

OREGON STATE UNIVERSITY

# Greenhouse Gas Inventory Fiscal Year 2012

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## Definitions of Key Terms

- (1) “**Carbon dioxide**” (CO<sub>2</sub>) means the chemical compound containing one atom of carbon and two atoms of oxygen.
- (2) “**Carbon dioxide equivalent**” (CO<sub>2</sub>e) represents the quantity of a greenhouse gas multiplied by a Global Warming Potential (GWP) factor, relative to CO<sub>2</sub>. This is the “standard unit” used to quantify various greenhouse gasses.
- (3) “**Global Warming Potential factor**” (GWP) means the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. For instance, methane (CH<sub>4</sub>) has a GWP of 23, meaning that every gram of methane will trap 23 times as much solar radiation as a gram of CO<sub>2</sub>.
- (4) “**Radiative Forcing Index**” (RFI) is a multiplier designed to account for the effects on climate an emission source will cause in addition to the release of fossil carbon. The RFI is most commonly used for aviation emissions, where it accounts for the effects of releasing greenhouse gases at altitude. The Intergovernmental Panel on Climate Change (IPCC) has [estimated the RFI](#) multiplier for aviation at 2.0-4.0.
- (5) “**Greenhouse gas**” (GHG) is any gas that contributes to anthropogenic global warming including, but not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.
- (6) “**Metric ton, tonne, or metric tonne**” (t) means one metric tonne (1000 kilograms) or 2204.62 pounds.
- (7) “**Total emissions**” is the calculated sum of GHGs emitted due to OSU-related activities.
- (8) “**Net emissions**” is the calculated sum of GHGs emitted minus renewable energy certificates, composting activities and carbon offsets.
- (9) “**Renewable energy source**” means any source of energy that is replenished rapidly by natural processes. Renewable sources may include, but are not limited to, wind, solar, hydroelectric, biomass, geothermal, tidal or sea currents etc.
- (10) “**Statewides**” refers to the inventory that analyzes emissions from statewide, legislatively-mandated OSU entities, specifically the Agricultural Experiment Stations (AES), Extension Service and the Forest Research Laboratory (FRL).
- (11) “**Renewable Energy Certificate**” (REC) is a tradable certificate that represents a unit of energy produced by renewable energy sources. The owner of a REC can claim that they are using renewable energy equal to the amount of RECs owned.

(12) “**Bonneville Environmental Foundation (BEF)**” is a Portland-based non-profit that specializes in carbon offsets, mainly renewable energy certificates (RECs). These credits increase the volume of clean, renewable energy that enters the electrical grid. OSU purchases RECs from BEF as part of the student renewable energy fee.

(13) “**Renewable energy fee**” refers to the student-approved initiative that directs \$8.50 per term per student towards the purchase of RECs. These RECs offset a large percent of OSU’s electrical consumption with additions of clean, renewable energy to the electrical grid.

(14) “**World Business Council for Sustainable Development (WBCSD)**” is a global association of business representatives that deals exclusively with business and sustainable development.

(15) “**Greenhouse Gas Protocol (GHGP)**” is an internationally-used accounting tool that allows business and governmental leaders to understand, quantify and manage greenhouse gas emissions. It provides a framework for nearly every greenhouse gas standard and program in the world. The WBCSD was an original partner in drafting and creating the GHGP.

(16) “**Intergovernmental Panel on Climate Change (IPCC)**” is a scientific body established to provide policymakers with an objective source of information on climate change. The IPCC performs no research nor does it monitor climate data; it instead offers analysis of research and climate data as an objective body with a broad range of views, expertise and wide geographical coverage.

(17) “**Clean Air-Cool Planet**” (CA-CP) is a non-partisan, non-profit organization that aims to find and promote solutions to global climate change. Their carbon calculator is used by many campuses for calculating emissions.

(18) “**American College and University Presidents Climate Commitment**” (ACUPCC) is an effort to encourage commitments from institutions of higher learning to neutralize greenhouse gas emissions and prioritize the research and education efforts aimed at stabilizing earth’s climate.

## Definition Sources

Oregon Department of Environmental Quality: [www.deq.state.or.us](http://www.deq.state.or.us)

Bonneville Environmental Foundation: [www.greentagsusa.org](http://www.greentagsusa.org)

World Business Council for Sustainable Development: [www.wbcsd.org](http://www.wbcsd.org)

Greenhouse Gas Protocol: [www.ghgprotocol.org](http://www.ghgprotocol.org)

Intergovernmental Panel on Climate Change: [www.ipcc.ch](http://www.ipcc.ch)

Clean Air-Cool Planet: <http://www.cleanair-coolplanet.org/>

American College and University Presidents Climate Commitment:

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



## Executive Summary

Oregon State University (OSU) aspires to be among the top 10 colleges and universities in the United States recognized for excellence in sustainability. OSU consistently places among the top 25 for sustainability efforts and this Fiscal Year 2012 (FY12) OSU Greenhouse Gas (GHG) Inventory Report demonstrates progress toward that goal. Since OSU President Ed Ray's April 2007 signing of the American College and University Presidents Climate Commitment (ACUPCC), OSU has made progress toward an ambitious goal of becoming climate neutral by 2025. This report is an update and expansion of the [FY11](#), [FY10](#), [FY09](#), [FY08](#) and [FY07](#) OSU GHG inventories, which themselves are expansions of a [CY04 inventory](#) commissioned by the Oregon University System (OUS).

The FY12 inventory provides:

1. A snapshot of OSU emissions: quantified greenhouse gas emissions resulting from OSU-related activities for the fiscal year ending June 30, 2012.
2. Comparison with prior OSU inventories: a comparative analysis with FY07, FY08, FY09, FY10 and FY11 emissions.
3. Guidance for future inventories: the methodology, successes, challenges and rationale of this expanded report provides a framework for future OSU reports.

### *Findings in Brief*

- Total gross emissions of 135,501.8 metric tonnes (t) carbon dioxide equivalent (CO<sub>2</sub>e), a **4.2% decrease** from FY11
  - This decrease was mainly due to electricity production at the Energy Center, which generates electricity with fewer emissions than electricity purchased from the utility
  - Decreased air travel and other directly financed travel also resulted in lower gross emissions
- Net emissions of 126,815.6 t CO<sub>2</sub>e, a **85.1% increase** from FY11
  - This increase was due primarily to the large purchase of renewable energy certificates in FY11 that OSU did not purchase for FY12
- Gross emissions per full-time equivalent (FTE) student of 6.02 t CO<sub>2</sub>e, a **0.7% decrease** from FY11
- Gross emissions per 1000 square foot of 18.3 t CO<sub>2</sub>e, a **0.09% decrease** from FY11

<b>Table 1. OSU Comprehensive Emissions by Scope (t CO<sub>2</sub>e)</b>						
	<b>FY07</b>	<b>FY08</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>	<b>FY12</b>
<b>Scope 1</b>						
Gross Emissions	36,511.4	39,419.0	37,920.3	42,475.5	54,498.8	58,017.6
Net Emissions	36,511.4	39,419.0	37,920.3	42,475.5	54,498.8	56,285.5
<b>Scope 2</b>						
Gross Emissions	76,043.0	78,575.5	72,559.4	75,467.5	53,593.4	41,466.9
Net Emissions	75,023.3	24,953.6	23,000.3	36,885.3	(19,250.3)	34,512.7
<b>Scope 3</b>						
Gross Emissions	37,340.6	36,923.0	34,288.4	33,434.6	33,407.6	36,017.3
Net Emissions	37,338.7	36,917.2	34,282.6	33,302.2	33,275.2	36,017.3
<b>Total</b>						
Gross Emissions	149,895.0	154,917.5	144,768.1	151,377.6	141,499.8	135,501.8
Net Emissions	148,873.4	101,289.8	95,203.2	112,663.0	68,523.7	126,815.6

- Table 1 illustrates the total gross and net emissions by scope for the FY07, FY08, FY09, FY10, FY11 and FY12 inventories.
- Scope 1 emissions are mainly from fossil fuel combustion, refrigerants and agriculture; Scope 2 emissions are from purchased electricity; Scope 3 emissions include air travel, other university financed travel (personal mileage reimbursement, Athletics bus travel, etc.), commute, solid waste, and line losses due to the transmission and generation of electricity. Under the guidance of the ACUPCC, OSU is responsible for mitigation of emissions from Scope 1 and 2, as well as emissions from commute and air travel.
- *Net* emissions of 121,320.7 t CO<sub>2</sub>e that OSU is required to mitigate by the ACUPCC.
- Gross emissions from operations in Corvallis represent 94.6% of total university emissions.

Changes in *net* emissions from the major emissions sources are shown in the Table 2 below.

