 and allocated to using the Board-approved allocation formula for Sports Action Lottery Funds.

2) Education & General Other Funds include tuition and fees, indirect cost recovery on sponsored projects and lesser amounts of other income. Prior to the passage of SB 242, this category was know as Other Funds Limited (OFL) and subject to legislatively established expenditure limitation.

3) Other Funds are periodically updated based on estimates received from the campuses. Prior to the passage of SB 242, this category was known as Other Funds Non-Limited (OFNL). The distinction of "non-limited" was relevant to distinguish this source from Other Funds "Limited."

4) Capital has historically been reflected in the first year of the biennium. Therefore, the 2011-2013 Capital Budget was reflected in 2011-12 with nothing in 2012-13. For 2011-2013, the portion of Capital Construction funded by Article XI-F(1), Lottery, SELP, and Article XI-Q bonds is $125,326,001.

Table 3 details the RAM allocations of General Fund by program areas within the campuses and the System Office.

Table 3
Oregon University System
State General Fund Appropriations
2012-13 Detail Allocation (includes - 2012 Enrollment Settle-up Adjustments, 2013 Incentive Funding Distribution, and 2013 Enrollment Settle-up Adjustments)

		EOU	OIT	OSU	OSU-CC	PSU	SOU	UO	WOU	Total Campuses	Operations	Other	E & G	Statewides	OUS
1	Undergraduate Funding	6,752,124	6,161,545	34,348,555	887,041	35,545,724	7,418,275	24,564,848	9,380,213	125,058,325	-	-	125,058,325	-	125,058,325
2	Graduate Funding	668,779	50,065	22,561,454	300,113	12,625,804	1,217,700	13,679,387	1,082,963	52,186,265	-	-	52,186,265	-	52,186,265
3	**Enrollment Funding**	**7,420,903**	**6,211,610**	**56,910,009**	**1,187,154**	**48,171,528**	**8,635,975**	**38,244,235**	**10,463,176**	**177,244,590**	**-**	**-**	**177,244,590**	**-**	**177,244,590**
4	Incentives for Student Success	227,710	157,200	764,413	43,031	977,741	209,320	616,662	253,156	3,249,233	-	-	3,249,233	-	3,249,233
7	**Total Enrollment & Incentive Funding**	**7,648,613**	**6,368,810**	**57,674,422**	**1,230,185**	**49,149,269**	**8,845,295**	**38,860,897**	**10,716,332**	**180,493,823**	**-**	**-**	**180,493,823**	**-**	**180,493,823**
8	*2012-13 Transition Funding* [1]	-	-	-	-	-	-	*2,200,000*	-	*2,200,000*	-	-	*2,200,000*	-	*2,200,000*
9	*2011-12 Settle-up - Enrollment Funding*	*(158,495)*	*144,933*	*143,614*	*48,964*	*(841,104)*	*83,764*	*1,052,946*	*(474,622)*	-	-	-	-	-	-
10	*2012-13 Settle-up - Enrollment Funding*	*(54,379)*	*377,328*	*2,118,742*	*(25,357)*	*(1,226,403)*	*(397,320)*	*(483,379)*	*(309,232)*	-	-	-	-	-	-
11	**Total Enrollment, Incent. &Settle-up Funding**	**7,435,739**	**6,891,071**	**59,936,778**	**1,253,792**	**47,081,762**	**8,531,739**	**41,630,464**	**9,932,478**	**182,693,823**	**-**	**-**	**182,693,823**	**-**	**182,693,823**
12	**Targeted Programs**														
13	**Regional Support**														
14	Retrenchment	182,097	182,188	-	121,447	-	182,182	-	182,148	850,062	-	-	850,062	-	850,062
15	Retention & Graduation	318,669	318,828	-	212,532	-	318,818	-	318,759	1,487,606	-	-	1,487,606	-	1,487,606
16	Underpinning	318,669	318,828	-	212,532	-	318,818	-	318,759	1,487,606	-	-	1,487,606	-	1,487,606
17	11-13 Regional Support[1]	824,486	824,486	152,591	-	-	984,461	-	630,154	3,416,178	-	-	3,416,178	-	3,416,178
18	Regional Solutions	12,000	-	-	12,000	12,000	-	12,000	-	48,000	-	-	48,000		48,000
19	**Regional University Funding**														
20	Statewide Access	-	776,567	-	-	-	-	-	-	776,567	-	-	776,567	-	776,567
21	Regional University Support Adjustment	2,565,330	2,829,933	-	2,535,317	-	1,492,447	-	1,283,557	10,706,584	-	-	10,706,584	-	10,706,584
22	*Regional University Supprt Adj FY 12 Settle-up*	*22,713*	*(100,088)*	-	*(80,641)*	-	*8,128*	-	*149,888*	-	-	-	-	-	-
23	*Regional University Supprt Adj FY 13 Settle-up*	*(3,513)*	*(140,729)*	-	*(74,474)*	-	*135,910*	-	*82,806*	-	-	-	-	-	-
24	Regional Access	792,939	341,383	-	-	-	256,030	-	85,330	1,475,682	-	-	1,475,682	-	1,475,682
25	Collaborative OUS Nursing Program	22,054	15,180	-	-	-	33,352	-	19,795	90,381	-	-	90,381	-	90,381
26	*Collaborative OUS Nursing Program- FY 13 Settle-up*	*(1,694)*	*(2,047)*	-	-	-	*1,196*	-	*2,545*	-	-	-	-	-	-
27	**Regional Funding**	**5,053,750**	**5,364,529**	**152,591**	**2,938,713**	**12,000**	**3,731,342**	**12,000**	**3,073,741**	**20,338,666**	**-**	**-**	**20,338,666**	**-**	**20,338,666**
28	**Engineering**														
29	Industry Affairs / OMI	-	-	-	-	-	-	-	-	-	-	658,279	658,279	-	658,279
30	ETIC Allocations	175,480	539,532	7,498,884	-	2,924,844	204,418	1,129,108	288,545	12,760,811	-	1,206,850	13,967,661	-	13,967,661
31	Engineering Technology Undergraduate	-	1,005,823	381,105	8,813	4,485	-	-	-	1,400,226	-	-	1,400,226	-	1,400,226
32	*Eng. Tech UG - FY 12 Settle-up*	-	*(11,899)*	*21,827*	*(8,618)*	*(1,310)*	-	-	-	-	-	-	-		-
33	*Eng. Tech UG - FY 13 Settle-up*	-	*388,565*	*(381,105)*	*(8,813)*	*1,353*	-	-	-	-	-	-	-	-	-
34	Engineering Graduate	-	-	2,038,710	-	638,718	-	-	-	2,677,428	-	-	2,677,428	-	2,677,428
35	*Eng. Graduate - FY 12 Settle-up*	-	-	*(19,186)*	-	*19,186*	-	-	-	-	-	-	-	-	-
36	*Eng. Graduate - FY 13 Settle-up*	-	*7,139*	*43,580*	-	*(50,719)*	-	-	-	-	-	-	-	-	-
37	**Engineering Funding**	**175,480**	**1,929,160**	**9,583,815**	**(8,618)**	**3,536,557**	**204,418**	**1,129,108**	**288,545**	**16,838,465**	**-**	**1,865,129**	**18,703,594**	**-**	**18,703,594**
38	**Research**														
39	Sponsored Research	40,127	15,294	1,963,484	-	325,557	30,588	966,549	115,319	3,456,918	-	-	3,456,918	-	3,456,918
40	Faculty Salaries - Research	36,131	60,250	548,785	-	472,503	85,686	643,214	62,914	1,909,483	-	-	1,909,483	-	1,909,483
41	Signature Research	-	-	209,270	-	22,029	-	209,291	-	440,590	-	44,071	484,661	-	484,661
42	**Research Funding**	**76,258**	**75,544**	**2,721,539**	**-**	**820,089**	**116,274**	**1,819,054**	**178,233**	**5,806,991**	**-**	**44,071**	**5,851,062**	**-**	**5,851,062**

Table 3
Oregon University System
State General Fund Appropriations
2012-13 Detail Allocation (includes - 2012 Enrollment Settle-up Adjustments, 2013 Incentive Funding Distribution, and 2013 Enrollment Settle-up Adjustments)

		EOU	OIT	OSU	OSU-CC	PSU	SOU	UO	WOU	Total Campuses	Operations	Other	E & G	Statewides	OUS
43	**Institutes / Programs**														
44	Campus Public Service Programs	197,182	-	-	-	698,201	87,970	816,116	1,355	1,800,824	-	-	1,800,824	-	1,800,824
45	Dispute Resolution	-	-	-	-	410,159	-	761,768	-	1,171,927	-	-	1,171,927	-	1,171,927
46	Institute for Natural Resource (incl. Nat Heritage)	-	-	185,887	-	45,710	-	-	-	231,597	-	-	231,597	-	231,597
47	Oregon Solutions	-	-	-	-	1,051,435	-	-	-	1,051,435	-	-	1,051,435	-	1,051,435
48	Climate Change Research Institute	-	-	145,708	-	-	-	-	-	145,708	-	-	145,708	-	145,708
49	Leadership Institute	-	-	-	-	60,660	-	-	-	60,660	-	-	60,660	-	60,660
50	Health Professions Programs	255,759	2,097,732	-	-	-	352,875	-	285,312	2,991,678	-	-	2,991,678	-	2,991,678
51	Rural Access	234,493	-	-	-	-	-	-	-	234,493	-	-	234,493	-	234,493
52	Clinical Legal Education[2]	-	-	-	-	-	-	-	-	-	-	162,409	162,409	-	162,409
53	Veterinary Diagnostic Lab	-	-	1,136,033	-	-	-	-	-	1,136,033	-	-	1,136,033	-	1,136,033
55	AES	-	-	-	-	-	-	-	-	-	-	-	-	26,414,682	26,414,682
56	ES	-	-	-	-	-	-	-	-	-	-	-	-	19,106,335	19,106,335
57	FRL	-	-	-	-	-	-	-	-	-	-	-	-	2,906,329	2,906,329
58	Bldg. Maintenance / SWPS	-	-	1,653,740	-	-	-	-	-	1,653,740	-	-	1,653,740	-	1,653,740
59	IT Fifth Site/OCATE/Southwest Oregon/OWEN	104,439	-	2,063,337	-	540,062	-	374,757	-	3,082,595	-	-	3,082,595	-	3,082,595
60	**Institutes / Programs Funding**	**791,873**	**2,097,732**	**5,184,705**	**-**	**2,806,227**	**440,845**	**1,952,641**	**286,667**	**13,560,690**	**-**	**162,409**	**13,723,099**	**48,427,346**	**62,150,445**
61	**Central Services**														
62	Chancellor's Office Operations	-	-	-	-	-	-	-	-	-	5,862,611	-	5,862,611	-	5,862,611
63	Systemwide Expenses / Programs	87,742	84,736	1,043,884	-	490,192	218,290	950,957	189,084	3,064,885	-	1,843,009	4,907,894	-	4,907,894
64	Central Services Funding	87,742	84,736	1,043,884	-	490,192	218,290	950,957	189,084	3,064,885	5,862,611	1,843,009	10,770,505	-	10,770,505
65	**Subotal Targeted Programs**	**6,185,103**	**9,551,701**	**18,686,534**	**2,930,095**	**7,665,065**	**4,711,169**	**5,863,760**	**4,016,270**	**59,609,697**	**5,862,611**	**3,914,618**	**69,386,926**	**48,427,346**	**117,814,272**
66															
67	Interest Earnings	(93,953)	(152,124)	(1,066,243)	-	(758,565)	(129,456)	(1,092,479)	(228,964)	(3,521,784)	(272,615)	-	(3,794,399)	-	(3,794,399)
68	**Targeted Programs/Other Total**	**6,091,150**	**9,399,577**	**17,620,291**	**2,930,095**	**6,906,500**	**4,581,713**	**4,771,281**	**3,787,306**	**56,087,913**	**5,589,996**	**3,914,618**	**65,592,527**	**48,427,346**	**114,019,873**
69	**Enrollment/Targeted Programs/Other**	**13,526,889**	**16,290,648**	**77,557,069**	**4,183,887**	**53,988,262**	**13,113,452**	**46,401,745**	**13,719,784**	**238,781,736**	**5,589,996**	**3,914,618**	**248,286,350**	**48,427,346**	**296,713,696**
70	Debt Service	-	-	-	-	-	-	-	-	-	-	43,419,460	43,419,460	-	43,419,460
71	**Total (Net Appropriation)**	**13,526,889**	**16,290,648**	**77,557,069**	**4,183,887**	**53,988,262**	**13,113,452**	**46,401,745**	**13,719,784**	**238,781,736**	**5,589,996**	**47,334,078**	**291,705,810**	**48,427,346**	**340,133,156**

1) FY13 allocations to UO and SOU include transitional funding but originating from different sources: Enrollment Funding ($2.2M) and 2011-13 Regional Support ($~160K), respectively

2) Clinical Legal Education funding is distributed by statutory formula to applicant institutions - UO will receive $136,338 and Lewis & Clark will receive $26,071

STAFF RECOMMENDATION TO THE COMMITTEE

Staff recommends that the Finance & Administration Committee approve the final allocation of state funding for Fiscal Year 2012-13 (as reflected in Tables 2 and 3).

(Committee action required.)

Internal Bank Update

A Look Back on the Implementation of the Internal Bank, established April 2010
Prepared: April 2013

Goal	Benefits	Results - Did We Reach Goal?	Future Development
Pool operating assets	Decrease cash flow volatility	Yes - Closed over 70 accounts at Treasury and made remaining accounts zero-balance accounts so that operating assets automatically sweep to where needed.	Tighten down liquidity levels to provide better investment returns. Evaluate whether some of the Internal Bank's operating costs should be paid from investment earnings.
	Save costs	Yes - Saved monthly account maintenance fees charged by Treasury and minimize staff time needed to monitor and move cash (saved 1.0 FTE).	
	Manage operating assets on an overall risk basis	Yes - Developed operating asset investment policy with Treasury, which was approved by the OIC. Policy covers OUS fund in its entirety and is based on liquidity of the total, not of its individual parts.	
	Optimize (and increase) the return on operating assets	Yes - Current investment earnings are 2.5X interest earnings on the short-term fund; incremental investment income from inception (1Q11) to 3Q13 is $10.9 million	
Pool the cost of XI-F debt	Establish a blended, long-term cost of capital	Yes -Using an outside study, established a rate of 5.25%	Rate is reviewed annually by the Oversight Committee and last ratified Feb 2013
	Simplify debt accounting on university books	Mixed results - New loans are simpler, accounting for legacy debt is more complex, refundings have added additional complexity on the books of the Chancellor's Office, accounting for both loans and debt has created incremental work; loan payments are twice per year with the smaller one occurring in December (to match university cash flows) but this causes negative amortization in the early years of a loan for this 6-month period which initially caused some confusion	Hire additional help in this area (using the 1.0 FTE saved above)
	Build a tranche of variable-rate debt to reduce the overall cost of capital	No variable rate debt has been issued yet	Continue to work with the Oversight Committee and the Finance & Administration Committee to build consensus
	Issue debt as needed to fund capital projects rather than in advance	Yes - Campuses may borrow for their project as soon as bonding authority is approved; we typically begin providing funds anywhere from one to eighteen months before the bonds are ultimately sold; this has significantly reduced interest carrying costs on projects, estimated interest savings $1.4 million	
	Create interim financing vehicle for projects using commercial paper	Yes - But through different means - instead of issuing commerical paper to create interim funding, we created a mechanism for borrowing from the bank that funded these interim needs with existing cash on hand; the benefits of this approach include no incremental borrowing cost to the System and the interest paid by borrowers went into the investment earnings pool and were distributed to all internal bank participants	Still plan to use commercial paper when operating assets are inadequate to fund this or other non-bond-based lending programs
	Build a reserve fund to cover the administrative costs of the Internal Bank and hedge rate changes from external borrowings.	Yes - As of the end of the last fiscal year, the reserve is $4 million. Net operating costs of the internal bank are about $500,000 per year. There have been no rate changes that needed hedging. The reserve can also be used to cover other operating risks that affect interest costs such as the effects of sequestration.	Determine a target for the reserve fund and develop options for what to do with any excess that might exist.

Provide greater flexibility and clearer planning horizons	Easily predict debt service for any capital project	Yes - the rate charged by the internal bank is constant; we have a debt service calculator for campuses to use	
	Borrow on terms tailored to specific project	Yes - we can tailor the timing of borrowing to be "just in time" for the project which reduces borrowing costs. We also provide a short-term borrowing option (at reduced cost) during the construction period that switches to permanent financing when the project is mostly complete	Be more diligent to shorten the permanent borrowing period by the length of the construction period to reduce interest costs
	Repay loans early	Yes - campuses can pre-pay the current year's debt service at a discount or any portion of outstanding principal; in some cases we have "retired" borrowings in their entirety	
	Able to focus on managing the project rather than financing the projects	Mixed - Campuses do not seem to worry as much about what the borrowing rate will be but instead they focus on the differential between the 5.25% rate and what they think current market rates might be.	This will take some time to achieve, as corporate memory is pretty strong.
Maximize allowable arbitrage earnings	Enter the capital markets more strategically	Yes - By entering the markets later, we reduce our risk of owing arbitrage rebate. The new investment structure allows us to earn as much as possible on unspent proceeds.	Though not specific to the internal bank implementation, a future enhancement will be to outsource our arbitrage calculations. This will add a small amount of expense but will provide an additional control on the risk that the computation and reporting is being done in a manner acceptable to the IRS.
Simplify administration of the debt	Close individual Treasury accounts for each bond allocation	Yes - the cash management side has been simplified as expected. As previously noted, the accounting is still complex.	
Other Benefits	Established lines of credit for campuses that they can use for any capital purpose. Total lines established are $65.4 million and $18.5 million has been advanced to campuses		Looking at creating additional loan products to replace SELP funding ("green revolving fund") and XI-Q technology debt. These may necessitate the use of commercial paper.
	Provided funding to capital projects already in process when legislature revoked bonding authority for certain student building fee funded projects		
	Called a portion of outstanding debt (rather than refunding it) at estimated savings of over $1.1 million over the remaining life of the debt		
	Due to the pooled nature of the debt issuance, we have been able to "front load" the typically more expensive taxable debt into shorter-terms while still allowing the campus the long-term borrowing they desire. It is estimated that the System will save approximately $9.3 million over the life of the debt by using this approach		
	Improved transparency of the benefits of early debt repayment		

Oregon University System 2012 Greenhouse Gas Inventory: Results and A View to the Future

June 20, 2013

Joshua Skov and Aaron Toneys
Good Company
Eugene, OR

overview

- Good Company
- project context and overarching findings
  - your vantage point
  - your commitments
  - essential results
- project background
- detailed results, *in six summary points*

For the full story, please refer to the complete report document, the *Oregon University System FY2012 Greenhouse Gas Inventory of Operations Results and Benchmarking*.

Good Company

- sustainability research and consulting firm
- mission-driven, for-profit
- clients: government, higher education, private sector

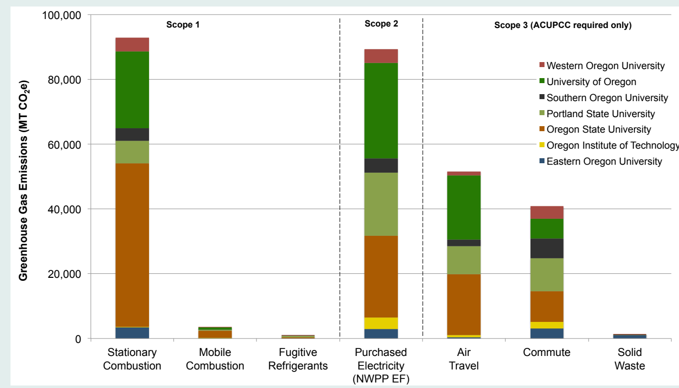
Climate Services

- completed 70+ GHG Inventories
  - operational inventories: food, fuel, manufacturing, government
  - community inventories
  - life-cycle GHG analyses: products, fuels, technologies
- completed OUS' first inventory back in 2006/2007
- Oregon public-sector clients include Metro, City of Portland, ODOT, ODOE, and 10+ other municipal governments

key features of the landscape

commitments

results and trends



opportunity

$,

your commitments

- all institutions that are ACUPCC signatories…
  - must take certain actions from a checklist (done)
  - must report inventory to ACUPCC site (done)
  - must *plan* for eventual carbon neutrality (not done)
- Oregon legislative goal – 10% below 1990 levels by 2020
  - not currently on track
  - will require a concerted effort; some cost, a lot of savings
- OUS Master Plan
  - also, 10% below 1990 levels by 2020…
  - …and carbon neutral by 2050

your opportunity

- cost savings, risk reduction
  - energy and other efficiencies
  - reduce volatility in operations budgets
- strategic advantage: reputation
  - mission-alignment for students, staff, faculty
  - several unscientific but oft-cited rankings include campus sustainability efforts
- strategic advantage: alignment with teaching, research
  - low-carbon practices foster a living laboratory
  - pedagogical and service learning opportunities
  - research and teaching alignment is already there for many particular departments (several AAA programs at UO, OIT programs for renewable energy, planning programs at UO and PSU, business schools at PSU, OSU and UO, etc.)

others see opportunity, too

?

6. should establish itself as a leader in efforts to address the challenges of climate change and sustainability by linking its GHG reduction strategy with broader efforts to stimulate relevant research, innovation and teaching.

This insight isn't rare – inside and outside of higher education:

- ACUPCC has 670 signatories.
- 1060 cities have signed the US Conference of Mayors Climate Protection Agreement (15 in Oregon).
- Over 65% of S&P 500 companies report *voluntarily* to the Carbon Disclosure Project.

project background

- repeat performance by Good Company
- hybrid of consultant work and OUS/campus staff
  - Big 3 did their own inventories
  - Small 4 provided data, Good Company led the process, completed the reports
  - Good Company did integration, AASHE reporting
- detailed results in a comprehensive report

project background

Increasingly, the key context for corporate, government and higher education decision makers is *global*. From the report:

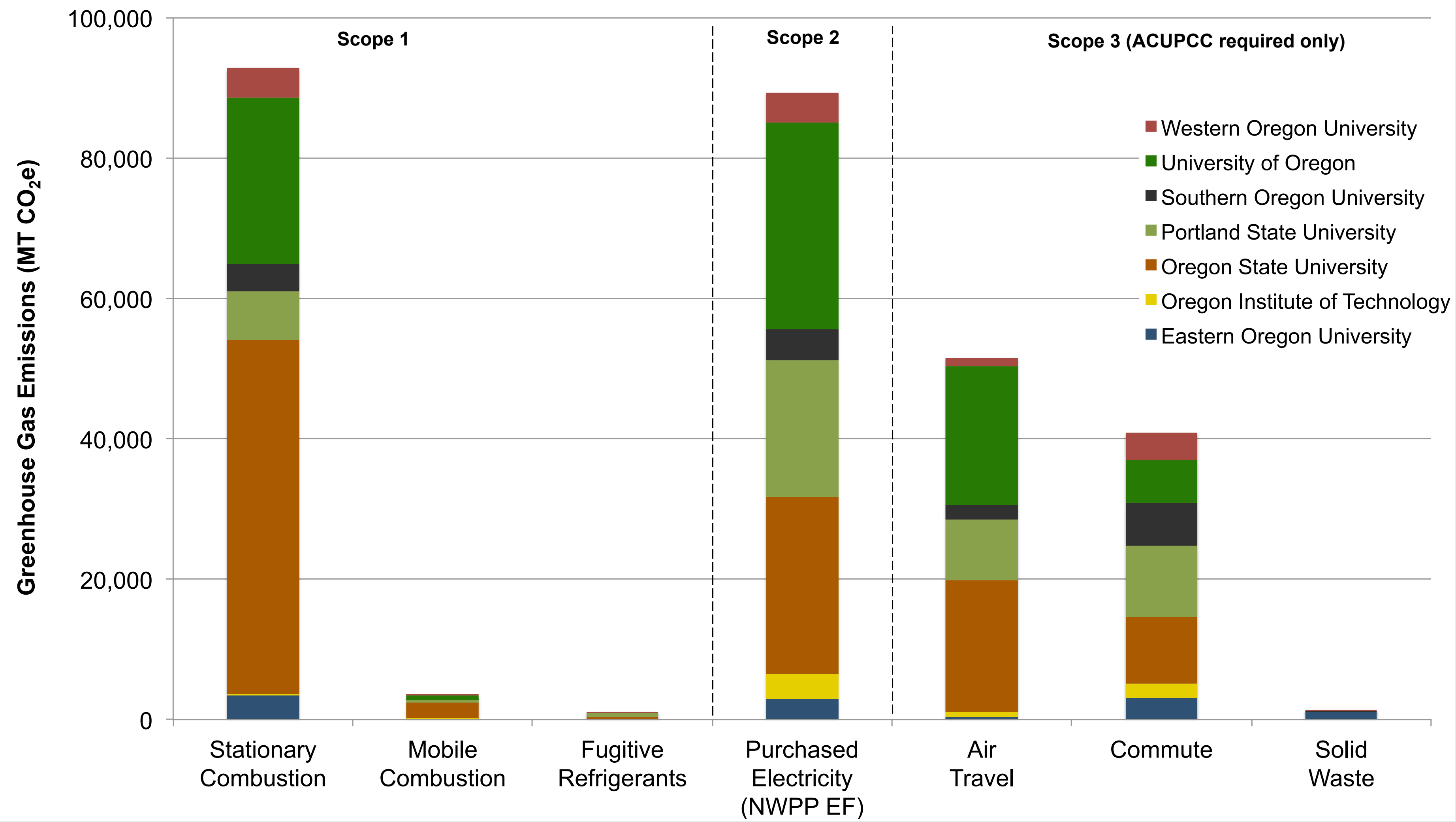
> *The Intergovernmental Panel on Climate Change, the United Nations body that regularly convenes climate scientists, has identified human activity as the primary cause of the climate change that has occurred over the past few decades and quickened in recent years. Consensus statements from the IPCC suggest that human-caused greenhouse gas (GHG) emissions must be reduced significantly – perhaps more than 50% globally, and by 90% in wealthier nations that are the largest emitters – by mid-century in order to avoid the worst potential climate impacts on human economies.*

the results, in six summary points

1. Documented emissions are overwhelmingly from stationary combustion and purchased electricity.
2. System-wide *absolute* emissions have leveled off.
3. Emissions intensities – per student, and per gross square foot (GSF) of buildings – are in modest decline.
4. In many cases, lower GHG emissions – for an individual institution or for the system as a whole – relate to *circumstances*, rather than *performance*.
5. External benchmarking reveals that OUS institutions have lower-than-average emissions per student and per gross square foot (GSF) of building space.
6. Other emissions – primarily the supply chain – are large, and eventually we will be on the hook for their measurement and management.

summary point 1

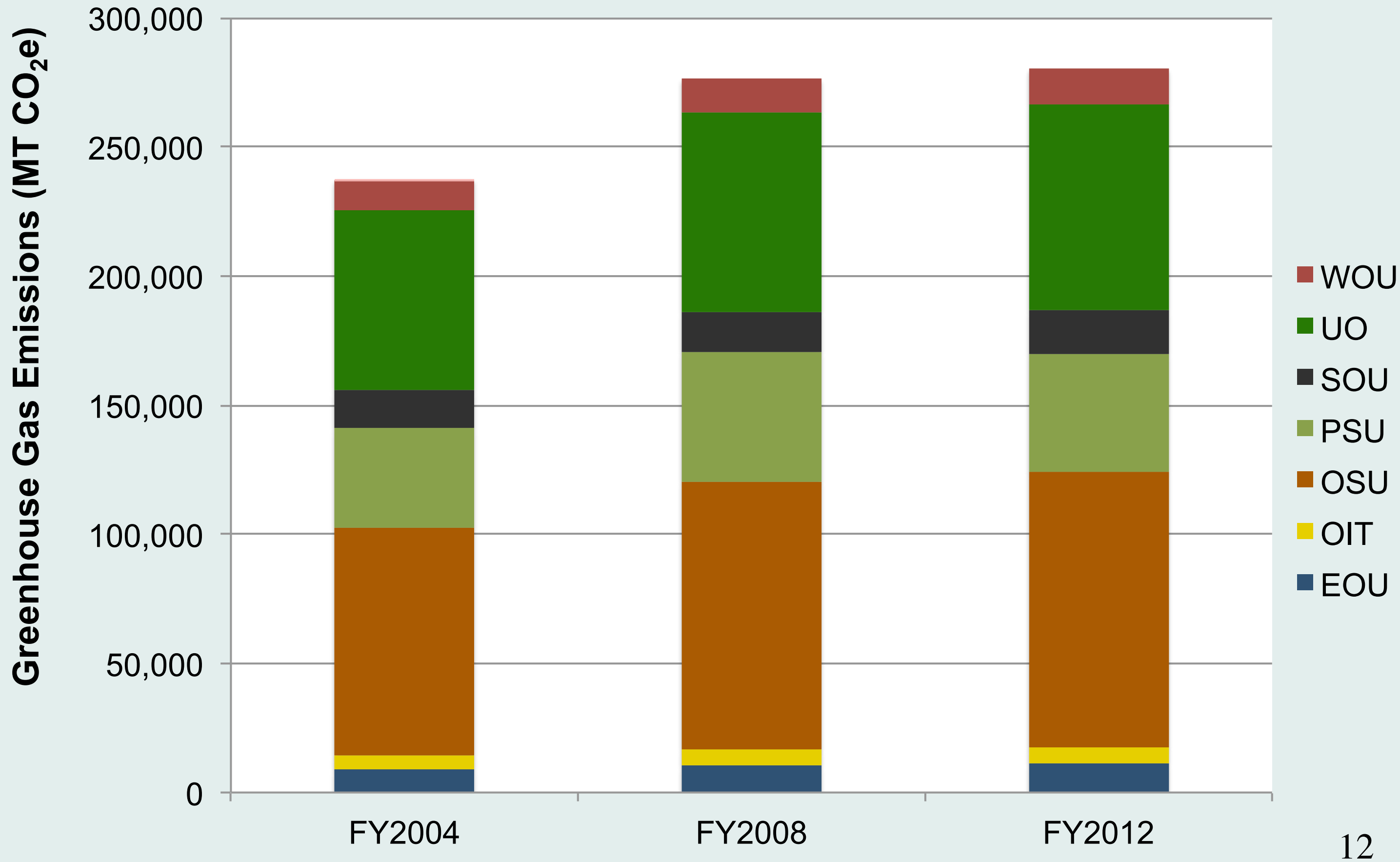
mainly on-campus combustion, electricity



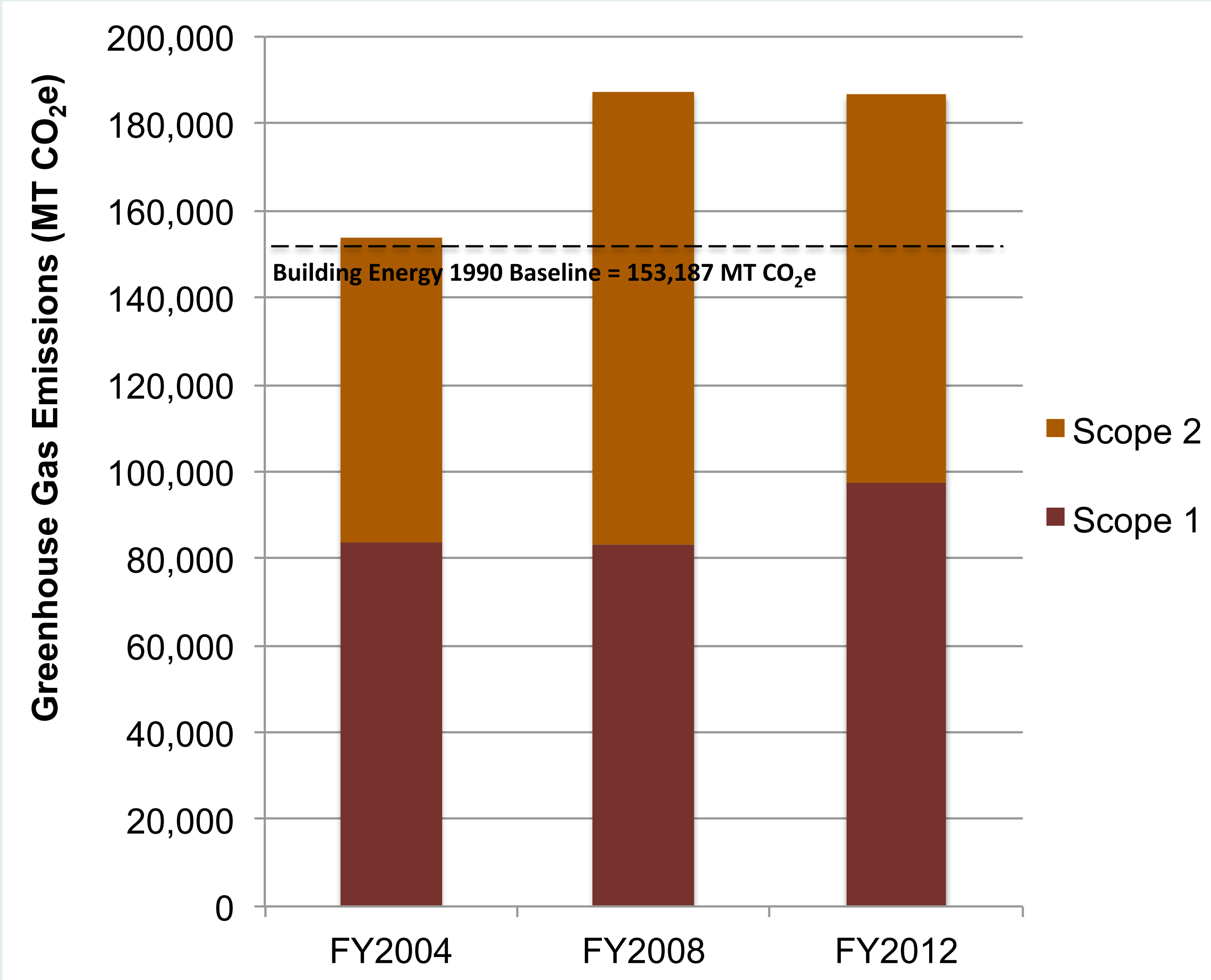
summary point 2

absolute emissions appear to be stable…

Figure 7: Summary of absolute OUS GHG emissions over time, by institution

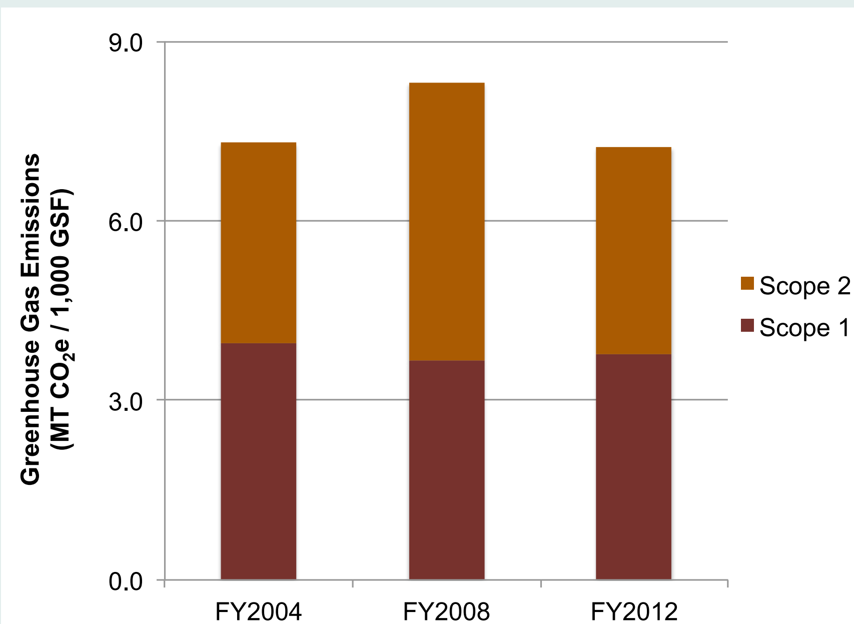


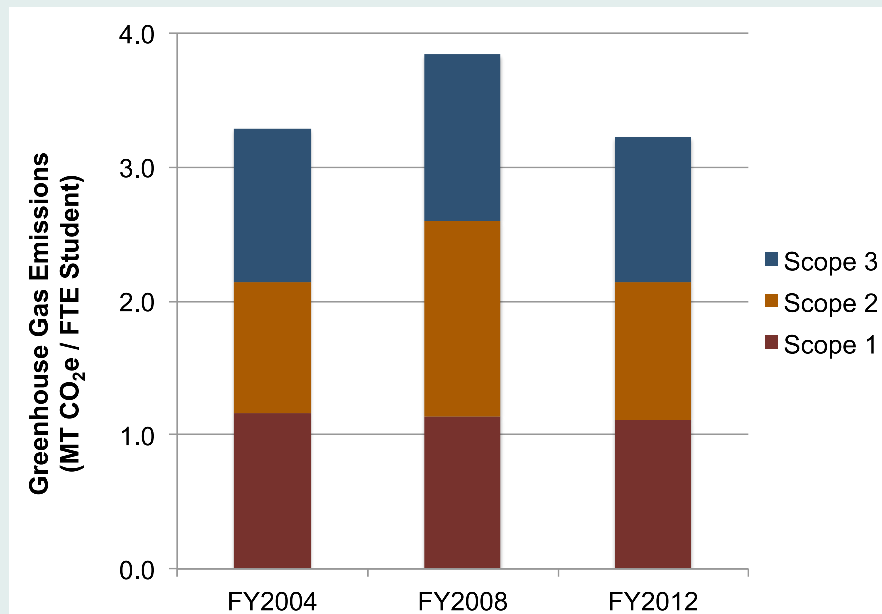
…but the total is ~20% above 1990 levels



carbon intensities declining slowly

Both of the carbon intensity metrics – emissions per 1000 GSF, and emissions per FTE student – are in gradual decline. These are the best measure of “carbon efficiency” and they both improved, albeit slowly, between 2008 and 2012.





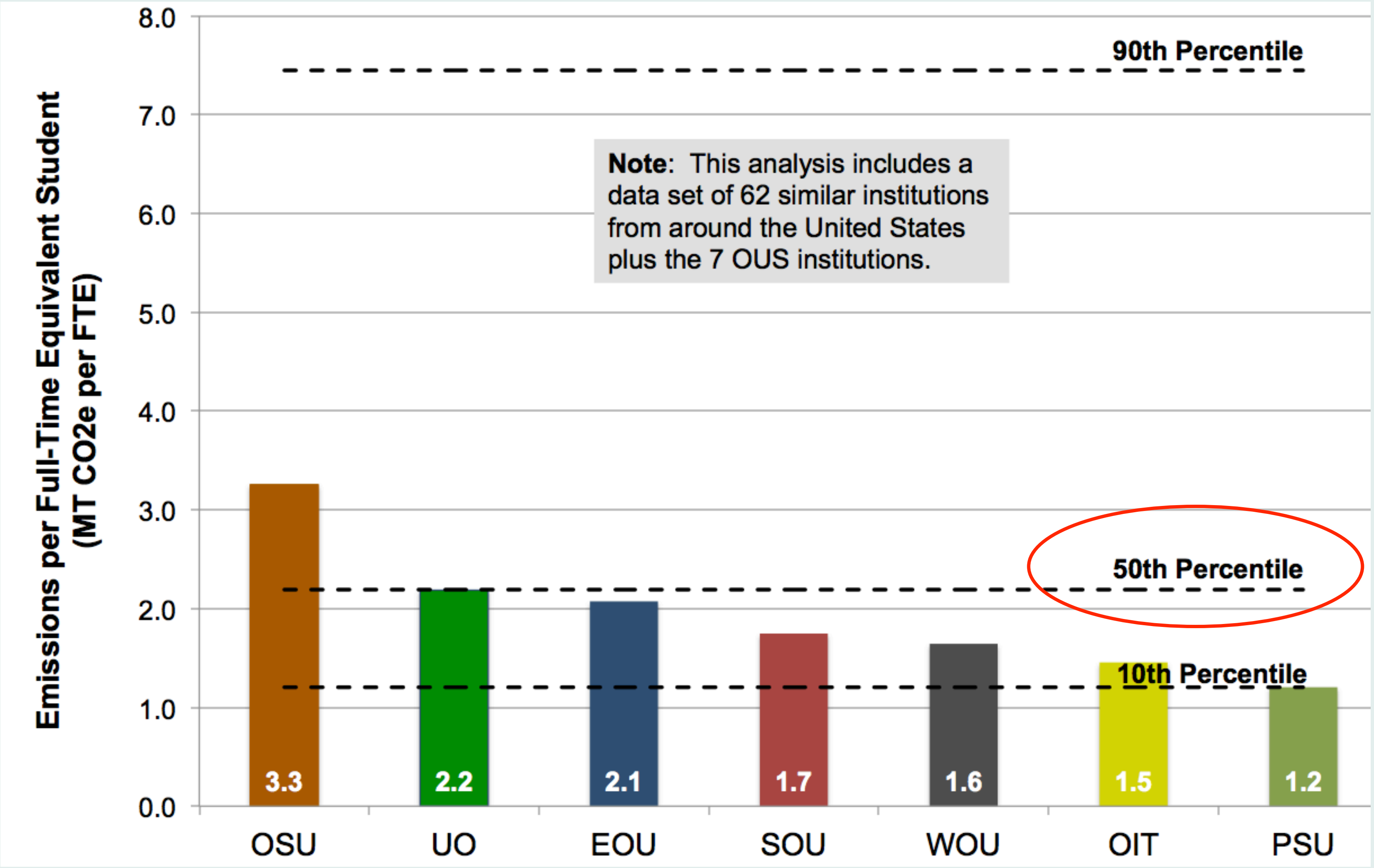
variation can be circumstances, not performance

In many cases, lower GHG emissions – for an individual institution or for the system as a whole – relate to *circumstances*, rather than *performance*.