<b>Emissions Sources</b>	<b>FY12 Net Emissions (t CO2e)</b>	<b>% of Net Emissions</b>	<b>% Change in Net Emissions from FY11</b>
<b>Purchased Electricity</b>	38,614	30.4%	N/A
<b>Stationary Sources</b>	3,958	3.1%	3.3%
<b>Fleet &amp; Maintenance</b>	2,247	1.8%	6.5%
<b>Agriculture</b>	1,434	1.1%	-53.7%
<b>Solid Waste</b>	(79)	-0.1%	5.6%
<b>Refrigerants</b>	400	0.3%	0.0%
<b>Commute</b>	9,294	7.3%	-5.1%
<b>Air Travel</b>	21,164	16.7%	26.7%
<b>Other Directly Financed Travel</b>	1,536	1.2%	-9.1%
<b>Cogeneration</b>	48,247	38.0%	55.7%
<b>Total Net</b>	126,816	100.0%	85.1%

Potentially significant emissions sources not included:

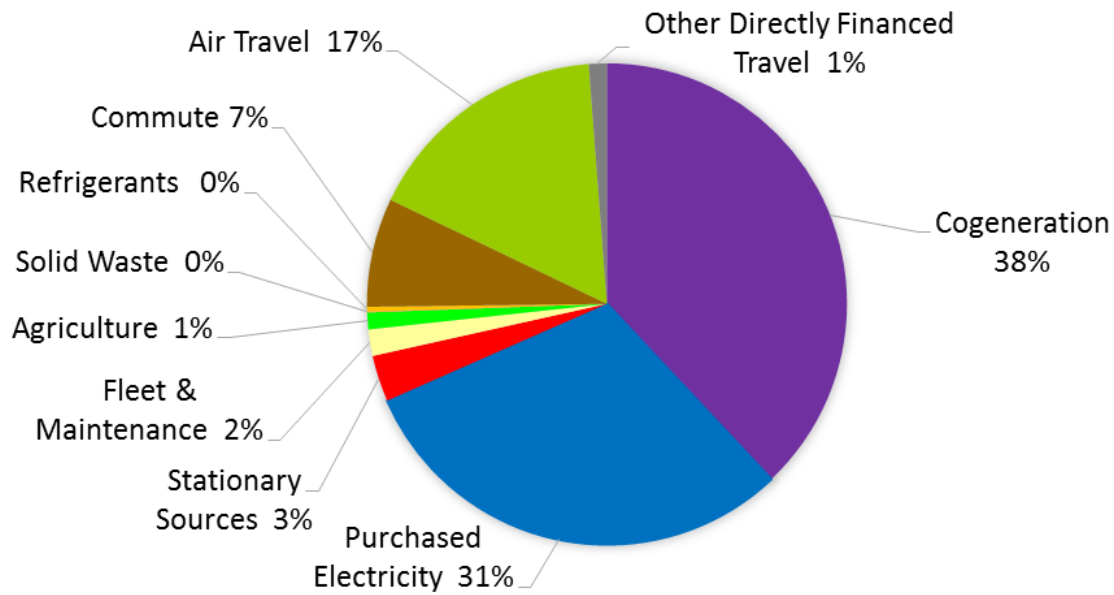
- Long-distance student travel, including study abroad travel
- Lifecycle/embodied emissions of purchased goods and materials
- Transportation and processing of materials to be recycled
- Water treatment and distribution
- Solid waste, commuting and fleet emissions for Statewides, HMSC and OSU-Cascades
- Some OSU Athletics team travel

### ***Changes since the FY11 Inventory***

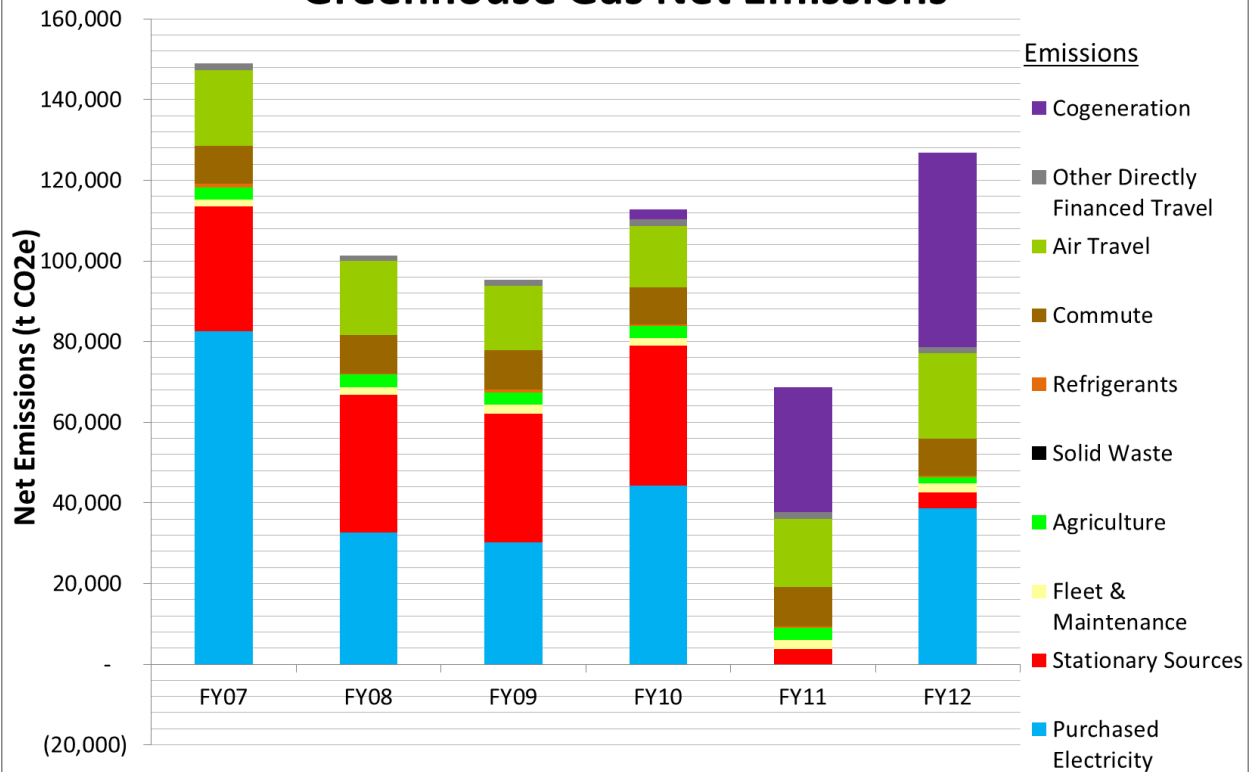
- Emissions sources included for the first time in FY12 are:
  - Electricity sales to the grid via the Energy Center
  - Travel Solutions travel agency is no longer used
- Emissions sources with a significant change in emission calculation methodology include:
  - Solid waste

Please see the [Analysis of Data and Results](#) section for more details regarding these sources and improvements.

## FY12 OSU Comprehensive Greenhouse Gas Emissions



## Comparison of Annual OSU Comprehensive Greenhouse Gas Net Emissions



## Introduction

Oregon State University's sixth annual comprehensive greenhouse gas inventory again reflects a continual improvement of data collection methods and analyses. This report contains a few changes since the previous annual report issued for Fiscal Year 2011. Although not reflected in this shorter report, constructing an inventory with this level of detail is now, more than ever, a monumental task.

In an effort to streamline the report format, the OSU Sustainability Office has moved to a reporting structure that highlights changes in methods from year to year. Rather than include text that largely remains static, the authors will, when appropriate, direct readers to past reports for specific details and references.

As was the case for the FY11 report, the science and methods behind best-practice inventory work is ever-evolving, making year-to-year comparisons complex. Greenhouse gas measurement is an increasingly important state and national issue. OSU's inventory processes exceeds (with a comfortable margin) the strictest regulatory requirements. Feedback is appreciated on this document and the processes used to create it. Please visit <http://oregonstate.edu/sustainability/climate> for details and updates.

## Methodology

### *Overview*

With operations as broad and far-reaching as Oregon State University's, the largest task in creating this FY12 inventory was data collection. Extensive data were gathered from central sources and from OSU entities across the state. Most large sources of GHG emissions are accounted for in their entirety. Omissions are described in the Boundaries section. This is the most complete inventory of OSU's GHG emissions performed to date.

The CA-CP calculator was chosen again for FY12 due to its focus on university and college campuses, ease of comparison with past inventories and its endorsement by the ACUPCC, of which OSU is a charter signatory. Other reasons for selecting this tool can be found on page 12 of the [FY08 report](#).

### *Scope and Boundaries*

Identifying scope and boundaries issues is a critical step in emissions reporting. While some connections to emissions sources – like electrical consumption – are direct, others, such as employee commuting or student air travel to and from the university, are not. In an effort to measure all emissions resulting from OSU activity, the boundaries were drawn to be fairly broad: any emissions from an entity over which OSU has financial and/or operational control were included.

FY12 essentially mirrors the methodology and reporting structure of FY11; a brief history of past reporting structures and the rationale for changes can be found on page 13 of the [FY09 report](#).

Unless otherwise noted, data comparing fiscal years and university-wide totals are drawn from the OSU Comprehensive inventory. Emissions sources like air travel and rental cars were attributed to OSU Corvallis unless otherwise noted.

### ***Data Gathering and Management***

As Oregon's land, sea, space and sun grant institution, OSU facilities are spread throughout the state, requiring data from a large number of sources. Not all data were readily available or in a useable format. The need to balance timeliness with attaining trivial data resulted in some intentional omissions. Other emissions sources were omitted because of incomplete data and a limited ability to reliably extrapolate. Rationale for these omissions is discussed in further detail in the [FY08 report](#).

### ***Past Inventory Comparison***

An important function of this FY12 inventory is the ability to compare with previous inventories. Data presented in this report reflect changes in emissions between FY11 and FY12 using the highest quality data and best calculation practices available. In an effort to present the highest-quality data using the latest calculation methods, past, current and future inventories may not be absolutely comparable for all source categories. Issues of comparison over time will continue to be noted in these reports.

## **Boundaries**

### ***Overview***

In order to create the most realistic, accurate greenhouse gas inventory possible, this report's scope and boundaries expand beyond what is typically included in organizational inventories. Using terminology common to greenhouse gas reporting, most inventories examine a "Scope 1," which includes all direct emissions from sources owned or directly controlled by the subject organization. "Scope 2" sources, which cover GHG emissions that result from importing or buying electricity, steam, heated or chilled water, are also often included. "Scope 3" includes all other indirect sources of GHG emissions that result from organization activities from sources not owned or controlled by the organization. These scopes are defined by the World Business Council for Sustainable Development (WBCSD) and are used to ensure consistency and prevent double-counting or double-crediting. The Presidents' Climate Commitment requires that signatories mitigate emissions only from Scope 1 and 2 sources, as well as commute and air travel from Scope 3. Most OSU peer institutions focus on these boundaries. Our inventory aims to document all OSU emissions for

which data exist, regardless of our mitigation responsibilities. Total emissions that OSU is required to mitigate by the ACUPCC will be specifically identified throughout the report.

### **Omitted Emissions Sources and Credits**

It was not possible to precisely inventory every emissions source or credit due to diverse university operations across the state and existing business practices and accounting methods not well suited for reporting the types of data needed. Those intentional omissions are discussed below. If emissions from a source are expected to contribute more than 1% to total emissions the source is considered significant; those that are expected to contribute less than 1% are considered negligible and not included in this analysis.

The list of omitted sources is shown in Table 3:

<b>Table 3. Omitted Sources</b>	
<b>Omitted Source</b>	<b>Expected Impact</b>
Water treatment and distribution	Significant
Long-distance student travel (travel abroad, to/from home)	Significant
<u>Additional</u> biological sequestration	Significant
Lifecycle/embodyed emissions*	Significant
Off-campus vehicle use	Negligible
Incinerated waste – non-energy producing	Negligible
Recycled materials (transport and processing)	Unknown

\*A [lifecycle greenhouse gas analysis](#) was performed for the Oregon University System by [Good Company](#) in August 2009 based on the Carnegie Mellon *Economic Input-Output Life-Cycle Assessment (EIO-LCA)* model. Quantifying emissions using FY08 expenditures for food, construction, retail goods, computers, paper, lab equipment and much more, Good Company found that OSU’s emissions from the procurement of goods and services were estimated at nearly 85,000 t CO<sub>2</sub>e, or more than 64% of gross FY12 emissions.

## **Findings and Analysis**

### **Findings**

Total gross and net emissions for each inventory are shown in the Table 4 below.

	<b>FY07</b>	<b>FY08</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>	<b>FY12</b>
<b>OSU Corvallis</b>						
Gross Emissions	145,106	147,840	138,290	145,264	135,214	128,230
Net Emissions	144,084	94,212	88,725	106,851	62,579	120,024
<b>Statewides</b>						
Gross Emissions	4,789	6,337	5,693	5,491	5,578	6,331
Net Emissions	4,789	6,337	5,693	5,491	5,578	6,331
<b>OSU Cascades</b>						
Gross Emissions	N/A	604	669	650	638	637
Net Emissions	N/A	604	669	348	296	157
<b>HMSC</b>						
Gross Emissions	-	454	441	316	497	303
Net Emissions	-	454	441	316	497	303
<b>OSU Comprehensive</b>						
Gross Emissions	<b>149,895</b>	<b>155,236</b>	<b>145,093</b>	<b>151,721</b>	<b>141,926</b>	<b>135,502</b>
Net Emissions	<b>148,873</b>	<b>101,608</b>	<b>95,529</b>	<b>113,006</b>	<b>68,950</b>	<b>126,816</b>

Total FY12 gross and net emissions are displayed in Table 5.

<b>Emissions Sources</b>	<b>FY12 Gross Emissions (t CO2e)</b>	<b>% of Gross Emissions</b>	<b>% Change in Gross Emissions from FY11</b>	<b>FY12 Net Emissions (t CO2e)</b>	<b>% of Net Emissions</b>	<b>% Change in Net Emissions from FY11</b>
Purchased Electricity	45,568	33.6%	-22.6%	38,614	30.4%	N/A
Stationary Sources	3,958	2.9%	3.3%	3,958	3.1%	3.3%
Fleet & Maintenance	2,247	1.7%	6.5%	2,247	1.8%	6.5%
Agriculture	3,166	2.3%	-1.9%	1,434	1.1%	-53.7%
Solid Waste	(79)	-0.1%	5.6%	(79)	-0.1%	5.6%
Refrigerants	400	0.3%	0.0%	400	0.3%	0.0%
Commute	9,294	6.9%	-5.1%	9,294	7.3%	-5.1%
Air Travel	21,164	15.6%	26.7%	21,164	16.7%	26.7%
Other Directly Financed Travel	1,536	1.1%	-9.1%	1,536	1.2%	-9.1%
Cogeneration	48,247	35.6%	7.4%	48,247	38.0%	55.7%
<b>Total</b>	<b>135,502</b>	<b>100.0%</b>	<b>-4.2%</b>	<b>126,816</b>	<b>100.0%</b>	<b>85.1%</b>

Table 6 details offsets related to composting activities and purchase of renewable energy certificates (RECs). Wind power represents the majority of the source of RECs, which also include some biogas and biomass.

<b>Offset Type</b>	<b>FY07</b>	<b>FY08</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>	<b>FY12</b>
<b>Composting</b>	1.9	5.8	5.8	132.4	132.4	1,732.1
<b>Renewable Energy Certificates (RECs)</b>	1,006.2	52,925.3	49,184.9	38,130.5	71,522.8	6,890.5



The following comparative data are drawn from reports submitted by the institutions to the [ACUPCC Reporting System website](#).

	'12 OSU Comprehensive	'11 OSU Comprehensive	'10 OSU Comprehensive	'09 OSU Comprehensive	'08 OSU Comprehensive	'07 OSU Comprehensive	'12 OSU Expanded	'10 Cornell University	'11 Cornell University	'10 The Ohio State University	'11 The Ohio State University	'10 Utah State	'10 Utah State	'10 UC Davis	'11 Washington State	'09 Washington State
<b>Net emissions per FTE enrolled (t CO2e)</b>	5.5	3.0	5.9	5.3	5.7	8.5	10.5	10.9	12.0	13.8	5.0	5.3	9.5	8.6	8.6	
<b>Net emissions per 1000 square feet (t CO2e)</b>	16.3	10.2	16.5	14.0	14.8	21.5	13.2	15.0	30.0	31.6	13.9	14.1	18.0	13.7	13.2	

### **Analysis of Data and Results**

#### **Commute - Faculty/Staff:**

Source data changes for FY12: OSU Cascades commuting data was not collected this year.

Methodology changes since FY11: Faculty/staff commute emissions reported in the FY12 Corvallis inventory estimated emissions using a 5-mile-per-round-trip distance estimate. In the [CY04 inventory](#) commissioned by the OUS, a value of 3 miles per trip was chosen based on demographic information gathered by the consultant.

Uncertainty Analysis: For an in-depth analysis on the uncertainty relating to faculty/staff commuting, please see page 22 of the [FY09 report](#).

#### **Directly Financed Travel (excluding Air Travel):**

Source data changes for FY12: Travel Solutions is no longer a preferred travel agency of OSU, therefore there are no emissions from this source as in previous reports.

Methodology changes since FY11: None.

Uncertainty analysis: Uncertainty in this category is still an improvement compared to previous years. Some minor emissions sources still go unreported, but their impact is estimated to be less than 5% of the category total.

#### **Stationary Sources:**

Source data changes for FY12: None

## **Solid Waste:**

Source data changes for FY12: None.