Examples

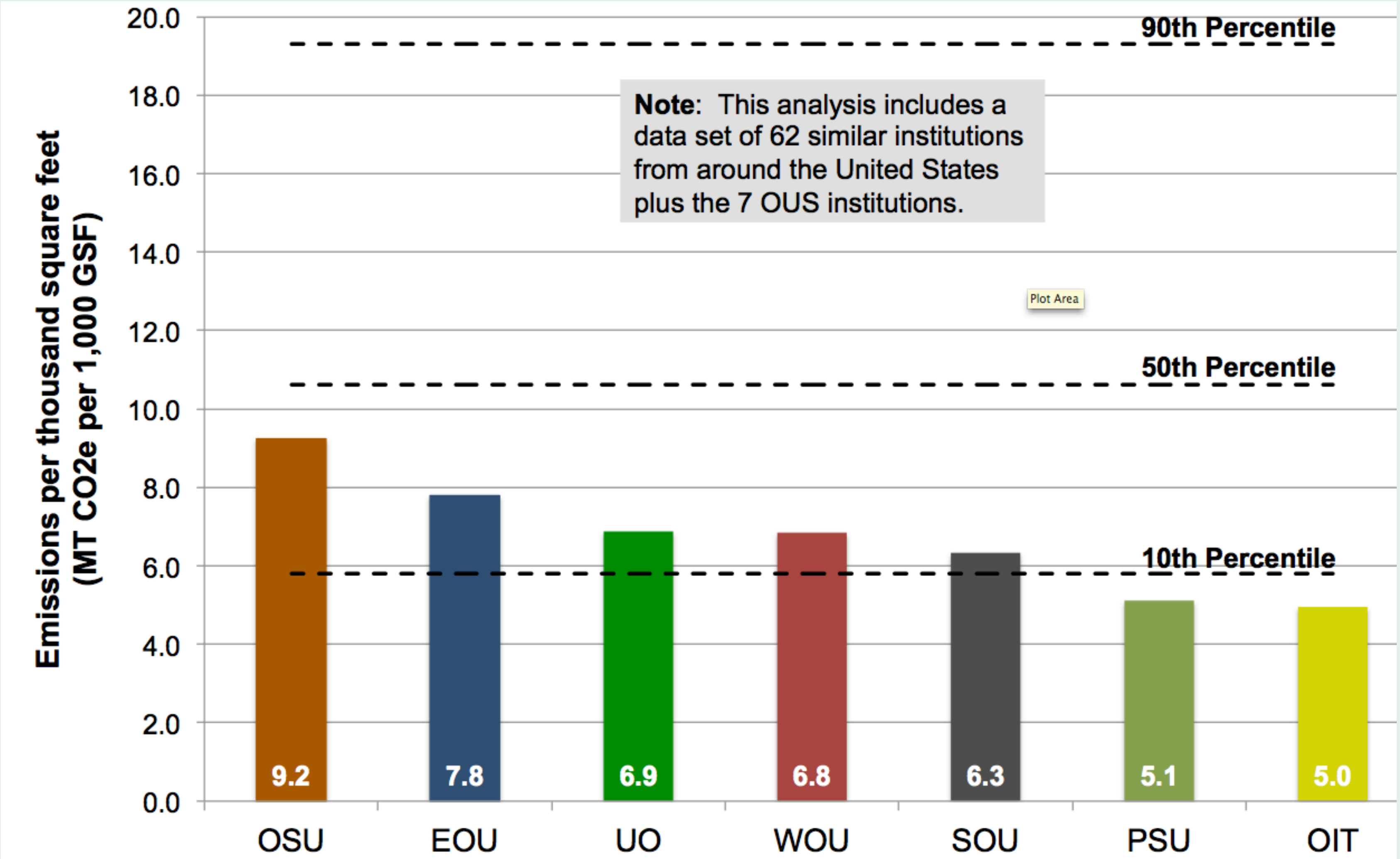
- OSU emissions intensities are higher (labs, agriculture, new central plant), while OIT emissions intensities are lower (geothermal plant).
- The regional electric grid is 30+% less carbon intensive than the national average, and 50-60% less carbon intensive than coal-dependent regions.
- The regional climate is fairly mild (little cooling, modest heating).

lower-than-average emissions per student

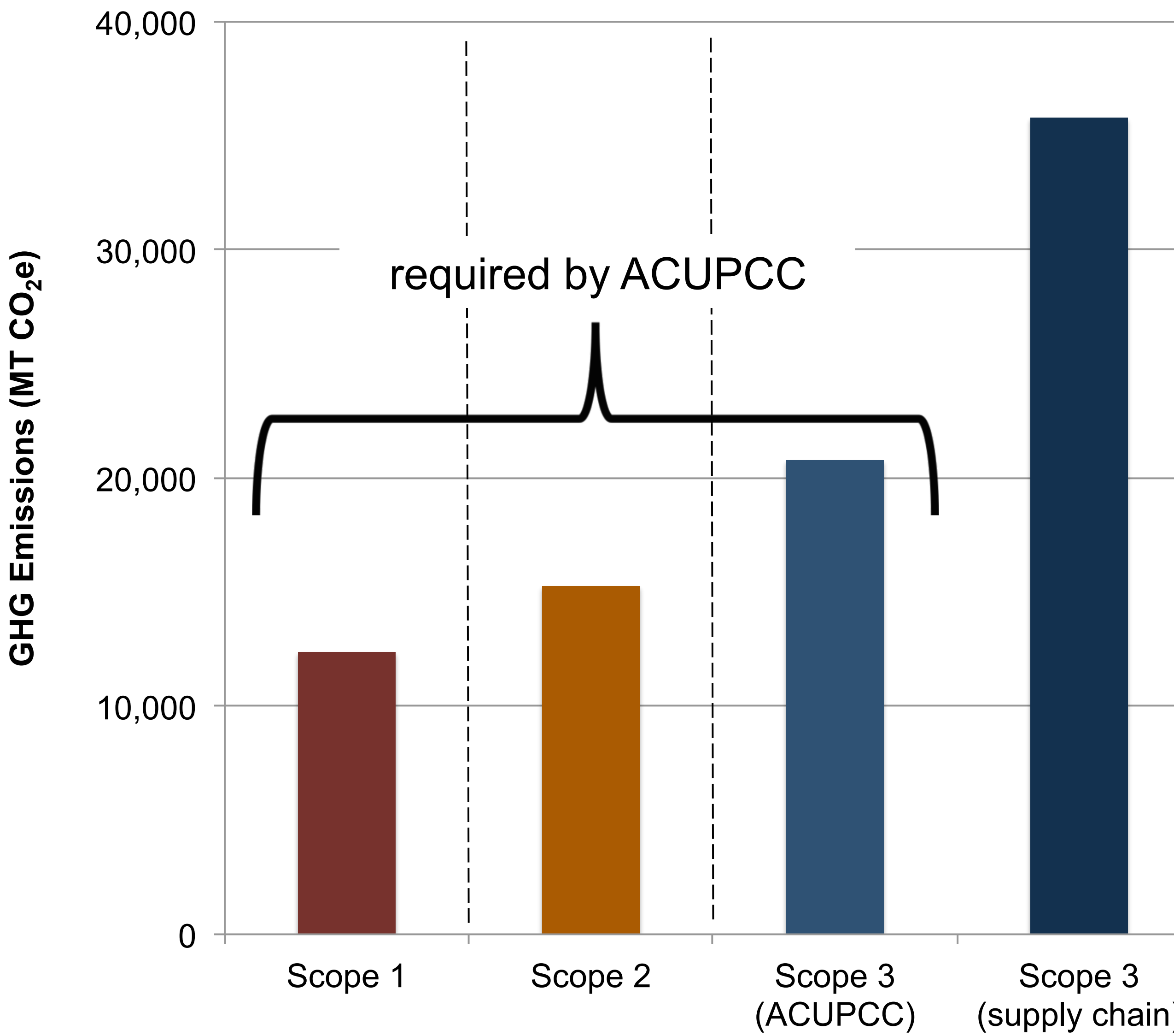


summary point 5

lower-than-average emissions per GSF



summary point 6



Some emissions that ACUPCC doesn't include (yet) are large. We should be prepared for the tasks of documenting and managing them.

(Note the parallel with corporate sustainability efforts, which have focused in recent years on the supply chain.)

insights for future inventories

- OUS and campus capacity isn't there
  - technical work
  - long intervals (e.g., four years) exacerbate these problems
- foundation for future self-sufficiency is there, if you want it
  - methods for complete ACUPCC boundaries
  - Audit Trail (bread crumbs) now ready for use
- three paths for future inventories
  - repeat this year's process, i.e., hire a consultant again in 3-4 years and have OUS and campus staff provide support
  - invest in additional capacity at several or all institutions – many higher ed institutions and government agencies do this
  - have some central system-wide function for on-going carbon accounting (with OUS, or at one of the institutions)

next steps, recommendations

- For your carbon accounting:
  - **Make a plan for future inventories** – don't wait to let this get solved by default at a later date.
  - **Decide the place for carbon accounting** *as a strategy issue* – it has that potential, so seize it.
- For your climate action:
  - **Follow your system-wide master plan goals** that provide a clear path toward meeting your commitments.
  - **Invest to meet your 2020 goal**, which you can do cost effectively (see McKinstry's detailed guidance).
  - **Identify the investments that make up the long arc of change** that gets you to your 2050 goal.
- For your next meeting agenda:
  - **Revisit the good technical work you paid for**, i.e., McKinstry's detailed building-level climate action planning from 2009. It has a shelf life, but you haven't hit the sell-by date.

your goals, in your own words

OUS
Campus Master Plan Goals

- Campus that promotes quality of life for student, faculty, staff and the community.
  - Reflection of culture, values and aspirations of campus
  - Promote community and opportunities for civil discourse
- Provide thoughtful stewardship of a resource-constrained environment whose dimensions include the eco-system(s), land/real estate and financial resources.
  - All new construction shall have zero net addition of CO_2 to the total campus emissions. Renovations shall lower the CO_2 emissions of the facility by no less than 25%.
- Right-sized campus that makes the best use of existing infrastructure and facilities.
  - Reuse and repurpose before considering new construction.
- Consistent with the OUS Climate Action Plan Goals:
  - 2020: 10% reduction below 19
  - 2050: Carbon neutrality
  - Develop a vibrant economy and
  - Ensure sustainable use of resour
  - Enhance economic self-reliance
  - Maintain and restore natural syst
  - Preserve Oregon's economic, sc generations

These high-level goals provide clear strategic guidance about how to develop with a carbon constraint in mind

- **Provide thoughtful stewardship of a resource-constrained environment whose dimensions include the eco-system(s), land/real estate and financial resources.**
  - All new construction shall have zero net addition of CO_2 to the total campus emissions. Renovations shall lower the CO_2 emissions of the facility by no less than 25%.
- **Right-sized campus that makes the best use of existing infrastructure and facilities.**
  - Reuse and repurpose before considering new construction.

Thank you!

Feel free to contact us:

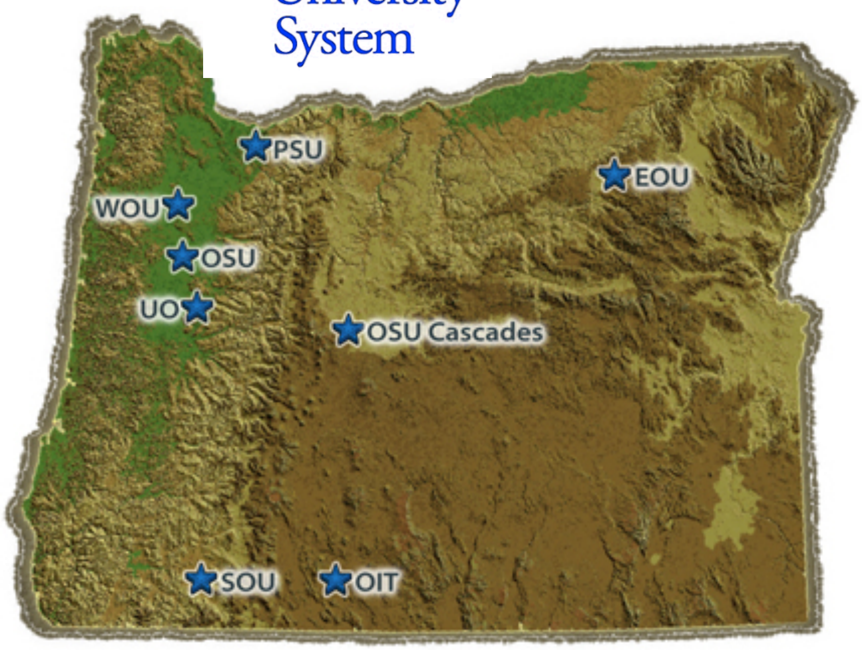
Aaron Toneys, Senior Associate
aaron.toneys@goodcompany.com
(541) 341-GOOD (4663), ext. 218

Joshua Skov, Principal
joshua.skov@goodcompany.com
(541) 341-GOOD (4663), ext. 211

Oregon University System

FY2012 Greenhouse Gas Inventory of Operations
Results and Benchmarking

Oregon University System



Report prepared by Good Company
May 2013

Table of Contents

Table of Contents	2
Acknowledgements	3
1. Executive Summary	4
2. Introduction	7
3. Inventory Protocols, Boundaries and Data	9
4. Summary of Results – Oregon University System	15
5. Summary of Results – Institution-Specific Details	20
Eastern Oregon University	20
Oregon Institute of Technology	23
Oregon State University	26
Portland State University	29
Southern Oregon University	32
University of Oregon	35
Western Oregon University	38
6. Benchmarking Performance	41
Internal Benchmarking – Comparing OUS Institutions	41
External Benchmarking – Comparing OUS Institutions to Other Similar Institutions	48
Appendix A: Data Gathering Findings and Revisions to Previous Inventories	57
Appendix B: Sensitivity Analysis for Electricity	58
Appendix C: Revision to Emissions Factors for Landfill Disposal of Solid Waste	61
Appendix D: 1990 GHG Baseline for Building Energy	62
Appendix E: Embodied GHG Emissions in OUS Purchased Goods and Services	72

Please direct questions and comments to Aaron Toneys (aaron.toneys@goodcompany.com) or Joshua Skov (joshua.skov@goodcompany.com) at Good Company.

ACKNOWLEDGEMENTS

This report – encompassing both the GHG inventory and the subsequent analysis – necessarily involved a wide range of individuals across all seven OUS institutions. We would like to thank the following individuals for their assistance and expertise in the data gathering for this GHG inventory.

- **Oregon University System**: Daniel Christensen and Jackie Thorsness
- **Eastern Oregon University**: Carol Franks and David Lageson
- **Oregon Institute of Technology**: Chris Campbell, David Ebsen and Jenny Young
- **Oregon State University**: Sonja Mae and Brandon Trelstad
- **Portland State University**: Molly Bressers and Jennifer McNamara
- **Southern Oregon University**: Roxane Beigel-Coryell
- **University of Oregon**: Steve Mital and Andrew Louw
- **Western Oregon University**: Debra Arends, Lucinda Milligan, Tom Neal and Karen Nelles

We also appreciate the data gathering support from Inga Duncan at Oregon Department of Administrative Services (DAS) and methodology comments from David Allaway at Oregon Department of Environmental Quality (DEQ).

Sincerely,

Alice Wiewel, Director of Capital Planning and Construction, OUS
Joshua Skov, Principal, Good Company

May 2013

1. Executive Summary

The Intergovernmental Panel on Climate Change, the United Nations body that regularly convenes climate scientists, has identified human activity as the primary cause of the climate change that has occurred over the past few decades and quickened in recent years. Consensus statements from the IPCC suggest that human-caused greenhouse gas (GHG) emissions must be reduced significantly – perhaps more than 50% globally, and by 90% in wealthier nations that are the largest emitters – by mid-century in order to avoid the worst potential climate impacts on human economies and wellbeing.

A necessary first step for any organization interested in reducing its GHG emissions is conducting a thorough inventory of those emissions. The Oregon University System (OUS) took this first step by conducting its baseline GHG inventory for FY2004 data and then again for FY2008. This GHG inventory updates those studies with FY2012 results for all seven OUS institutions, using the boundaries now endorsed in the higher education community through the American College and University Presidents Climate Commitment (ACUPCC).

In addition, this document aims to provide three types of insights:

1. Sense of scale: First and foremost, the document provides a snapshot of the major and minor sources of direct and indirect emissions by the seven OUS institutions.
2. Trends: The focus is on FY2012 results, but this report also draws comparisons with FY2004 and FY2008, with some reference to a rough 1990 baseline as well. A lack of consistent data and methods in the past complicates this task, but a number of helpful trends still emerge.
3. Internal and external benchmarking: This report attempts to provide apples-to-apples comparisons, among OUS institutions and for each with comparison to itself over time. This side-by-side assessment is augmented with data from other institutions of higher education reporting to ACUPCC.

Findings in Brief

The report contains extensive detail, but the high-level findings are straightforward. As background, readers may note that the Oregon University System consists of seven institutions, had a full-time student population of 87,000 in FY2012, a campus population of 103,000 and includes almost 26 million gross square feet of building area.

Building energy use is responsible for a majority of emissions. Commute and air travel are the other major sources.

- Building energy use represents two-thirds (just over 67%) of total emissions for the ACUPCC reporting boundary. Emissions from stationary combustion and electricity-related emissions are nearly equal shares of that subtotal.
- Commute (15%) and air travel (18%) make up most of the remaining emissions.

Absolute emissions have increased slightly, but most campus-level and system-wide measures of "carbon efficiency" have improved. In other words, emissions are up, but measures of higher education "outputs" – such as students and building space – have increased faster than emissions.

- Absolute emissions have increased by 1% from FY2008 to FY2012, and by 18% since FY2004.
- Building-related emissions are approximately 19% above the rough estimate of the 1990 building-energy baseline.
- While absolute emissions have risen slightly, emissions *per student* have decreased by 16% since FY2008.
- Emissions per 1,000 gross square feet have decreased by 17%.
- The emissions increase from FY2004 to FY2008 resulted mainly from institutions expanding the

geographic boundaries of the inventories, as well as establishing data systems to allow calculation of certain additional emissions sources (e.g., commute).

Data gathering and inventory boundaries have shifted in the decade since OUS institutions first began tracking carbon carefully. The current work provides an improved foundation for future carbon accounting and climate action.

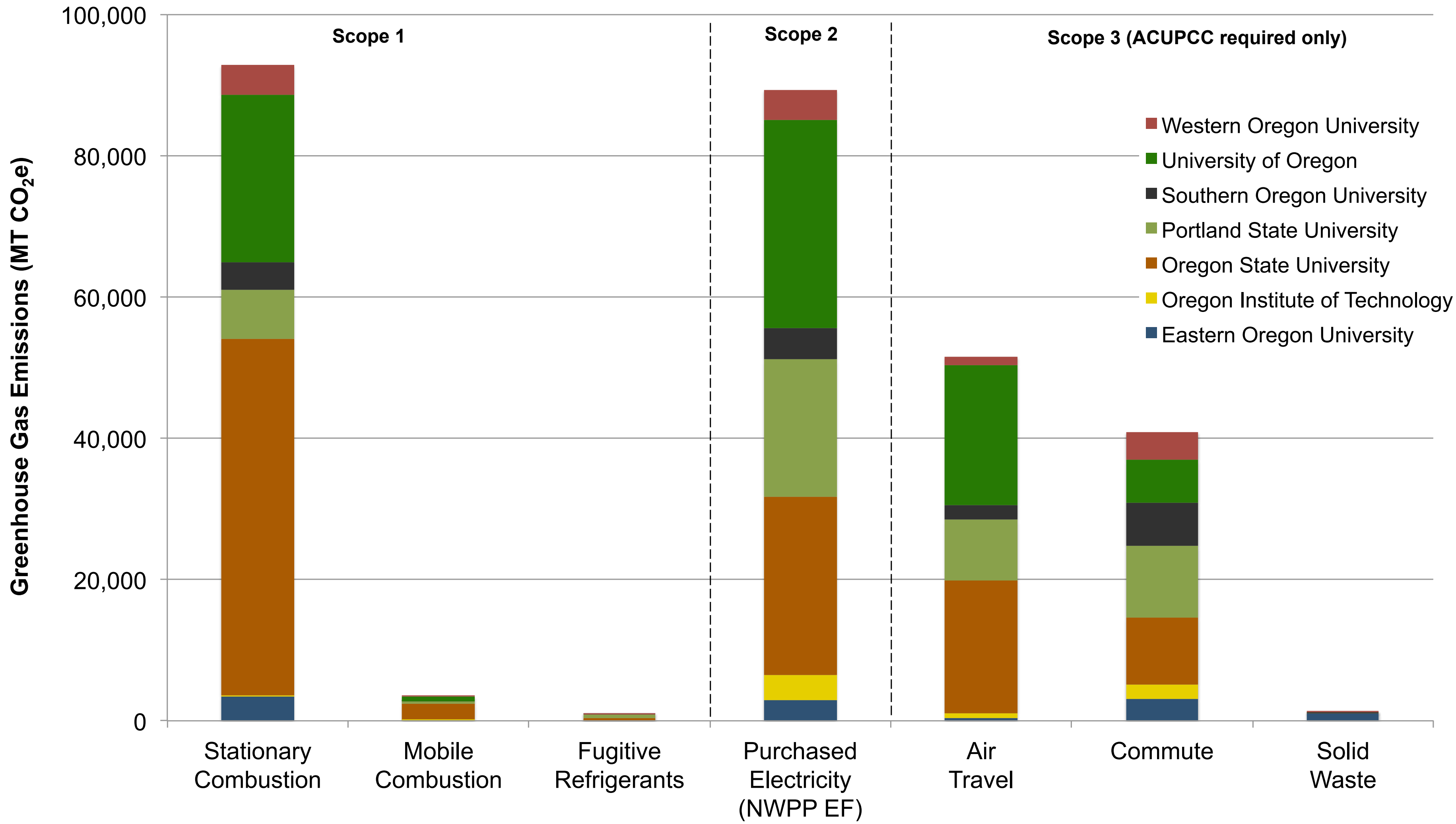
- Change in absolute emission from FY2004 to FY2008 is significantly influenced by improved data collection systems allowing calculation of additional emissions sources as well as expanding the geographic boundaries for some institutions.
- Change in absolute emissions from FY2008 to FY2012 is slightly influenced by changing geographic boundaries of the inventories, but is now more accurate due to much improved data collection systems.
- The collaborative system used for data collection, analysis and reporting was the swiftest, most streamlined and cost-effective to date. Furthermore, it leaves a clear path for future inventory efforts. Still, there is an on-going need for capacity building that could occur leading up to and during the next inventory, perhaps with a process that convenes the institutions regularly to discuss data collection and methods.

Findings within the Context of State Emissions Reduction Efforts

The GHG inventory work completed by OUS puts the system in a position not only to quantify future emissions reductions, but also to connect these efforts to a number of statewide climate action initiatives:

- The state of Oregon has a stated goal of 10 % below 1990 emissions by 2020 and 75% below 1990 levels by 2050. While the lack of detailed data for 1990 makes progress toward the target difficult to assess, the analysis suggests that OUS is not on track to achieving the 1990 baseline by 2020. The main challenge is that current growth of enrollment and building space is faster than increasing efficiencies.
- That 1990 baseline (applicable to building energy, as described herein) and ACUPCC boundaries provide a foundation for planning and action related to a number of aspirational goal-setting efforts at the state level by the Global Warming Commission and at the local level by municipal governments, including the City of Portland, Multnomah County, the City of Eugene and others.
- The brief examination of the supply chain emissions in Appendix E parallels Oregon Department of Environmental Quality's Consumption-Based Emissions Inventory or CBEI. OUS' previous supply chain GHG analysis also provides a foundation for OUS efforts to participate in DEQ's long-term effort described in its *2050 Vision and Framework for Action* for materials management.
- The inclusion of full fuel-cycle emissions draws on analysis in support of Oregon's Clean Fuel Standard.

Figure 1: Summary of OUS FY2012 GHG emissions (ACUPCC required), by emissions source and OUS institution



2. Introduction

The Intergovernmental Panel on Climate Change (IPCC), the United Nations body that regularly convenes climate scientists, has identified human activity as the primary cause of the climate change that has occurred over the past few decades and quickened in recent years. Consensus statements from the IPCC suggest that human-caused greenhouse gas emissions (GHG) must be reduced significantly – perhaps more than 50% globally, and by 90% in wealthier nations that are the largest emitters – by mid-century in order to avoid the worst potential climate impacts on human economies that have been projected.

Many individual corporations, government agencies, universities, non-profits and even individuals have proactively sought to take on this challenge. Emissions from university operations can be significant, so higher education institutions can have a direct impact through emissions reductions. Universities also have a role in educating future policy makers and citizens. By measuring emissions from the seven institutions that comprise Oregon University System's (OUS) operations, this inventory is a step toward taking action, managing risk and leading the way forward.

Beyond addressing climate change, OUS acknowledges there are numerous other benefits associated with GHG emission-reduction activities and student and employee education of these issues. Stabilization of energy costs, reduction of pollution that impacts human health and air quality, increasing energy independence, attraction of students and faculty members that care about these issues, and local community support are just a few of such benefits.

The seven institutions of the Oregon University System are signatories of the American College and University President's Climate Commitment (ACUPCC), which states that each institution will regularly inventory its emissions and develop climate action goals. This report presents the findings for each institution's FY2012 Greenhouse Gas Inventory and benchmarks these results internally (within the system) and externally (compares results to similar higher education institutions outside of OUS).

Project Description

Good Company was contracted by Oregon University System (OUS) to assist OUS institutions in completion of FY2012 greenhouse gas (GHG) inventories for ACUPCC reporting and to aggregate and summarize institutional-specific results into a system-wide OUS summary report. The project consisted of assisting the four smaller OUS institutions: Eastern Oregon University (EOU), Oregon Institute of Technology (OIT), Southern Oregon University (SOU) and Western Oregon University (WOU) to complete FY2012 GHG inventories; collecting inventory results from the larger institutions: Oregon State University (OSU), Portland State University (PSU) and University of Oregon (UO); and aggregating the institution-specific results into a system-wide report. This project consisted of the following tasks:

- Assist a project liaison at EOU, OIT, SOU and WOU in the collection of the required data for ACUPCC required emissions sources: stationary and mobile combustion, fugitive refrigerant losses, purchased electricity, commute, air travel and solid waste. In addition, collect institutional data on campus population and building areas in order to calculate emissions intensities. Finally, collect data on the purchase of Renewable Energy Certificates (RECs) or carbon offsets for the purpose of mitigating the institution's GHG emissions.
- Conduct a commute survey and the associated analysis for the institutions listed above.
- Calculate emissions based on the gathered data using Clean Air Cool Planet's *Campus Carbon Calculator*.
- Collect complete FY2012 GHG inventory results from OSU, PSU and UO. Each of the larger OUS institutions was responsible for completing its own GHG inventory in support of this project.
- Identify and correct errors, fill data gaps and consistently apply methodology to FY2004 through FY2012 GHG inventories.

- Aggregate institution-specific results into an *OUS FY2012 Greenhouse Gas Inventory of Operations Report*.

This work began in December 2012 and concluded in May 2013.

Structure of This Report

The primary focus of this project was completing or collecting a FY2012 GHG inventory for all OUS institutions, and this report therefore focuses on summarizing the results for OUS institutions and the system as a whole. Section 3 describes the methodologies and process used for completion of the FY2012 GHG inventories. Section 4 presents the results of the FY2012 GHG inventory for the OUS system as a whole and Section 5 describes institution-specific results. Finally, Section 6 focuses on internal and external benchmarking of OUS and single-institution performance over time and compared to similar higher education institutions across the country. Following Section 6 are five (5) appendixes that offer more detail on specific topics as well as provide the full content of two previously completed reports by Good Company that are referenced throughout this report: *1990 GHG Baseline for Building Energy* and *Embodied GHG Emissions in OUS Purchased Goods and Services*.

3. Inventory Protocols, Boundaries and Data

Protocols and Methodology

This inventory follows The Climate Registry's *General Reporting Protocol* (TCR-GRP) as well as guidance provided by the Association for the Advancement of Sustainability in Higher Education (AASHE). The TCR-GRP only requires the reporting of emissions in Scopes 1 and 2, but the minimum reporting boundaries for ACUPCC signatories include Scope 1 and Scope 2, as well as several Scope 3 emissions sources (air travel, solid waste and commute).

TCR-GRP was followed for Scope 1 and Scope 2 emissions sources per the requirements of ACUPCC reporting guidance. There is no standard protocol for the Scope 3 emissions sources. This inventory follows ACUPCC guidance, which directs reporters to methodology recommended by the AASHE. See the ACUPCC reporting website for more details (http://rs.acupcc.org/instructions/ghg/).

Clean Air Cool Planet's *Campus Carbon Calculator (Version 6.85)* was used to calculate all greenhouse gas (GHG) emissions in the inventories summarized in this report. The *Campus Carbon Calculator* follows TCR-GRP and AASHE guidance in its methodology and calculator of emissions. The *Campus Carbon Calculator* was revised in two ways for the inventories completed by Good Company.

1. Biogenic fuels (100% biodiesel and ethanol fuel types) were added and the calculator was revised to ensure the carbon dioxide emissions were accounted for as biogenic.
2. The solid waste emissions factors were revised to remove the credit applied for landfill carbon sequestration. See Appendix C for more details on the basis of this revision.

All GHG emissions presented in this report are represented in metric tons of carbon dioxide equivalent (MT CO_2e). Quantities of individual GHGs are accounted for in the *Campus Carbon Calculator* file used to calculate emissions for this GHG inventory. The GHG calculations use the global warming potentials (GWP) as defined in the International Panel on Climate Change's Second Assessment Report. While these GWPs do not represent the scientific state-of-the-art, these numbers are in line with the Kyoto Protocol and are used to provide consistency with past GHG inventories.

Boundaries

GHG inventory protocols classify emissions sources and activities as producing either direct or indirect GHG emissions. Direct emissions are those that stem from sources owned or controlled by a particular organization. Indirect emissions occur because of the organization's actions, but the direct source of emissions is controlled by a separate entity.

To distinguish direct from indirect emissions sources, three "Scopes" are defined for traditional GHG accounting and reporting purposes (World Resources Institute, *The Greenhouse Gas Protocol)*.

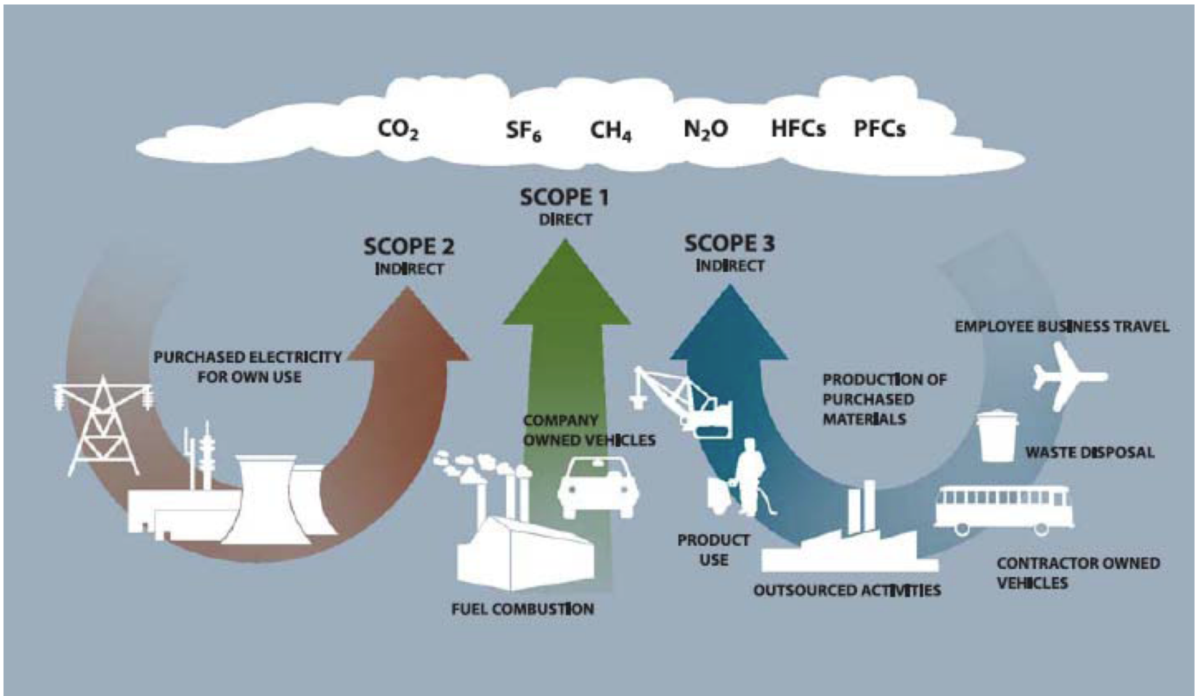
Scope 1 – Direct sources of GHG emissions that originate from owned equipment and facilities such as combustion of fuels or loss of fugitive refrigerants.

Scope 2 – Indirect emissions from purchased electricity, heat or steam.

Scope 3 – All other indirect sources of emissions that result from the institution's activities but occur from sources owned or controlled by another company, such as commute, air travel, solid waste disposal or supply chain.

Figure 2 illustrates the three Scopes of emissions. Scope 1 (direct) and Scope 2 (indirect) emissions must be reported for most protocols and registries, including ACUPCC. Scope 3 emissions are indirect and usually considered optional when reporting emissions, but serve to clarify an organization's entire carbon footprint and illuminate the potential regulatory and financial risks an institution may face due to its carbon footprint. ACUPCC signatories are required to report Scope 3 emissions from air travel, student / faculty / staff commute and solid waste.

Figure 2: Greenhouse gases and accounting and reporting Scopes



Source: WRI/WBCSD. *Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.*

ACUPCC requires the reporting of some Scope 3 emissions sources, but there are several additional emissions sources worth calculating or estimating because they can be large for higher education institutions. The inventories conducted by Good Company cover three such sources: the emissions associated with the "fuel cycle" of fossil fuels, those emissions upstream of the combustion of the fuel for stationary use, mobile use or electric power generation; the emissions from generating the share of power that is lost in transmission and distribution (T&D losses); and the supply chain, i.e., all of the purchases by the institution.

The largest scale emissions source is known to be supply chain, but the analysis was not conducted for FY2012 data. Supply chain analysis was completed for OUS in support of the FY2008 GHG Inventory. These results are used as a proxy for this inventory. The larger OUS institutions did not include fuel cycle or supply chain emissions, but do include other Scope 3 emissions sources not considered for the smaller institutions.

Emissions mitigations or "credits" were also estimated based on the quantity of Renewable Energy Certificates (RECs) or carbon credits purchased by each institution for the purpose of offsetting the institution's operational GHG emissions.

Figure 3 lists, by institution, which emissions sources are included in the GHG inventory.

Figure 3: Scope 1, Scope 2, Scope 3 (ACUPCC and additional) emissions sources reported, by institution

Scope Category and Emissions Source	EOU	OIT	OSU	PSU	SOU	UO	WOU
Scope 1							
Stationary Combustion	✓ **Required reporting by ACUPCC**						
Mobile Combustion							
Refrigerants and Chemicals							
Scope 2							
Purchased Electricity	✓ **Required reporting by ACUPCC**						
Scope 3 (ACUPCC)							
Commute	✓ **Required reporting by ACUPCC**						
Air Travel							
Solid Waste							
Scope 3 (Additional)							
Supply Chain	✓ **Estimated by Good Company using FY2008 data**						
T&D Losses	✓ **Automatically calculated by the CA-CP's *Campus Carbon Calculator***						
Fuel Production (Stationary, Mobile and Electricity)	✓	✓			✓		✓
Agriculture			✓	✓		✓	
Other Business Travel			✓	✓		✓	
Paper				✓		✓	
Wastewater				✓		✓	
Offsets							
Purchased Offsets	✓ **Data available and collected for all institutions**						
Renewable Energy Certificates (REC)	✓ **Data available and collected for all institutions**						

This GHG inventory covers emissions from fiscal year 2012 that runs from July 2011 through June of 2012. Data for the emissions sources were collected for all owned and leased facilities located within the state of Oregon minus the following exclusions. The exclusions are grouped into two categories: emissions sources and facilities.

Emissions sources exclusions and rationale:

- Fugitive refrigerants from vehicles. These emissions sources are assumed to be relatively small for OUS institutions and do not have readily available data streams to support emissions calculations.
- Business travels other than air travel (e.g., bus, train and rental vehicles) as well as reimbursed miles for employee vehicles for EOU, OIT, SOU and WOU. These emissions sources are assumed to be relatively small for OUS institutions and do not have readily available data streams to support emissions calculations.
- Agriculture was excluded as an emissions source for EOU, OIT, SOU and WOU due to a lack of readily available data and the assumption that these emissions would be small in scale.

Facility exclusions, by institution, and rationale:

- EOU has a number of regional centers around Oregon. These facilities are housed within and share others' owned facilities. Data is not readily available for these regional centers and therefore they have been excluded from this inventory.
- OIT partnership programs in Seattle (Boeing - engineering and manufacturing degrees) and La Grande.

- Data for the Seattle facility is not available and is therefore is excluded from this inventory. OIT should consider including the energy used by these buildings in future inventories.
- The program in La Grande is offered through a partnership with OIT and Oregon Dental Services (ODS). ODS manages and operates the facility in La Grande, and thus is outside of OIT's operational boundaries.

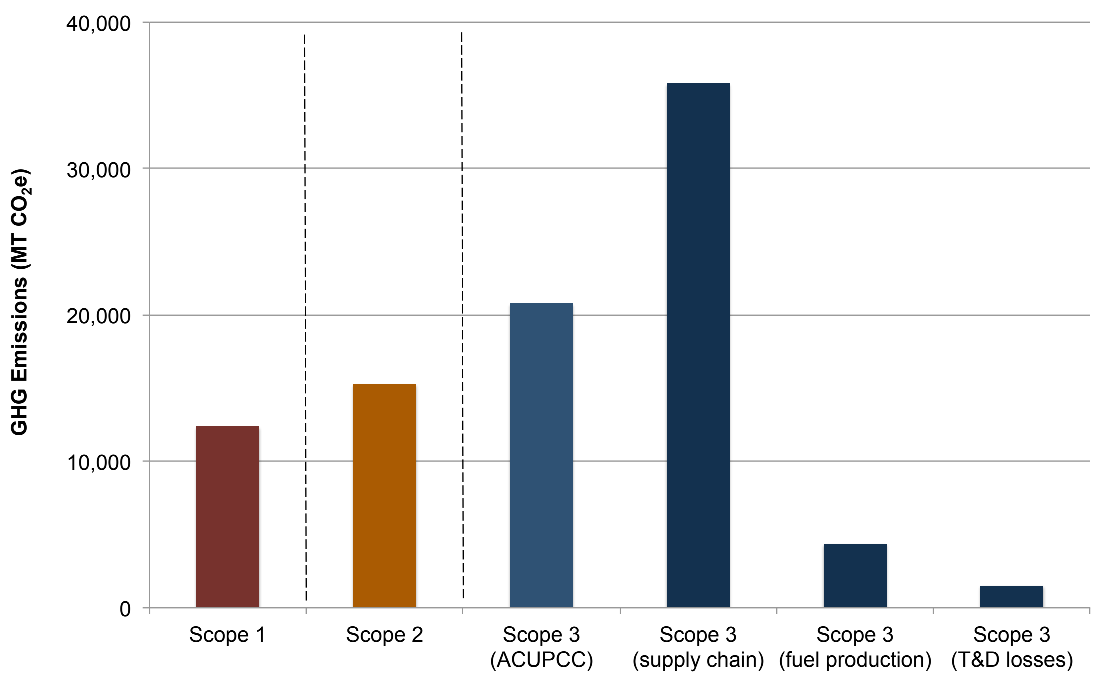
  Wilsonville Campus is not included in this analysis, since it did not come fully on-line in FY12.

- OSU: None.
- PSU excluded all 178,694 square feet of leased building space, or about 3% of the total
- SOU: None.
- UO: None.
- WOU: None.

This inventory includes all seven "Kyoto gases" including: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), nitrogen trifluoride (NF_3), and the groups of high GWP gases, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). As no OUS institution uses PFCs, NF_3 or SF_6, those gases are not included. Overwhelmingly, the direct and indirect CO_2-equivalent emissions consist of CO_2 from the combustion of fossil fuels.

For the four small institutions that this analysis assessed in greatest detail, emissions are spread fairly evenly across Scope 1 (26%), Scope 2 (33%), and ACUPCC Scope 3 sources (41%). Figure 4 shows the scale of the ACUPCC required Scope 1,2 and 3 emissions sources for EOU, OIT, SOU and WOU compared to the additional Scope 3 emissions sources. As Figure 4 demonstrates, the additional Scope 3 sources – supply chain, fuel cycle and T&D losses for electricity – increase total emissions by 88.5% above the total for the ACUPCC boundary. This important sense-of-scale exercise should guide future reporting efforts and, ultimately, climate action priorities. Several institutions quantified additional emissions that do not appear in Figure 4; those institutions' individual inventory reports describe those emissions, which are generally a small percentage of institutional totals.