Methodology changes since FY11: In past years, solid waste data was based on estimates of number of pickups, fullness of dumpsters, and density (lbs. per cubic yard) of waste. Since January 2010, OSU's waste hauler has been weighing waste hauled from OSU, providing much better detail on OSU's solid waste impacts. Also, emissions factors were update in the calculator for FY12 due to more complete information about the amount of offgassing that occurs over particular time periods for certain types of waste.

Uncertainty Analysis: Since no solid waste information was collected for any other entity besides OSU Corvallis, mainly due to data availability issues, this emissions source will undoubtedly increase as information becomes available. It is likely actual emissions from solid waste are 10-15% higher than reported here.

## ***Analysis of Data Quality***

Due to varied data quality and completeness, assumptions and extrapolations were used for the following areas: mission-related air travel, student and faculty/staff commuting for the Corvallis campus, gasoline and diesel fleet and Enterprise rental car mileage.

Areas requiring further investigation and enhanced recordkeeping include: long-distance student travel (to/from home and school); auto mileage and commute information that includes Extension, Ag. Experiment Stations, the FRL, OSU-Cascades Campus and HMSC; backup generator fuel consumption; propane use; fertilizer use; solid waste and composting.

## **Future Action**

### ***OSU Climate Plan***

As awareness and demand for action around global climate change continues to grow, requests and requirements will come from the campus community, the community at-large, and local, state and federal governments. To respond to this increasing attention and to meet the requirements of the American College and University Presidents Climate Commitment, the OSU Sustainability Office created the [OSU Climate Plan](#) in September 2009.

The Plan develops goals, frameworks and strategic steps necessary for OSU to achieve climate neutrality (no net emissions) by 2025. Intermediate goals consist of halting the growth of emissions by FY10, reducing FY12 net emissions to 10% below 1990 levels, and reducing FY20 net emissions to 75% below 1990 levels. While reducing actual emissions are a central focus of the Climate Plan, outlining steps to

further incorporate climate change awareness into education, engagement and research is also required by the ACUPCC and included in the Plan.

The Climate Plan speaks to applying a combination of three primary mitigation strategies:

- conservation and efficiency projects
- on-site renewable energy installations
- carbon offsets, renewable energy certificate purchases, and other off-site measures.

These strategies and progress toward neutrality goals are not included in this report, but are covered by a separate reporting system. This system and more information is available online at <http://oregonstate.edu/sustainability/climateplan>

### ***Creating a 1990 Baseline***

Creating an organizational baseline, or reference emissions level, is critical to goal setting and tracking progress over time and across organizations. Although detailed measurement like the kind illustrated in this report didn't begin at OSU until 2007, it is still possible to create a rough baseline for years past.

Determining an appropriate baseline year is both critical and challenging. OSU selected Fiscal Year 1990 as its baseline year due to the prevalence of 1990 as a baseline for many state, federal and international climate initiatives.

However, using 1990 as a baseline year imposes considerable challenges, including low data quality and availability. Much of the data central to emissions calculations are simply not available for this time period. When data are available, quality and scope are often questionable. IPCC emissions from sources like electricity and air travel from that time period are difficult to calculate. The combination of these factors makes estimating a 1990 baseline difficult.

OSU's 1990 baseline was calculated after analyzing a number of factors that correlate with emissions. They were: student enrollment FTE; faculty/staff FTE; gross square footage (GSF); natural gas use; and electricity use. Using a blend of historical data and estimations, FY90 emissions levels were calculated based on the rates of change of these factors.

Upon analysis of these factors, it was determined that emissions from electricity were best suited to use as a proxy for 1990 emissions. This is due to a number of reasons:

- Emissions from electricity represent a significant portion of OSU's gross emissions
- Prior to the cogeneration capability at the OSU Energy Center, the rate of consumption of natural gas and other heating fuels has closely mirrored the increase in electricity consumption; also, together, these sources accounted for nearly 75% of OSU's gross emissions

- The calculated emissions for 1990 based on electricity were “middle of the road” when compared with the other analyzed factors as well as other baseline estimations.

OSU's FY90 emissions are estimated to be 110,977 t CO<sub>2</sub>e from all major sources now included in recent GHG inventories.

In the summer of 2009, OUS contracted with [Good Company](#) to provide an estimate of 1990 emissions from buildings (essentially all Scope 1 & 2 emissions) for the seven campuses. Using campus square footage, estimated emissions coefficients for the electrical grid in 1990, and energy intensity of buildings (based on a multi-year report for the Western United States), OSU's 1990 emissions from buildings were estimated at 49,855 t CO<sub>2</sub>e.

Due to its limited scope, the Good Company estimate could not stand alone as the 1990 emissions baseline; no Scope 3 emissions (air travel, waste, commute, etc.) were included, and some Scope 1 and 2 sources (refrigerants, fleet, etc.) were also missing. However, it does provide some assurance that the 1990 baseline calculated by the OSU Sustainability Office is reasonable.

While a relatively sound estimate for 1990 emissions is important, an exact value for 1990 emissions cannot be calculated. The value of the 1990 baseline is to set a reference point for institutional emissions reductions goals.

## Findings Table

### Energy

#### Purchased Electricity (Scope 2)

Corvallis Campus purchased electricity usage for FY 2012 was 57,864,271 kWh.

The 14 Agricultural Experiment Stations (AES) consumed 4,568,646 kWh.

County Extension offices used 2,349,977 kWh.

Hatfield Marine Science Center used 1,874,526 kWh.

OSU-Cascades Campus consumed 749,009 kWh.

Four Extension offices (in Aurora, Hood River, Hermiston and Central Point) are covered in the AES data, as they are combined units of both Extension and AES and share facility space.

The CA-CP calculator allowed for a grid mix specific to the electric utility. Using information from Pacific Power the following utility grid mix was entered and used for the Corvallis Campus and OSU-Cascades Campus. Since Statewides use a more diverse electricity resources, the utility grid mix for Statewides was determined from [EPA eGrid](#) data for the Northwest Power Pool (NWPP) utility grid mix.

Pacific Power Grid Mix	
Fuel	% of total
Coal	60.3%
Natural Gas	12.2%
Hydro	8.4%
Wind	8.1%
Geothermal	0.4%
Biomass	0.4%
Other	10.3%

NWPP Sub-Regional Grid Mix	
Fuel	% of total
Coal	32.0%
Oil	0.2%
Natural Gas	12.8%
Biomass	1.1%
Hydro	48.4%
Wind	1.9%
Nuclear	3.0%
Geothermal	0.3%
Other	0.3%

Central Lincoln PUD reported the following utility grid mix for HMSC.

Central Lincoln PUD Grid Mix	
Fuel	% of total
Hydro	89.0%
Nuclear	5.0%
Other	5.6%

Total FY12 purchased electricity usage for OSU: 67,406,429 kWh.

<p><b>On-campus Cogeneration</b></p>	<p>In July 2009, the new \$40 million Energy Center, a cogeneration facility, began producing steam from its two boilers. In June 2010, it began producing electricity under non-test conditions.</p> <p>As a cogeneration facility, the Energy Center consumed 9,051,930 therms of natural gas and 74,604 gallons of diesel in FY12. It produced 170,166,212 pounds of steam and 45,860,892 kWh of electricity.</p>
<p><b>Natural Gas (Scope 1)</b></p>	<p>The Corvallis Campus consumed 535,050 therms of natural gas in FY12 not including use at the OSU Energy Center. Most of this was used for space and water heating in buildings not served by steam from the Energy Center.</p> <p>The Agricultural Experiment Stations used a combined 62,250 therms.</p> <p>The Extension Service county offices used a total of 55,574 therms.</p> <p>Hatfield Marine Science Center consumed 4,594 therms.</p> <p>Cascade campus used 20,591 therms.</p> <p>Total FY12 consumption of natural gas, excluding use at the Energy Center: 678,059 therms or 67,806 MMBtu</p>
<p><b>Steam and Chilled water purchased</b></p>	<p>N/A – no steam or chilled water is purchased from non-OSU sources.</p>
<p><b>Residual oils (#5, #6) and Distillate oils (#1, #2, #3, #4) (Scope 1)</b></p>	<p>The Corvallis Campus used 80,630 gallons of distillate oil #2 (diesel) primarily at the Energy Center when natural gas supply was curtailed. Backup generators accounted for 6,026 gallons of the total and the Energy Center accounted for 10,295 gallons, though this figure may be incomplete. Further recordkeeping is necessary.</p> <p>Agricultural Experiment Stations used 4,522 gallons of diesel #2 for heating.</p> <p>Extension Service consumed 7,716 gallons of diesel #2.</p> <p>Total FY12 consumption of distillate oil #2 (diesel) for non-transportation uses was: 92,868 gallons</p>
<p><b>Propane (Scope 1 &amp; 3)</b></p>	<p>Total documented propane use at the Corvallis Campus was 10,646 gallons, used mainly for heating, backup generator priming and forklifts. Purchasers of propane are scattered throughout campus and there is no centralized recordkeeping.</p> <p>Agricultural Experiment Stations used 13,343 gallons of propane for heating, forklifts and backup generators.</p> <p>The Extension Service used 7,001 gallons.</p> <p>Total FY12 consumption of propane: 30,991 gallons.</p>
<p><b>Incinerated Waste</b></p>	<p>The Research Animal Isolation Lab (RAIL) reported 6,185 pounds of incinerator waste for FY12. This number represents half of the fiscal year since half of the data was lost during staffing changes. Even so, the CA-CP calculator is only set up to calculate emissions for incinerators producing electricity.</p>

<b>Coal</b>	N/A – no coal is directly consumed by OSU.
<b>Solar / Wind / Biomass</b>	<p>During FY12, the Kelley Engineering Center and the OSU Solar Trailer were the only locations on the Corvallis Campus with photovoltaic (PV) solar generation. HMSC has a PV system as well. The estimated FY12 output from all sites was 7,540.67 kWh. This amount was not applied to this inventory as the energy produced reduced the buildings' electricity use.</p> <p><b>Data sources:</b> Les Walton, Energy Operations Supervisor; George Voss, Associate Director of Admin Services; Facilities Services; Carson Oil; Travis Feldsher, RAIL; Kira Billingsley, Cascades Campus Faculty and Finance Specialist; Solveig Stormo, Amerigas; Chelle Boswell, HMSC Office Specialist; numerous staff contacts at Extension county offices and Ag. Experiment Stations.</p>

## Transportation

<b>Fleet and Maintenance (Scope 1)</b>	<p><b>Gasoline</b></p> <p>Fossil fuels used in transportation are reported separately from fuels used in stationary sources. OSU has a fuel pump located at the Motor Pool that fills maintenance and fleet vehicles. There is also a credit card system that allows individuals on business trips to fill fleet vehicles wherever they wish. Total volume from these sources in FY12 was 148,933 gallons.</p> <p>OSU also received deliveries of 240 gallons of gasoline from Carson Oil. This fuel was primarily used in landscape equipment and vehicles.</p> <p>Hyslop farms received 1,157 gallons of gasoline in FY12. The fuel was primarily used in farm vehicles.</p> <p>Hatfield Marine Science Center used 1,240.3 gallons of gasoline for their fleet.</p> <p><b>Diesel</b></p> <p>On the Corvallis Campus, diesel is primarily used in the small diesel fleet run by the Motor Pool as well as in the Campus shuttles. The shuttles are fueled off-campus by First Student, the contracted service provider.</p> <p>Reported diesel use at the Campus Motor Pool filling station and the Motor Pool credit card system was 7,930 gallons.</p> <p>The shuttles used 4,537 gallons of diesel in FY12.</p> <p>HMSC also uses diesel for their research vessels and fleet vehicles. The only ship fuel information available was for the R/V Pacific Storm. Total FY12 diesel consumption for HMSC was 12,688.3 gallons.</p> <p>Total gasoline in FY12: 211,752.3 gallons</p> <p>Total diesel used in mobile sources: 31,001.3 gallons.</p> <p><b>Data sources:</b> Justin Fleming, Motor Pool Manager; Delwin Loucks, First Student; Chelle Boswell, HSMC Office Specialist; Amber Sams, Credit Dept. Carson Oil;</p>
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<p><b>Directly Financed Travel (Scope 3)</b></p>	<p>In FY12, 3.6 million miles were reimbursed by Travel Reimbursement.</p> <p>Mileage reimbursed to accounts outside of TRES totaled 129,348 miles.</p> <p>OSU also contracts rental cars through Enterprise Rent-a-Car. Enterprise reported OSU accounts driving 280,426 miles in FY12.</p> <p>Mileage driven in non-contracted vendor rental vehicles totaled 259,256 miles in FY12. These values were based on charges and reimbursements, and used data given by Enterprise to extrapolate a mileage total. Travel on non-contracted vendor rental vehicles is assumed to be the same as Enterprise.</p> <p>OSU Athletics charters buses to provide short- and long-distance transportation to its teams. Using a medium-length route with a known distance and typical cost, an extrapolation was made using bus charter payment information.</p> <p>A one-way trip to Portland Airport from the Corvallis Campus is 98 miles. The standard one-way rate to the airport is \$440 per bus. Total bus expenditures were calculated to be \$343,684. Assuming this rate of \$4.50/mi is representative of all chartered bus travel, Athletics' chartered buses drove 76,544 miles in FY12.</p> <p>In FY12, a reported 4,015,061 car miles were directly financed by OSU.</p> <p>A total of 76,544 bus miles were financed by OSU.</p> <p><b>Data sources:</b> Justin Fleming, Motor Pool Manager; Julie Stratton, Auxiliaries &amp; Activities Business Center; Stephanie Smith, Fiscal Coordinator Business Affairs; Margaret Taylor, Business Affairs; Davion Reese, Enterprise Rent-a-Car; Jacque Bruns, OSU Athletics; Brad Teel, Teel's Travel; Stephen Matusik, Account Manager Azumano Travel.</p>
<p><b>Commute (Scope 3)</b></p>	<p>It is assumed each person made one trip to campus per day. Students and staff/faculty were counted separately in the calculator. Institutional Research reports 146 teaching days per year (excluding summer) and that number was used for commuting days for students. Staff and faculty commuting days were determined by dividing the number of regular and overtime payroll hours for classified staff and faculty by the FTE of the respective classification. This method yielded 233 working days for classified staff and 245 for faculty.</p> <p>An average commute distance of 5 miles was used for personal vehicle travel and based jointly on the 2003 OSU commute survey, and a 2003 Portland State University GHG inventory estimated commute distance of 7.5 miles. While Corvallis is a much smaller community, many students commute from outside the area. More accurate information on commuting distances is needed to definitively determine commute emissions. This estimated distance was also applied to the OSU-Cascades Campus. While the estimation is reasonable, further commuting studies should be performed to better model commute patterns there.</p> <p>An average commute distance of 3 miles was used for bus travel. This reflects the likelihood of bus commuters traveling shorter distances, as the majority of the transit system is based around Corvallis.</p> <p>Staff and faculty FTE provided by Institutional Research include OSU-Cascades Campus, AES, Extension and the FRL. Commute distance and mode splits are most likely different from those of Corvallis Campus, yet no reliable commute data exists for these auxiliaries.</p> <p>Summer students were not included in commute calculations.</p>



**Data sources:** Sal Castillo, Institutional Research; Steve Nash, Payroll Manager; Rebecca Houghtaling, Senior Planner Campus Operations.

**Air Travel  
(Scope 3)**

OSU used two travel agents in FY12: Teel's Travel Planners and Azumano Travel. Travel Solutions was a third travel agent used by OSU in previous years. All provided significant amounts of information, as well as advice and guidance. Air travel is also reimbursed by OSU's Travel Reimbursement office.

Azumano Travel provided a report detailing all OSU activity booked through their firm and included mileage, number of trip segments and cost. Teel's Travel provided total number of trip segments booked by their firm for OSU groups. OSU Travel Reimbursement provided a similar list. All of these reports included non-packaged, non-tour Athletics travel.

Since Azumano had a complete report of mileage and number of segments, and both Teel's and Travel Reimbursement provided number of segments, we can extrapolate using Azumano's mileage information.

The extrapolation and calculation are:

Company	Flights/Seg	% of Total
Azumano	15,685	55.5%
Teel's	9,757	34.5%
Travel Reimbursement	2,840	10.0%
Total	28,282	100.0%

Azumano booked 12,438,887 miles for OSU.

$$\frac{15,685 \text{ Azumano flights}}{19,951,188 \text{ Azumano miles}} = \frac{28,100 \text{ total flights}}{x \text{ total miles}}$$

$$x = 35,742,963 \text{ total miles}$$

In addition, non-TRES reimbursements accounted for 72,453 miles (based on reimbursement amounts). This brings total mileage to 35,815,416 miles.

Both Teel's and Azumano stated that approximately 5% of flights will not appear in their records due to the way a couple of airlines (notably JetBlue and Southwest) ticket. One final extrapolation is needed:

$$\text{Total OSU air mileage} = (1/.95) * 35,815,416 = 37,700,438 \text{ miles}$$

All air travel emissions were applied to the OSU Corvallis Campus inventory due to lack of specific data for non-Corvallis sites.