Figure 4: Comparison of Scope 1, Scope 2 and ACUPCC Scope 3 to additional Scope 3 emissions sources



Note: Figure 4 only includes emissions from EOU, OIT, SOU and WOU.

Data Collection and Uncertainty

This section describes the sources and quality of data collected for the inventories completed by Good Company, which include EOU, OIT, SOU and WOU. Per project scope, this report does not include details about the data collection process for the other OUS institutions (OSU, PSU and UO). Good Company worked with liaisons at each of the four institutions to collect the data required to calculate emissions. Primary data collection for the FY2012 inventory was completed in January and February of 2013. After the receipt of a data file, Good Company reviewed it for completeness and asked follow-up questions if necessary. All data source files, answers to follow-up questions, calculation files and resource files are documented and cataloged in the institution-specific FY2012 audit trail.

Each institution's audit trail consists of a table of contents and folders containing all files used to complete the inventory. After the data was cataloged in the audit trail, the values were input into the institution-specific version of the *Campus Carbon Calculator*. Each input cell in the *Campus Carbon Calculator* contains a comment that specifies a reference number directing the user back to the original data file in the audit trail folders. In each data file the user will find notes that describe which value was input into the *Campus Carbon Calculator*.

Building square footage data was provided by each institution and is considered accurate, albeit in need of an audit during the next OUS GHG inventory to insure consistency of methodology between OUS institutions. Student population full-time equivalent (FTE) numbers are taken from the OUS 2012 Factbook. Staff and faculty FTE values are provided by OUS Institutional Research Services.

Data provided for stationary and mobile combustion and purchased electricity by all institutions is considered highly accurate. For natural gas combustion and electricity, two data sources were available that allowed for quality control through cross comparisons. Each institution provided fuel consumption data for campus-owned vehicles and equipment and Oregon Department of Administrative Services (DAS) was able to provide a report on fuel used by the vehicles leased from DAS by institution. Fugitive refrigerant loss data required slightly more effort by the campus liaisons to collect, but in the end all institutions were able to acquire the necessary data.

All institutions were able to provide solid waste and recycling data with little difficulty. Almost all of the four institutions discussed in this section have the ability to digitally report air miles or cost for air travel independently from other travel expenses except for SOU. At SOU air travel required the campus liaison to sample travel expense requests to determine the average percentage of dollars spent on air travel relative to other travel expenses (e.g., hotel, rental car, food, etc.). Even though Good Company did not conduct their inventory it was reported that PSU had similar difficulties with air travel data. Commute data for FY2012 was not available at any institution, which necessitated the creation and proctoring of a commute survey. This survey, proctored using Survey Monkey, was distributed via campus e-mail.

As the foregoing discussion makes clear, there is some degree of uncertainty in any GHG inventory. This uncertainty can come from data issues, but it can also result from uncertainty in the methodology for translating units of an activity into CO_2-equivalent emissions. The magnitude of this total uncertainty should inform future inventory and reporting efforts, including prioritization of additional data gathering and the framing of results, their precision and their magnitude relative to each other.

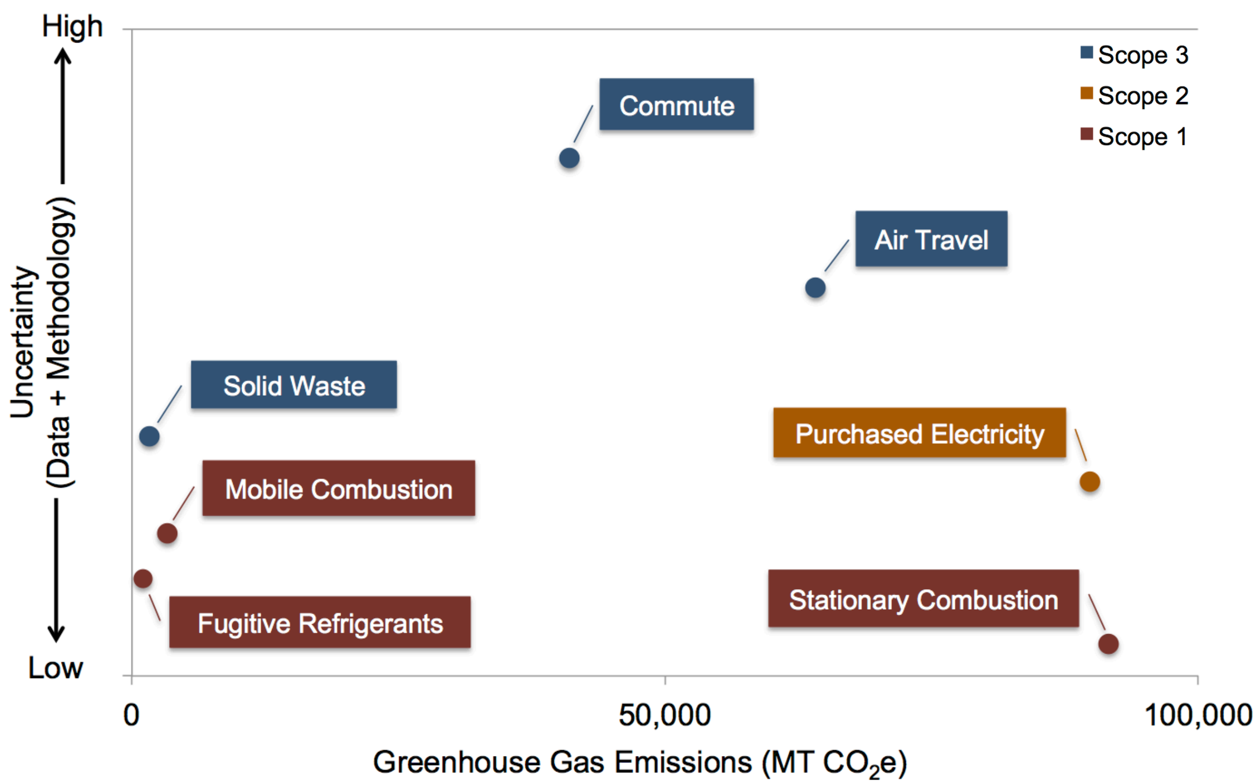
Figure 5 provides a subjective assessment of this uncertainty, by emissions source. Later sections of the report provide additional detail, but the general points are straightforward:

- The two largest emissions sources have fairly low uncertainty. Stationary combustion, the largest, appears to have very good data, and the methods for quantifying emissions from it are well-defined and non-controversial.
- Purchased electricity, the second-largest emissions source, has well-defined and well-known units of activity (kWh of electricity consumed), but the details of the electric grid, idiosyncrasies in

regional power contracts, and controversy in carbon accounting methods combine to add uncertainty, which Appendix B addresses in some detail.

- Several emissions sources are small and have low or only moderate uncertainty associated with their data and methods. These include fugitive refrigerants, mobile combustion (campus fleets) and solid waste.
- Two large emissions sources, commute and air travel, face considerable challenges related to data and methodology. The calculations here offer good approximations, but the detailed institution-specific reports clearly describe a need for updating data collection and methodology in the future.

Figure 5: Assessment of emissions calculation uncertainty (ACUPCC required sources)



Suggestions for Future OUS GHG Inventories

In the course of this completing this inventory, primary process improvements were identified that could significantly improve the quality of future GHG inventories.

1. There should be a system-wide standard for carbon accounting. OUS and the seven institutions should decide on and commit to boundaries that support individual and collective climate action priorities.
2. Individual institutions and the system must build the capacity necessary to follow through on this commitment to a system-wide standard. This capacity must include basic carbon accounting knowledge, systems for data collection, and a mechanism for quality control.
3. Apart from raising the individual skillsets of practitioners at each institution, there should be an on-going collaborative process to make the process more effective, to address inevitable turn-over and to facilitate clear thinking about climate action opportunities that emerge in the analysis.

Following these suggestions will generate high-quality inventories in the future. This commitment to better results will pay dividends by raising the quality of analysis at the institutional level, facilitating better climate action planning and improving institutional collaboration.

4. Summary of Results – Oregon University System

Oregon University System (OUS) consists of 7 institutions, had a full-time equivalent student population of 87,000 in FY2012, a campus population of over 100,000 and almost 26 million gross square feet (GSF) of building area. In terms of population, the three largest institutions in order are: UO, OSU and PSU. In terms of buildings space, the three largest in order are: OSU, UO and PSU.

Figure 6: Summary of campus population and building space, by institution

Institution / Category	Institutional Value			% of OUS Total		
Eastern Oregon University (EOU)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	806,001	891,891	834,868	3.9%	4.0%	3.2%
Campus Population (student+faculty+staff)	2,898	2,785	3,504	3.5%	3.3%	3.4%
Student Population	*2,565*	*2,435*	*3,138*	*3.6%*	*3.4%*	*3.6%*
Faculty Population	*103*	*112*	*128*	*2.3%*	*2.4%*	*2.1%*
Staff Population	*230*	*238*	*238*	*3.3%*	*3.0%*	*2.4%*
Oregon Institute of Technology (OIT)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	582,048	624,818	805,487	2.8%	2.8%	3.1%
Campus Population (student+faculty+staff)	2,860	2,720	3,085	3.5%	3.2%	3.0%
Student Population	*2,499*	*2,350*	*2,743*	*3.5%*	*3.3%*	*3.2%*
Faculty Population	*150*	*135*	*123*	*3.3%*	*2.8%*	*2.0%*
Staff Population	*211*	*235*	*219*	*3.1%*	*3.0%*	*2.2%*
Oregon State University (OSU)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	6,839,309	7,032,001	8,466,838	32.8%	31.3%	32.8%
Campus Population (student+faculty+staff)	22,683	23,347	29,129	27.4%	27.6%	28.3%
Student Population	*18,699*	*18,961*	*24,040*	*26.2%*	*26.4%*	*27.6%*
Faculty Population	*1,763*	*1,785*	*1,931*	*39.1%*	*37.6%*	*31.9%*
Staff Population	*2,221*	*2,601*	*3,158*	*32.2%*	*33.2%*	*32.0%*
Portland State University (PSU)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	4,271,808	4,959,352	5,273,188	20.5%	22.1%	20.4%
Campus Population (student+faculty+staff)	19,803	21,453	26,403	23.9%	25.4%	25.7%
Student Population	*17,965*	*19,213*	*22,403*	*25.2%*	*26.7%*	*25.8%*
Faculty Population	*773*	*924*	*1,750*	*17.1%*	*19.5%*	*29.0%*
Staff Population	*1,065*	*1,316*	*2,250*	*15.4%*	*16.8%*	*22.8%*
Southern Oregon University (SOU)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	1,248,678	1,308,678	1,345,232	6.0%	5.8%	5.2%
Campus Population (student+faculty+staff)	5,257	4,800	5,529	6.4%	5.7%	5.4%
Student Population	*4,659*	*4,213*	*4,875*	*6.5%*	*5.9%*	*5.6%*
Faculty Population	*213*	*222*	*266*	*4.7%*	*4.7%*	*4.4%*
Staff Population	*385*	*365*	*388*	*5.6%*	*4.7%*	*3.9%*
University of Oregon (UO)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	5,930,710	6,441,734	7,800,628	28.5%	28.7%	30.2%
Campus Population (student+faculty+staff)	24,227	24,402	29,312	29.3%	28.9%	28.5%
Student Population	*20,481*	*20,361*	*24,543*	*28.7%*	*28.3%*	*28.2%*
Faculty Population	*1,264*	*1,309*	*1,540*	*28.0%*	*27.6%*	*25.5%*
Staff Population	*2,482*	*2,732*	*3,229*	*36.0%*	*34.9%*	*32.7%*
Western Oregon University (WOU)	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	1,163,843	1,179,382	1,261,899	5.6%	5.3%	4.9%
Campus Population (student+faculty+staff)	4,965	4,996	5,956	6.0%	5.9%	5.8%
Student Population	*4,417*	*4,384*	*5,257*	*6.2%*	*6.1%*	*6.0%*
Faculty Population	*248*	*263*	*305*	*5.5%*	*5.5%*	*5.0%*
Staff Population	*300*	*349*	*394*	*4.4%*	*4.5%*	*4.0%*
Oregon University System (OUS) Totals	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Gross Building Square Footage	20,842,397	22,437,856	25,788,140	100.0%	100.0%	100.0%
System Population (student+faculty+staff)	82,693	84,503	102,918	100.0%	100.0%	100.0%
Student Population	*71,285*	*71,917*	*86,999*	*100.0%*	*100.0%*	*100.0%*
Faculty Population	*4,514*	*4,750*	*6,043*	*100.0%*	*100.0%*	*100.0%*
Staff Population	*6,894*	*7,836*	*9,876*	*100.0%*	*100.0%*	*100.0%*

OUS's aggregate FY2012 GHG emissions total more than 280,000 MT CO_2e. These emissions include Scope 1, Scope 2 and Scope 3 emissions sources required for reporting by ACUPCC. It is important to note that these accounting boundaries exclude a number of known large emissions sources such as supply chain, fuel production, agriculture (in the case of OSU) and purchased electricity purchased electricity transmission and distribution losses (T&D).

Figure 7: Summary of OUS GHG emissions, by institution and Scope category

Institution	GHG Emissions (MT CO_2e)			MT CO_2e / Full-Time Student			MT CO_2e / 1,000 square feet		
EOU	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	3,506	3,655	3,570	1.4	1.5	1.1	4.4	4.1	4.3
Scope 2	2,865	3,672	2,934	1.1	1.5	0.9	3.6	4.1	3.5
Scope 3	2,688	2,823	4,646	1.0	1.2	1.5			
Total	**9,059**	**10,149**	**11,150**	**3.5**	**4.2**	**3.6**	**7.9**	**8.2**	**7.8**
OIT	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	299	323	382	0.1	0.1	0.1	0.5	0.5	0.5
Scope 2	2,109	3,375	3,608	0.8	1.4	1.3	3.6	5.4	4.5
Scope 3	3,141	2,923	2,659	1.3	1.2	1.0			
Total	**5,549**	**6,622**	**6,650**	**2.2**	**2.8**	**2.4**	**4.1**	**5.9**	**5.0**
OSU	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	34,541	35,989	53,077	1.8	1.9	2.2	5.1	5.1	6.3
Scope 2	26,085	39,861	25,230	1.4	2.1	1.0	3.8	5.7	3.0
Scope 3	26,948	27,936	28,398	1.4	1.5	1.2			
Total	**87,573**	**103,786**	**106,705**	**4.7**	**5.5**	**4.4**	**8.9**	**10.8**	**9.2**
PSU	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	7,155	7,777	7,600	0.4	0.4	0.3	1.7	1.6	1.4
Scope 2	14,058	21,421	19,367	0.8	1.1	0.9	3.3	4.3	3.7
Scope 3	17,465	20,992	18,660	1.0	1.1	0.8			
Total	**38,678**	**50,190**	**45,627**	**2.2**	**2.6**	**2.0**	**5.0**	**5.9**	**5.1**
SOU	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	4,476	4,491	4,034	1.0	1.1	0.8	3.6	3.4	3.0
Scope 2	3,343	4,576	4,483	0.7	1.1	0.9	2.7	3.5	3.3
Scope 3	7,198	6,292	8,344	1.5	1.5	1.7			
Total	**15,017**	**15,358**	**16,862**	**3.2**	**3.6**	**3.5**	**6.3**	**6.9**	**6.3**
UO	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	29,916	26,724	24,230	1.5	1.3	1.0	5.0	4.1	3.1
Scope 2	18,188	27,656	29,421	0.9	1.4	1.2	3.1	4.3	3.8
Scope 3	21,574	22,858	25,900	1.1	1.1	1.1			
Total	**69,678**	**77,238**	**79,551**	**3.4**	**3.8**	**3.2**	**8.1**	**8.4**	**6.9**
WOU	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	4,047	4,045	4,389	0.9	0.9	0.8	3.5	3.4	3.5
Scope 2	2,958	3,774	4,250	0.7	0.9	0.8	2.5	3.2	3.4
Scope 3	4,148	5,239	5,124	0.9	1.2	1.0			
Total	**11,153**	**13,057**	**13,763**	**2.5**	**3.0**	**2.6**	**6.0**	**6.6**	**6.8**
OUS	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**	**FY2004**	**FY2008**	**FY2012**
Scope 1	83,941	83,004	97,283	1.0	1.0	0.9	3.4	3.2	3.1
Scope 2	69,606	104,335	89,293	0.9	1.4	1.0	3.2	4.4	3.6
Scope 3	83,160	89,062	93,732	1.2	1.3	1.2			
Total	**236,707**	**276,400**	**280,308**	**3.1**	**3.6**	**3.1**	**6.6**	**7.5**	**6.7**

Figure 8 shows how OUS emissions change over time by institution. Comparisons like this are useful to determine how system-wide emissions are changing over time and the relative impact each institution has on the total. Three years, FY2004, FY2008 and FY2012 were selected at three points in time that will be compared throughout this report. These years represent the moments in time where the all institutions in the entire system completed GHG inventories. During the intervening years, some of the institutions conducted GHG inventories while other did not.

While there have been three system-wide inventories, these three inventories represent different inventory boundaries (in terms of emissions sources and geography) in ways that complicate comparison of aggregate results over time. Good Company, on behalf of OUS, conducted the first system-wide inventory in 2006 based on FY2004 data. To do this required identifying existing data sets at each institution and creating systems where none had existed previously. This is common for a first-time inventory. What is also common during a first inventory is that the data availability is poor and, to some extent, defines the boundaries of the inventory.

For many institutions in FY2004, only main campuses were included and some emissions sources were excluded due to lack of data. In 2008, the inventory boundaries were expanded at some institutions to include additional campuses and emissions sources where data was unavailable or incomplete in FY2004, such as commute and air travel.

FY2012 further expands the geographical inventory boundary to capture nearly all OUS square footage and benefits from practiced data collection and calculation of all ACUPCC emissions sources. Future inventory efforts will be able to reap the benefits of these improvements. There may be additional refinements to methods and data for individual emissions sources, but this current inventory brings all OUS institutions in line with ACUPCC's boundaries. Future inventories can now leverage existing data systems to focus on expanding those boundaries to include other important emissions sources.

When considering the results of Figure 8 and other figures in this report that compare multiple years, the influence of changing inventory boundaries should be kept in mind. Particularly when comparing FY2004 to FY2008.

Figure 8: Summary of absolute OUS GHG emissions over time, by institution

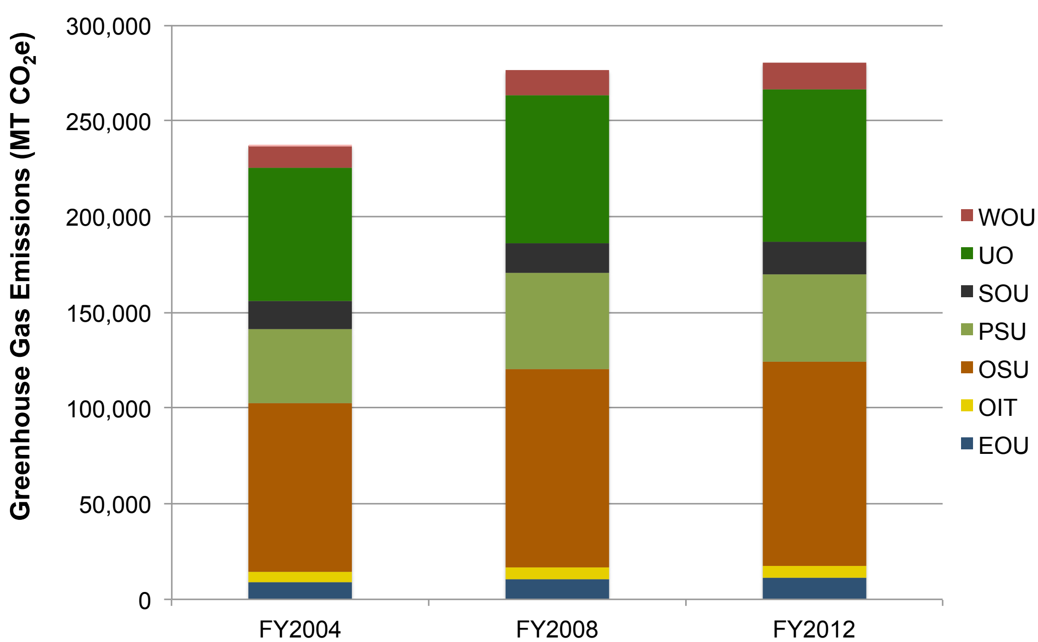
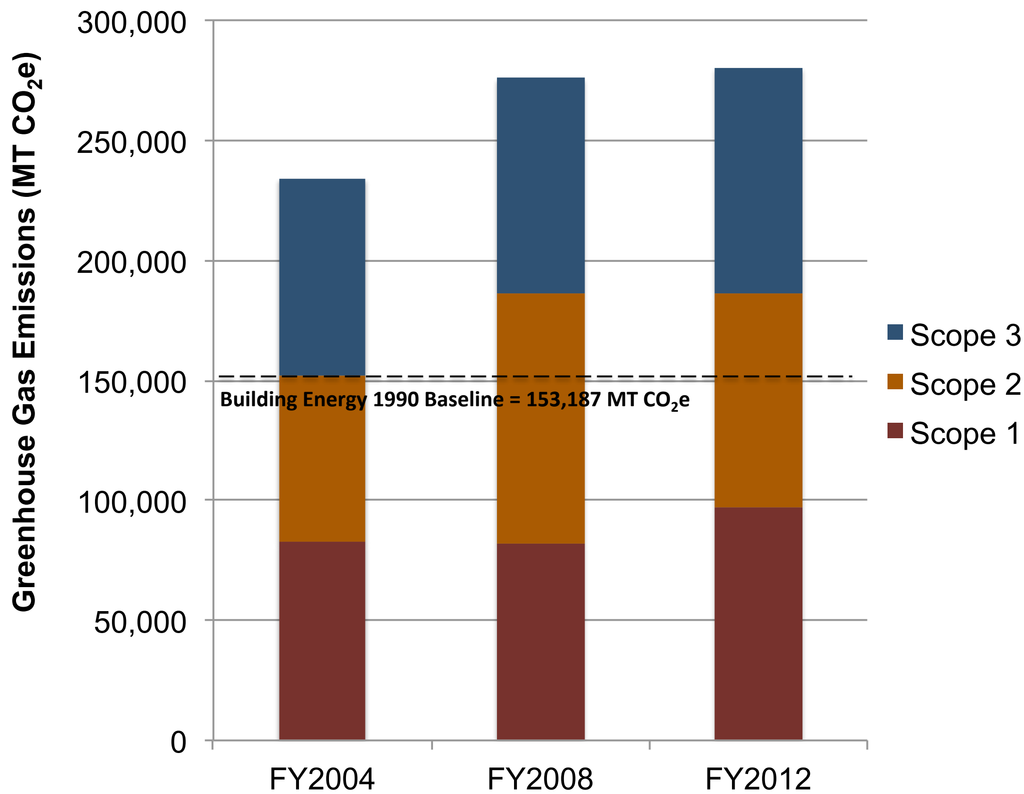


Figure 9 compares OUS's absolute GHG emissions over time, by Scope category and to the 1990 baseline for building energy emissions. Total emissions have increased between FY2008 and FY2012 by less than 2%. Scope 1 emissions were stable from FY2004 through FY2008, but increased by 18% between FY2008 and FY2012. Scope 2 emissions decreased between FY2008 and FY2012 by 14% while Scope 3 emissions have increased by 5%. The increase in Scope 3 emissions is the result of increasing commute and air travel emissions.

Baseline 1990 building energy emissions were calculated as part of the FY2008 OUS GHG Inventory. The OUS 1990 building energy baseline is shown as a dotted line in Figure 9. The 1990 baseline includes stationary energy combustion (e.g. natural gas) and electricity use, but does not include mobile combustion or fugitive refrigerants. The baseline is included throughout this report for reference purposes, but its important to note that the findings of the baseline analysis are highly uncertain due to a lack of accurate 1990 energy consumption data and electricity emissions factor. The full baseline report is included in Appendix D.

Figure 9: Summary of OUS absolute GHG emissions, by scope category and fiscal year (FY)



Oregon University System (OUS) Totals	FY2004	FY2008	FY2012
Gross Building Square Footage	20,842,397	22,437,856	25,788,140
System Population (student+faculty+staff)	82,693	84,503	102,918
Student Population	*71,285*	*71,917*	*86,999*
Faculty Population	*4,514*	*4,750*	*6,043*
Staff Population	*6,894*	*7,836*	*9,876*

OUS experienced a steady rise in GSF between FY2004 and FY2012. Campus population remained steady between FY2004 and FY2008, but increased significantly from FY2008 to FY2012. Population increases were greatest for student and faculty populations.

Although total emissions have increased slightly, two key measures of GHG *intensity* for campus facilities have gone down. Figure 10 shows a modest decrease in Scope 1 and 2 emissions between FY2008 and FY2012 per 1,000 GSF. Figure 10 does not include Scope 3 because Scope 1 and Scope 2 emissions are dominated by stationary combustion and electricity use, which are primarily used for and within the square footage of buildings. Adding Scope 3 emissions would skew the results in ways unrelated to the management of the buildings.

Similarly, Figure 11 shows a decrease in the GHG intensity per full-time student equivalent (FTE) between FY2008 and FY2012. In both cases, this demonstrates a system-wide improvement in “carbon efficiency” according to key measures.

Figure 10: Multi-year OUS GHG emissions intensity per 1,000 gross square feet of building space

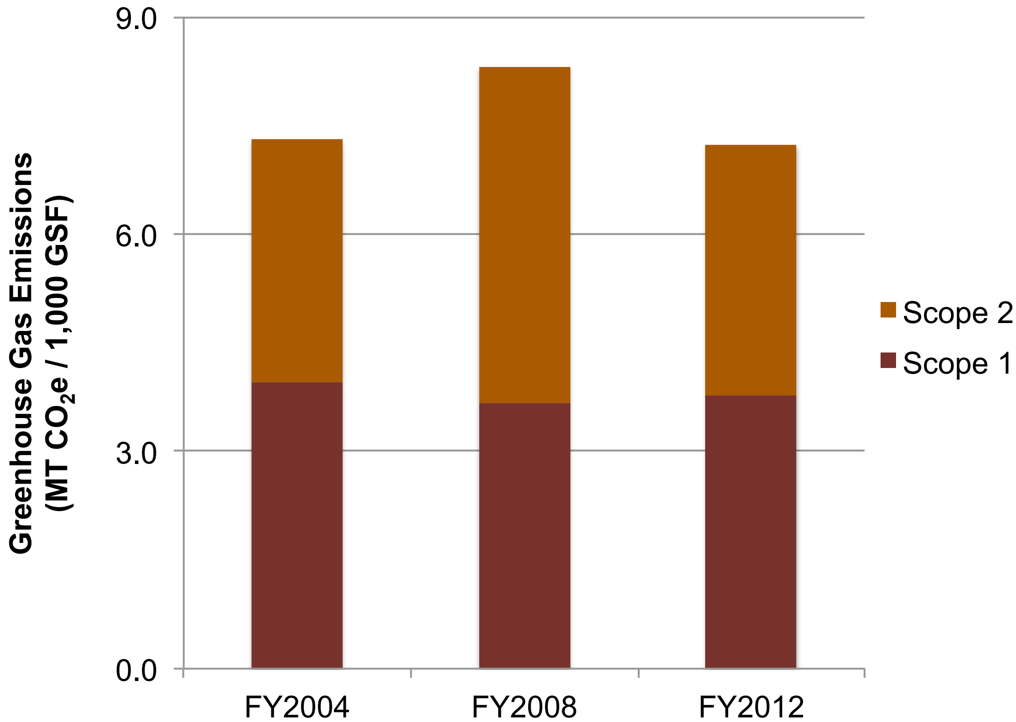
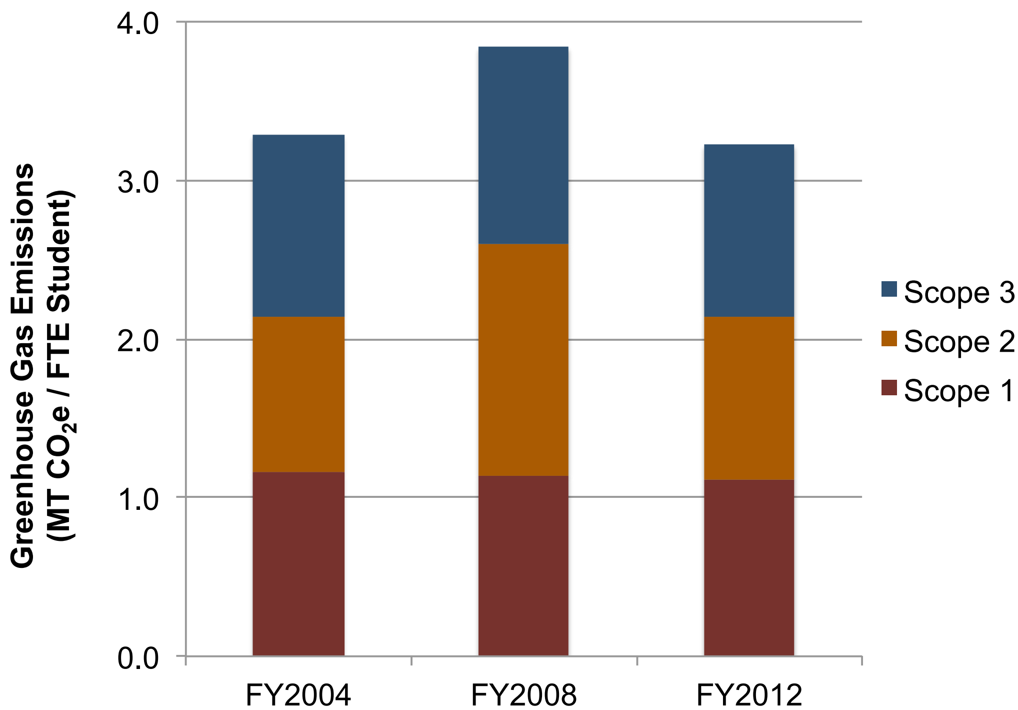


Figure 11: Multi-year OUS GHG emissions intensity per full-time student equivalent



While individual institutions and the system as a whole must aim to decrease absolute emissions in order to fulfill their ACUPCC commitment for eventual carbon neutrality, these changes represent and important step. Figures 10 and 11 show that OUS has begun to "decouple" growth in carbon emissions from growth in what the institutions produce. Total students and total facility space are proxies for the harder-to-measure outputs of education, research and service. The lessons here are cause for optimism, as the system is increasingly producing its key outputs with lower GHG emissions intensity.

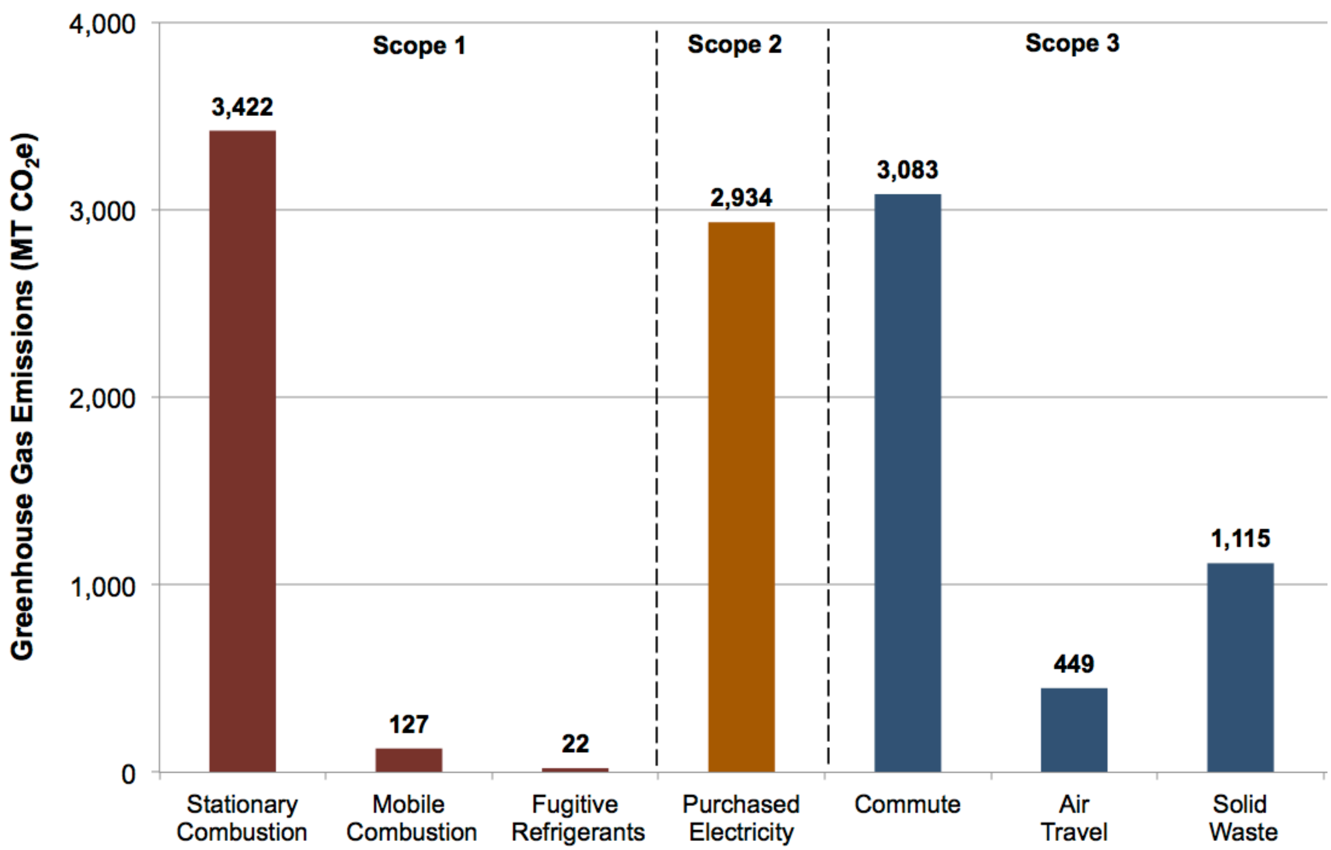
5. Summary of Results – Institution-Specific Details

The following subsections of this report provide details for each institution's FY2012 GHG inventory as well as multi-year emissions comparisons.

Eastern Oregon University

Eastern Oregon University's (EOU) Scope 1 and Scope 2 emissions from fuel combustion and power use by stationary and mobile sources and fugitive refrigerants are 6,505 MT CO_2e.[1] Figure 12 shows that Scope 1 and Scope 2 emissions are dominated by stationary combustion (primarily natural gas) and electricity consumption. In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 4,647 MT CO_2. The largest of these emissions sources is commute followed by solid waste and air travel.

Figure 12: EOU's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 6,505 MT CO_2e. For sense of scale, this is equivalent to[2]:

- Annual emissions from 1,355 passenger vehicles
- Annual emissions from the energy consumed by 335 average U.S. homes

ACUPCC Scope 3 emissions yield 4,647 MT CO_2e. For sense of scale, this is equivalent to:

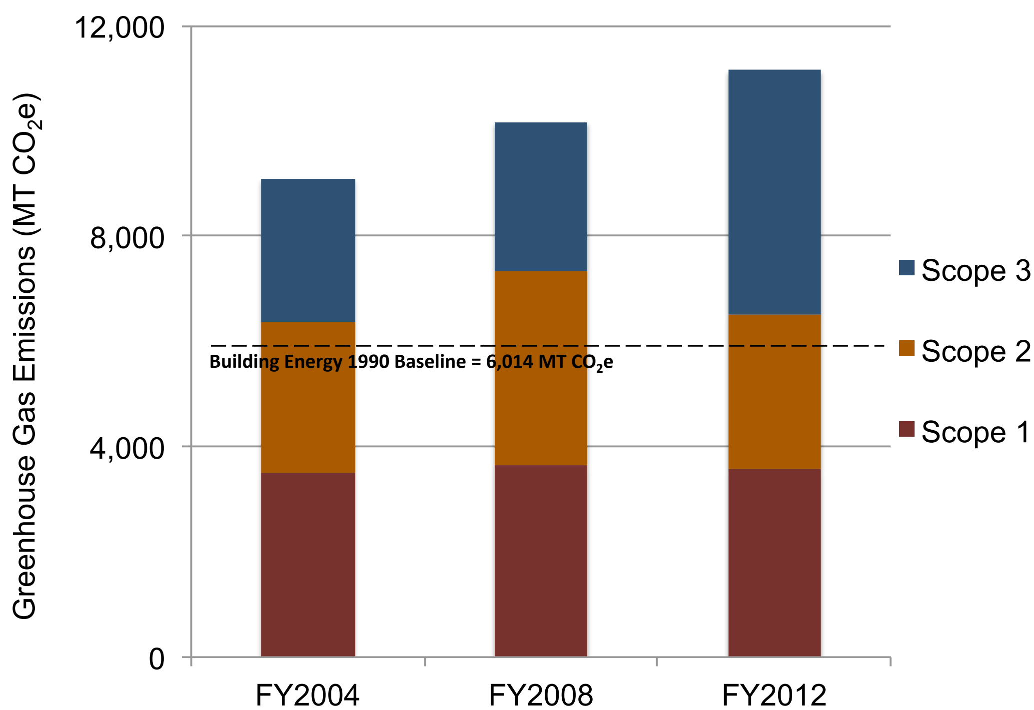
- Annual emissions from 968 passenger vehicles
- Annual emissions from the energy consumed by 239 average U.S. homes

[1] See Section 3 of this report for more detail on Scope categories.
[2] EPA equivalency calculator (http://www.epa.gov/cleanenergy/energy-resources/calculator.html)

Figure 13 compares EOU's absolute GHG emissions over time to the 1990 building energy baseline emissions. Total emissions have increased between FY2004 and FY2012. Scope 1 emissions have remained consistent throughout that time period, Scope 2 emissions have decreased and Scope 3 emissions have increased. Electricity emissions have decreased by 20% at EOU between FY2008 and FY2012, which corresponds with a 9% reduction in gross building square footage. EOU's building energy related emissions are 6,356 MT CO_2e, or 342 MT CO_2e more than the 1990 baseline (black dotted line).

The increases in Scope 3 emissions are the result of increasing commute and solid waste emissions. Commute emissions are increasing with a growing student population and an increase in the average number of commute miles per trip between FY2008 and FY2012.

Figure 13: EOU's multi-year absolute GHG emissions with 1990 baseline



Eastern Oregon University (EOU)	FY2004	FY2008	FY2012
Gross Building Square Footage	806,001	891,891	834,868
Campus Population (student+faculty+staff)	2,898	2,785	3,504
Student Population	*2,565*	*2,435*	*3,138*
Faculty Population	*103*	*112*	*128*
Staff Population	*230*	*238*	*238*

As can be seen in the table above EOU's building space peaked in FY2008 and has since decreased, while campus population increased from FY2004 to FY2012.

While EOU's absolute emissions continue to increase, it's emissions intensity per building area and per full-time student are both decreasing. Between FY2008 and FY2012 EOU's Scope 1 and Scope 2 GHG emissions intensity per square foot has decreased by 5%, which is led by a reduction in electricity emissions. Emissions intensity per full-time student between FY2008 and FY2012 decreased by 15%.