**Assumptions:** Travel booked through Azumano is representative of all OSU travel.

For each away game, the OSU Football team charts an Airbus 320 to take the team from Eugene, OR to the game destination. Using the 2012 football schedule at <http://www.osubeavers.com/> and Webflyer.com, an airport distance calculator,

	<p>the calculated distance flown by chartered football jets was 9,822 miles.</p> <p>The European Environmental Agency<sup>1</sup> has fuel burn rates for numerous jetliners. It is estimated that for a 2,482 mile flight, an A320 will burn 11,608 kg of jet fuel.</p> <p>The following calculations were made separate from the CA-CP calculator, as it is not equipped to accurately calculate emissions resulting from a dedicated jet flight:</p> $\frac{11,608 \text{ kg fuel}}{2482 \text{ mi}} \times \frac{1 \text{ gal jet fuel}^2}{3.06 \text{ kg fuel}} \times \frac{21.095 \text{ lb CO}_2^2}{1 \text{ gal jet fuel}} \times \frac{1 \text{ t}}{2205 \text{ lbs}} = \frac{0.0146 \text{ t CO}_2}{\text{mi}}$ $\frac{0.0146 \text{ t CO}_2}{\text{mi}} \times 9,822 \text{ miles} = 143.6 \text{ t CO}_2 \times 2.8 \text{ RFI} = 402.1 \text{ t CO}_2\text{e}$ $402.1 \text{ t CO}_2\text{e} \times 0.90718474 \text{ MT} = 364.8 \text{ MT CO}_2\text{e}$ <p>Emissions resulting from chartered football air travel are reported under the Directly Financed Travel category.</p> <p><b>Data sources:</b> Brad Teel, President, Teel's Travel Planners; Julie Stratton, Business Affairs; Margaret Taylor, Business Affairs. Webflyer.com; <sup>1</sup> - European Environmental Agency Emission Inventory Guidebook <a href="http://www.eea.europa.eu/publications/EMEPCORINAIR4">http://www.eea.europa.eu/publications/EMEPCORINAIR4</a> ; <sup>2</sup>- Energy Information Agency <a href="http://www.eia.doe.gov/oiaf/1605/coefficients.html">http://www.eia.doe.gov/oiaf/1605/coefficients.html</a></p>
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## Other Major Sources

<p><b>Solid Waste (Scope 3)</b></p>	<p>Total weight of solid waste sent to Coffin Butte Landfill in FY12: 6.5 million lbs. (3,254 tons).</p> <p>Coffin Butte recovers methane and produces power, but it is unknown how much methane produced could be attributed to OSU waste.</p> <p>No solid waste information was available for the Statewides, HMSC or OSU-Cascades Campus.</p> <p><b>Data source:</b> Pete Lepre, Campus Recycling Manager</p>
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**Animals and Agriculture (Scope 1)**

**Animals**

Animals are raised and cared for at several OSU facilities. Their totals are displayed in the table below.

Type	Animal Science	Union Station	Burns Station	Vet Med	Soap Creek	Total
Dairy Cows	254	-	-	1.0	-	255
Beef Cattle	18	295	312	1.0	107.0	733
Horses	26	2	4	15.0	15.0	62
Poultry	1,500	-	-	-	-	1,500
Sheep	585	-	-	-	-	585
Swine	15	-	-	-	-	15

The College of Veterinary Medicine provided the number of treatment days for each type of animal. This annual total was divided by 365, giving a yearly equivalent for each type. One category, 'large animals' was determined to be mostly llamas and alpacas. Because the Clean Air-Cool Planet calculator had no category or emissions factor for camelids, these animals were categorized as sheep because of their size and type of digestion system.

Emissions from animals kept at the Burns and Union stations were reported under the Statewides inventory. Emissions from Animal Science and Vet Med were reported under the OSU Corvallis Campus inventory.

**Fertilizer**

Location	Weight (lbs)	% Nitrogen
Burns	0	0%
Union	12,000	36%
Corvallis Grounds	0	0%
Soap and Berry Creek	50,250	40%
Ag. Exp. Stations	266,638	26%
Total	328,888	29%

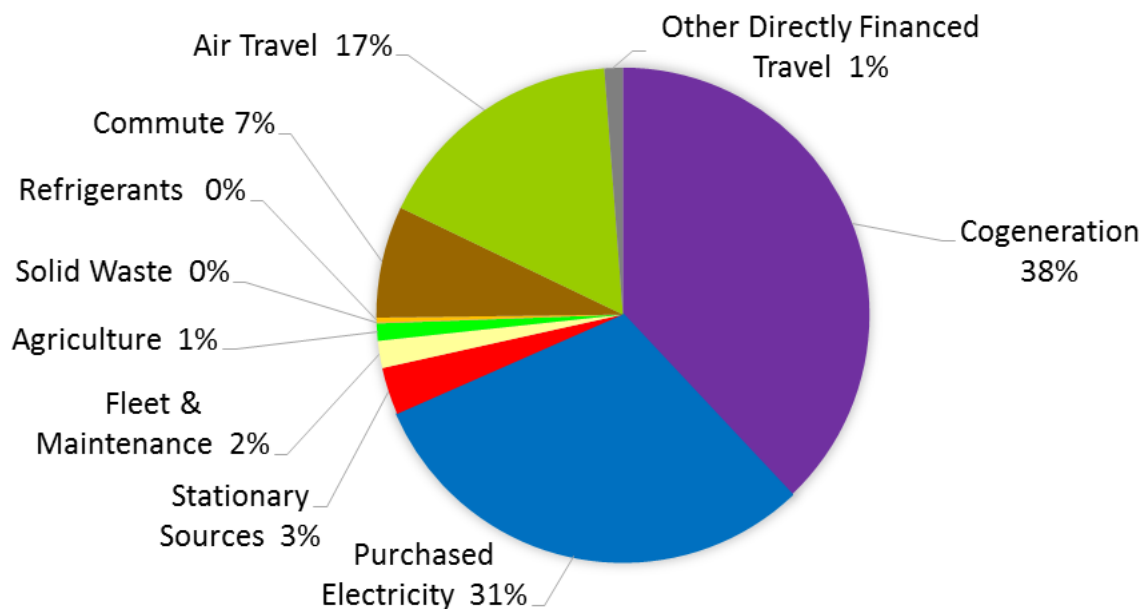
Fertilizer application on OSU grounds is inadequately tracked. Even so, this emissions source is likely small. Emissions from fertilizer applied to Burns, Union and AES grounds were reported in the Statewides inventory. Emissions from the Dairy, Corvallis Campus grounds and the Soap Creek and Berry Creek cattle ranches were reported in the OSU Corvallis Campus inventory.

**Data sources:** Nora Ross, Asst. to the Chair, Animal Science Dept.; Tim DelCurto, Superintendent, Union Station; Norm Brown, OSU Landscape; Mandy Seals, Coordinator Client Service Vet Med.

<p><b>Refrigerants (Scope 1)</b></p>	<p>Refrigerants can be powerful greenhouse gases and their tracking is required by the EPA. Small amounts can escape during typical equipment use or in cases of equipment failure. The following table outlines the type and amount of refrigerants used in FY11 and their 100-year global warming potential (GWP). Due to incomplete data for FY12, FY11 data was used again.</p> <table border="1" data-bbox="683 373 1143 684"> <thead> <tr> <th>Refrigerant</th> <th>Weight (lbs)</th> <th>GWP (100 year)</th> </tr> </thead> <tbody> <tr> <td>R-11</td> <td>2</td> <td>4,000</td> </tr> <tr> <td>R-12</td> <td>105</td> <td>2,400</td> </tr> <tr> <td>R-22</td> <td>278</td> <td>1,780</td> </tr> <tr> <td>R-134A</td> <td>3</td> <td>1,300</td> </tr> <tr> <td>R-404A</td> <td>21</td> <td>3,260</td> </tr> <tr> <td>R-409A</td> <td>29</td> <td>1,440</td> </tr> </tbody> </table>	Refrigerant	Weight (lbs)	GWP (100 year)	R-11	2	4,000	R-12	105	2,400	R-22	278	1,780	R-134A	3	1,300	R-404A	21	3,260	R-409A	29	1,440
Refrigerant	Weight (lbs)	GWP (100 year)																				
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	<p><b>Data source:</b> Greg Riutzel, Refrigeration Mechanic, Facilities Services</p>																					
<p><b>Offsets (green tags, RECs, composting etc.)</b></p>	<p><b>Renewable Energy Certificates (RECs)</b> Total REC purchases for the OSU Corvallis campus were 10,000 MWh.</p> <p>Total offsets for FY12: 10,749 MWh.</p> <p><b>Offsets with Additionality</b> Approximately 4,499 tons of waste is composted by various campus entities. The Allied Waste wood drop box, Organic Growers Club, Crop and Soil Sciences Department and the Student Sustainability Initiative compost dairy solids, pre-consumer food waste from campus dining centers and landscape debris. OSU's waste hauler, Allied Waste, has indicated intent to accept greater amounts of food waste from the dining centers. OSU-based waste composted offsite by a third party, such as Allied Waste, will not be counted as an offset by OSU. The benefit of this type of composting is instead realized in the reduced reported weight of landfill solid waste.</p>																					