Figure 14: EOU's multi-year GHG intensity per 1,000 GSF of building space

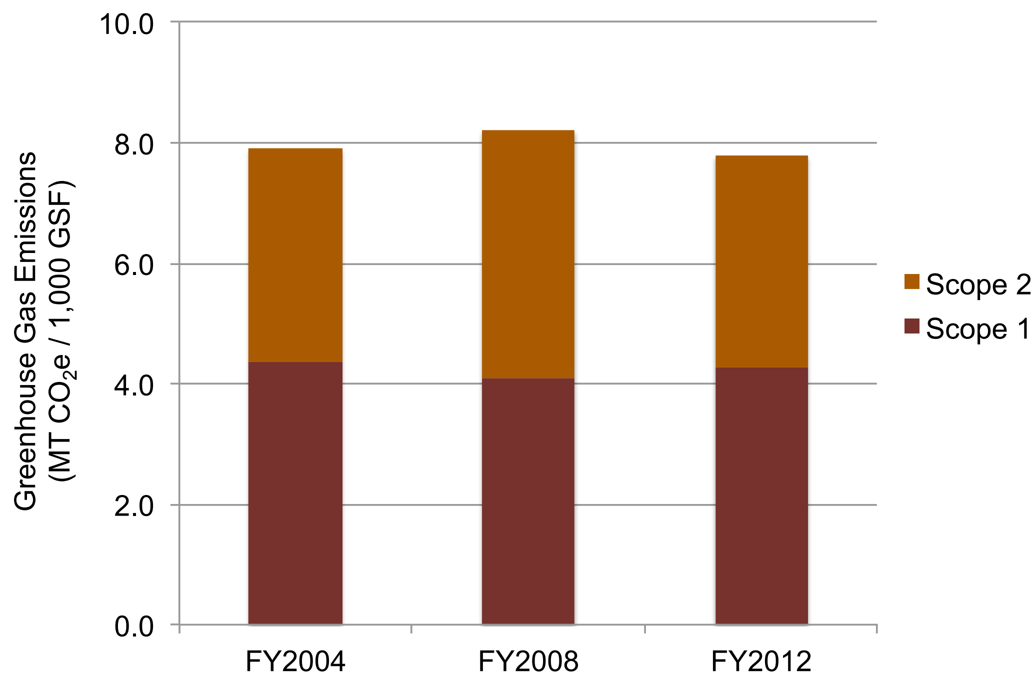
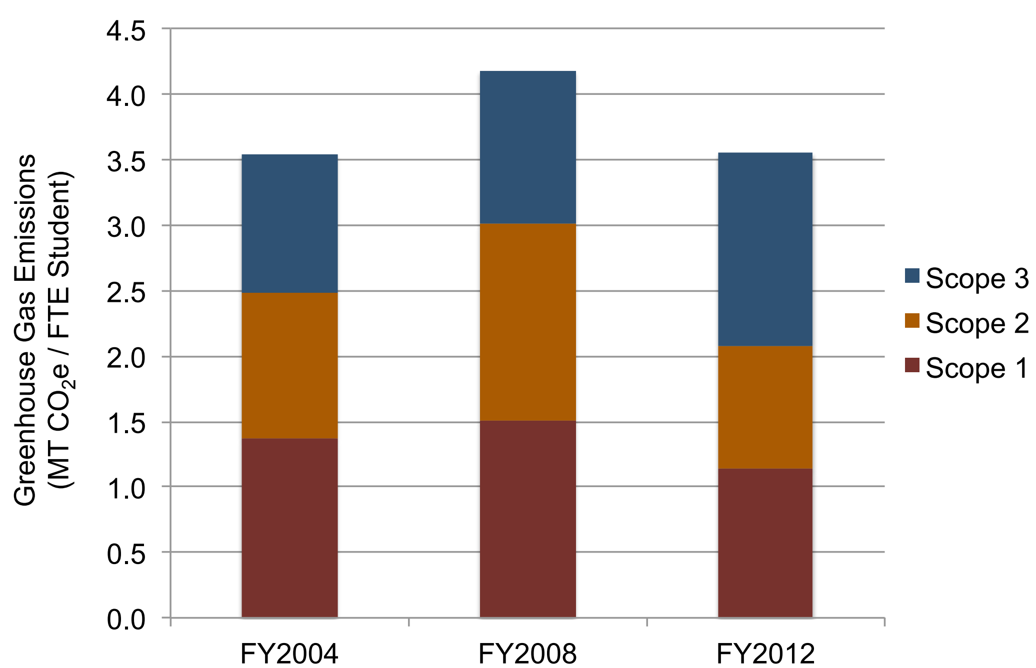


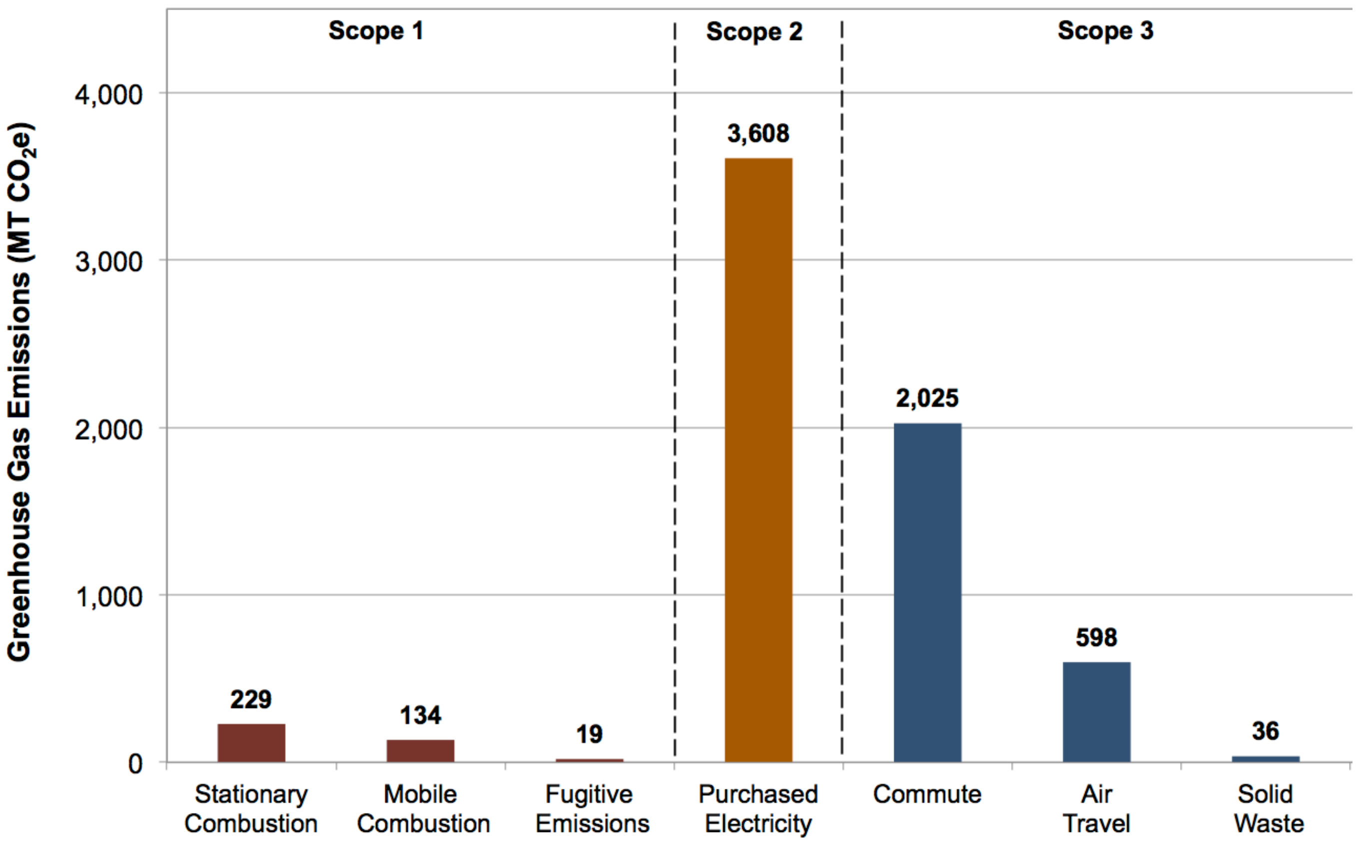
Figure 15: EOU's multi-year GHG intensity per full-time student equivalent



Oregon Institute of Technology

Oregon Institute of Technology's (OIT) emissions from fuel combustion and power use by stationary and mobile sources are 3,990 MT CO_2e, described below as Scope 1 and Scope 2 emission sources.[3] Figure 16 shows that Scope 1 and Scope 2 emissions are dominated by electricity consumption and stationary combustion (primarily natural gas). In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 2,659 MT CO_2e. The largest of these is commute followed by air travel and solid waste.

Figure 16: OIT's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 3,990 MT CO_2e. For sense of scale, this is equivalent to[4]:
- Annual emissions from 831 passenger vehicles
- Annual emissions from the energy consumed by 205 average U.S. homes

ACUPCC Scope 3 emissions yield 2,659 MT CO_2e. For sense of scale, this is equivalent to:
- Annual emissions from 554 passenger vehicles
- Annual emissions from the energy consumed by 137 average U.S. homes

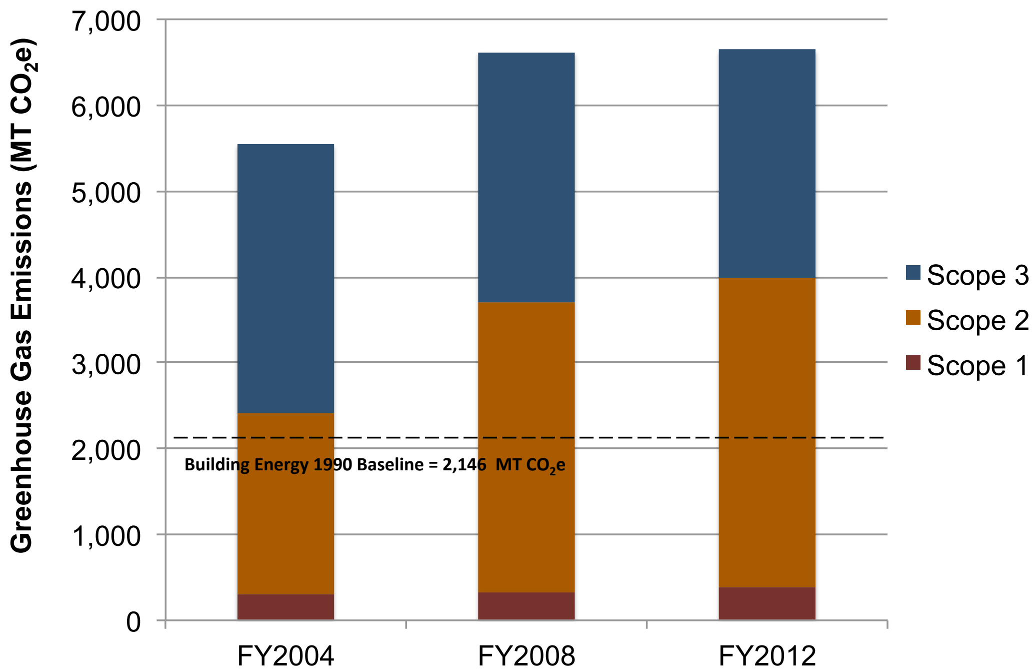
Figure 17 compares OIT's absolute GHG emissions over time to the 1990 baseline for building energy emissions. Total emissions increased between FY2004 and FY2008 and slightly decreased between FY2008 and FY2012. Scope 1 and Scope 2 emissions have increased over that time period while Scope 3 emissions have decreased. OIT is unique among OUS institutions in that it has abundant geothermal resources that it uses to meet its thermal load (reduction in Scope 1 emissions) and its

[3] See Section 3 of this report for more detail on Scope categories.
[4] EPA equivalency calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

electric load (reduction in Scope 2 emissions), which results in a relatively small emissions increase even though OIT has experienced significant growth in gross building square footage (~180,000 in the last 4 years). OIT's building energy related emissions are 3,837 MT CO_2e, or 1,691 MT CO_2e more than the 1990 building energy baseline emissions (black dotted line).

The change in Scope 3 emissions is driven entirely by a reduction in air travel between FY2008 and FY2012.

Figure 17: OIT's absolute multi-year GHG emissions with 1990 baseline



Oregon Institute of Technology (OIT)	FY2004	FY2008	FY2012
Gross Building Square Footage	582,048	624,818	805,487
Campus Population (student+faculty+staff)	2,860	2,720	3,085
Student Population	*2,499*	*2,350*	*2,743*
Faculty Population	*150*	*135*	*123*
Staff Population	*211*	*235*	*219*

As can be seen in the table above, OIT's building space and campus population steadily increased between FY2004 and FY2012.

OIT has the lowest Scope 1 emissions intensity of all the institutions and its Scope 2 intensity is near the OUS average, which has remained relatively consistent between FY2004 and FY2012. The emissions from purchased electricity have decreased by 15% between FY2008 and FY2012 as the university has brought online its geothermal electricity generation plant, which meets 47% of OIT's FY2012 electricity load. Two more renewable energy projects will be breaking ground in early summer of 2013 that include a new 1.1 MW geothermal power project and a 2 MW PV solar array. Both should be producing power in early 2014. Likewise OIT's emissions intensity per student decreased 14% between FY2008 and FY2012.

Figure 18: OIT's multi-year GHG intensity per 1,000 square feet of building space

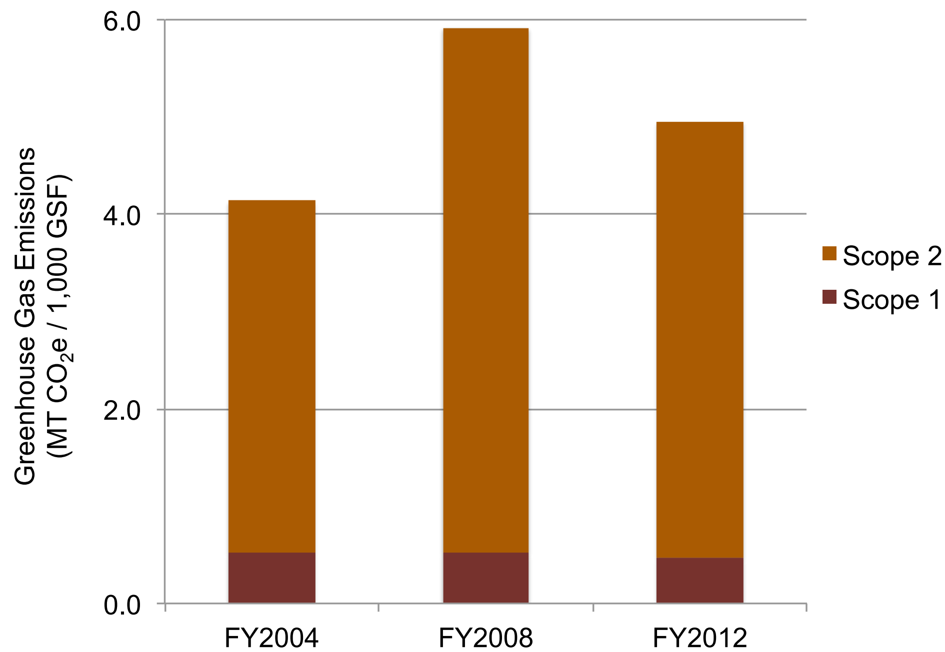
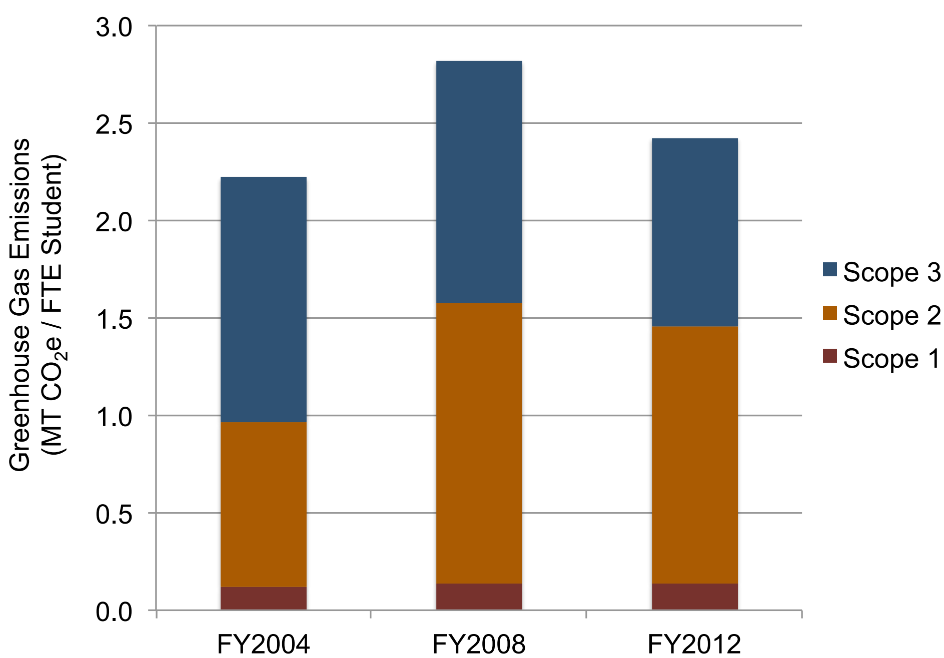


Figure 19: OIT's multi-year GHG intensity per full-time student equivalent

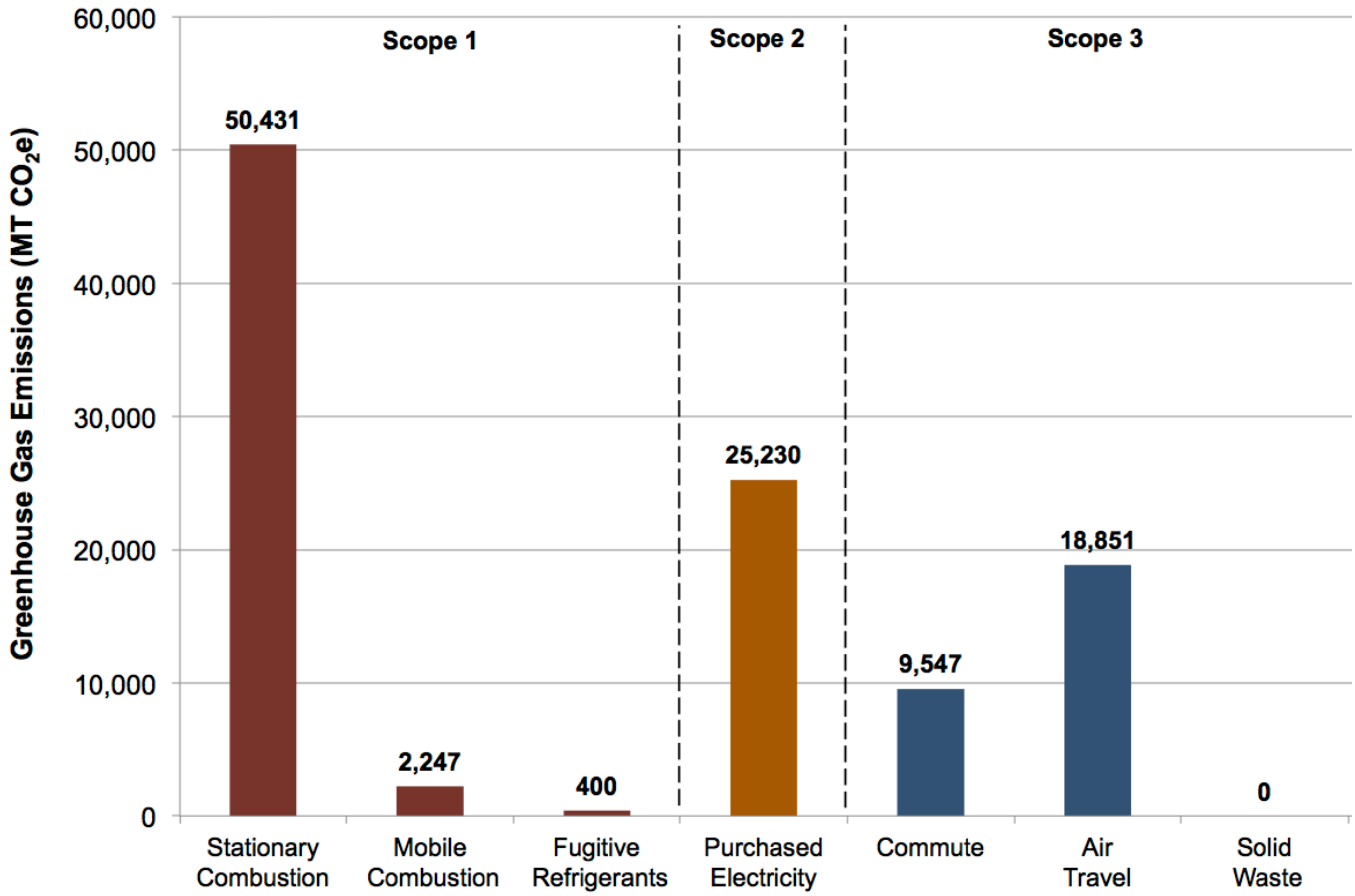


Oregon State University

Oregon State University's (OSU) emissions from fuel combustion and power use by stationary and mobile sources are 78,308 MT CO_2e, described below as Scope 1 and Scope 2 emission sources.[5] Figure 20 shows that Scope 1 and Scope 2 emissions are dominated by stationary combustion (primarily natural gas) and electricity consumption. In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 28,398 MT CO_2e. See Appendix C for why solid waste emissions equal 0 MT CO_2e.

Unlike many of the other institutions a significant emissions source for OSU is agriculture, a Scope 1 emissions source that is not included in the chart below. This source was not considered across all institutions, because for most it is assumed to be small, but is mentioned here because it is known to be significant at 3,246 MT CO_2e, which for OSU is larger than mobile combustion emissions.

Figure 20: OSU's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 78,308 MT CO_2e. For sense of scale, this is equivalent to:[6]
- Annual emissions from 16,314 passenger vehicles
- Annual emissions from the energy consumed by 4,030 average U.S. homes

ACUPCC Scope 3 emissions yield 28,398 MT CO_2e. For sense of scale, this is equivalent to:
- Annual emissions from 5,916 passenger vehicles

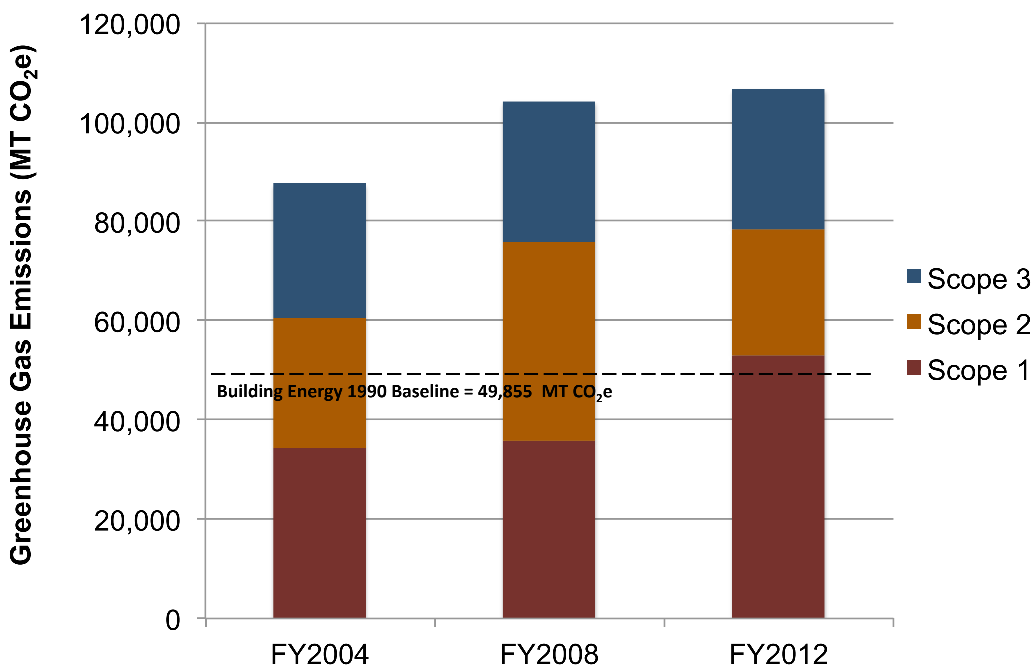
[5] See Section 3 of this report for more detail on Scope categories.
[6] EPA equivalency calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

• Annual emissions from the energy consumed by 1,462 average U.S. homes

Figure 21 compares OSU's absolute GHG emissions over time to the 1990 building-energy baseline emissions. Total emissions increased between FY2008 and FY2012. Scope 1 emissions increased over that time period, while Scope 2 emissions decreased, and Scope 3 emissions remained static. OSU is among the OUS institutions that use a natural gas-fired combined heat and power system (CHP) to meet their thermal and electric loads. OSU's $40 million Energy Center came online at the beginning of FY11, which is the reason for Scope 1 increases and Scope 2 decreases between FY2008 and FY2012.

OSU's building energy emissions are 77,394 MT CO_2e, or 27,539 MT CO_2e more than the 1990 building energy baseline emissions (black dotted line). As with most other institutions, the primary drivers for this increase are expanding enrollment and square footage. Also, OSU has increased lab space, which will continue to increase building-energy related emissions because labs are typically energy-intense facilities.

Figure 21: OSU's multi-year absolute GHG emissions with 1990 baseline



Oregon State University (OSU)	FY2004	FY2008	FY2012
Gross Building Square Footage	6,839,309	7,032,001	8,466,838
Campus Population (student+faculty+staff)	22,683	23,347	29,129
Student Population	*18,699*	*18,961*	*24,040*
Faculty Population	*1,763*	*1,785*	*1,931*
Staff Population	*2,221*	*2,601*	*3,158*

As can be seen in the table above, OSU's building space and campus population have both increased over time with significant expansion between FY2008 and FY2012.

Between FY2008 and FY2012 OSU's total GHG emissions intensity per GSF decreased by 14%. This decrease is driven by the operation of a new CHP system, which increased the quantity of natural gas combusted, but decreased the quantity of purchased electricity. Likewise OSU's emissions intensity per student decreased by 19% between FY2008 and FY2012.

Figure 22: OSU's multi-year GHG intensity per 1,000 square feet of building space

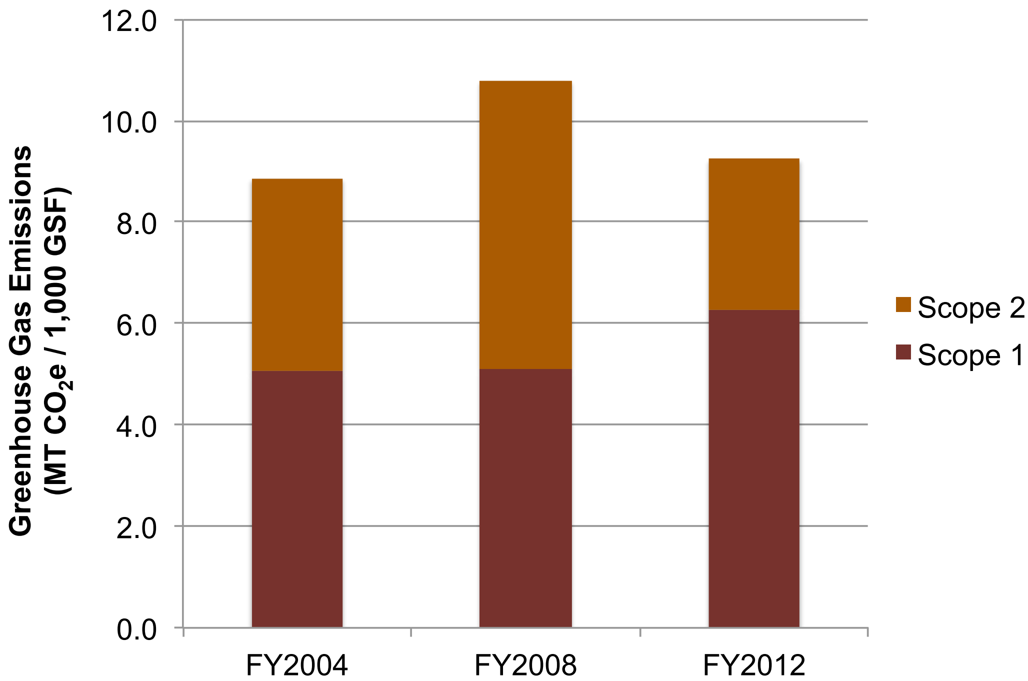
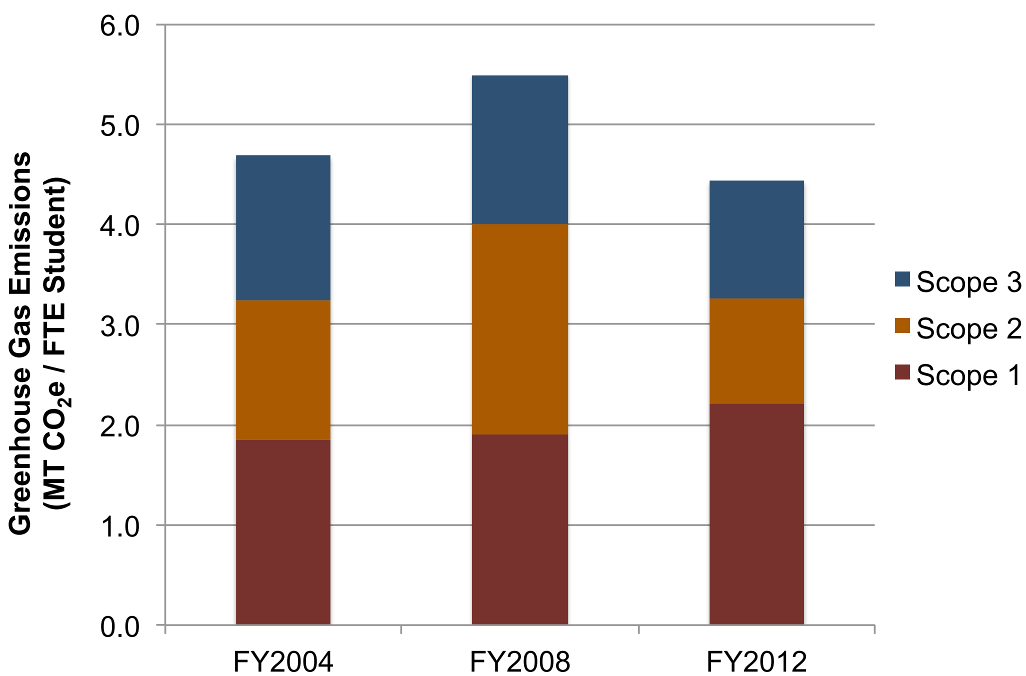


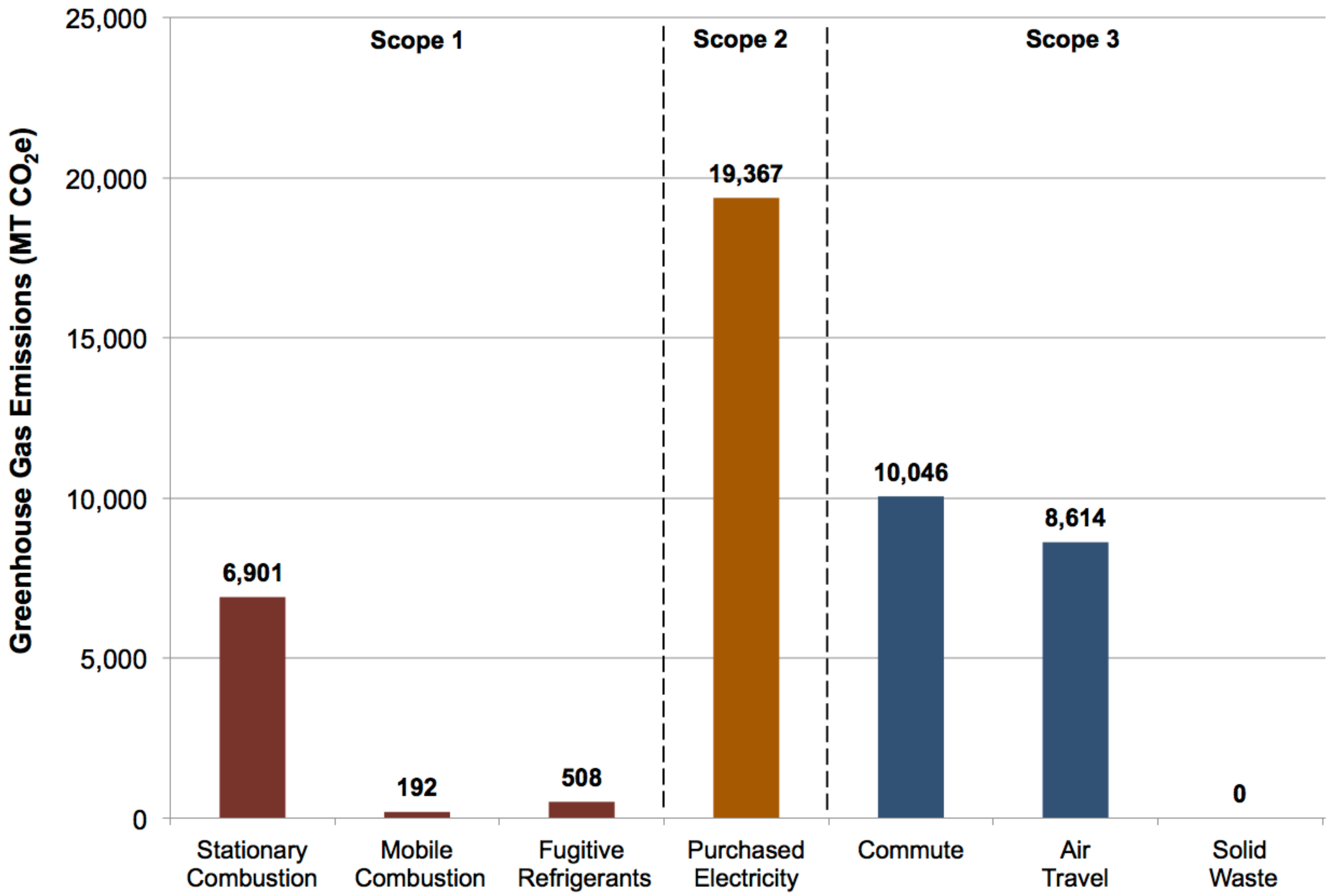
Figure 23: OSU's multi-year GHG intensity per full-time student equivalent



Portland State University

Portland State University's (PSU) emissions from fuel combustion and power use by stationary and mobile sources are 26,968 MT CO_2e, described below as Scope 1 and Scope 2 emission sources.[7] Figure 24 shows that Scope 1 and Scope 2 emissions are dominated by electricity consumption and stationary combustion (primarily natural gas). In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 18,660 MT CO_2e. The largest of these is commute followed by air travel and solid waste. See Appendix C for why solids waste emissions equal 0 MT CO_2e.

Figure 24: PSU's FY2012 greenhouse gas emissions, by emissions source



Note: Air travel passenger miles were incomplete for FY2012. FY2010 is used as a proxy.

Scope 1 and Scope 2 yield 26,968 MT CO_2e. For sense of scale, this is equivalent to:[8]

- Annual emissions from 5,618 passenger vehicles
- Annual emissions from the energy consumed by 1,388 average U.S. homes

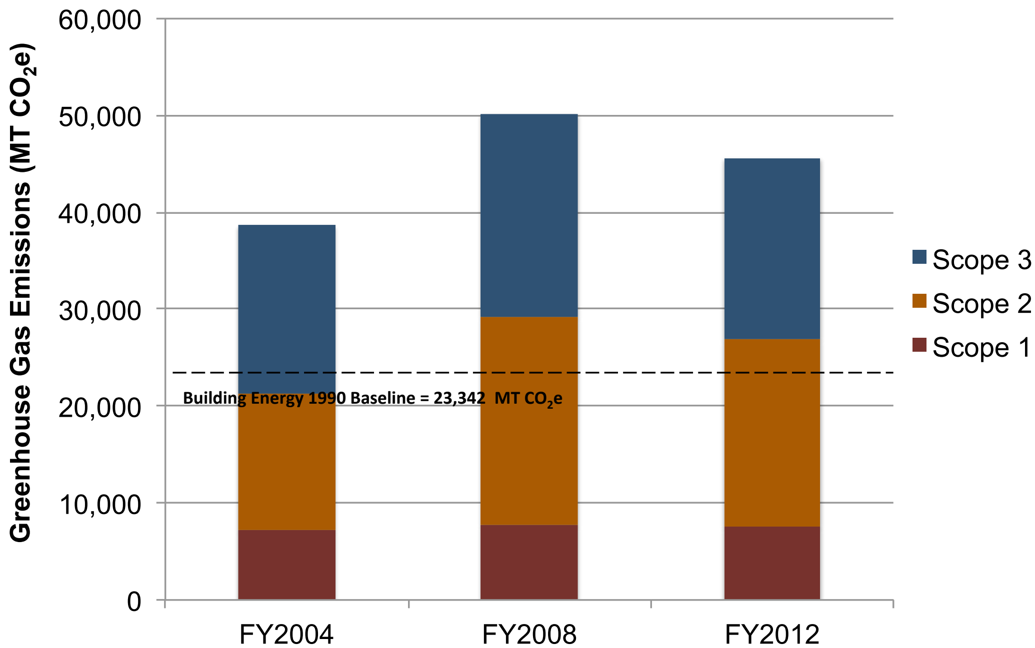
ACUPCC Scope 3 emissions yield 18,660 MT CO_2e. For sense of scale, this is equivalent to:

- Annual emissions from 3,888 passenger vehicles
- Annual emissions from the energy consumed by 960 average U.S. homes

[7] See Section 3 of this report for more detail on Scope categories.
[8] EPA equivalency calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Figure 25 compares PSU's absolute GHG emissions over time to the 1990 baseline for building energy emissions. Total emissions decreased between FY2008 and FY2012. The decreases are spread over all three Scope categories. PSU's building energy related emissions are 26,268 MT CO_2e, or 2,926 MT CO_2e more than the 1990 building energy baseline emissions (black dotted line).

Figure 25: PSU's multi-year absolute GHG emissions with 1990 baseline



Portland State University (PSU)	FY2004	FY2008	FY2012
Gross Building Square Footage	4,271,808	4,959,352	5,273,188
Campus Population (student+faculty+staff)	19,803	21,453	26,403
Student Population	*17,965*	*19,213*	*22,403*
Faculty Population	*773*	*924*	*1,750*
Staff Population	*1,065*	*1,316*	*2,250*

Note: PSU has 178,694 square feet of leased space that is excluded.

As can be seen in the table above, PSU's building space and campus population have both increased over time with a significant expansion in student population between FY2008 and FY2012.

PSU's Scope 1 and Scope 2 emissions intensity per building square foot decreased by 13% between FY2008 and FY2012. PSU's Scope 1 intensity is low relative to other OUS institutions. There are a number of possible explanations for these findings; 1) efficiency improvements to district heating system, 2) electric heating is used in some facilities, and 3) parking ramp square footage is included in GSF. Emissions intensity per full-time student has decreased by 22% between FY2008 and FY2012.