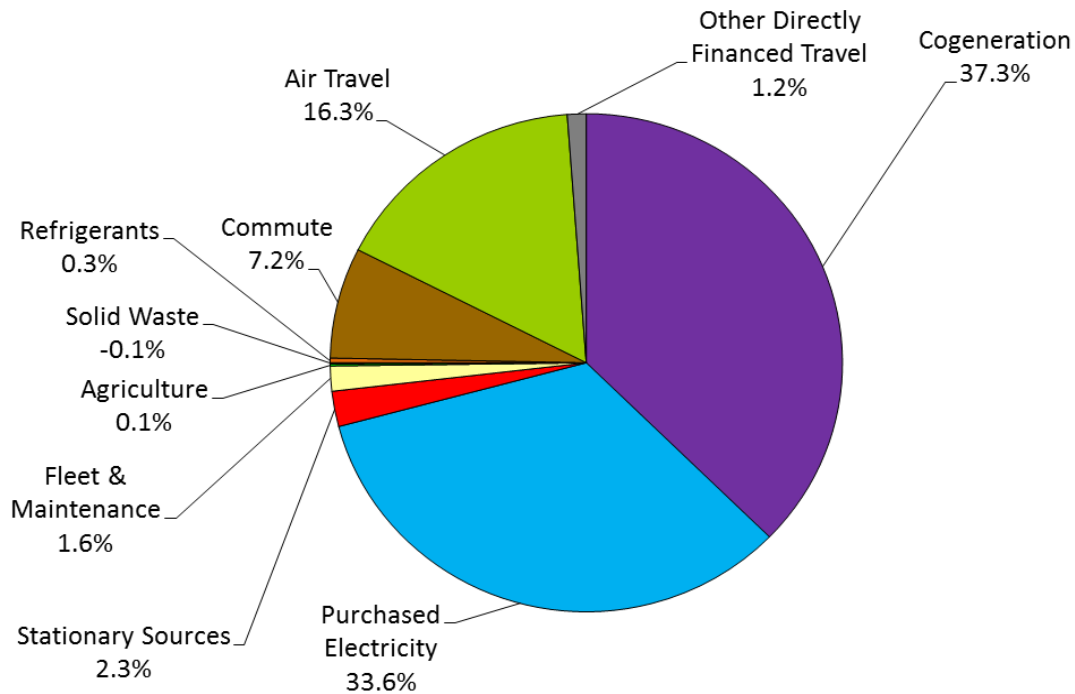
MODULE	Comprehensive FY12 Summary						
WORKSHEET	Overview of Annual Emissions						
UNIVERSITY	Oregon State University						
Select Year -->	2012	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	% change from FY11
		MMBtu	kg	kg	kg	Metric Tonnes	
Scope 1	Co-gen Electricity	2,217.8	117,662.1	11.7	0.2	118.0	-9.7%
	Co-gen Steam	904,403.0	47,981,267.4	4,778.2	96.2	48,129.4	7.4%
	Other On-Campus Stationary	72,964.0	2,972,019.9	18,021.9	17,728.1	3,957.8	3.3%
	Direct Transportation	30,607.3	2,055,899.1	2,316.8	2,049.8	2,247.2	6.5%
	Refrigerants & Chemicals	-	-	-	-	399.5	0.0%
	Agriculture	-	-	66,654.9	815.1	3,165.7	-1.9%
Scope 2	Purchased Electricity	576,937.4	37,135,655.6	71,221.2	70,728.2	41,466.9	-29.6%
Scope 3	Faculty / Staff Commuting	40,872.3	2,921,476.2	592.1	199.0	2,995.6	47.6%
	Student Commuting	85,838.2	6,149,674.2	1,184.3	400.7	6,298.7	-18.9%
	Directly Financed Air Travel	92,877.7	18,713,051.7	535.5	562.2	21,164.5	26.7%
	Other Directly Financed Travel	20,970.4	1,497,176.1	311.1	104.2	1,536.0	-9.1%
	Solid Waste	-	-	(3,145.1)	-	(78.6)	5.7%
	Scope 2 T&D Losses	57,059.7	3,672,757.1	7,043.9	6,995.1	4,101.1	-22.6%
Offsets	Additional					(1,732.1)	1208.2%
	Non-Additional					(6,890.5)	-90.5%
Totals	Scope 1	1,010,192.1	53,126,848.6	91,783.5	20,689.5	58,017.6	6.5%
	Scope 2	525,893.5	37,084,611.7	20,177.4	19,684.4	41,466.9	-22.6%
	Scope 3	309,906.7	32,966,423.7	18,810.1	20,549.5	36,017.2	7.8%
	All Scopes	1,806,722.0	123,138,613.6	91,500.7	21,653.0	135,501.7	-4.2%
	All Offsets					(8,686.3)	-88.1%
Net Emissions:						126,815.4	85.1%