Figure 26: PSU's multi-year GHG intensity per 1,000 square feet of building space

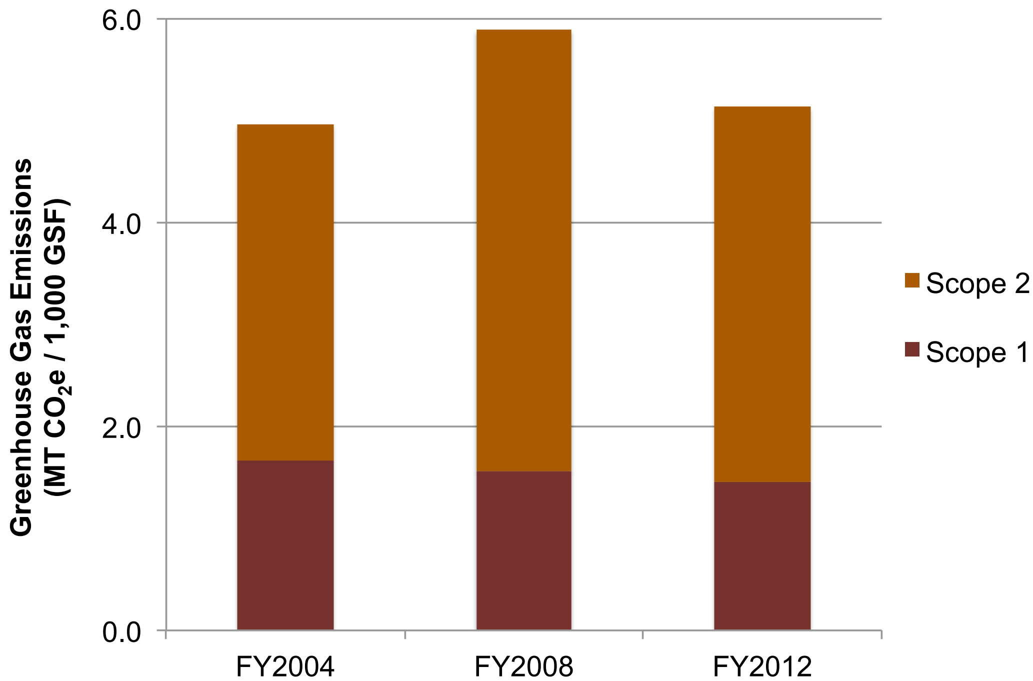
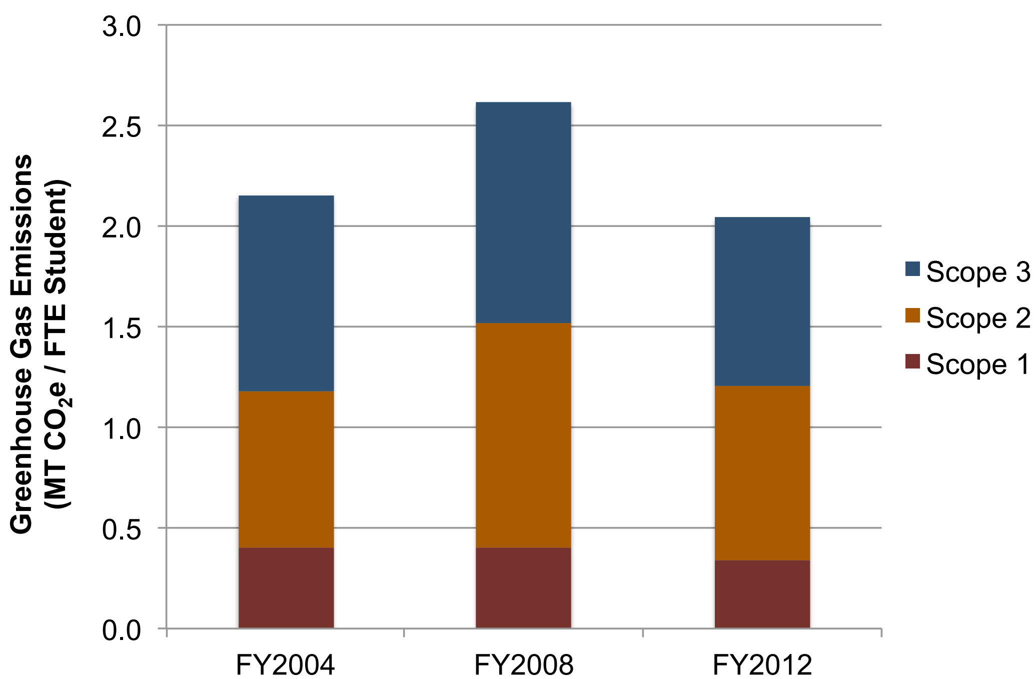


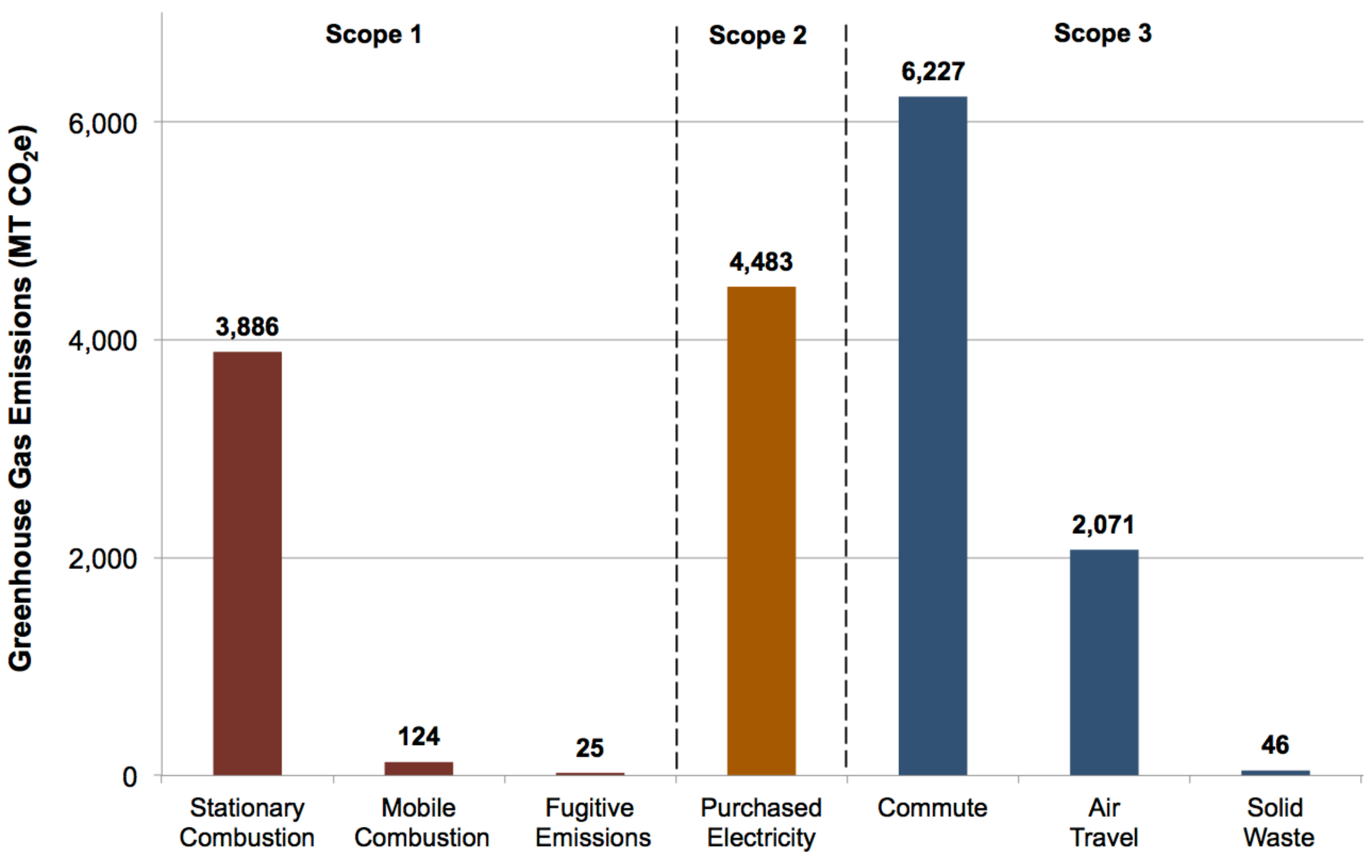
Figure 27: PSU's multi-year GHG intensity per full-time student equivalent



Southern Oregon University

Southern Oregon University's (SOU) emissions from fuel combustion and power use by stationary and mobile sources are 8,518 MT CO_2e, described below as Scope 1 and Scope 2 emission sources.[9] Figure 28 shows that Scope 1 and Scope 2 emissions are dominated by electricity consumption and stationary combustion (primarily natural gas). In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 8,344 MT CO_2e. The largest of these is commute followed by air travel and solid waste. An important note related to these findings is the quantity of Renewable Energy Certificates (RECs) and carbon offset credits purchased by SOU. During FY2012, SOU purchases mitigated 8,637 MT CO_2e, which is greater than the sum of Scope 1 and Scope 2 emissions.

Figure 28: SOU's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 8,518 MT CO_2e. For sense of scale, this is equivalent to: [10]
- Annual emissions from 1,775 passenger vehicles
- Annual emissions from the energy consumed by 438 average U.S. homes

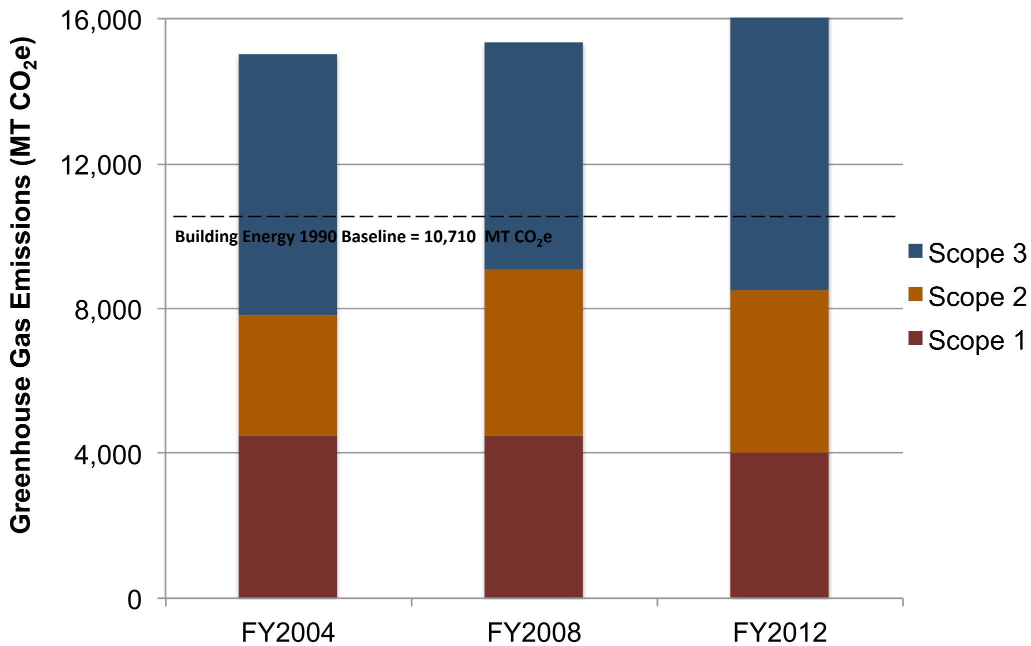
ACUPCC Scope 3 emissions yield 8,344 MT CO_2e. For sense of scale, this is equivalent to:
- Annual emissions from 1,738 passenger vehicles
- Annual emissions from the energy consumed by 429 average U.S. homes

[9] See Section 3 of this report for more detail on Scope categories.
[10] EPA equivalency calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Figure 29 compares SOU's absolute GHG emissions over time to the 1990 baseline for building energy emissions. Total emissions increased between FY2004 and FY2012. Scope 1 and Scope 2 emissions decreased over that time period while Scope 3 emissions have increased. The increase in Scope 3 emissions is due primarily to commute.

SOU's building energy related emissions are 8,369 MT CO_2e, or 2,341 MT CO_2e less than the 1990 building energy baseline emissions (black dotted line).

Figure 29: SOU's multi-year absolute GHG emissions with 1990 baseline



Southern Oregon University (SOU)	FY2004	FY2008	FY2012
Gross Building Square Footage	1,248,678	1,308,678	1,345,232
Campus Population (student+faculty+staff)	5,257	4,800	5,529
Student Population	*4,659*	*4,213*	*4,875*
Faculty Population	*213*	*222*	*266*
Staff Population	*385*	*365*	*388*

As can be seen in the table above SOU's building space has continually increased since FY2004 and campus population also increased over that time period with a slight decrease between FY2004 and FY2008.

SOU's Scope 1 and Scope 2 emissions intensity per building square foot decreased by 9% between FY2008 and FY2012. This reduction is the result of decreased use of both natural gas and electricity per square foot. Likewise, emissions intensity per full-time student also decreased by 5% between FY2008 and FY2012.

Figure 30: SOU's multi-year GHG intensity per 1,000 square feet of building space

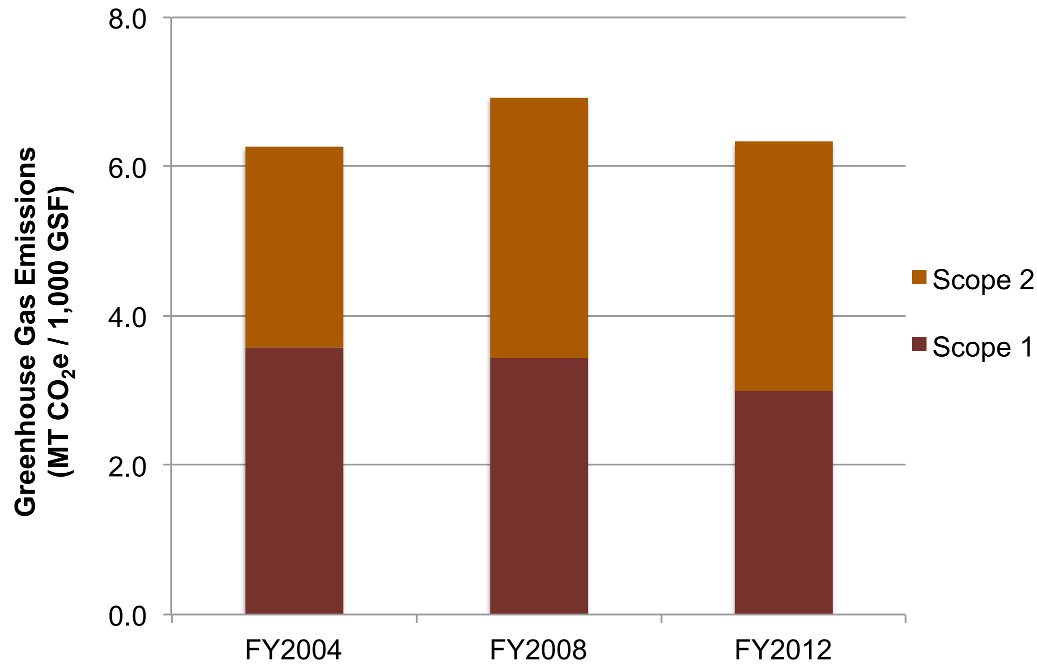
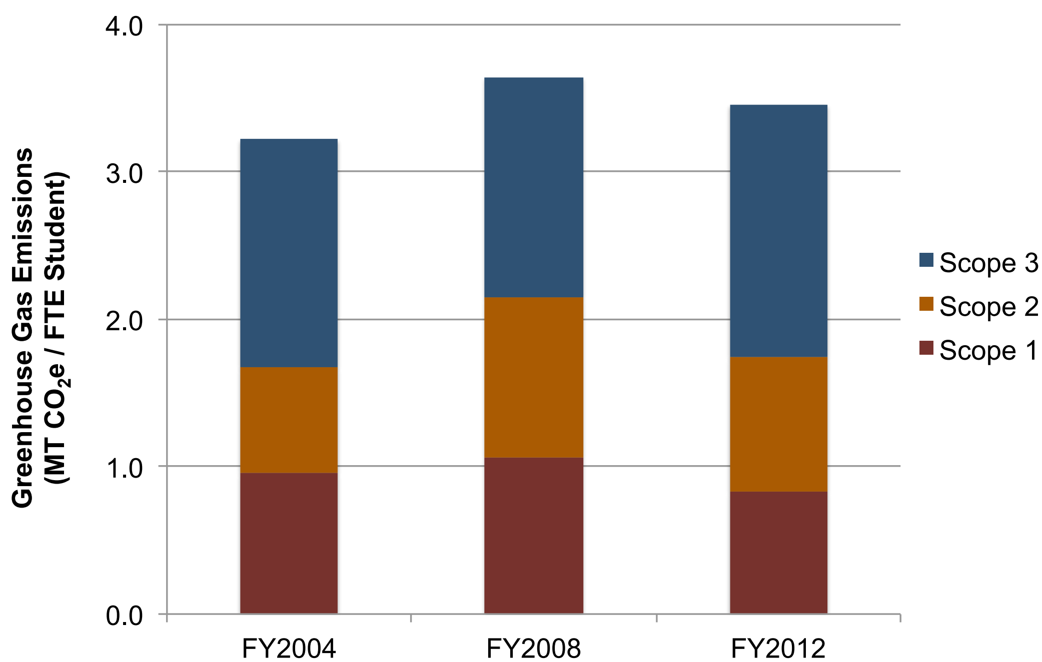


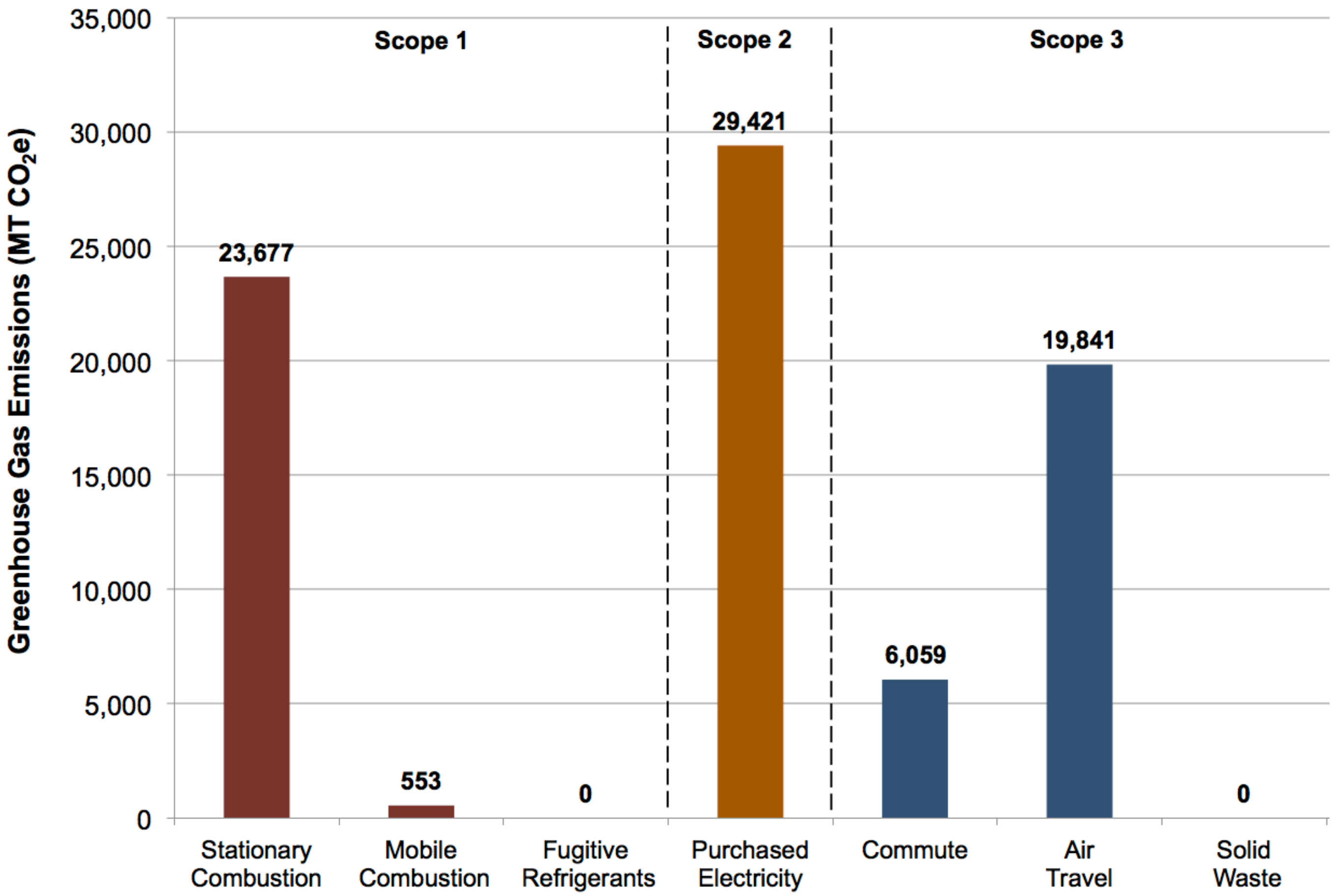
Figure 31: SOU's multi-year GHG intensity per full-time student equivalent



University of Oregon

The University of Oregon's (UO) emissions from fuel combustion and power use by stationary and mobile sources are 53,651 MT CO_2e, described below as Scope 1 and Scope 2 emission sources.[11] Figure 32 shows that Scope 1 and Scope 2 emissions are dominated by electricity consumption and stationary combustion (primarily natural gas). In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 25,900 MT CO_2e. The largest of these is air travel, followed by commuting and solid waste. See Appendix C for why solids waste emissions equal 0 MT CO_2e.

Figure 32: UO's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 53,651 MT CO_2e. For sense of scale, this is equivalent to:[12]
- Annual emissions from 11,177 passenger vehicles
- Annual emissions from the energy consumed by 2,761 average U.S. homes

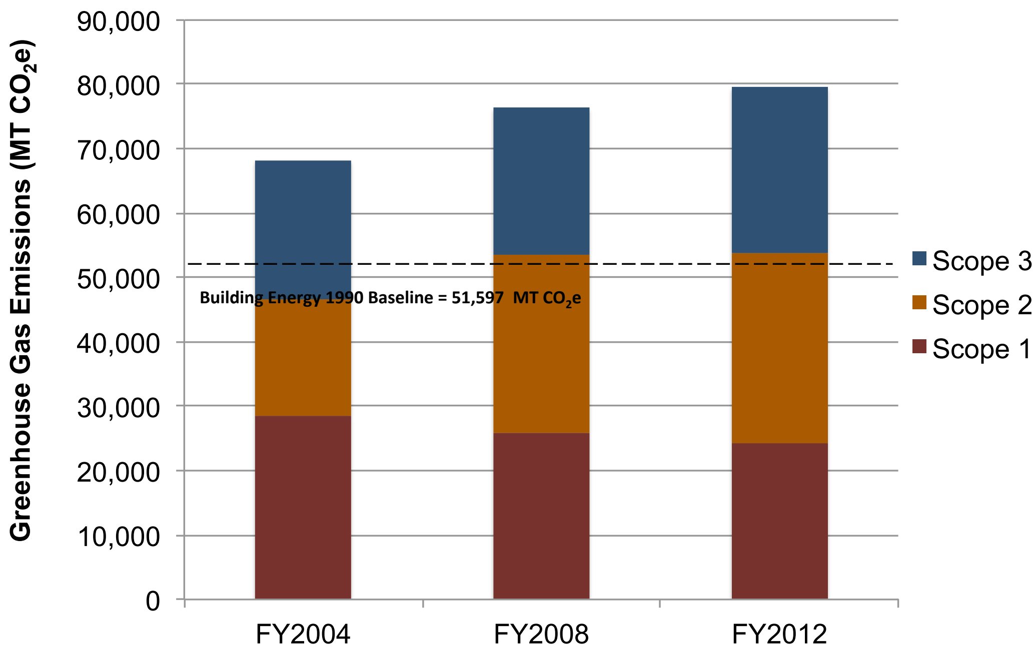
ACUPCC Scope 3 emissions yield 25,900 MT CO_2e. For sense of scale, this is equivalent to:
- Annual emissions from 5,396 passenger vehicles
- Annual emissions from the energy consumed by 1,333 average U.S. homes

[11] See Section 3 of this report for more detail on Scope categories.
[12] EPA equivalency calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Figure 33 compares UO's absolute GHG emissions over time to the 1990 baseline for building energy emissions. Total emissions increased between FY2004 and FY2012. Scope 1 and Scope 2 emissions stayed consistent between FY2008 and FY2012, while Scope 3 emissions increased over that time period. UO's building energy related emissions are 52,598 MT CO_2e, just 2% more than the 1990 building energy baseline emissions (black dotted line).

The change in Scope 3 emissions is largely the result of increased air travel emissions between FY2008 and FY2012.

Figure 33: UO's multi-year absolute GHG emissions with 1990 baseline



University of Oregon (UO)	FY2004	FY2008	FY2012
Gross Building Square Footage	5,930,710	6,441,734	7,800,628
Campus Population (student+faculty+staff)	24,227	24,402	29,312
Student Population	*20,481*	*20,361*	*24,543*
Faculty Population	*1,264*	*1,309*	*1,540*
Staff Population	*2,482*	*2,732*	*3,229*

As can be seen in the table above UO's building space and campus population has continually increased since FY2004, with a rapid increases between FY2008 and FY2012.

UO's emissions intensity per building square feet decreased by 17% between FY2008 and FY2012, which is the result of static building energy consumption even as building square footage increased by 14%. UO's emissions intensity per student decreased by 13% between FY2008 and FY2012, as emissions have remained consistent or decreased as the student population increased.

Figure 34: UO's multi-year GHG intensity per 1,000 square feet of building space

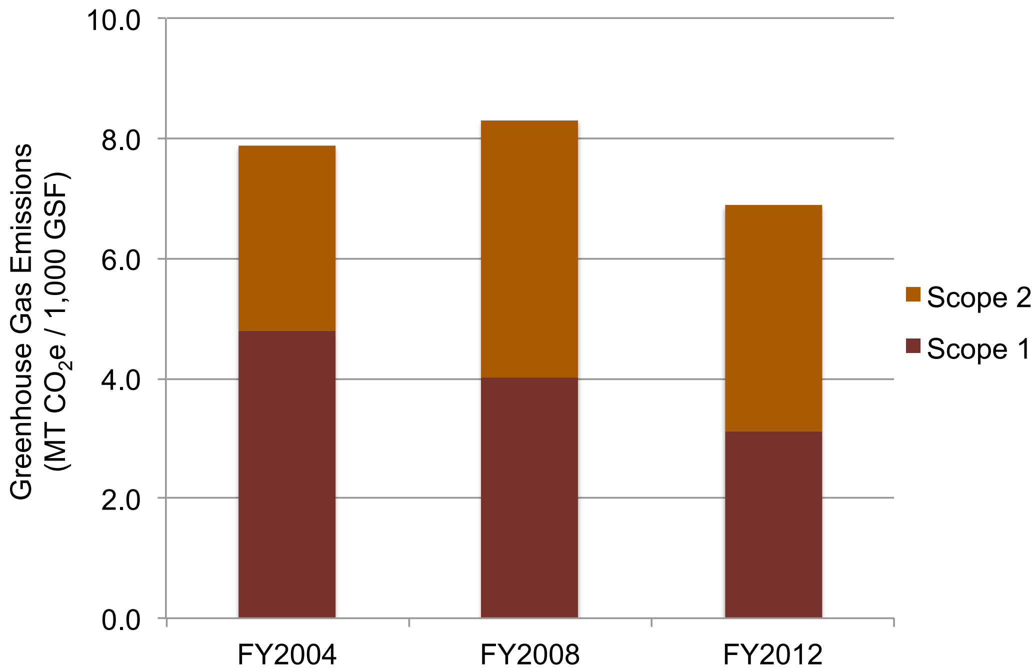
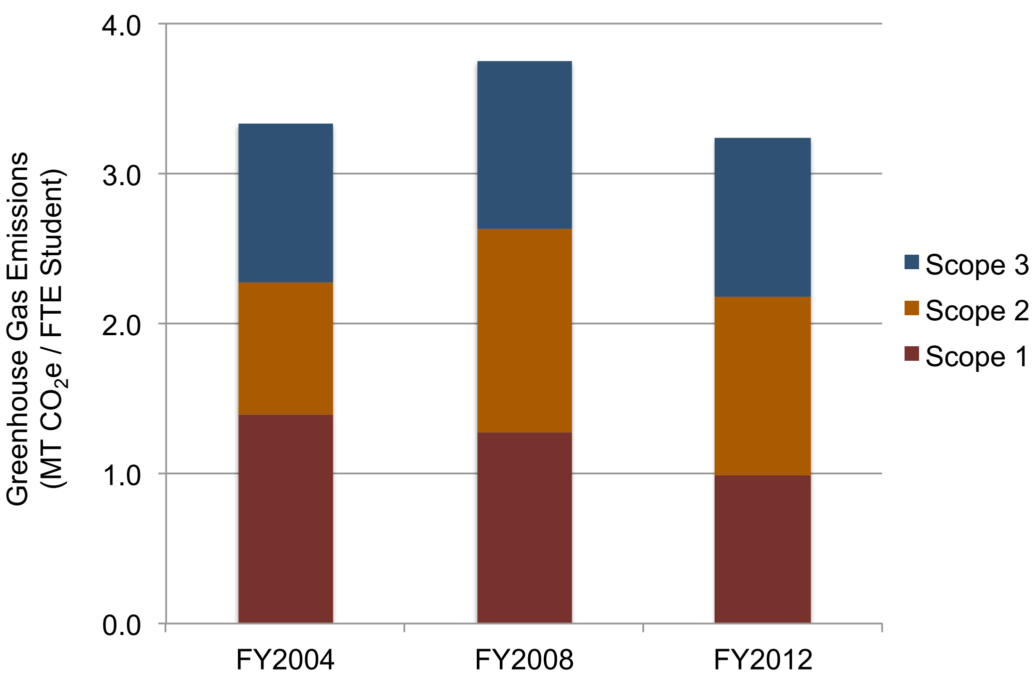


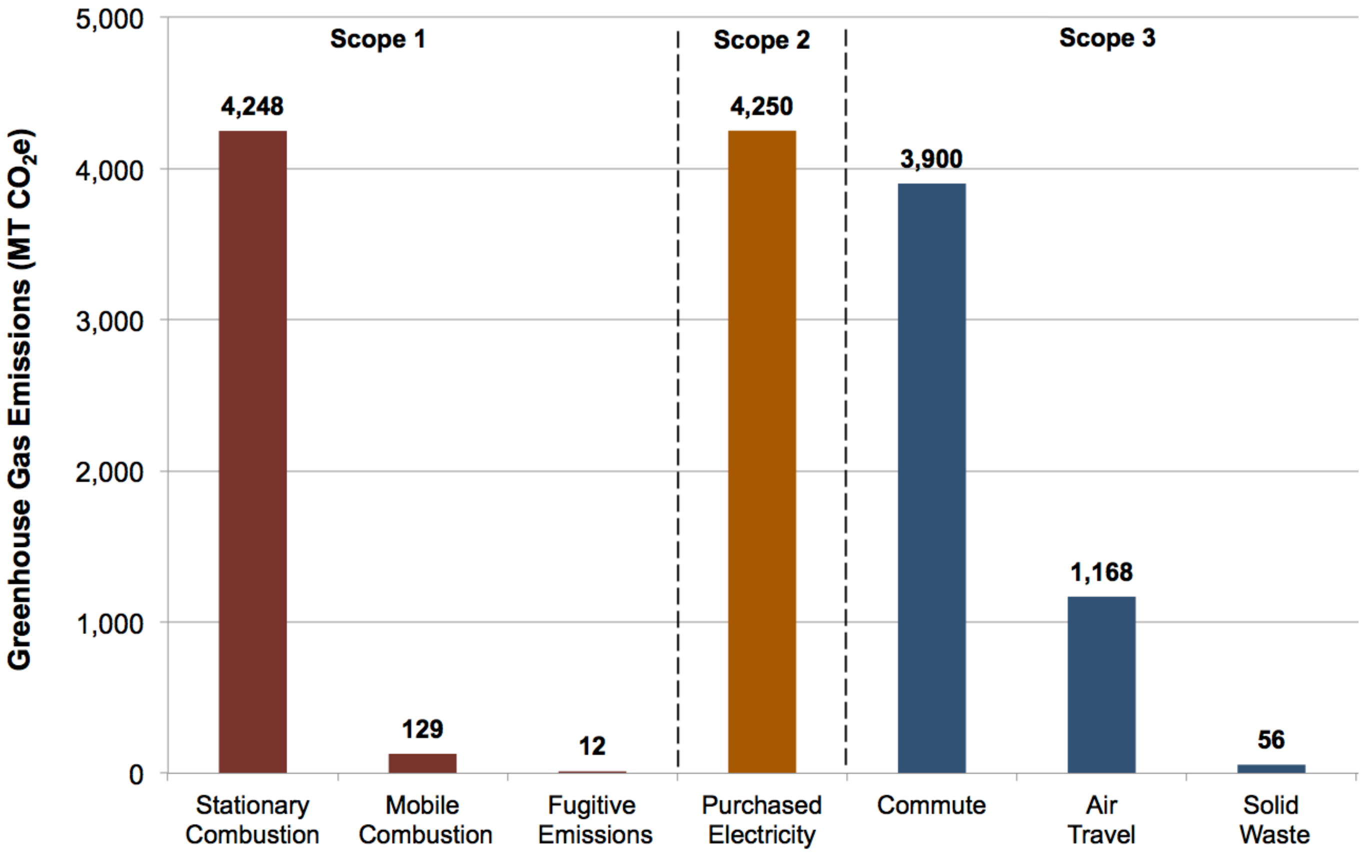
Figure 35: UO's multi-year GHG intensity per full-time student equivalent



Western Oregon University

Western Oregon University's (WOU) Scope 1 and Scope 2 emissions from fuel combustion and power use by stationary and mobile sources and fugitive refrigerants equal 8,639 MT CO_2e.[13] Figure 36 shows that Scope 1 and Scope 2 emissions are dominated by stationary combustion (primarily natural gas) and electricity consumption. In addition to Scope 1 and Scope 2 emissions sources, ACUPCC requires reporting on a defined set of Scope 3 emissions sources (commute, air travel and solids waste), which in aggregate equal 5,124 MT CO_2e. The largest of these sources is commute followed by air travel and solid waste.

Figure 36: WOU's FY2012 greenhouse gas emissions, by emissions source



Scope 1 and Scope 2 yield 8,639 MT CO_2e. For sense of scale, this is equivalent to[14]:

- Annual emissions from 1,633 passenger vehicles
- Annual emissions from the energy consumed by 403 average U.S. homes

ACUPCC Scope 3 emissions yield 5,124 MT CO_2e. For sense of scale, this is equivalent to:

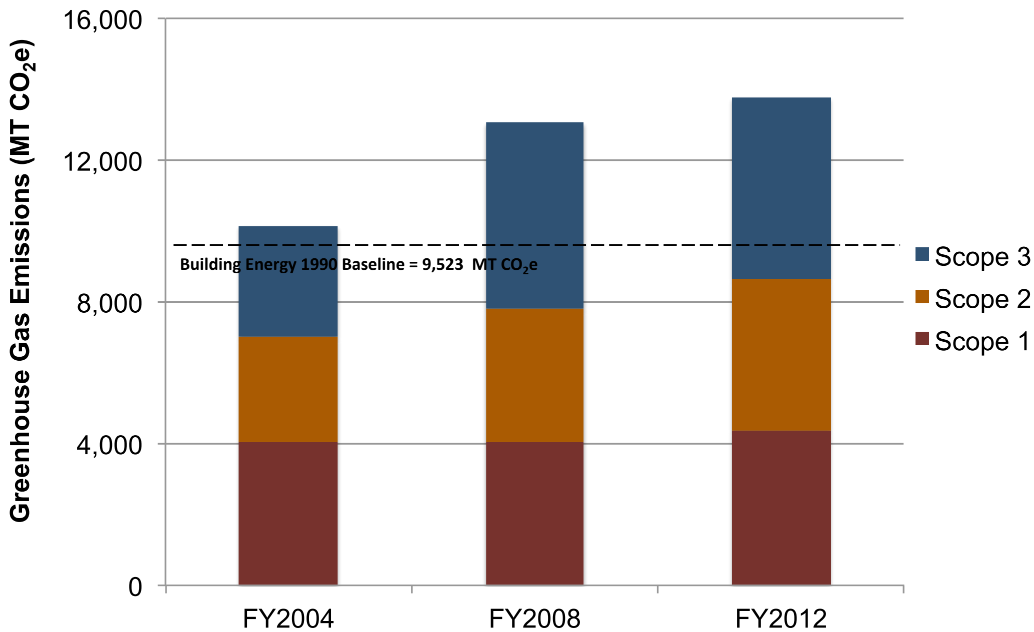
- Annual emissions from 1,068 passenger vehicles
- Annual emissions from the energy consumed by 264 average U.S. homes

[13] See Section 3 of this report for more detail on Scope categories.
[14] EPA equivalency calculator (http://www.epa.gov/cleanenergy/energy-resources/calculator.html)

Figure 37 compares WOU's absolute GHG emissions over time to the 1990 baseline for building energy emissions. Total emissions increased between FY2004 and FY2012. Scope 1 and Scope 2 emissions increased over that time period while Scope 3 emissions plateaued.

WOU's building energy related emissions are 8,498 MT CO_2e, or 1,025 MT CO_2e less than the 1990 building energy baseline emissions (black dotted line).

Figure 37: WOU's multi-year absolute GHG emissions with 1990 baseline



Western Oregon University (WOU)	FY2004	FY2008	FY2012
Gross Building Square Footage	1,163,843	1,179,382	1,261,899
Campus Population (student+faculty+staff)	4,965	4,996	5,956
Student Population	*4,417*	*4,384*	*5,257*
Faculty Population	*248*	*263*	*305*
Staff Population	*300*	*349*	*394*

As can be seen in the table above WOU's building space and campus population has increased since FY2004, with a slight increase in campus population between FY2004 and FY2008.

WOU emissions intensity has increased slightly between FY2008 and FY2012 as energy use has increased roughly in proportion with building area. WOU's emissions intensity per student decreased by 12% between FY2008 and FY2012 as student population increased at a greater rate than building area, in other words the existing available space is being utilized to serve an increasing number of students.

Figure 38: WOU's multi-year GHG intensity per 1,000 square feet of building space

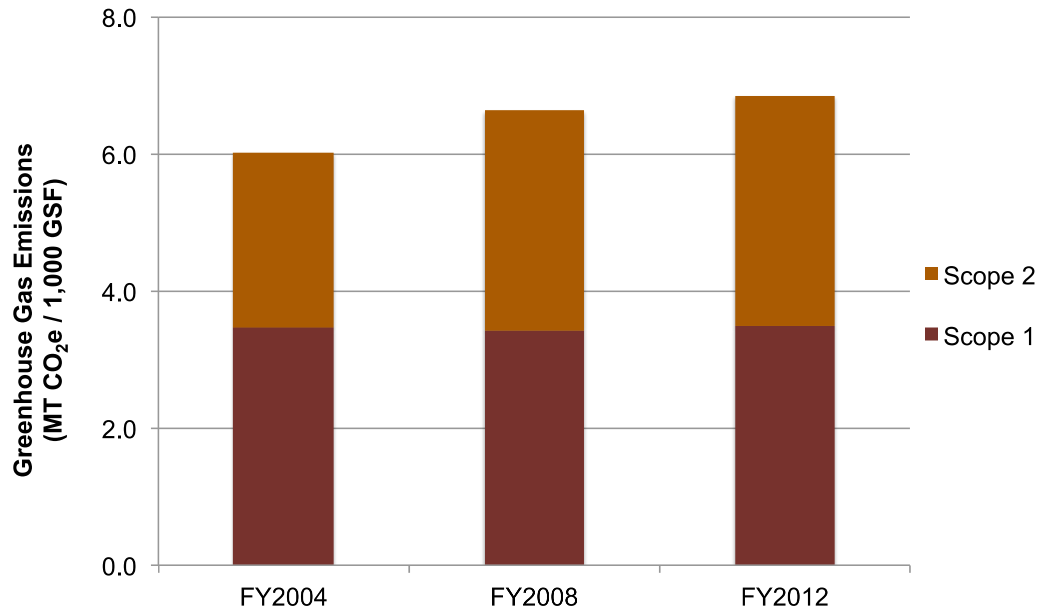
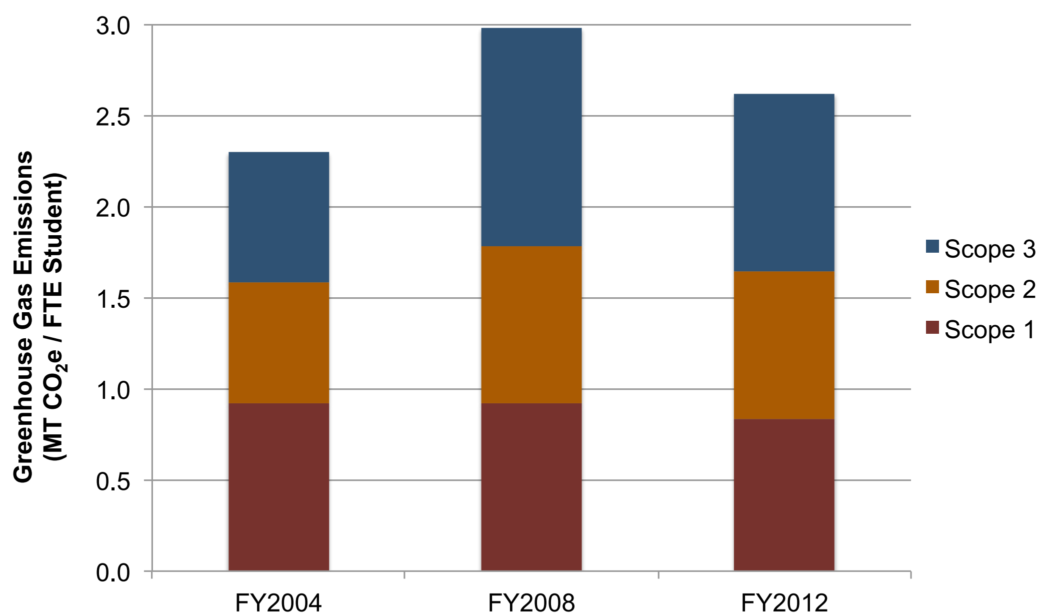


Figure 39: WOU's multi-year GHG intensity per full-time student equivalent



6. Benchmarking Performance

The FY2012 performance of OUS institutions is compared internally and externally in this section. Internal comparisons consider the performance of all OUS institutions against one another based on FY2012 emissions results, while external comparisons consider the FY2012 performance of OUS institutions against other comparable institutions outside the state of Oregon using GHG data reported to ACUPCC.

Internal Benchmarking – Comparing OUS Institutions

The following sections will compare OUS institutions' FY2012 GHG performance in terms of absolute emissions, net emissions, and emissions intensities.

Gross Emissions

Gross FY2012 GHG emissions for OUS institutions total 280,335 MT CO_2e including Scope 1, Scope 2 and the Scope 3 boundaries required by ACUPCC. The largest emissions source for OUS is stationary combustion (33% of total), followed by purchased electricity (32%), air travel (18%), commute (15%), and then mobile combustion, solid waste and fugitive refrigerants. See Figure 40 for details.

Of all the OUS institutions, OSU emitted the largest total quantity of ACUPCC GHG emissions, followed by UO, PSU, SOU, WOU, EOU and finally OIT. Figure 40 provides absolute emissions, by source and by institution, while Figure 41 shows the net emissions by institution, including purchased credits (or mitigation). Figure 42 shows the same data as Figure 40, as a bar graph.

Figure 40: OUS's FY2012 absolute emissions, by institution and emissions source

	Emissions Scope Category and Source	EOU	OIT	OSU	PSU	SOU	UO	WOU	Total (OUS)
Scope 1	Stationary Combustion (MT CO_2e)	3,422	229	50,431	6,901	3,886	23,677	4,248	**92,793**
	% of total	*3.7%*	*0.2%*	*54.3%*	*7.4%*	*4.2%*	*25.5%*	*4.6%*	***33%***
	Mobile Combustion	127	134	2,247	192	123	553	129	**3,505**
	% of total	*3.6%*	*3.8%*	*64.1%*	*5.5%*	*3.5%*	*15.8%*	*3.7%*	***1.3%***
	Fugitive Refrigerants	22	19	400	508	25	0	12	**986**
	% of total	*2.2%*	*2.0%*	*40.5%*	*51.5%*	*2.5%*	*0.0%*	*1.2%*	***0.4%***
Scope 2	Purchased Electricity (NWPP EF)	2,934	3,608	25,230	19,367	4,483	29,421	4,250	**89,293**
	% of total	*3.3%*	*4.0%*	*28.3%*	*21.7%*	*5.0%*	*32.9%*	*4.8%*	***32%***
Scope 3	Commute	3,083	2,025	9,547	10,046	6,227	6,059	3,900	**40,887**
	% of total	*7.5%*	*5.0%*	*23.3%*	*24.6%*	*15.2%*	*14.8%*	*9.5%*	***15%***
	Air Travel	449	598	18,851	8,614	2,071	19,841	1,168	**51,592**
	% of total	*0.9%*	*1.2%*	*36.5%*	*16.7%*	*4.0%*	*38.5%*	*2.3%*	***18%***
	Solid Waste	1,115	36	-	-	46	-	56	**1,253**
	% of total	*88.9%*	*2.9%*	-	-	*3.7%*	-	*4.5%*	***0.4%***
	Total (by OUS institution)	**11,150**	**6,650**	**106,705**	**45,627**	**16,862**	**79,551**	**13,763**	**280,308**

Net Emissions

Each OUS institution purchases some quantity of an environmental commodity, which mitigates operational GHG emissions, such as carbon offsets or Renewable Energy Certificates (RECs). Figure 41 compares the scale of these purchases to each institution's FY2012 absolute GHG emissions. The total height of the bar (blue + green) equals absolute GHG emissions. The green bar represents the GHG reductions associated with the purchase of mitigation credits. The blue bar represents *net* FY2012 emissions (absolute GHG emissions – mitigation credits = net GHG emissions).

Figure 41: Purchased GHG mitigation and net GHG emissions, by institution

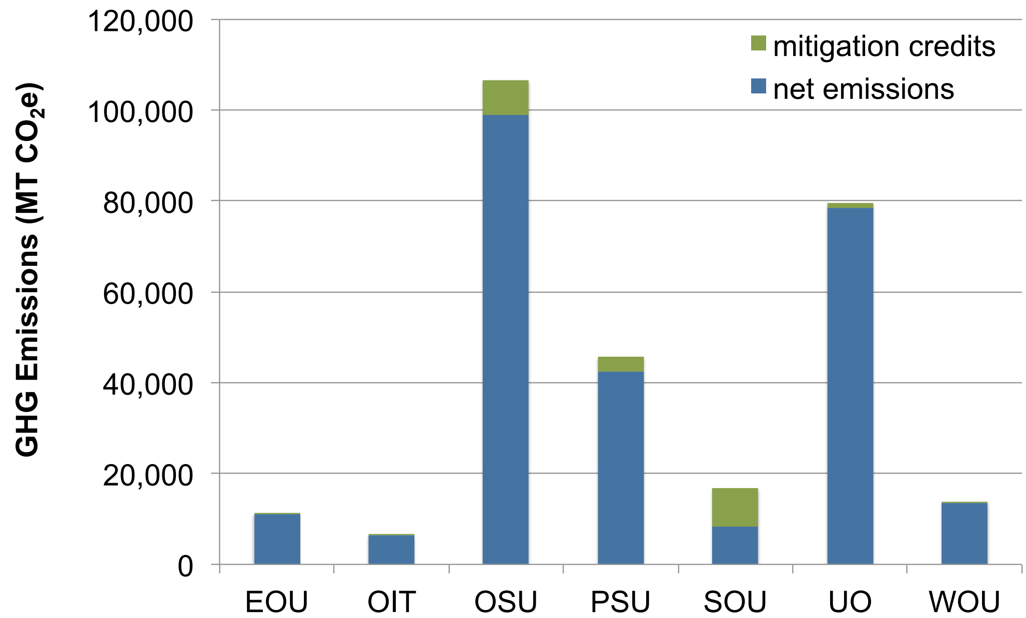
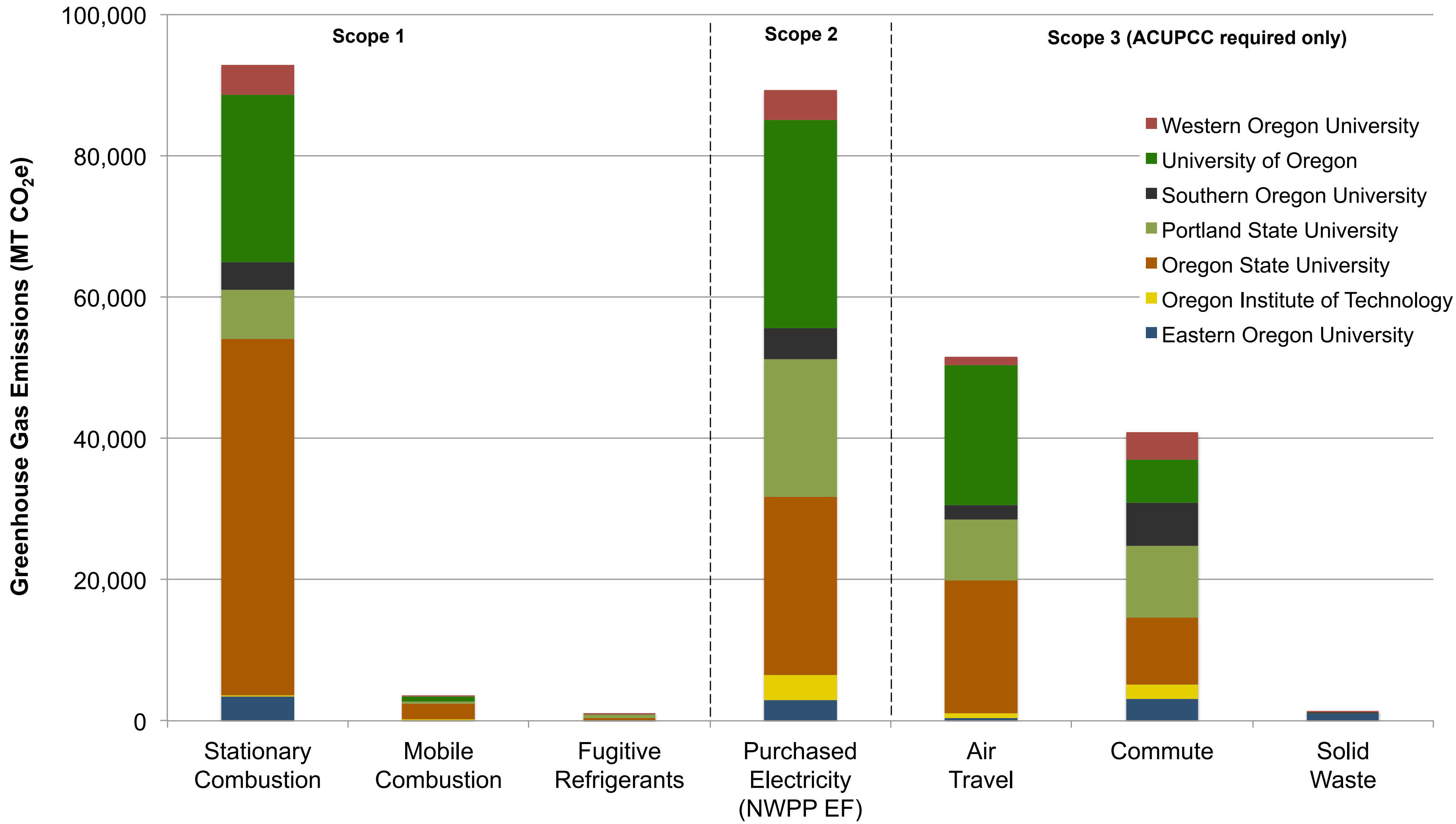


Figure 42: FY2012 absolute emissions, by institution and emissions source

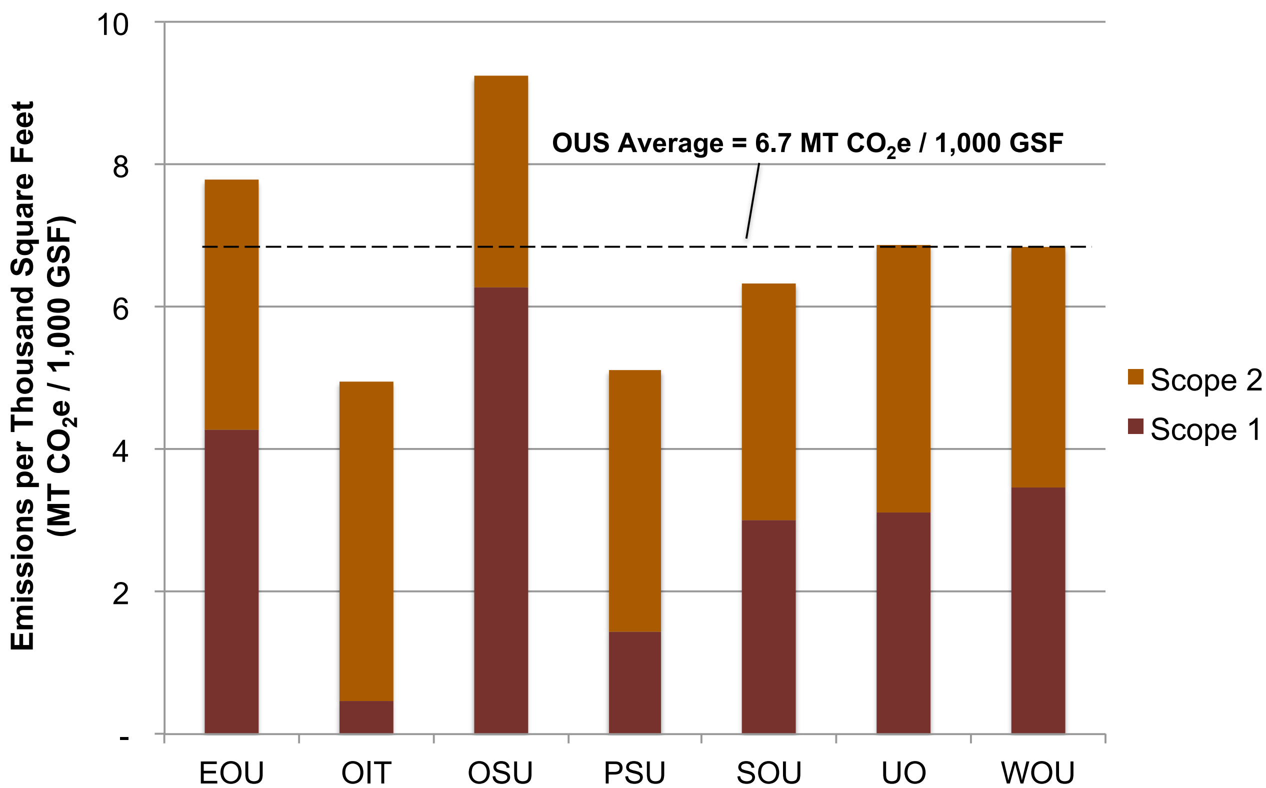


Emissions Intensity – Building Area

Figure 43 compares OUS institutions' building area emissions intensity using Scope 1 + Scope 2 GHG emissions per 1,000 gross square feet (MT CO_2e / 1,000 GSF). Scope 3 emissions are excluded from this metric because they do not relate to building management the same way as Scope 1 (mainly stationary combustion) and Scope 2 (purchased electricity). Based on this intensity metric, two institutions are above the OUS average: OSU and EOU. OSU has the greatest intensity and is 39% above the OUS average, followed by EOU at 17% above average. OIT has the lowest intensity of the OUS institutions and is -35% below average. PSU is -23% below average and SOU is -5% below.

OSU has the greatest Scope 1 emissions intensity of all the institutions by a wide margin. This finding is related to OSU's use of natural gas in its combined heat and power (CHP) system. The system was scaled to meet the OSU's electricity load and therefore not all of the heat will be utilized. They system is relatively new and OSU staff are still learning to run the system as efficiently as possible and new meters need to be installed to support efficient operation. Over time heat utilization will increase, making the system more efficiency and lowering natural gas usage and associated emissions. On the flip side, OSU's purchased electricity intensity (Scope 2) is the least of any OUS institution at -15% below average. PSU's Scope 1 intensity is very low compared to other OUS institutions. There are a number of potential reasons for these findings; 1) efficiency improvements to district heating system, 2) electric heating is used in some facilities, and 3) parking ramp square footage is included in GSF.

Figure 43: FY2012 emissions intensity per 1,000 square feet of building space, by institution



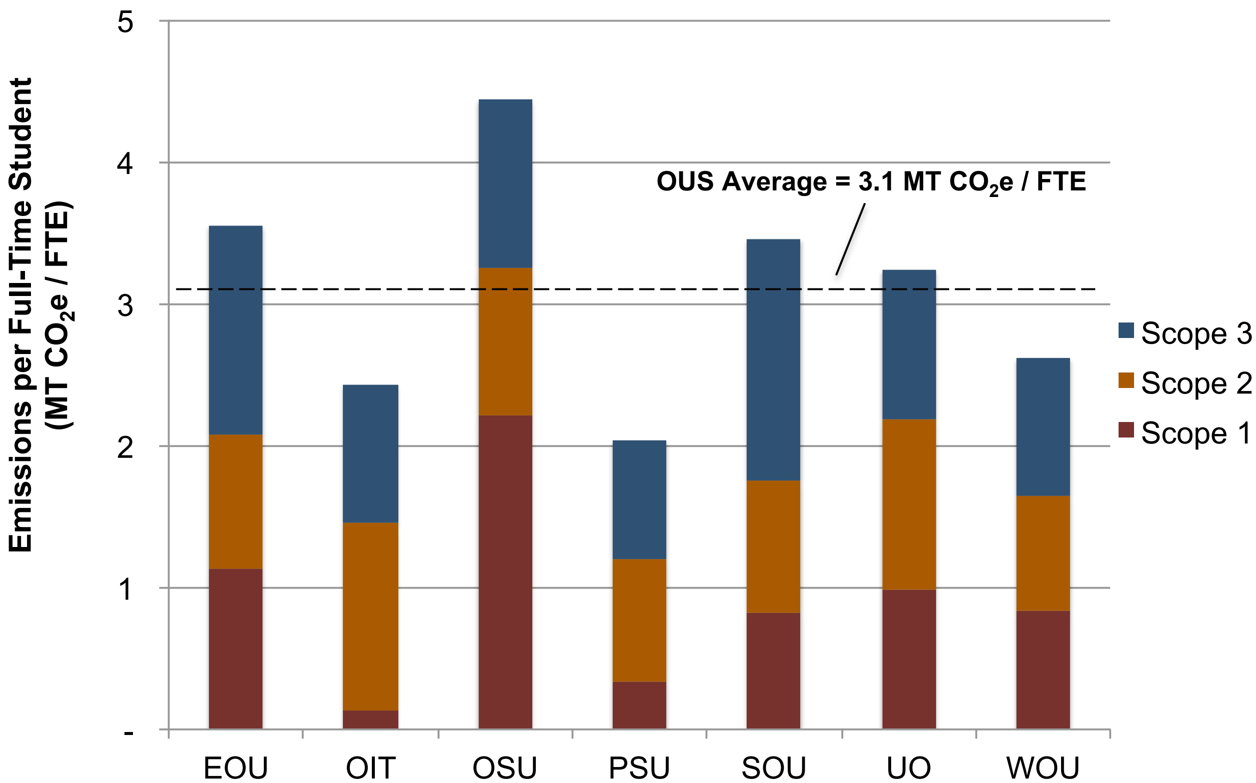
Emissions Scope Category and Source	EOU	OIT	OSU	PSU	SOU	UO	WOU	Avererage (OUS)
Scope 1	4.3	0.5	6.3	1.4	3.0	3.1	3.5	3.1
% difference from average	*36%*	*-85%*	*99%*	*-54%*	*-5%*	*-1%*	*10%*	
Scope 2	3.5	4.5	3.0	3.7	3.3	3.8	3.4	3.6
% difference from average	*-2%*	*25%*	*-17%*	*2%*	*-7%*	*5%*	*-6%*	
Total (Scope 1 + Scope 2)	**7.8**	**5.0**	**9.2**	**5.1**	**6.3**	**6.9**	**6.8**	**6.7**
% difference from average	***16%***	***-26%***	***37%***	***-24%***	***-6%***	***2%***	***2%***	

Emissions Intensity – Students

Figure 44 compares OUS institutions' emissions intensity per student using Scope 1 + Scope 2 + Scope 3 (ACUPCC required only) GHG emissions per full-time student equivalent (MT CO_2e / FTE). Based on this intensity metric, four institutions are above the OUS average: OSU, EOU, SOU and UO. OSU has the greatest intensity and is 43% above the OUS average, followed by EOU at 14% above average. PSU and OIT have the lowest intensities of the OUS institutions and are -35% and -22% below average respectively.

The above-average finding for OSU is driven by its Scope 1 emissions intensity, while EOU's is a combined result of its Scope 1 and Scope 3 emissions intensities. The below-average findings for OIT and PSU are due to low Scope 1 and Scope 3 emissions intensities, respectively.

Figure 44: FY2012 emissions intensity per full-time student, by institution



Emissions Scope Category and Source	EOU	OIT	OSU	PSU	SOU	UO	WOU	Avererage (OUS)
Scope 1	1.1	0.1	2.2	0.3	0.8	1.0	0.8	0.9
% difference from average	*23%*	*-85%*	*139%*	*-63%*	*-11%*	*7%*	*-10%*	
Scope 2	0.9	1.3	1.0	0.9	0.9	1.2	0.8	1.0
% difference from average	*-8%*	*30%*	*3%*	*-15%*	*-9%*	*18%*	*-20%*	
Scope 3	1.5	1.0	1.2	0.8	1.7	1.1	1.0	1.2
% difference from average	*26%*	*-17%*	*1%*	*-29%*	*46%*	*-10%*	*-17%*	
Total (Scope 1 + 2 + 3)	**3.6**	**2.4**	**4.4**	**2.0**	**3.5**	**3.2**	**2.6**	**3.1**
% difference from average	***14%***	***-22%***	***43%***	***-35%***	***11%***	***4%***	***-16%***	

Air Travel

Air travel is the largest aggregate OUS Scope 3 emissions source and, as a discrete source, represents 18% of total OUS emissions. Figure 45 compares gross air travel emissions for the seven OUS institutions. As can be seen, UO is responsible for the largest portion of these emissions, followed by OSU and PSU. It is not unexpected to find that the three OUS institutions, by population, are responsible for the largest quantities of air travel emissions. Figure 46 compares air travel emission intensities (MT CO_2e / campus member). Again OSU and UO have the largest emissions per campus member. EOU has the lowest absolute emissions and intensity. An interesting take away is that PSU's emissions intensity is small relative to the size of its student population.[15]

Figure 45: FY 2012 air travel emissions, by institution

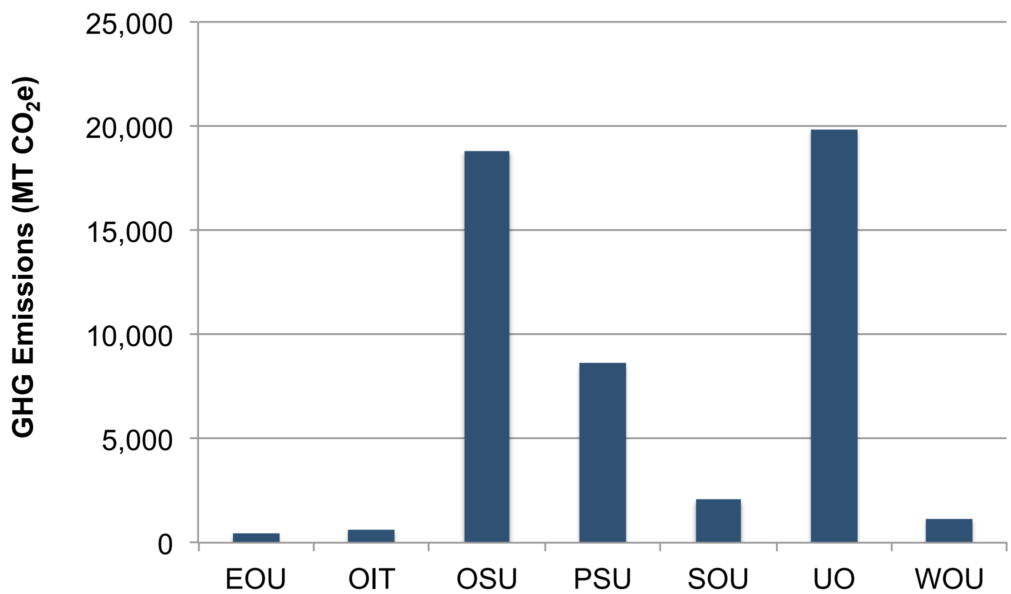
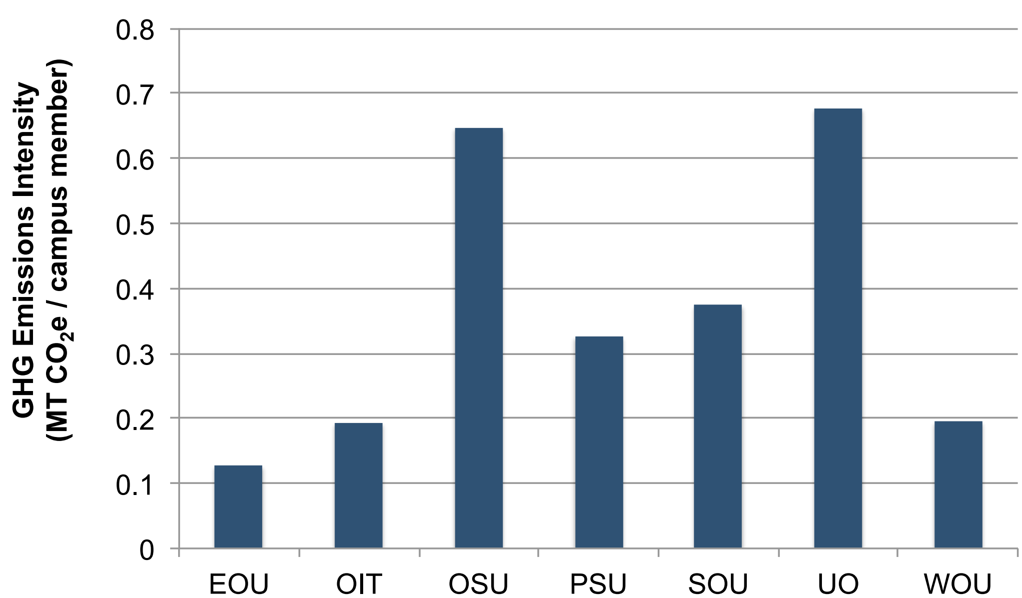


Figure 46: FY2012 air travel emissions intensity per campus member, by institution



[15] PSU's air travel emissions for FY2012 are based on FY2010 data. Air travel data was incomplete as of finalizing this report. FY2010 was used as a proxy.

Commute

Figure 47 compares commute emissions, by OUS institution and campus population group. The three institutions with the largest campus populations also have the greatest commute emissions: PSU, OSU and UO. On average, roughly 75% of these emissions are from student commute and 25% are the result of faculty and staff commutes.

Figure 48 presents campus population, results from the commute surveys (i.e., modal split, commute distance and trips) and total GHG emissions and emissions intensity per campus member. As can be seen, the institutions that have the largest absolute emissions also have the smallest emissions intensity per campus member. This finding is likely related to the geographic relationship between the campus and nearby housing stock. The three large institutions (PSU, OSU and UO) and OIT are located in mid-sized cities with significant quantities of housing stock near campus. In contrast, most of the smaller institutions (EOU, SOU and WOU) are located in small-sized cities with a larger city nearby (e.g., SOU is in Ashland, but Medford is nearby, and WOU is in Monmouth, but Salem is nearby). This geographic relationship may be the reason for the longer commute distance at these schools, which has a significant effect on the scale of the associated emissions.

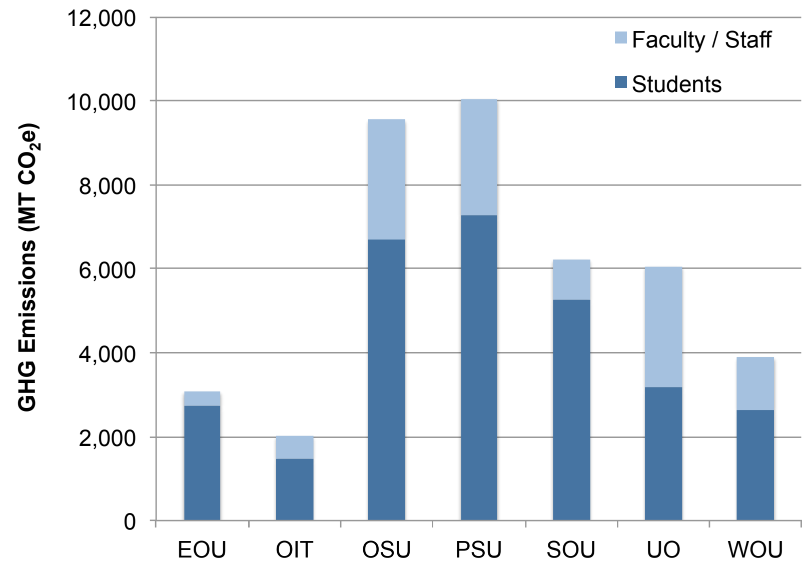


Figure 48: Institutional data (population), commute survey results, assumptions and GHG emissions from commute

Category				Students							Faculty							Staff			
	EOU	OIT	OSU	PSU	SOU	UO	WOU	EOU	OIT	OSU	PSU	SOU	UO	WOU	EOU	OIT	OSU	PSU	SOU	UO	WOU
Campus Population																					
Full time equivalent	3,138	2,743	24,040	22,403	4,875	24,543	5,257	128	123	1,931	1,750	266	1,540	305	238	219	3,158	2,250	388	3,229	394
Modal Split (% of total)																					
Drive Alone	44%	65%	35%	36%	47%	13%	31%	47%	72%	69%	50%	65%	49%	72%	72%	89%	47%	43%	73%	49%	82%
Carpool	18%	15%	3%	7%	9%	8%	5%	14%	16%	3%	7%	9%	0%	7%	12%	7%	3%	9%	7%	0%	10%
Bus	2%	2%	9%	27%	10%	23%	0%	3%	5%	7%	26%	0%	12%	0%	1%	0%	9%	39%	8%	12%	0%
Walk / Bike	36%	18%	53%	30%	34%	56%	64%	36%	7%	21%	17%	26%	39%	21%	15%	4%	41%	9%	13%	39%	8%
Commute Distance (one-way distance)																					
Drive Alone / Carpool	11.2	5.8	5	7	18.2	7	11.2	7.0	9.3	5	6	9.0	8	19.1	8.3	12.1	5	7	13.2	8	11.5
Bus	52.5	1.7	3	5	14.3	3	1.0	40.0	2.2	3	6	-	3	-	44.0	0.0	3	6	12.6	3	30.0
Average of all surveys	8.3	8.9	n / a	n / a	16.5	n / a	5.6	5.3	8.4	n / a	n / a	7.9	n / a	17.4	7.5	11.1	n / a	n / a	11.8	n / a	11.2
Trips (trips per year)																					
trips / week	9.26	9	10	5.6	7.5	10	9.8	9	10	10	7	9	10	8.9	10	10	10	8	9.8	10	9.7
weeks / year	36	36	36	30	36	36	36	40	40	47	48	40	36	40	46	46	50	48	46	46	46
trips / year	333	324	360	168	270	360	353	360	400	470	336	360	360	356	460	460	500	384	451	460	446
GHG Emissions and Intensities																					
Total (MT CO_2e)	2,724	1,475	6,702	7,270	5,270	3,163	2,648	359	549	2,845	2,776	957	2,896	1,252	Emissions and intensity are combined for faculty and staff (see faculty columns for combined results)						
Intensity (MT CO_2e / person)	0.9	0.5	0.3	0.3	1.1	0.1	0.5	1.0	1.6	0.6	0.7	1.5	0.6	1.8							

n / a = not available

Refrigerants and Solids Waste

Fugitive refrigerant losses and methane emissions from landfilling solid waste are the smallest of the OUS institution collective emissions sources. Due to their small scale, these sources do not warrant detailed analysis, but the following subsections describe the highest-level findings related to these emission sources.

<u>Solid Waste</u>

- EOU's solid waste emissions are the largest of any OUS institution because its local landfill, Baker Sanitation Landfill, does not collect and combust landfill gas and therefore is a significant source of methane. While EOU does not have any direct control over how the local landfill operates, it does have some level of control over the quantity of organic material that is disposed of at the landfill. EOU may want to research, consider and utilize any available opportunities to divert the organic fraction of its waste to alternative treatment options such as composting.
- The default emissions factor used in the Campus Carbon Calculator was revised for EOU, OIT, SOU and WOU. See Appendix C for an explanation and related details.

<u>Refrigerants</u>

- It was found that the *total* quantities of refrigerants purchased during a fiscal year were used to calculate emissions in some institution's' previous GHG inventories, when emissions should only be calculated based on the quantity of refrigerant *losses* (or the quantity used to recharge an existing system). This issue becomes particularly acute during a year when a new cooling system is commissioned that requires a large quantity of refrigerant during its initial charge.

External Benchmarking – Comparing OUS Institutions to Other Similar Institutions

Benchmarking GHG performance across institutions is challenging, but several general insights emerged from comparing OUS data to institution-specific data from 62 additional similar institutions across the United States. This section describes our methods and results, while clearly stating the limitations of institution-level analysis and comparisons. We hope that, above all, readers will take away from this exercise that GHG benchmarking and comparisons are best done *in other settings and with other units of analysis*, rather than at the level of an entire campus. In particular, we believe the best benchmarking is against oneself over time, or with simpler units of analysis, such as with individual products, for particular emissions sources, or with buildings of a particular type.

While only general comparisons and conclusions can be made (for reasons described in the Methods section below) when comparing OUS institutions to other similar institutions, OUS GHG emissions intensities are near average or below average (i.e., less carbon intensive than average). There are many factors that account for these favorable outcomes. Several are clearly outside of OUS control and therefore look more like circumstances than genuine performance. Examples include Oregon's moderate climate and the lower GHG intensity of the region's electricity due to abundant hydropower resources. These factors clearly lower the GHG intensity metrics for OUS, but OUS cannot exactly "take credit" for them.

Several other contextual factors impact the emissions intensities. Such factors can include the type, size and setting of the institution (e.g., public vs. private, small vs. large, residential vs. nonresidential) and the general level of affluence of the institution. For example, a more affluent university could potentially provide many more square feet of building space per full-time equivalent student. The analysis below describes the ways in which these factors were addressed.

This analysis follows on the benchmarking work in the FY2008 inventory, with considerable expansion.

Method: Rationale, Precedent and Data

In brief, the approach used for this benchmarking exercise included three steps. First, "similar" institutions were identified based primarily on Carnegie Classifications, a typology commonly used in comparing higher education institutions. Next, this peer group was culled based on key criteria described below to create an OUS peer group. Finally, GHG intensity metrics were created for all institutions and OUS performance was compared to the peer group.

In order to find similar institutions, we found each of the seven OUS institutions using the Carnegie Foundation's Carnegie Classifications Institution Lookup[16] feature. This search tool covers all similar institutions among accredited, degree-granting colleges and universities in the United States represented in the National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS). After selecting certain criteria related to level (4-year or above), control (public), and the size and setting (e.g., "Large four-year, primarily nonresidential") of each OUS institution, the tool provided a list of similar institutions. This large pool of similar institutions became the starting point; for consistency, this pool was expanded to include the institutions in external benchmarking by the FY 2008 GHG inventory.

Once this large pool of institutions had been identified, the list was culled based on two criteria. If the square footage per student was significantly higher than the rest of the pool, it was excluded. The rationale for this exclusion is that institutions with the highest square footage per student represent qualitatively different institutions

Also, if the institution had not reported relevant data to ACUPCC it was also excluded, as intensity metrics could not be created. The resulting pool has 62 similar institutions that were then compared to the seven OUS institutions. In order to understand if there were significant differences among institutions of different sizes, this larger pool of 62 institutions was split by size creating two smaller subgroups of 27 large institutions for comparison with OSU, PSU and UO, and 35 small and medium-sized institutions for comparison with OIT, WOU, SOU and EOU.

Once the peer groups had been identified, data was also collected on climatic differences between regional locations using heating degree days (HDD) and cooling degree days (CDD). This climate information was essential in the eventual metrics.

With this data set as the starting point, OUS GHG performance was analyzed based on the following metrics developed for the task:

1. Scope 1 and 2 Emissions per Full-Time Equivalent Student (MT CO_2e / FTE)
2. Scope 1 and 2 Emissions per Thousand Gross Square Feet of Building Space (MT CO_2e / 1,000 GSF)
3. Scope 1 and 2 Emissions per Degree Day and Full-Time Equivalent Student (MT CO_2e / [(HDD + CDD) x FTE]
4. Square Feet of Gross Building Space per Full-Time Equivalent Student (GSF / FTE)

Note: As these metrics suggest, it was determined that GHG performance could only be reasonably compared using data for Scopes 1 and 2 because of the lack of systematic and transparent Scope 3 emissions reporting. This limitation may surprise some readers because ACUPCC reporting requires Scope 3 reporting for air travel, commute and solid waste.

The four metrics are not entirely straightforward, so the following discussion explains the rationale and details of each.

<u>1. Scope 1 and 2 Emissions per Full-Time Equivalent Student</u>

Scope 1 and Scope 2 emissions relate to campus activities—overwhelmingly to buildings and to a much

[16] http://classifications.carnegiefoundation.org/lookup_listings/institution.php

lesser extent fleets. The physical campus serves individuals and must be scaled accordingly. Therefore, the ratio of campus-related emissions to campus individuals is a straightforward metric of carbon intensity. FTE students was selected as a proxy for all individuals on campus because students are a proxy for a principal "output" of higher education, i.e., undergraduate, graduate and professional education.
Units: Metric tons carbon dioxide-equivalent per full-time equivalent student (MT CO_2e / FTE)

2. Scope 1 and 2 Emissions per Thousand Gross Square Feet of Building Space
The rationale is similar to that of the metric above, with the caveat that building space is a means to an end, rather than an end in itself. In other words, institutions do not seek to deliver *space* as a key outcome; instead, classrooms and offices and other building spaces are tools to achieve instruction, research and other outcomes. That said, the management of buildings is a necessary campus activity under the current model, so its carbon intensity deserves scrutiny, hence the inclusion of the metric.
Units: Metric tons carbon dioxide-equivalent per 1,000 gross square feet (MT CO_2e / 1,000 GSF)

3. Scope 1 and 2 Emissions per Degree Day and FTE Student
Building operation is the main component of Scope 1 and Scope 2 emissions, and climate characteristics determine much of the heating and cooling load that must be provided. As previously noted, this variation is about circumstances rather than performance, so this metric attempts to correct for climate. Degree days are a measure of the need for both heating and cooling building spaces, and this need is further scaled by campus users, for which FTE students are a proxy. Hence, this metric assesses the carbon efficiency of the physical campus in a more comparable way, by correcting for *both* the number of campus users and the local climate. More explanation appears below in the discussion of the results.
Units: Metric tons carbon dioxide-equivalent per degree day per full-time equivalent student (MT CO_2e) / [(HDD+CDD)x(FTE)]

4. Square Feet of Gross Building Space per Full-Time Equivalent Student
Physical campuses must provide some building space, but the quantity of building space per student varies considerably. The analysis here provides separate data on this metric, mainly as a way of explaining some of the variation across institutions. The metric is not a *performance* measure per se, but it is important in understanding the results from cross-campus comparisons, as well as the limitations of such comparisons.
Units: Gross square feet per full-time equivalent student (GSF / FTE)

Limitations of External Benchmarking: The Search for Apples-to-Apples Comparisons

The desire to compare performance from one institution to the next seems inevitable, especially among institutions where meritocracy is part of the culture and ethic. But assigning grades and scores for greenhouse gas emissions performance is challenging. Despite all of the attempts to make a meaningful comparison – assembling groups of similar institutions, plus data corrections for building space, student population and climate characteristics – we still do not achieve like-to-like comparisons. As a way of constraining the use and interpretation of the results here, three observations are in order.

First, this effort provides limited insight *at the aggregate level of the physical campus*. Higher education institutions still differ in ways that the corrections here simply do not capture and, most importantly, that can reasonably be assumed to affect GHG emissions. The extent of on-campus housing, the share of energy-intensive science buildings in a campus' building space, and the age of the campus building stock all represent obvious impacts on energy and GHGs. Yet gathering high-quality information on each of these variables would represent a costly and difficult data-gathering task that was beyond the current study's scope, as well as outside of any similar benchmarking work that ACUPCC has assembled to date.

Second, this effort is equally challenging *at the level of core functions*. Higher education institutions produce a wide range of "outputs" – economic language used earlier in the definition of the metrics. Most institutions generate some mix of degrees, certificates, research, public service, athletic achievement and cultural stewardship (such as museums). Each function requires activities that may generate more or less carbon than any other function, so comparisons across institutions necessarily fail to accommodate this level of detail. The state of carbon accounting in higher education has not yet reached a level where such differences are described in GHG inventories, much less being quantified precisely in benchmarking analysis.

Third, a key limitation of this analysis is that *there is no consistency in Scope 2 emissions reporting among ACUPCC signatories*. Some institutions report their emissions from purchased electricity using the grid emissions factor for their EPA eGRID subregion, an approach endorsed by protocol and common practice outside of higher education. Other institutions report GHG emissions using an electric utility-specific emissions factor, also a common practice. In some cases, the difference between the two values can be quite significant. For example, the regional emissions factor is more than 23 times larger than the utility-specific emissions factor for the University of Oregon. While all electricity emissions for the OUS institutions in this benchmarking section were calculated using the regional emissions factor for electricity, there is no easy way to determine which emissions factor was used by other ACUPCC signatories in their respective inventories.

In summary, one must read the following results and interpretation as a preliminary effort to make helpful but limited comparisons. Perhaps future efforts, most of all by ACUPCC, will address the limitations described herein.

Detailed Results

Overall, OUS performed well compared to the full peer group with all institutions falling near the 50th percentile, or significantly under, for all metrics.

In Figures 49 and 50 below, emissions intensities of the seven OUS institutions are compared to 62 similar institutions in the selected peer group (for a total of 69 institutions). In Figure 49, only OSU is greater than the 50th percentile for GHG emissions per full-time equivalent student, while PSU is equal to the 10th percentile. In Figure 50 for emissions per thousand square feet of building space, all OUS institutions are under the 50th percentile, while PSU and OIT are both under the 10th percentile.

Throughout this section, OUS institutions appear in order according to their carbon intensity results, a break with the rest of the document, in which the institutions consistently appear in alphabetical order.