## FY12 OSU COMPREHENSIVE GREENHOUSE GAS EMISSIONS

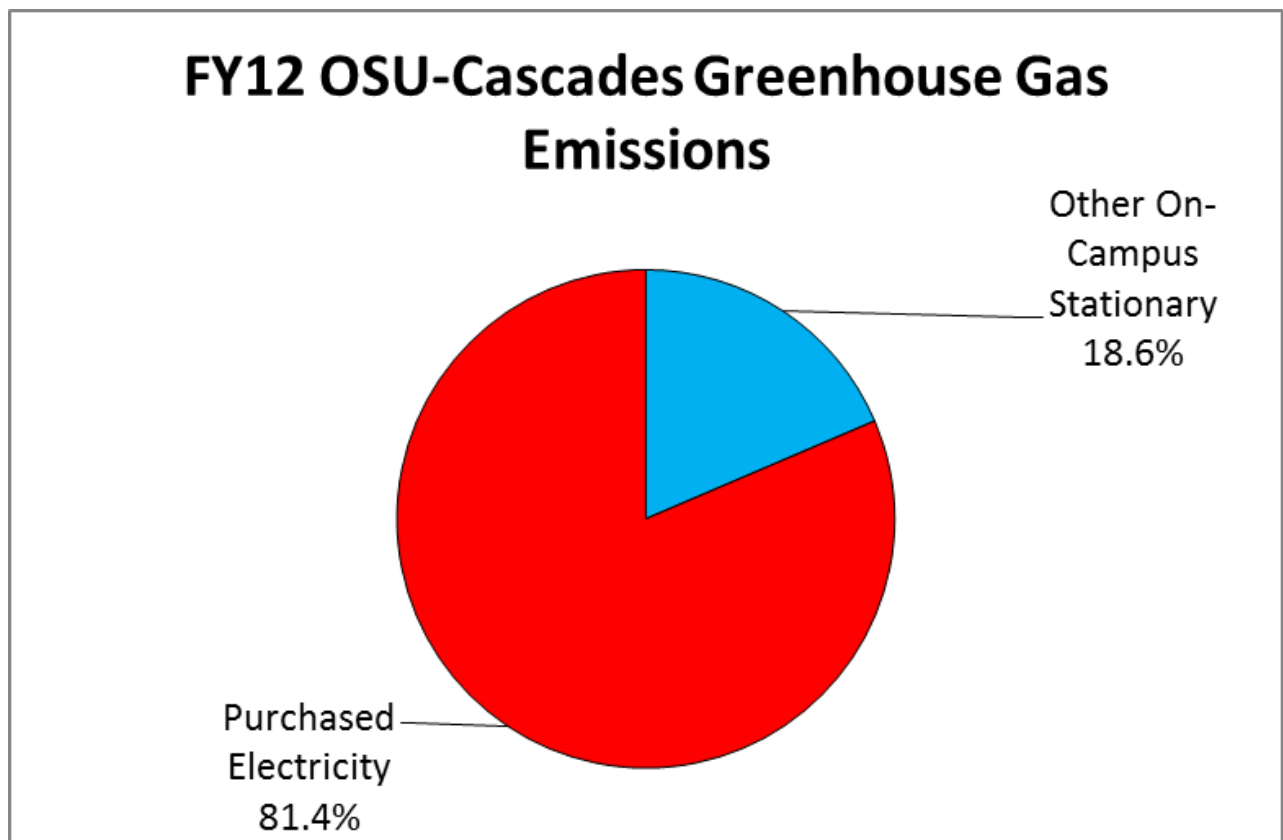


MODULE	Corvallis FY12 Summary						
WORKSHEET	Overview of Annual Emissions						
UNIVERSITY	Oregon State University						
Select Year -->	2012	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	% change from FY11
		MMBtu	kg	kg	kg	Metric Tonnes	
Scope 1	Co-gen Electricity	2,217.8	117,662.1	11.7	0.2	118.0	-9.7%
	Co-gen Steam	904,403.0	47,981,267.4	4,778.2	96.2	48,129.4	7.4%
	Other On-Campus Stationary	55,242.6	2,954,298.6	300.6	6.7	2,963.8	-3.0%
	Direct Transportation	28,693.4	2,053,985.2	403.0	136.0	2,104.6	9.0%
	Refrigerants & Chemicals	-	-	-	-	399.5	0.0%
	Agriculture	-	-	66,654.9	815.1	1,909.3	-5.2%
Scope 2	Purchased Electricity	506,258.3	37,064,976.5	542.2	49.2	37,029.3	-25.7%
Scope 3	Faculty / Staff Commuting	40,872.3	2,921,476.2	592.1	199.0	2,995.6	47.6%
	Student Commuting	85,838.2	6,149,674.2	1,184.3	400.7	6,298.7	-18.9%
	Directly Financed Air Travel	92,521.1	18,712,695.1	178.9	205.6	21,092	30.7%
	Other Directly Financed Travel	20,970.4	1,497,176.1	311.1	104.2	1,536.0	-9.1%
	Solid Waste	-	-	(3,145.1)	-	(78.6)	5.7%
	Scope 2 T&D Losses	50,069.5	3,665,766.9	53.6	4.9	3,668.6	-25.6%
Offsets	Additional					(1,732.1)	1208.2%
	Non-Additional					(6,410.4)	-91.2%
Totals	Scope 1	990,556.9	53,107,213.4	72,148.4	1,054.3	55,624.6	6.3%
	Scope 2	506,258.3	37,064,976.5	542.2	49.2	37,029.3	-25.7%
	Scope 3	290,271.6	32,946,788.5	(825.1)	914.3	35,512.3	7.5%
	All Scopes	1,787,086.8	123,118,978.4	71,865.5	2,017.8	128,166.2	-5.2%
	All Offsets					(8,142.4)	-88.8%
						<b>Net Emissions:</b> 120,023.7	91.8%

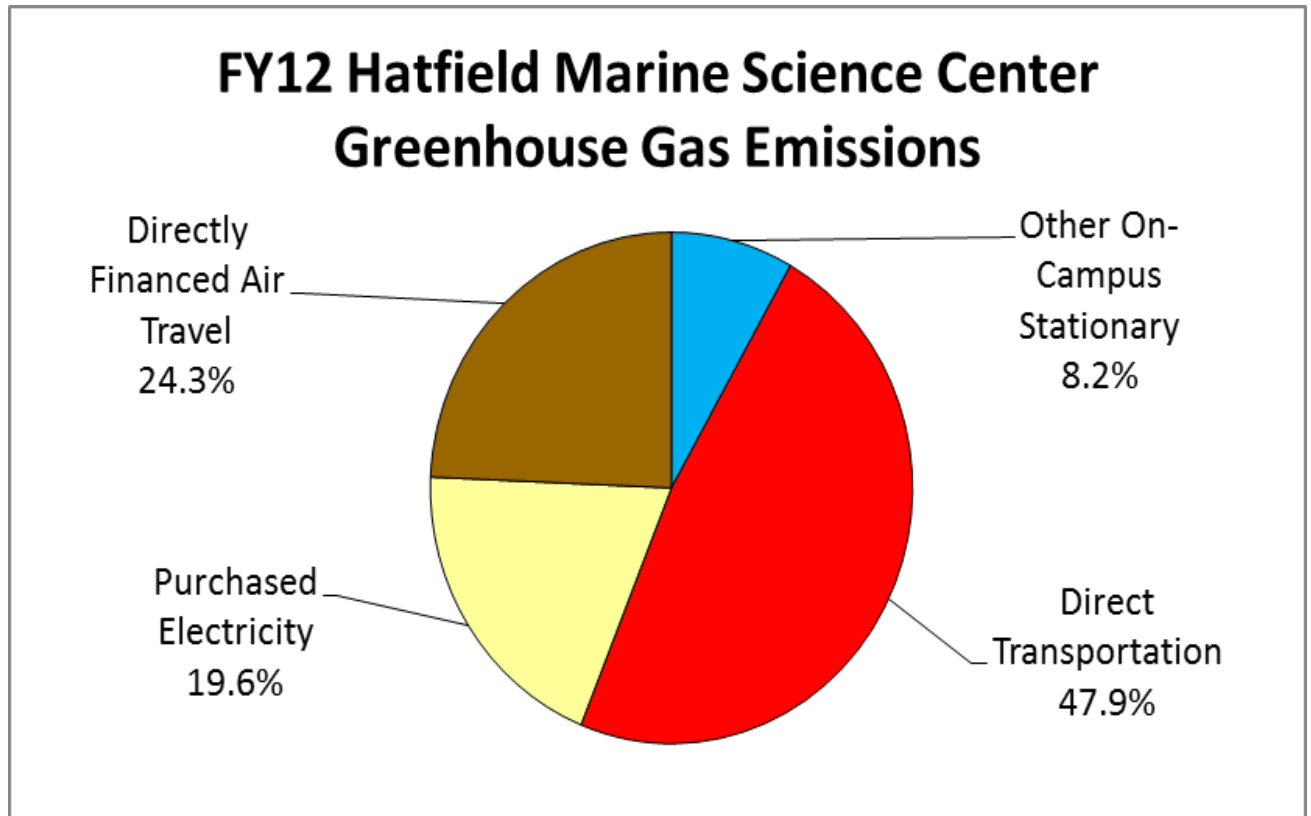
### FY12 OSU-Corvallis Greenhouse Gas Emissions



MODULE	OSU Cascades FY12 Summary						
WORKSHEET	Overview of Annual Emissions						
UNIVERSITY	Oregon State University						
Select Year -->	2012	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	% change from FY11
		MMBtu	kg	kg	kg	Metric Tonnes	
Scope 1	Other On-Campus Stationary	2,059.1	109,171.9	10.9	0.2	109.5	11.1%
Scope 2	Purchased Electricity	6,559.0	479,772.6	7.1	0.6	480.1	50.8%
Scope 3	Scope 2 T&D Losses	648.7	47,450.0	0.7	0.1	47.5	50.8%
Offsets	Non-Additional					(480.1)	-240.7%
	Scope 1	2,059.1	109,171.9	10.9	0.2	109.5	11.1%
Totals	Scope 2	6,559.0	479,772.6	7.1	0.6	480.1	50.8%
	Scope 3	648.7	47,450.0	0.7	0.1	47.5	-78.5%
	All Scopes	9,266.7	636,394.5	18.7	0.9	637.1	102.9%
	All Offsets					(480.1)	-240.7%
						<b>Net Emissions:</b> 157.0	-40.7%



MODULE		HMSC FY12 Summary					
WORKSHEET		Overview of Annual Emissions					
UNIVERSITY		Oregon State University					
Select Year -->	2012	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	% change
		MMBtu	kg	kg	kg	Metric Tonnes	from FY11
Scope 1	Other On-Campus Stationary	459.4	24,359.0	2.4	0.0	24.4	-14.3%
	Direct Transportation	1,913.8	141,140.0	9.5	4.0	142.6	-20.4%
Scope 2	Purchased Electricity	17,288.4	57,908.5	1.0	0.9	58.2	22.8%
Scope 3	Directly Financed Air Travel	356.6	72,121.6	0.7	0.8	72.4	N/A
	Scope 2 T&D Losses	1,709.8	5,727.2	0.1	0.1	5.8	22.5%
Totals	Scope 1	2,373.3	165,499.0	11.9	4.1	167.0	-19.6%
	Scope 2	17,288.4	57,908.5	1.0	0.9	58.2	22.8%
	Scope 3	2,066.4	77,848.8	0.8	0.9	78.1	1562.3%
	All Scopes	21,728.1	301,256.3	13.7	5.8	303.3	16.8%
<b>Net Emissions:</b>						<b>303.3</b>	<b>16.8%</b>





MODULE		Statewides FY12 Summary					
WORKSHEET		Overview of Annual Emissions					
UNIVERSITY		Oregon State University					
Select Year -->	2012	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	% change from FY11
		MMBtu	kg	kg	kg	Metric Tonnes	
Scope 1	Other On-Campus Stationary	15,202.8	856,568.9	98.2	3.4	860.0	32.3%
	Agriculture	-	-	35,369.4	1,248.9	1,256.4	3.5%
Scope 2	Purchased Electricity	46,831.7	3,816,653.2	67.5	57.3	3,835.4	13.5%
	Scope 2 T&D Losses	4,631.7	377,471.2	6.7	5.7	379.3	13.5%
Offsets	Scope 1	15,202.8	856,568.9	35,467.6	1,252.3	2,116.5	13.5%
	Scope 2	46,831.7	3,816,653.2	67.5	57.3	3,835.4	13.5%
	Scope 3	4,631.7	377,471.2	6.7	5.7	379.3	13.5%
Totals	All Scopes	66,666.2	5,050,693.3	35,541.8	1,315.3	6,331.2	13.5%
<b>Net Emissions:</b>						<b>6,331.2</b>	<b>13.5%</b>