Figure 49: Emissions intensity per student equivalent for OUS institutions, compared external percentiles

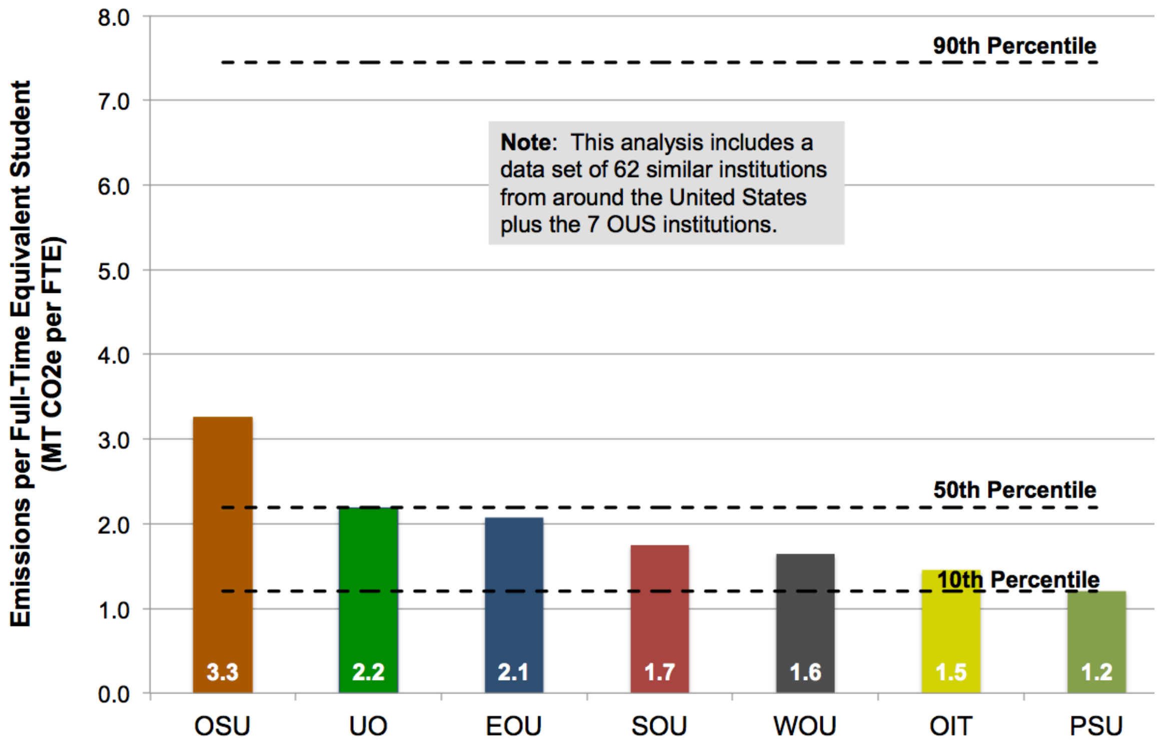
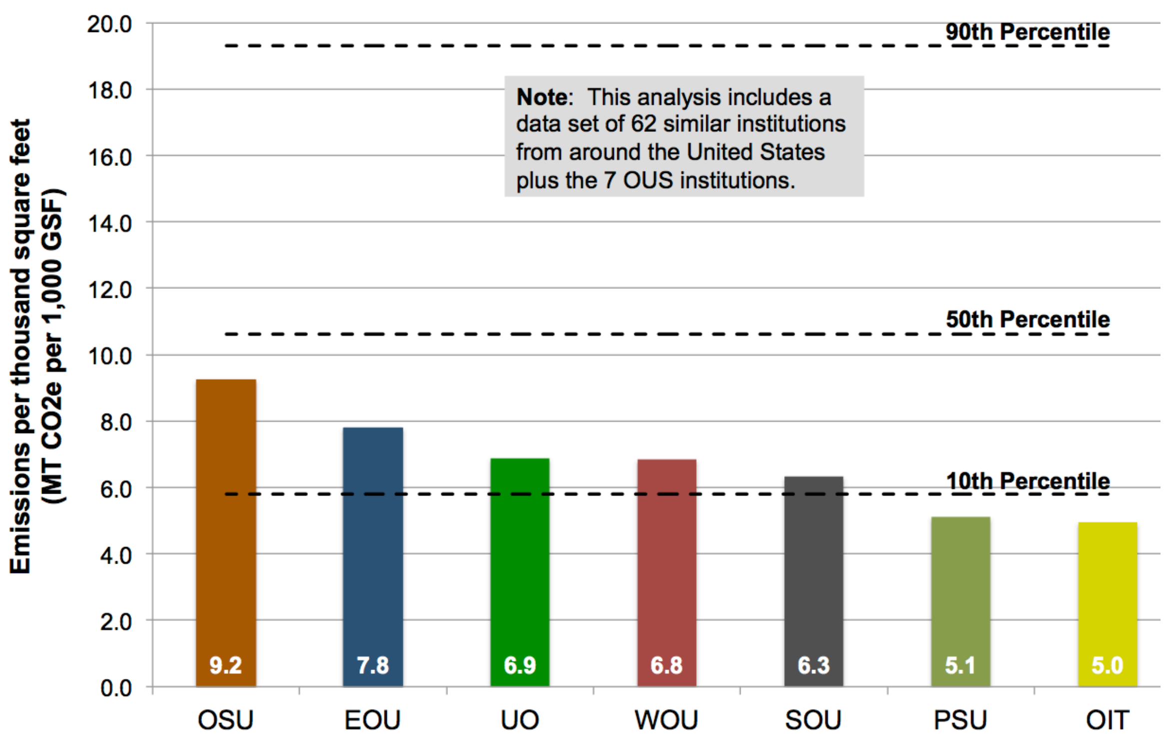


Figure 50: Emissions intensity per thousand square feet for OUS institutions compared to similar institutions

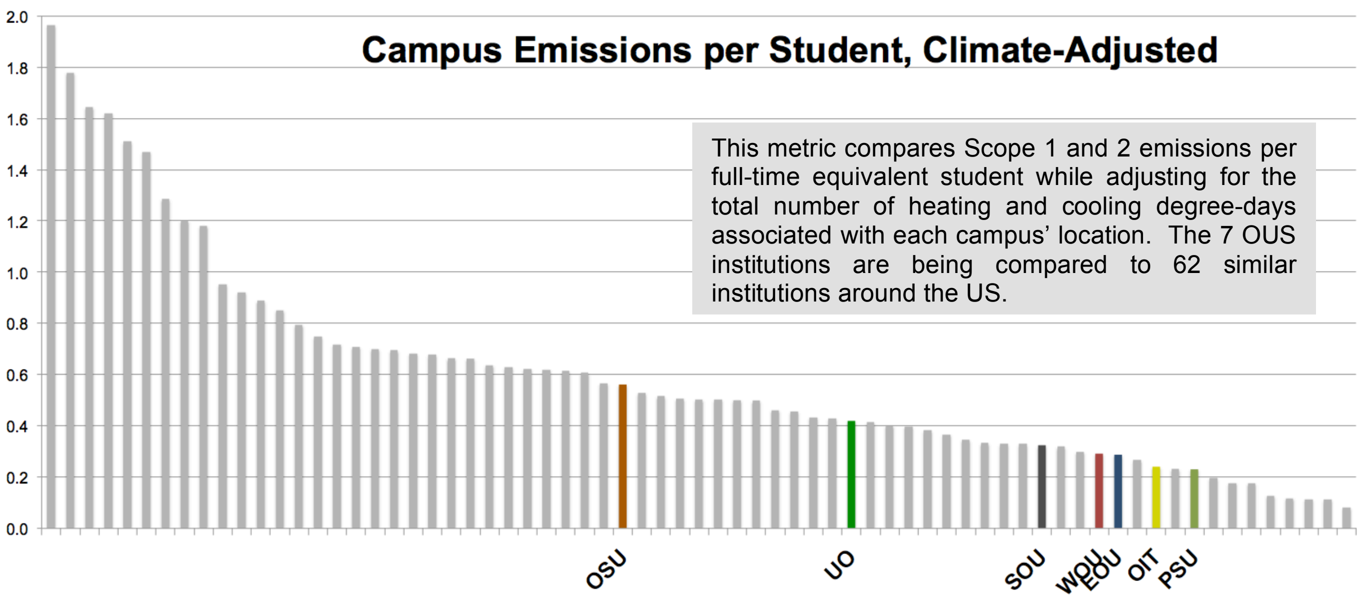


Given Oregon's relatively mild climate compared to other parts of the country as well as the differences in climate zones within OUS itself, there was a need to develop an additional intensity metric that could take these differences into account. This was accomplished by incorporating heating and cooling degree days into the metric looking at Scope 1 and 2 emissions per student. A standard metric for describing the energy use of a particular climate, a heating degree day (HDD) is a day in which the average outdoor temperature must be raised to a baseline temperature at which a building would need no additional heat. For example, using a common baseline of 66 degrees, on a day with an average temperature of 58 degrees would accrue eight (8) heating degree days. A cooling degree day (CDD) follows the same logic but for cooling needs, typically relative to a baseline temperature of 76 degrees. By incorporating the sum of HDD and CDD into the emissions-per-student metric, the metric can compare performance without being affected by variation caused by the geographic differences in annual energy usage for space heating and cooling. The metric used the following equation:

$$\frac{Scope\ 1\ Emissions + Scope\ 2\ Emissions}{(Heating\ Degree\ Days + Cooling\ Degree\ Days) \times Full\ time\ equivalent\ student}$$

As shown in Figure 51, this additional metric does not change the previously noted trend that OUS institutions tend to be in the middle to the lower half of the pack of similar institutions.

Figure 51: Campus emissions per student, climate adjusted, for OUS institutions compared to similar institutions



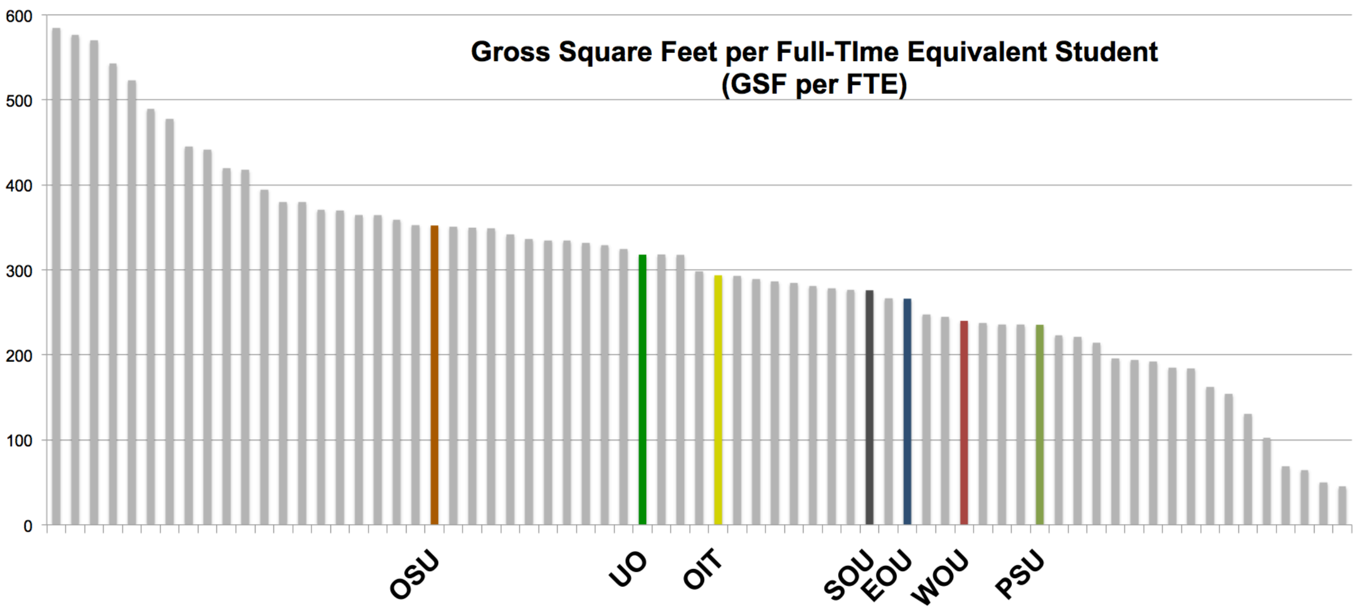
One final metric is shown to provide a more robust way of understanding the factors that influence the emissions per student within higher education. Mathematically, the emissions per FTE student must equal the emissions per gross square foot times the number of square feet per FTE student as shown by the equation below.

$$\frac{GHG}{FTE\ student} = \frac{GHG}{Gross\ Square\ Feet} \times \frac{Gross\ Square\ Feet}{FTE\ student}$$

This is relevant because even if an institution is getting more efficient per square foot of building space, if they provide more building space per student, then the emissions per student will not decrease as quickly. Figure 52 shows how the pool of similar institutions compares in terms of gross square feet per student.

The two figures (51 and 52) together provide hints of both circumstances and performance. For example, OSU's higher emissions per student is at least in part attributable to its higher square footage per student. The greater square footage is part of OSU's circumstances and perhaps related to the specific academic and research functions at the institution. OIT, with fairly high square footage per student, still delivers low emissions per student, suggesting a campus-specific carbon efficiency story – which indeed is the case, with the campus' geothermal energy source.

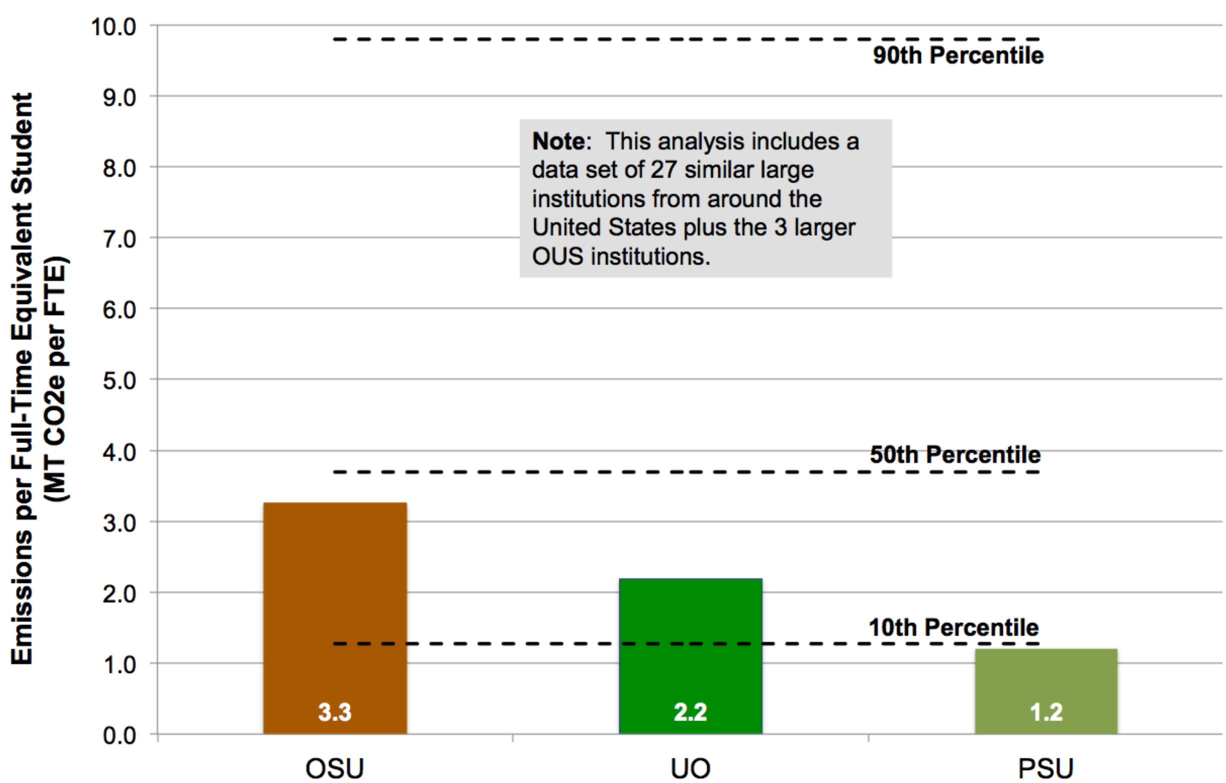
Figure 52: Gross square feet per student for OUS institutions compared to similar institutions



Large Institutions (OSU, PSU and UO)

To better understand if there were significant differences between the large and small/medium-sized institutions in the identified peer group, the larger cohort of 69 institutions was split into two subgroups, allowing the three larger OUS institutions to be compared to similar large institutions. Twenty-seven additional large institutions were identified and compared to OSU, PSU and UO. Comparing only large institutions, OUS performs even better. For Scope 1 and 2 emissions per full-time equivalent student, none of the three OUS institutions are above the 50th percentile and PSU is just under the 10th percentile.

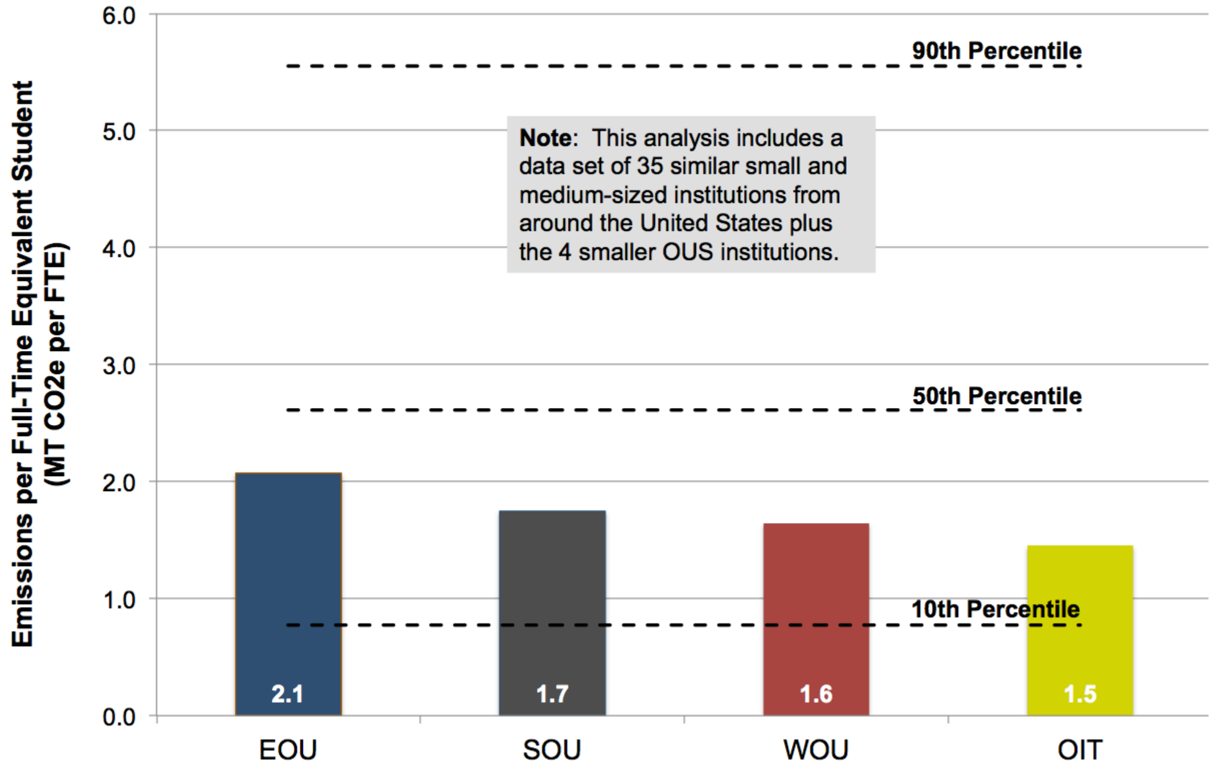
Figure 53: Emissions intensity per student for OSU, PSU and UO, compared to similar large institutions



Small Institutions (EOU, OIT, SOU and WOU)

Similarly, a subgroup of similar small and medium-sized institutions was identified for comparison with the smaller four of the OUS institutions. Thirty-five additional small and medium-sized institutions were identified and compared to EOU, OIT, SOU, and WOU. There is no significant difference in performance among the smaller institutions, as all four performed between the 50th and 10th percentiles.

Figure 54: Emissions intensity per student equivalent for the four smaller OUS institutions compared to similar small/medium institutions



List of Similar Organizations

The following is the list of similar organizations that were identified as part of this benchmarking process.

Peer Group for Large OUS Institutions (OSU, PSU, UO)	**Peer Group for Smaller OUS Institutions (EOU, OIT, SOU, WOU)**
Boise State University	Babson College
Clemson University	Bellevue College
Cleveland State University	Bentley University
CUNY City College	Bowie State University
Eastern Washington University	Bridgewater State University
Metropolitan State College of Denver	Central Connecticut State University
Northern Kentucky University	Eckerd College
Ohio State University-Main Campus	Frostburg State University
Temple University	Governors State University
University of Arkansas	Hampshire College
University of Cincinnati-Main Campus	Indiana State University
University of Colorado Boulder	Loyola Marymount University
University of Colorado Denver	Olympic College
University of Illinois at Chicago	Pacific Lutheran University
University of Louisville	Radford University
University of Maryland-University College	Rowan University
University of Massachusetts-Boston	Santa Clara University
University of Missouri-Kansas City	Seattle University
University of Nevada-Reno	Slippery Rock University of Pennsylvania
University of New Mexico-Main Campus	Southern Connecticut State University
University of Toledo	The Evergreen State College
University of Utah	The Richard Stockton College of New Jersey
University of Vermont	University of Central Missouri
University of Washington-Seattle Campus	University of Colorado Colorado Springs
Virginia Commonwealth University	University of Denver
Weber State University	University of Illinois at Springfield
Western Michigan University	University of Massachusetts-Lowell
	University of Missouri-St Louis
	University of Portland
	University of Redlands
	University of Washington-Bothell Campus
	University of Washington-Tacoma Campus
	Western Connecticut State University
	William Paterson University of New Jersey
	Worcester State University

APPENDIX A: DATA GATHERING FINDINGS AND REVISIONS TO PREVIOUS INVENTORIES

In the course of collecting data for the FY2012 inventory and comparing the resulting emissions to previous years, methodological inconsistencies, data gaps and errors became apparent. Some of these are to be expected when conducting inventories at multiple campuses of different sizes over a number of years. Issues associated with staff familiarity with the process, institutional memory and methodological approach are common, as are changing inventory boundaries over time as the campuses become more adept at conducting inventories and expand inventory boundaries beyond the main campus. These inconsistencies lead to questions about historic data and its comparability to current year data. Some of these questions can be answered and some cannot.

In the course of this work, Good Company has done everything within the confines of existing and currently available records to ensure consistency throughout the historical results. The following subsections document inconsistencies that were discovered during the course of this project in three groups.

Issues Corrected for Multiple Institutions

- During the course of the FY2012 inventory it was discovered that the results of the FY2008 commute survey were not used to calculate emissions for the FY2008 inventory or previous inventories, instead arbitrary assumptions were used. Sightlines, the company who worked on the FY2008 inventory, retrospectively analyzed and summarized the results of the FY2008 for the institutions for which data existed: OIT, SOU and WOU. Sightlines' analysis was used by Good Company to correct data entry for previous inventories. Data was not available for EOU in the FY2008 survey so a survey conducted by Sightlines in FY2011 was used as a proxy to correct commute inputs for earlier years.
- Revision of EPA's WARM landfill emissions factor to remove the credit applied for the "carbon sequestration" of landfilled materials. See Appendix D for more detail.

Issues Corrected at Single Institutions

- OIT's 2010 natural gas use. A unit conversion error from therms to million British thermal units (MMBTU) led to a significant over reporting of natural gas consumption.
- OIT's 2010 refrigerant emissions. Refrigerants used to charge a new cooling system were incorrectly accounted for as atmospheric losses.
- OIT was incorrectly calculating for solids waste disposal emissions with the emissions factor for "Landfilled with no CH_4 recovery" when its disposal landfill actually captures methane and generates electricity.

Issues Identified at Single Institutions, but Not Corrected

- SOU's air travel for years prior to 2012 only represents a portion of air travel. The method used for the FY2012 inventory should be used to revise passenger miles for earlier inventory years. See the SOU FY2012 GHG Inventory Report and associated audit trail for methodological details.
- Fuel combusted by Department of Administrative Services vehicles leased by OIT may not be accounted for in years prior to FY2012. In addition the diesel value for FY2004 is out of scale with other year's totals. Good Company suspects that the value for gasoline and diesel may be reversed, but data from the institution for 2004 was not available.
- WOU may be missing data for stationary diesel use for years prior to FY2012. Data was requested, but never received.
- WOU mobile fuel use is significantly different in FY2012 compared to earlier years. The root of this difference was not determined. It could be there was a shift in vehicle use or it may be an issue of inconsistency in data collection.

APPENDIX B: SENSITIVITY ANALYSIS FOR ELECTRICITY

The goal here, as with all emissions sources, is to represent the carbon consequences of the activity. However, electricity-related emissions have several complications that most other emissions sources do not have. This section briefly explains the decision to use the regional grid carbon intensity as the baseline in this report, and it briefly describes these additional complications. We also present a sensitivity analysis with several alternative versions of this calculation. Electricity warrants this additional attention because it is a major emissions source for all OUS institutions, and because the carbon accounting used to calculator carbon intensity per unit of electricity is in the midst of considerable change, nationally and internationally.

As a default emissions factor for electricity, this report uses the carbon intensity of the eGRID sub-region, which for all OUS institutions is the NWPP. We (at Good Company) believe, based existing research and protocol, that the regional electric grid carbon intensity represents the most accurate *single* emissions factor for most GHG inventories. To understand the carbon consequences of electricity, it is necessary to consider the electric grid to which we are all connected – and the ways in which we are connected to it.

We recognize that any individual institution purchases its electricity from a particular utility. The report does not use the emissions factors for any university's electric utility because of the intent to show the carbon consequences of electricity use. The regional grid, in our opinion, is a better representation of those consequences for a couple straightforward and related reasons:

- Any individual utility relies on a broader regional grid for its electricity, as opposed to generating that electricity itself. The utility could not function as an island without a continual connection to that regional grid.
- The entity upon which public power providers (serving EOU, WOU, SOU and UO) rely – that is, Bonneville Power Administration – imports and exports electricity from its geographic region (its "control area") on an on-going basis.

We strongly favor the NWPP-based calculation for the reasons explained here. Still, there are additional issues to consider, as the understanding – and management – of electricity-related emissions will evolve considerably over the coming years.

First and foremost, connection to a regional grid also means that energy efficiency and climate action take on new meaning. Less energy use at peak times, for example, decreases demand for whatever the "marginal" resource is in the region. That marginal resource is rarely an average mix; rather, it is typically natural gas (around 900-1,000 lbs CO_2e/MWh compared to NWPP's of ~800 lbs CO_2e/MWh), or some mix of fossil resources. In short, the carbon intensity of an individual utility's portfolio is not necessarily a good indication of the impacts of local efficiency and conservation, or "load-shifting" from peak to off-peak times.

A given utility's interdependence with the larger regional grid extends beyond the buying and selling of electricity. Retail power customers benefit from an integrated system in a number of ways. The interconnected grid helps assure reliability by allowing the transfer of electricity from one part of the network to another in response to changes in supply (including integration of intermittent resources like wind power) and demand, or in response to planned or unplanned generation or transmission outages.

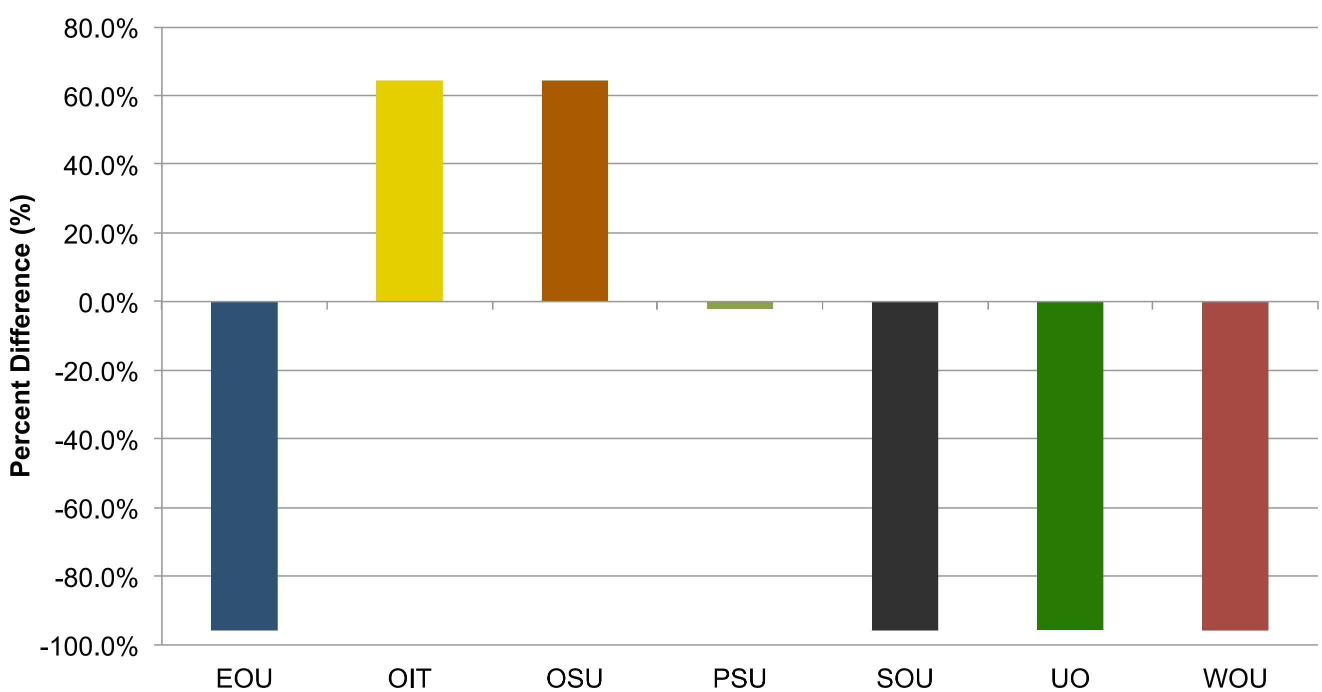
This interconnectedness includes even large entities, not just small ones like the utilities serving EOU, SOU and WOU. Even electricity from BPA, which in 2011 supplied the large majority of public power in the Northwest (and the overwhelming share of the region's hydropower), relies on the external grid to some extent. While BPA's portfolio of power resources is primarily hydroelectric power plants, it also includes nuclear and biomass, as well as market purchases that include coal- and natural gas-based power generation.

Furthermore, there is a time variance to the carbon intensity of electricity that GHG inventories do not generally address. BPA provides the best example for our region: in wetter years, like 2011, the fraction of BPA's power portfolio from hydroelectric resources increases while the fraction of market purchases decreases. This results in less carbon intense power in wetter years for both BPA and its customers. The converse is true as well: drier years result in decreased hydropower generation.

In recognition of these (and other) complications, reporting of electricity emissions is evolving. Two major organizations involved in setting standards for greenhouse gas accounting, The Climate Registry and World Resources Institute, are both in the midst of multi-year stakeholder processes to update protocols and guidance for reporting electricity-related emissions. The simplification presented here is, we believe, current best practice, but all OUS institutions will want to revisit these issues in future GHG inventory and climate action planning efforts.

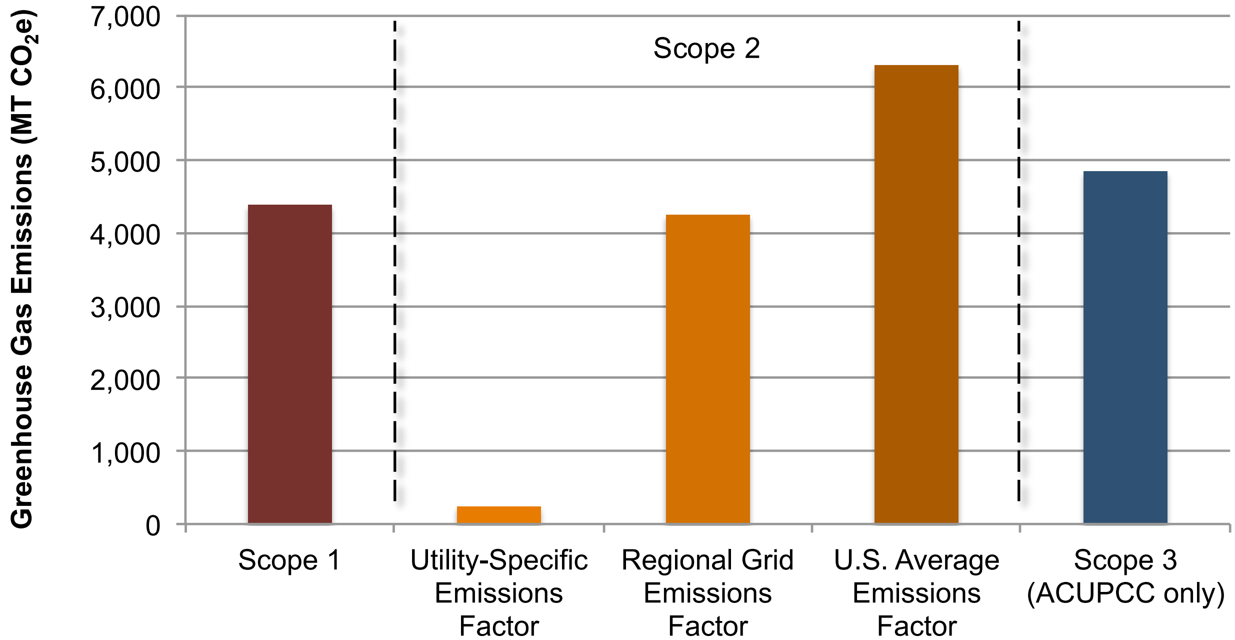
Figure 55 emphasizes the extent to which utility-specific emissions factors differ. The bars for each utility-specific number represents a percentage above or below the regional number, the eGRID results for NWPP. The four bars far below the line (EOU, SOU, UO, WOU) are for institutions served by municipal utilities that draw overwhelmingly on hydropower. OIT and OSU purchase their power from Pacific Power, the regional utility that has the most carbon-intensive portfolio. PSU is served by Portland General Electric, whose portfolio's carbon intensity is almost identical to the regional average carbon intensity.

Figure 55: Comparison of the carbon intensity of utility-specific emissions factors and eGRID



The selection of an electricity emissions factor affects the presentation and interpretation of results at the institutional level. Figure 56 provides the example of WOU. Clearly, the different versions of electricity-related emissions (Scope 2) differ enormously from each other, but they also differ to a similar magnitude from Scope 1 and Scope 3 results. In short, the selection of an electricity emissions factor can significantly alter electricity results *and* the relative perception of all other results.

Figure 56: Comparison of Electricity Emissions using Local, Regional, and U.S. Emissions Factors



APPENDIX C: REVISION TO EMISSIONS FACTORS FOR LANDFILL DISPOSAL OF SOLID WASTE

The following describes the adjustment made the *Campus Carbon Calculator* and the associated rationale for that adjustment.

Emissions factor adjustment: The emissions factors used in the *Campus Carbon Calculator* have been adjusted to remove the credit given in the WARM emissions factors for landfill carbon sequestration and account *only* for gross landfill emissions. See **RF 12-511**. The CH_4 emission factors in column C were calculated using the values for mixed MSW from Exhibit 17 of the WARM model's landfill documentation[17] and adjusted to exclude the credit given for carbon storage in Exhibit 16 of the and electricity generation (for CH_4 recovery and electric generation only).

Methodology-based rationale: The basis for this change is consistency with entity-level carbon accounting that quantifies direct effects from direct and indirect activities, i.e., attributional life-cycle analysis (LCA). Such an approach asks the same question of all activities: What is the effect of this activity on atmospheric concentrations of greenhouse gases? Using WARM's emissions factors and including a credit for carbon sequestration in landfills would instead represent a consequential LCA approach that "takes credit" for sequestration during other activities in other life-cycle stages. The actual decrease in atmospheric CO_2 does not occur at the landfill; rather, it occurs in upstream activities, such as the growth of biological inputs in forestry and agriculture. Life-cycle carbon accounting will capture that sequestration at earlier life-cycle stages.

Protocol-based rationale: Major carbon accounting protocols, such as The Climate Registry's *General Reporting Protocol* and World Resources Institute's *Greenhouse Gas Protocol*, imply attributional accounting, rather than consequential accounting. The appropriate way to include these indirect emissions associated with other life-cycle stages is in setting boundaries that include the carbon-sequestering activities in the GHG inventory. If carbon sequestration occurs during biological activity in the production of an agricultural input for a product (e.g., wood for furniture) or fuel (e.g., soy for biofuel), then again, life-cycle carbon accounting for those purchases will capture that sequestration at that earlier life-cycle stage. But in that case the boundaries must include those upstream activities in order to include this credit in the GHG inventory.

Relationship to supply chain carbon accounting: Using WARM's landfill credit is especially misleading in the absence of detailed supply chain carbon accounting (for which there was no scope in the current study). WARM focuses on emissions impacts of waste management; it does not quantify upstream production emissions for the materials that ultimately generate carbon sequestration credit in the model. In other words, EPA is accounting for a material-related carbon sequestration credit, but not accounting for the debit required to produce the materials (i.e., emissions related to harvest and manufacture of products using these biological inputs). Instead of using WARM's landfill credit, a better path would involve more granular supply chain carbon accounting.

The aforementioned revision to landfill emission factor in the *Campus Carbon Calculator* was applied to the four GHG inventories (and *Campus Carbon Calculators*) that Good Company was directly responsible for completing (EOU, OIT, SOU and WOU). The remaining three institutions, PSU, OSU and UO used the default setting in the *Campus Carbon Calculator*. The default settings result in a negative value (i.e., the amount of carbon sequestration and displacement as materials are disposed of in landfills) for landfills collecting landfill gas and using it to generate electricity, which applies to 6 of 7 OUS institutions. The institution-specific results presented in Section 5 of this report (for PSU, OSU and UO) show these negative values as 0 MT CO_2e instead of as a negative value. Ideally all inventories would use the same methodology.

[17] Details of EPA's WARM landfill disposal document may be downloaded at http://epa.gov/epawaste/conserve/tools/warm/pdfs/Landfilling.pdf.

APPENDIX D: 1990 GHG BASELINE FOR BUILDING ENERGY

This section provides the complete contents of a memo that Good Company completed for OUS on September 6, 2009.

OVERVIEW AND RESULTS

This memo provides an estimate of 1990 building energy use and the associated greenhouse gas (GHG) emissions for Oregon University System's seven institutions. This GHG calculation or "carbon footprint" is accompanied by a sensitivity analysis to scale the uncertainty in the calculation.

The Oregon University System, as part of its climate action planning process, seeks to put its current GHG inventory in the context of past emissions. In particular, Governor Kulongoski has issued an executive order that asks for reductions relative to 1990, the base year for consideration by the Kyoto protocol. While institutions and the system as a whole are free to pursue other more binding goals, there is a pressing need to establish this baseline to ensure compliance with the governor's stated intent. Specifically, there is a focus on building energy use, the single largest source of direct emissions and electricity-related emissions.

Establishing such a baseline is difficult. In the intervening twenty years, few institutions have maintained comprehensive records of facilities operations at this granular level. Many institutions did not, at that time, track energy use in the detail necessary to perform these calculations. Indeed, there have been data-related challenges simply in establishing data for 2004 to the present, much less for 1990.

This memo combines complete recent data, incomplete 1990 data, and a multi-year building energy survey for the Western United States, the Commercial Buildings Energy Consumption Survey (CBECS). In brief, the method assesses the value of CBECS as a proxy for current energy use by OUS institutions, then estimates 1990 use with the resulting proxy values. Energy use corrections are made for changes in building square footage. The energy use data is used to calculate GHG emissions. Corrections are made for the changes in the electricity generation mix (and modest increase in carbon intensity) of the regional grid since 1990.

As a last but crucial step, there is extensive sensitivity analysis to provide a sense of the scale of uncertainty in the estimates. The large range is driven by the lack of complete data for 1990 energy use, as well as the challenges in using CBECS to estimate energy use for specific contexts. This final section indicates potential improvements to the data that are likely to be high-leverage opportunities for narrowing the uncertainty. For more, please see the source spreadsheets that contain all original data, estimated data and calculations.

In highest-level summary, the resulting emissions were calculated as follows:

Figure 57: Comparison of 2008 GHG emissions to estimated 1990 emissions baseline with uncertainty range

2008 Building Energy Emissions	1990 Baseline Building Energy Emissions	1990 - High Estimate	1990 - Low Estimate
188,779 MT CO_2e*	Point Estimate: **153,187 MT CO_2e**	178,528 (17% above point estimate)	118,375 (23% below point estimate)

**Value includes natural gas and electricity emissions (regional emissions factor) taken from Sightlines GHG inventory.*

Greenhouse gas emissions from building energy use in 2008 were about 23% higher than the 1990 baseline. In other words, OUS institutions must, in aggregate reduce 2008 emissions from building energy by about 19% to get back to 1990 levels.

Over the same period, total square footage of the six institutions covered here (excluding WOU) rose 15.4%, from 16.369 million to 18.895 million gross square feet (GSF).

The estimated emissions calculated for each institution are as follows:

Figure 58: Summary of 1990 GHG baseline, by OUS institution, with uncertainty range

OUS Institution	1990 estimate MT CO_2e	low estimate MT CO_2e	high estimate MT CO_2e
Eastern	**6,014**	4,484	8,830
Portland State	**23,342**	20,773	30,394
Southern	**10,710**	7,969	11,742
Western	**9,523**	7,098	10,440
U of O	**51,597**	36,867	56,556
Oregon State	**49,855**	39,359	58,130
OIT	**2,146**	1,826	2,436
Totals:	**153,187**	118,375	178,528

DESCRIPTION OF METHOD

This method of estimating the 1990 baseline for energy consumption and associated greenhouse gas (GHG) emissions required two primary pieces of information: the average energy intensity (energy use per square foot) of university buildings in 1990 and the emissions factor for electricity produced in the Northwest Power Pool (NWPP).

1990 Energy Consumption Baseline

Average electricity and natural gas intensity (energy consumed / square foot) statistics are available in the Energy Information Administration's *Commercial Building Energy Consumption Survey (CBECS)*[18]. The survey has been conducted in 2003, 1999, 1995, and 1992. The surveys provide average electricity and natural gas intensities by principal building use for the western census region (everything west of the Rockies from the northern to southern US borders). The principal building types included in the survey, that fit university activities include: education, food service, health care, lodging, office, public assembly and warehouse and storage.

The CBECS statistics were assigned to each university building, by primary building type (as assigned by Sightlines), to estimate electricity and natural gas consumption for 1990, using the intensities reported in the 1992 CBECS survey. Building inventories were assembled for Sightlines' work that included the construction year for all institutions. The CBECS statistics were assigned to buildings constructed prior to 1990 (so buildings constructed in 1989 were included but those constructed in 1990 were not) to estimate electricity and natural gas consumption.

The CBECS building type classified as "health care" was assigned to those buildings classified by Sightlines as "scientific research" buildings. The CBECS statistics do not capture the function of a university scientific research building in any of their primary building categories. McKinstry recently

[18] The Commercial Buildings Energy Consumption Survey (CBECS) is a national sample survey that collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. Commercial buildings include all buildings in which at least half of the floor space is used for a purpose that is not residential, industrial, or agricultural, so they include building types that might not traditionally be considered "commercial," such as schools, correctional institutions, and buildings used for religious worship. The CBECS website is accessed at: http://www.eia.doe.gov/emeu/cbecs/

measured energy consumption for scientific research buildings on a number of OUS campuses; when averaged, these measured EUI values are most comparable to the CBECS statistics for the "health care" category.

Figure 59: Comparison of CBECS electricity and natural gas statistics for 1992 and 2003

Principal Building Activity	1992 Electricity Energy Intensity (kWh / square foot)	2003 Electricity Energy Intensity (kWh / square foot)	1992 Natural Gas Energy Intensity (cubic feet / square foot)	2003 Natural Gas Energy Intensity (cubic feet / square foot)	1992 Energy Use Intensity (kBTU / square foot)	2003 Energy Use Intensity (kBTU / square foot)
Education	10.9	10.2	36.6	39.6	74.5	75.2
Food Sales	49.8	**49.8**	Not Included in Survey	Not Included in Survey	Not Applicable	Not Applicable
Food Service	45.3	31.9	189.1	**189.1**	347.4	301.7
Health Care	19.7	22.5	59.8	86.1	128.2	164.6
Lodging	28	14.7	90.4	56.6	187.7	107.9
Retail (other than mall)	10.8	14.8	38.2	18.3	75.8	69.2
Office	17.4	15	28.2	23	88.1	74.6
Public Assembly	12.7	16	41.5	32.4	85.7	87.6
Public Order and Safety	Not Included in Survey	Not Included in Survey	Not Included in Survey	Not Included in Survey	Not Included in Survey	Not Included in Survey
Religious Worship	2.5	3.6	17.2	18.1	26.1	30.7
Service	**11.4**	11.4	Not Included in Survey	Not Included in Survey	Not Applicable	Not Applicable
Warehouse and Storage	6.3	7.3	14.5	**14.5**	36.3	39.7
Other	15.6	**15.6**	Not Included in Survey	Not Included in Survey	Not Applicable	Not Applicable
Vacant	6.8	**6.8**	28.6	**28.6**	52.4	23.2
Parking Garage	6.5	**6.5**	Not Included in Survey	Not Included in Survey	Not Applicable	Not Included in Survey

Note: *Bold values on the table indicate where 1992 data was substituted for a value that was missing from the 2003 survey. Values for some categories (in this case some principal building types) are not reported for some surveys due lack of data.*

1990 Emissions Factors

Electricity - The factors needed to calculate the emissions factor for the electricity produced in the Northwest Power Pool (NWPP) subregion are provided in a Washington State - Department of Community, Trade & Economic Development (CTED) report titled *Methodology for Estimating 1990 Electricity Load-based Emissions for Washington State*[19]. The report provides the NWPP's 1990 total electricity generation and the associated emissions with that generation. The total 1990 NWPP emissions are divided by the total 1990 electricity generation to determine the 1990 emissions factor (MT CO_2 / MWh). This method results in a 1990 emissions factor of 0.3179 MT CO_2 / MWh. For comparison, the most recent eGRID value for the NWPP is 0.4093 MT CO_2 / MWh.

The 1990 emissions factors for methane (CH_4) and nitrous oxide (N_2O) are not estimated in the CTED report, so these emissions are estimated using the 2006 U.S. EPA eGRID values. It is acknowledged that these values may differ from actual 1990 values, but will still be very small compared to the CO_2 emissions factor.

Natural Gas – The emissions factors are taken from The Climate Registry's *General Reporting Protocol (version 1.1)*[20]. The emissions factors used in this analysis were published in 2008. It is used for this analysis with the assumption that the heat and carbon content of natural gas is not significantly different from 1990. The carbon dioxide (CO_2) emissions factor is a weighted U.S. average based on the heat and carbon contents of the natural gas (page 74). The methane (CH_4) and nitrous oxide (N_2O) emissions factors are for a commercial-sector boiler (page 80). The GHG emissions factor used in this analysis for natural gas is 53.36 kg CO_2e / MMBTU.

Wood and Wood Waste (12% moisture) – The University of Oregon used wood waste as fuel in 1990 which has since been replaced by natural gas. Based on interviews with the operations staff, it is assumed that 100% of the 1990 heat content as estimated by CBECS for natural gas was actually produced by wood waste. UO was not the biggest estimated user of natural gas in 1990, but the usage made up 18% of the total estimated 1990 energy consumption.

[19] The CTED report may be accessed online at: http://www.ecy.wa.gov/climatechange/TWGdocs/ene/1990WALoad-basedElectricitysectoremissions.pdf
[20] The Climate Registry, *General Reporting Protocol* may be downloaded at: http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/

Emissions for UO were calculated using a wood waste emissions factor. This emissions factor only takes into account “tailpipe” emissions, not life-cycle emissions, and as such is almost double the GHG emissions per MMBTU compared to natural gas. This method is being used per California Climate Action Registry’s *Power Generation/Electric Utility Reporting Protocol*. As of this writing, policy consensus on the net impact on climate from the combustion of biofuels has not yet been reached. In the absence of detailed information on the sources of the wood waste, it is inappropriate to make assumptions about the forest practices that led to this energy feedstock. Accordingly, this analysis draws on default emissions factors from high-consensus protocols.

The emissions factors for wood and wood waste are taken from The Climate Registry’s *General Reporting Protocol (version 1.1)*. The emissions factors used in this analysis were published in 2008. It is used for this analysis with the assumption that the heat and carbon content of wood and wood waste is not significantly different from 1990. The carbon dioxide (CO_2) emissions factor is a based on the heat and carbon contents of the wood and wood waste (page 74). The methane (CH_4) and nitrous oxide (N_20) emissions factors are for a commercial-sector technology (page 80). The GHG emissions factor used in this analysis for wood waste is 93.22 kg CO_2e / MMBTU.

Description of Calculations

The following equations represent the proposed method of estimating 1990 energy consumption for the OUS system and the associated GHG emissions. Figure 60 shows this method for in general terms for total energy consumption (electricity and natural gas). Figure 61 shows the specific equations used for electricity and natural gas respectively.

Figure 60: General formula and description of variables used to estimate 1990 emissions

$$\text{GHGs}_{\text{total energy use}} = \frac{\text{GHGs}}{\text{unit of energy}} \times \frac{\text{unit of energy}}{\text{square footage}} \times \text{square footage}$$

Variable	Variable Description
GHGs	An estimate of greenhouse gases generated from total energy consumption during the 1990 fiscal year.
GHGs / unit of energy	This term represents the emissions factor for all energy consumed regardless of type. In practice a separate emissions factor will be used for electricity and natural gas.
Unit of energy / square footage	This term represents the CBECS statistics used to estimate 1990 energy consumption (for electricity and natural gas) for each campus. These statistics are specific to the western census region and the primary building type. For more information see the 1990 Energy Consumption Baseline section of this report.
Square footage	Existing building data provided to Sightlines by each institution will be used to determine 1990 building square footage by primary building type.

Figure 61a: Formula and description of variables to estimate electricity emissions

$$GHGs_{\text{electricity use}} = \frac{GHGs}{kWh} \times \frac{kWh}{\text{square footage}} \times \text{square footage}$$

Variable	Variable Description
GHGs	An estimate of greenhouse gases generated from electricity during the 1990 fiscal year.
GHGs / kWh	This term represents the emissions factor for all electricity. The 1990 emissions factor for the Northwest Power Pool (NWPP) is taken from a CTED report. See the Emissions Factors section of this memo for more detail.
kWh / square footage	This term represents the CBECS statistics used to estimate 1990 electricity consumption for each campus. These statistics are specific to the western census region and the primary building type. For more information see the 1990 Energy Consumption Baseline section of this report.
Square footage	Existing building data provided to Sightlines by each institution will be used to determine 1990 building square footage by primary building type.

Figure 61b: Formula and description of variables to estimate natural gas emissions

$$GHGs_{\text{natural gas/wood waste use}} = \frac{GHGs}{\text{cubic foot}} \times \frac{\text{cubic feet}}{\text{square feet}} \times \text{square feet}$$

Variable	Variable Description
GHGs	An estimate of greenhouse gases generated from natural gas or wood waste during the 1990 fiscal year.
GHGs / cubic foot	This term represents the emissions factor for natural gas. The 1990 emissions factor for natural gas and wood or wood waste is taken from The Climate Registry *General Reporting Protocol (version 1.1)*. These emissions factors are not specific to 1990, but the current value for both are assumed to be equal to the 1990 value. We assume the current heat and carbon content of natural gas and wood in 2009 is very similar to 1990.
cubic foot / square footage	This term represents the CBECS statistics used to estimate 1990 natural gas consumption for each campus. These statistics are specific to the western census region and the primary building type. For more information see the 1990 Energy Consumption Baseline section of this report.
square footage	Existing building data provided to Sightlines by each institution will be used to determine 1990 building square footage by primary building type.

Figure 61c: Formula for CBECS-based estimate of 1990 emissions for electricity and natural gas

$$\text{1990 Electricity and Natural Gas Estimate}_{\text{university } i} = \frac{\text{CBECS } 1990_i}{\left(\frac{\text{CBECS } 2004}{\text{Actual } 2004}\right)_i}$$

DATA SOURCES, DATA ISSUES AND SOURCES OF UNCERTAINTY

This method has significant sources of uncertainty, but it is currently the only defensible process for estimating building energy consumption. The only truly accurate method to establish a 1990 consumption baseline is digging into facilities records and / or determining if your utilities retain records from 1990.

The first source of uncertainty is the assumption that electricity and natural gas are consumed at every building included in the Sightlines building inventories. Having a knowledgeable representative from each institution conduct a line-by-line review of the estimation spreadsheet could significantly reduce this source of uncertainty.

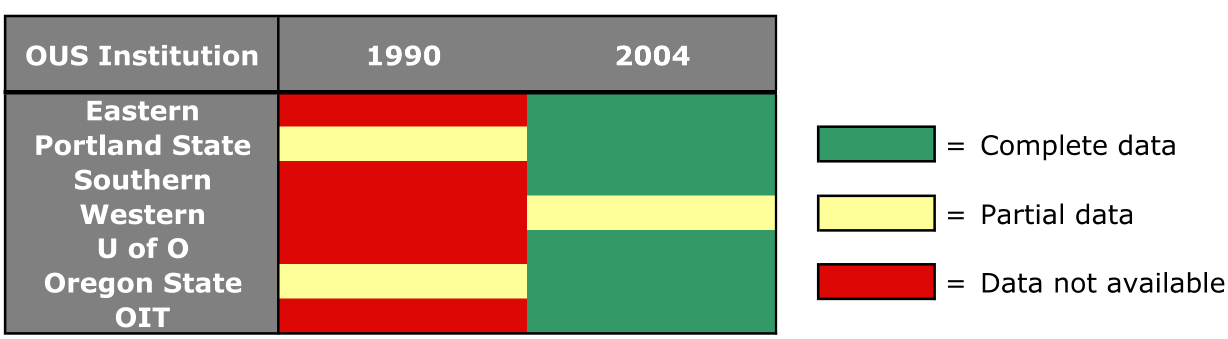
A second source of uncertainty is that CBECS statistics are based on averages from the Western region. This means the average energy intensity statistics are most likely skewed by mixing dramatically different climate zones. For example the heating needs of Phoenix or Los Angeles are dramatically different than those in Eugene or Corvallis, which may result in an underestimate of CBECS natural gas intensity statistics when applied to Oregon.

The third source of uncertainty is the inability of the CBECS statistics to account for on-site electricity, steam or chilled water generation. On-site generation could affect the consumption of both electricity and natural gas, depending largely on the extent of co-generation by a campus power plant.

A fourth source is that CBECS provides energy intensity values for electricity and natural gas, but no other sources of fuel. For example, it is known that the University of Oregon consumed hog fuel in 1990 at its campus power plant. With the CBECS statistics it is not possible to estimate the quantity of hog fuel consumed. This is especially significant when calculating emissions. The emissions factor and generation equipment efficiency could be significantly different, but are difficult to account for using this method.

A fifth source of uncertainty lies in the lack of good data for *any* of the institutions, for 1990 or for a nearby proxy year. The estimates for PSU and OSU are based on partial data; those datasets have limitations, but even the limitations are not entirely clear. For example, Oregon State was able to provide 1990 electricity and natural gas consumption, but is currently unable to determine if these values are based on use records or some method of estimation. There is therefore some question about what activities these values actually cover. Second, Portland State provided utilities information for FY1993 that is partial in facilities scope (only 22 buildings out of 50+ buildings in the portfolio in that year) and in time (for certain buildings, several months were missing and had to be interpolated from surrounding months).

Figure 62: Building inventory and energy consumption data availability, by OUS institution



Sensitivity Analysis

This section provides an attempt to scale the uncertainty associated with the estimated values for energy use and resulting GHG emissions, by institution and by fuel (electricity or natural gas).

The figures below present the estimated range of uncertainty for electricity use and natural gas use, by institution. The high and low values are based on *the widest observed diversion from the CBECS benchmark for all institutions*. In other words, the high values (for electricity and for natural gas) assume that all institutions are at the same ratio of the CBECS benchmark, the highest observed for any one institution. Similarly, the low values assume that all institutions are at the lowest ratios for any one institution. This method is probably quite cautious, as it assumes that each institution could, in 1990, fall along the spectrum experienced in 2004 (relative to CBECS) for *all institutions*. Since the institutions are likely to be more similar to themselves over time rather than to each other, this method probably overstates the likely plausible range.

Figure 63: Sensitivity analysis for electricity consumption in 1990, by OUS institution

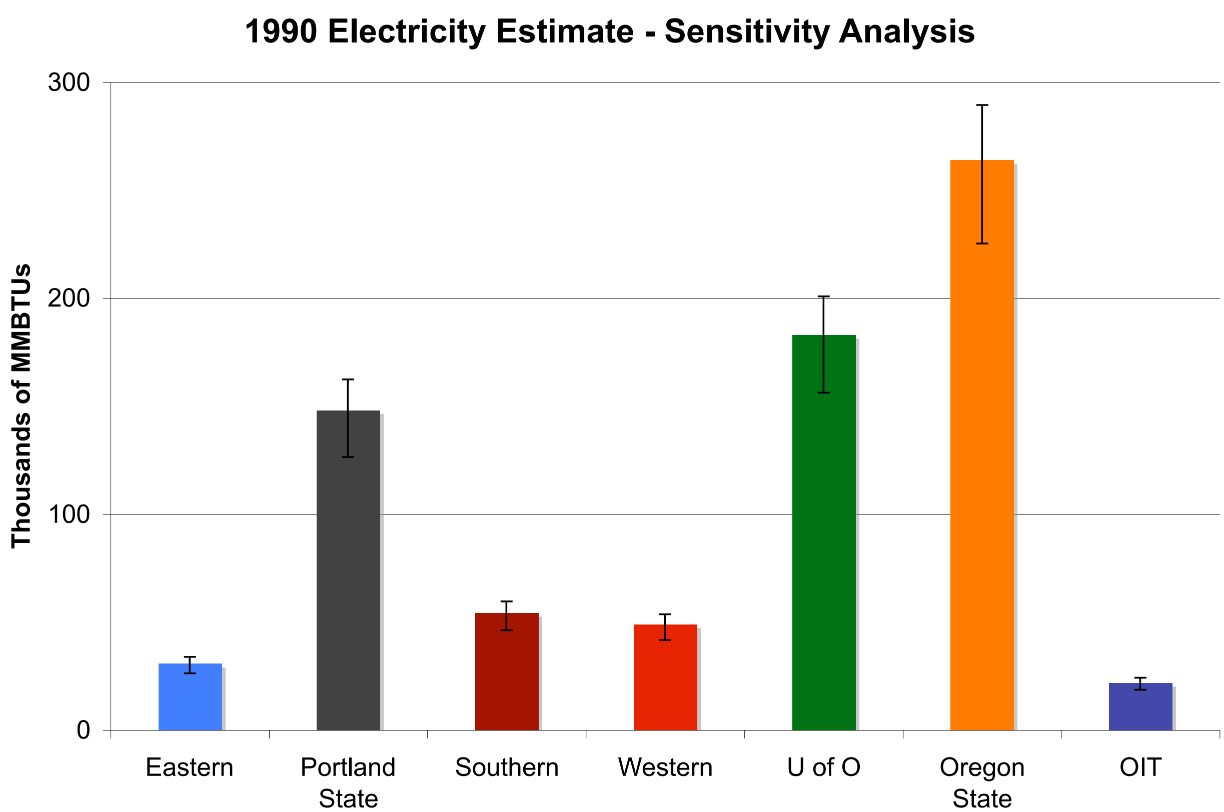
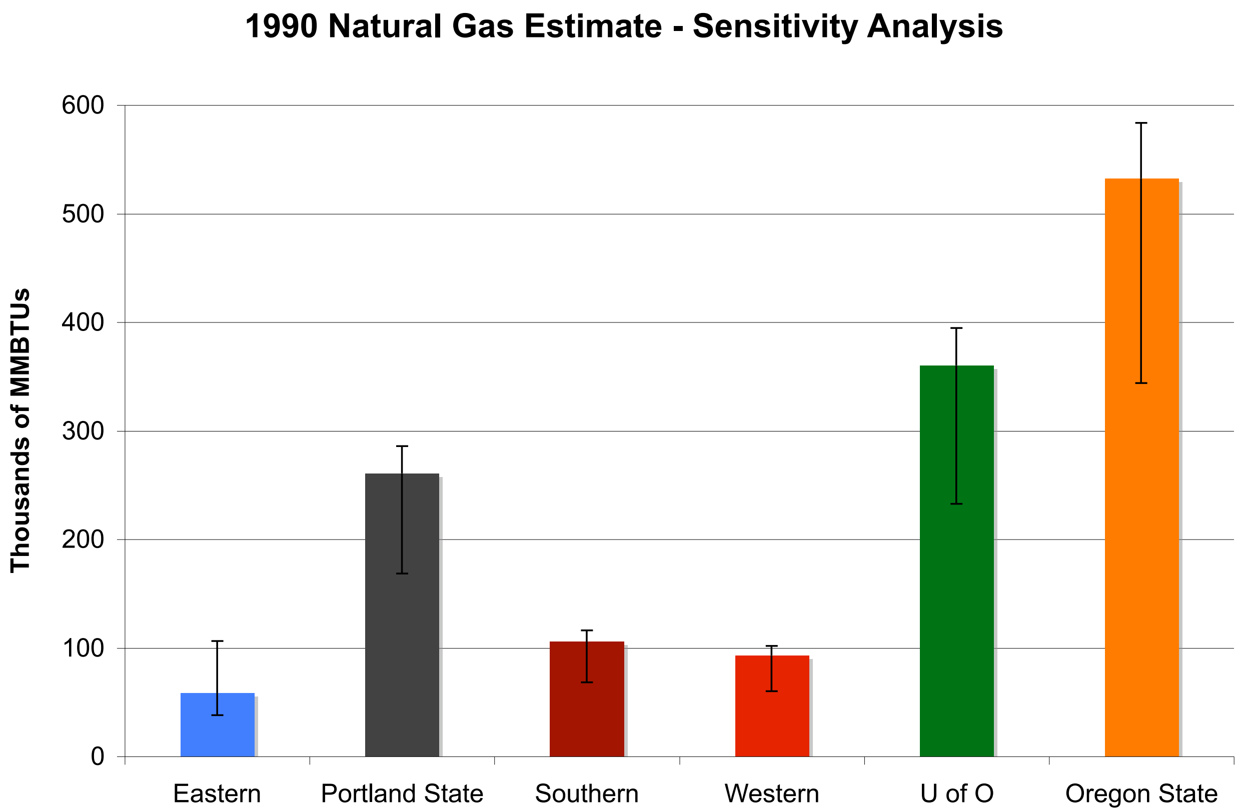


Figure 64: Sensitivity analysis for natural gas consumption in 1990, by OUS institution



Note: *OIT is excluded from the natural gas calculations because its consumption is negligible (as a result of its geothermal resource). Therefore, its consumption relative to the CBECS benchmark provides no guidance regarding to the other institutions' consumption.*

There is no additional sensitivity analysis necessary in translating electricity and natural gas consumption into greenhouse gas emissions. Thus, the range of estimates of energy consumption *is*, with appropriate unit conversions (to MT CO_2e), the range of GHG calculations. Figures 65 and 66 below show the GHG conversions from the underlying data used to generate the graph above.

Figure 65: 1990 estimates of GHG emissions from electricity, by OUS Institution

OUS Institution	1990 point estimate MT CO_2e	low estimate MT CO_2e	high estimate MT CO_2e
Eastern	**2,884**	2,462	3,164
Portland State	**13,797**	11,780	15,135
Southern	**5,061**	4,321	5,552
Western	**4,557**	3,891	4,999
U of O	**17,062**	14,568	18,717
Oregon State	**24,606**	21,009	26,994
OIT	**2,054**	1,754	2,253
OUS Emissions:	**70,020**	59,785	76,814

Figure 66: 1990 estimates of GHG emissions from natural gas (or wood waste), by OUS institution

OUS Institution	1990 estimate MT CO_2e	low estimate MT CO_2e	high estimate MT CO_2e
Eastern	**3,130**	2,021	5,666
Portland State	**9,545**	8,993	15,259
Southern	**5,650**	3,648	6,190
Western	**4,966**	3,207	5,441
U of O	**34,535**	22,299	37,838
Oregon State	**25,249**	18,350	31,136
OIT	**92**	72	183
OUS Emissions:	**83,167**	58,590	101,713

Note: *University of Oregon emissions are estimated using the wood and wood waste emissions factor and should be considered and reported as biogenic GHG emissions per California Climate Action Registry Power Generation/Electric Utility Reporting Protocol.*

The sums of these ranges provide the overall range for the 1990 GHG baseline, as presented on the first page of this memo. To recap:

Figure 67: Summary of 1990 GHG baseline, with uncertainty range

2008 Building Energy Emissions	1990 Baseline Building Energy Emissions	1990 - High Estimate	1990 - Low Estimate
188,779 MT CO_2e*	Point Estimate: **153,187 MT CO_2e**	178,528 (17% above point estimate)	118,375 (23% below point estimate)

**Value includes natural gas and electricity emissions (regional emissions factor) taken from Sightlines GHG inventory.*

The following tables provide the electricity, natural gas and total energy use in tabular form.

Figure 68: Estimates of 1990 electricity use, actual data and CBECS benchmarks

OUS Institution	1990 / 1993			2004	
	1990 estimate Thousands of MMBTUs	constructed actual Thousands of MMBTUs	CBECS benchmark Thousands of MMBTUs	actual Thousands of MMBTUs	CBECS benchmark Thousands of MMBTUs
Eastern	31	-	39	32	33
Portland State	148	101	185	158	171
Southern	54	-	68	38	59
Western	49	-	61	33	53
U of O	183	-	229	156	262
Oregon State	264	215	330	287	309
OIT	22	-	28	24	25

Figure 69: Estimates of 1990 natural gas / wood waste use, actual data and CBECS benchmarks

OUS Institution	1990 / 1993			2004	
	1990 estimate	constructed actual	CBECS benchmark	actual	CBECS benchmark
	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs
Eastern	59	-	36	63	32
Portland State	261	97	158	120	153
Southern	106	-	64	81	56
Western	93	-	56	74	51
U of O	360	-	218	493	249
Oregon State	533	414	322	564	305
OIT	2	-	27	1	23

Note: *The Sightlines-reported value for PSU's FY2008 natural gas consumption was substituted for the 2004 consumption. This change was necessary because the 2004 value reported in the Sightlines GHG inventory is implausibly low, in addition to known accounting changes due to changes in PSU's service providers for building management and energy.*

Figure 70: Estimates of 1990 total building energy use, actual data and CBECS benchmarks

OUS Institution	1990 / 1993			2004	
	1990 estimate	constructed actual	CBECS benchmark	actual	CBECS benchmark
	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs	Thousands of MMBTUs
Eastern	90	-	74	95	65
Portland State	409	198	343	278	323
Southern	160	-	132	119	115
Western	142	-	118	107	104
U of O	543	-	447	649	510
Oregon State	797	629	653	852	614
OIT	24	-	54	25	48

Note: *Values for the CBECS benchmarks in Figure 70 are merely the sums from the previous two tables.*

APPENDIX E: EMBODIED GHG EMISSIONS IN OUS PURCHASED GOODS AND SERVICES

This section provides the complete contents of a memo that Good Company completed for OUS on September 4, 2009.

OVERVIEW AND RESULTS

A life-cycle greenhouse gas (GHG) analysis using Carnegie Mellon's *Economic Input-Output Life-Cycle Assessment (EIO-LCA)* model was conducted for all supply chain purchases (including goods, food and services) by the Oregon University System's (OUS) seven institutions in fiscal year 2008. This analysis estimates the quantity of GHG emissions produced during the course of raw material extraction, production and transportation of goods and services, up to the point of retail.

The responsibility for embodied emissions in purchases is not equal to the responsibility for emissions produced directly by operations and owned equipment, such as the combustion of fossil fuels. The embodied emissions are clearly *shared*, as the responsibility for the activities is in the hands of both vendors (who control the production processes directly) and OUS institutions, which purchase (and rely upon) the fruits of these labors.

Figure 71 presents the scale of the embodied emissions estimated in this analysis. It compares the embodied emissions in OUS's purchased goods, food and services (Scope 3 – supply chain) to all other OUS fiscal year 2008 emissions sources (Scopes 1, 2 and all other Scope 3 sources required by ACUPCC), aggregated by Scope category. As can be seen, the embodied emissions at ~232,000 metric tons of carbon dioxide equivalent (MT CO_2e) are almost equal to all Scope 1 and 2 emissions combined (~244,000 MT CO_2e). This result may be surprising, but consider that this estimate of embodied emissions includes purchases totaling more than $600 million.

Figure 71: Embodied emissions in the OUS supply chain versus other GHG inventory emissions sources

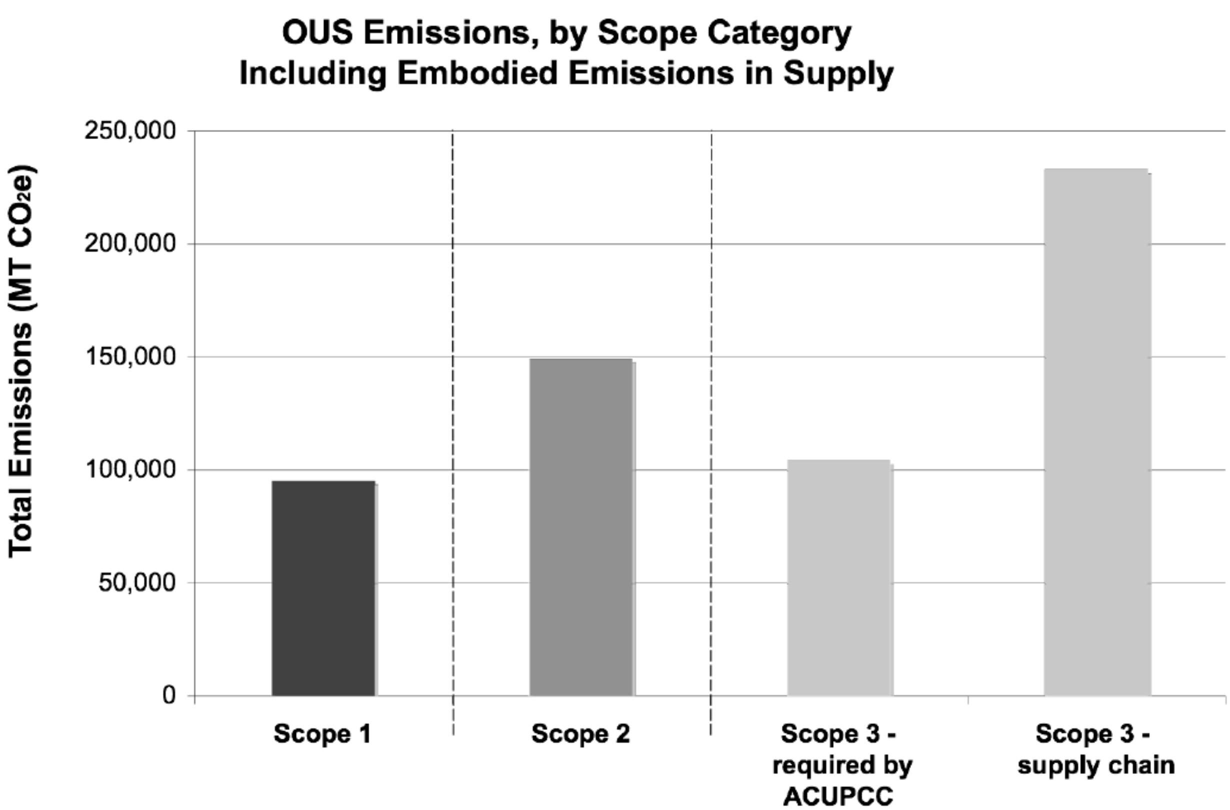


Figure 72 presents the results of the analysis in greater detail. Expenditures for fiscal year 2008 are shown in the center column, while total emissions for each individual university are shown in the far right-hand column. The scale of embodied emissions for each institution roughly correlates with the scale of expenditures. As such, 66% of the estimated embodied emissions result from the purchases of OUS's two largest institutions, Oregon State University and the University of Oregon, that together represent about 65% of purchases considered here.

Figure 72: Fiscal year expenditures and embodied emissions in purchases, by institution

Institution	2008 Fiscal-Year Expenditures (included in analysis) $	Total Emissions MT CO_2e
Eastern Oregon University	$7,595,934	**3,465**
Oregon Institute of Technology	$19,441,690	**7,208**
Oregon State University	$212,949,292	**84,917**
Portland State University	$123,938,519	**42,394**
Southern Oregon University	$31,089,760	**12,897**
University of Oregon	$188,347,875	**69,809**
Western Oregon University	$29,188,263	**12,228**
OUS Totals:	**$612,551,332**	**232,917**

Figure 73 presents the total embodied emissions from five aggregated purchasing categories. The first four categories listed below are large discrete categories (buildings, resale merchandise, information technology, printing) of individual expense accounts grouped by like items, while the last is a catchall category for items that do not fit into any of the first four categories.

- **Buildings:** Includes the labor and materials used in building construction, renovation and maintenance as well as the rental of various types of facilities.
- **Resale Merchandise:** Includes all items purchased for resale at on-campus stores. This group includes a wide variety of items including foods, health care products, clothing, computers, books, etc.
- **Information Technology:** Includes computer and telephone hardware, software and associated services.
- **Commercial Printing:** Includes commercial printing, materials duplication (copying), book publishing and book, reference materials and periodical purchases.
- **Other Goods and Services:** Includes "all other" goods and services that were not included in the first four categories and were not large enough to be grouped into a separate category. This category includes widely disperate economic sectors that include: laboratory chemicals and equipment, office supplies, vehicles, furniture, catered food, medical services, legal services, insurance, veterinary services, advertising, real estate services and office administration.

Figure 73 shows that building-related embodied emissions are the largest aggregated category, contributing 43% of OUS's embodied emissions. This is typical for organizations with large building portfolios, such as higher education institutions or municipal governments. The next largest large discrete category is resale merchandise at 15%, which is not surprising considering that OUS institutions spent nearly $40 million procuring items for resale, of which about 75% are food items that generally have large emissions factors.

Due to space limitations in this memo the full detail of EIO-LCA analysis is not included. The process is fully captured and transparent in an accompanying Excel spreadsheet that is available upon request.

Figure 73: FY2008 embodied emissions by purchasing category

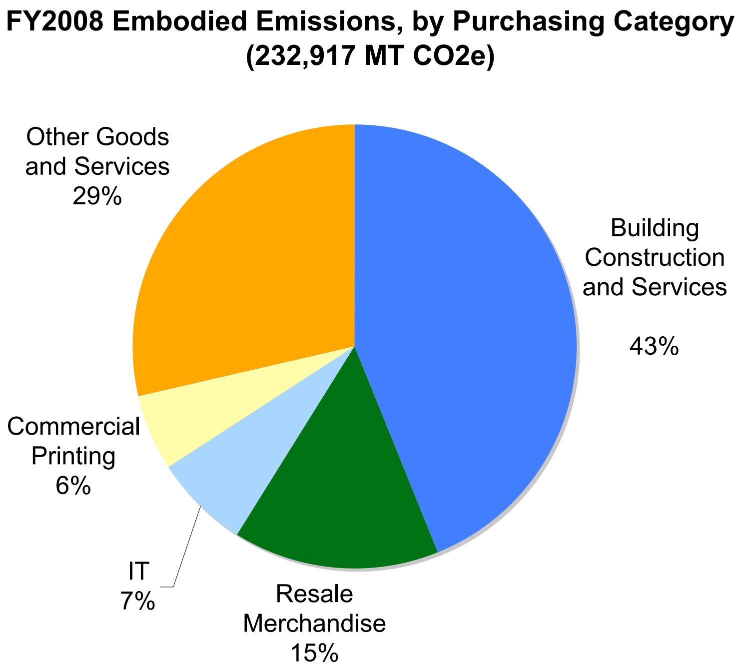


Figure 74 presents the results of the analysis in full detail.

Figure 74: Embodied emissions in purchased goods and services, by institution and purchasing category

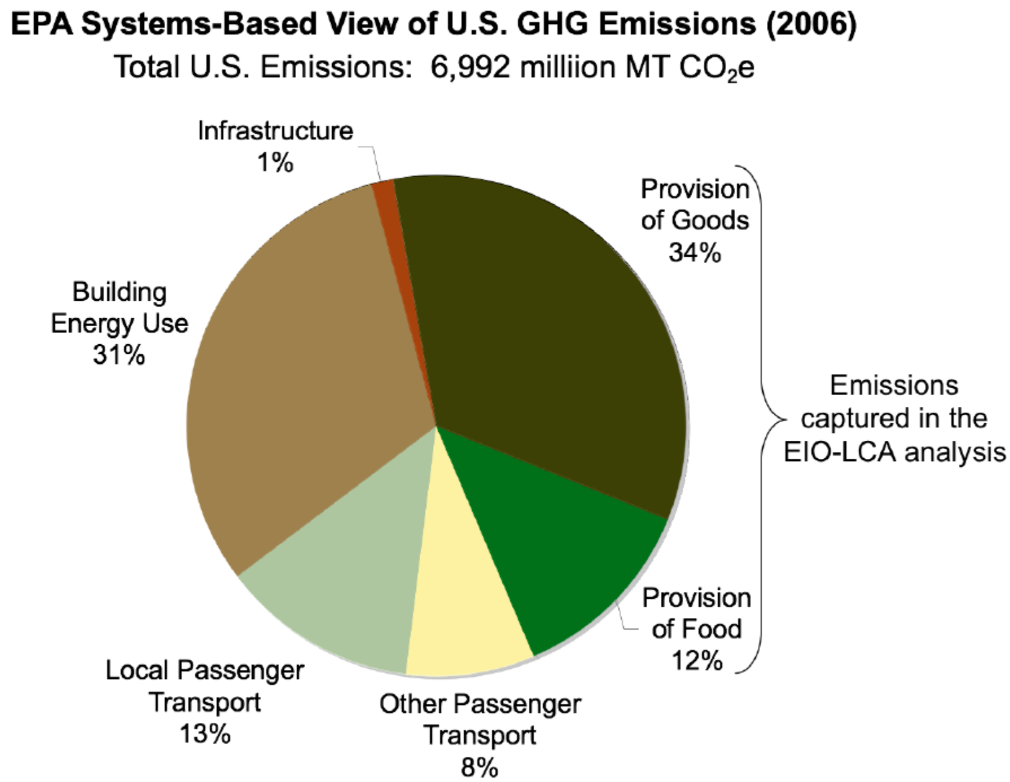
Institution	2008 Fiscal-Year Expenditures (included in analysis)	Buildings (Construction, Renovation, Maintenance, Rental)	Resale Merchandise	Information Technology	Commercial Printing	Other Goods and Services	Total Emissions
	$	MT CO_2e	MT CO_2e	MT CO_2e	MT CO_2e	MT CO_2e	MT CO_2e
Eastern Oregon University	$7,595,934	889	679	310	159	1,427	**3,465**
Oregon Institute of Technology	$19,441,690	3,193	1,207	354	332	2,122	**7,208**
Oregon State University	$212,949,292	33,946	9,450	6,722	4,336	30,463	**84,917**
Portland State University	$123,938,519	25,492	3,095	2,774	1,419	9,612	**42,394**
Southern Oregon University	$31,089,760	4,995	4,176	868	467	2,391	**12,897**
University of Oregon	$188,347,875	29,170	12,387	4,505	5,912	17,835	**69,809**
Western Oregon University	$29,188,263	4,715	3,518	1,027	362	2,606	**12,228**
OUS Totals:	**$612,551,332**	**102,399**	**34,513**	**16,561**	**12,987**	**66,456**	**232,917**
% of Emissions Total:		44.0%	14.8%	7.1%	5.6%	28.5%	

CONTEXT AND MOTIVATION

The emissions generated by the manufacture and distribution of goods, food and services are a large share of total emissions for the U.S. economy and for other economies, and the summary results above reflect this fact. This result will surprise some readers because common practice for GHG inventories has typically excluded these difficult-to-quantify emissions sources that lie beyond the day-to-day operations and direct control of entities that purchase these goods, food and services.

A recent EPA analysis provides the motivation for including the supply chain in GHG inventories. The accompanying graph (Figure 75) provides the core insight: the production of goods and food together make up nearly half of all U.S. GHG emissions.

Figure 75: Overview of U.S. GHG emissions in 2006



Source: *Unpublished analysis (2008 draft) by US Environmental Protection Agency Office of Solid Waste and Emergency Response.*

This insight, however, poses a challenge. How does a purchaser – whether an individual, business, government agency or higher education institution – address this complex portion of the carbon footprint? Indeed, the analysis herein provides little guidance for action because of the complexity of this segment of OUS' carbon footprint.

The scale of these emissions requires that a thorough GHG inventory and climate action plan address them, even if with less precision than enjoyed in the quantification of other emissions sources. Given that universities and colleges are part of the economy-wide systems that emit greenhouse gases, it is imperative that ACUPCC signatories begin to assign a sense of scale to these emissions. We must build our knowledge and intuition today to be able to identify strategies for GHG reduction tomorrow.

DESCRIPTION OF METHOD

This analysis method used for this analysis follows the EIO-LCA method described in UC Berkeley's *Climate Action Partnership Feasibility Study 2006-2007 Final Report*, but refines UC Berkley's method by correcting for inflation.

The approach used for this estimate is Carnegie Mellon University – Green Design Institute's *Economic Input-Output Life Cycle Assessment* (EIO-LCA), U.S. 1997 Industry Benchmark model. Researchers at the Green Design Institute have developed this free online tool (available online at www.eiolca.net) to estimate life-cycle greenhouse gas emissions of economic activity in each of 491 sectors of the U.S. economy.

The model is valuable for simple, cost-effective emissions *estimates*. The strength of the model is its ability to provide comprehensive estimates by using aggregate values for all goods and services in the 491 sectors. Its weakness is that it cannot provide a detailed estimate for specific processes. In order to accurately estimate embodied emissions for a specific purchase, that product's specific supply chain must be assessed. This alternative is typically extremely time-consuming and often relies on data from many private sources.

The model has several significant sources of uncertainty. The first is that it is based on United States industry averages. These averages do not include the influence of major U.S. trading partners such as China on emissions factors, nor does the model have the ability to account for specific sourcing practices such as a higher than average percentage of post-consumer recycled content in paper products. Second, the model relies on a relatively old data set from 1997, which will not capture recent efficiency improvements or best practices that result in lower emissions for specific industrial sectors. This data set also requires adjustments to be made to account for inflation (see below). Finally, organizational accounting codes don't always directly map to the economic sectors included in the model.

Carnegie Mellon does not provide an estimate of uncertainty. Still, even if the level of uncertainty were quite high (say, ±50%), correcting the point estimate (of 232,917 MT CO_2e) would give a low end of the range of 116,459 MT CO_2e. This low estimate is still greater than all of OUS's Scope 1 emissions sources combined (95,164 MT CO_2e).

In broad terms, the EIO-LCA method consists of utilizing the following equation to estimate total CO_2-equivalent emissions for various areas of expenditure:

$$\frac{CO_2e}{\$} \cdot \$ = CO_2e$$

In other words, the estimate stems from multiplying the carbon intensity of a given economic sector per dollar of output (the first term) by the quantity of purchases (the second term). This product is summed across purchasing categories, which differ in both carbon intensity and total dollars spent.

It is noted that the EIO-LCA model asks for the production cost of each item, but the retail price (price paid for any given item) is what is readily available and was used in the 2008 Inventory. It is also noted that this calculator is last updated in 1997 and means that some simple refinements need to be made in the method. The initial calculations suffer from the distortions of price level, as described above. While this is rarely a problem over a short period (a year or two), the decade between the EIO-LCA database's creation and this inventory's calculations created an issue. We therefore attempt to correct for this change in price level.

Price-level refinements to EIO-LCA model

The initial calculations suffered from the distortions of price level, as described above. While this is rarely a problem over a short period (a year or two), the decade between the EIO-LCA database's creation and this inventory's calculations created an issue. We therefore attempted to correct for this change in price level.

Specifically, we made two corrections. First, for the large bulk of purchases (excluding those related to construction), we adjusted the calculations by the Consumer Price Index[21], the standard and official measure of retail inflation for the US economy. Second, we adjusted all construction expenditures (one of the largest areas of procurement) by a construction price index (Turner Building Cost Index[22]) that, while not official government data, is well known and has decades of history.

[21] More information on the Consumer Price Index may be found on the Bureau of Labor Statistics website at http://www.bls.gov/CPI/.
[22] To download a copy of the Turner Building Cost Index report visit http://www.turnerconstruction.com/corporate/content.asp?d=20.

The results of these corrections made a significant difference, lowering the general (non-construction) procurement footprint estimate by more than 20% and lowering the construction-related procurement footprint by more than 40%. Because of the central role of prices for purchased goods in using the EIO-LCA methodology, these corrections are likely to bring the overall estimate much closer to the truth.

EIO-LCA Method

The following steps were used to conduct this analysis for the OUS analysis.

1. Received fiscal year 2008 expense report from Oregon University System's central accounting department. This report included annual expenses by OUS account codes for each of the seven OUS institutions.
2. The raw data was reviewed and certain account codes were removed to avoid double counting (electricity, fuels, etc.) as well as account codes that were accounting functions with relatively large expense (employee salaries, taxes, etc.). These accounting functions were removed because the low carbon intensity of the function combined with a large expense would overestimate emissions.
3. The remaining account codes were assigned to economic sectors found in the EIO-LCA tool. In some cases there was no direct match, so multiple economic sectors were averaged to create an emissions factor for the account code.
4. The EIO-LCA model[23] is used to generate an emissions factor (GHGs / million dollars) for each assigned economic sector.
5. The EIO-LCA emissions factors are captured in a spreadsheet and emissions are calculated for each economic sector.
6. Calculated emissions are corrected for inflation using the CPI and Turner Cost Index.

[23] The Economic Input-Output Life-Cycle Assessment model may be accessed at www.eiolca.net.