Version 1.0

SOU Climate Action Plan

Campus Planning & Sustainability

Southern Oregon University

January 15, 2010

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2. Definitions of Key Terms

Carbon dioxide (CO_2)	The chemical compound that contains one atom of carbon and two atoms of oxygen.
Carbon dioxide equivalent (CO_2e)	The quantity of a greenhouse gas multiplied by a Global Warming Potential (GWP) factor, relative to CO_2. This is the standard unit used to quantify various greenhouse gasses.
Carbon offsets	Reductions of greenhouse gases that can be used to counteract emissions from other activities, measured in metric tonnes of CO_2e. While similar, carbon offsets are not the same as Renewable Energy Certificates (RECs).
Emissions categories	High-level groupings of related emissions sources. Air travel, ground transportation and agriculture are examples of emissions categories.
Emissions sources	Distinct sources of greenhouse gases. Athletics air travel, student commuting, and fertilizer are examples of emissions sources.
Global Warming Potential factor	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_4) has a GWP of 23, meaning that every gram of methane will trap 23 times as much solar radiation as a gram of CO_2.
Green energy fee	The SOU student-approved initiative that directs $8.00 per term per student towards the purchase of renewable energy certificates. These RECs offset 100% of SOU's electrical and natural gas consumption with additions of clean, renewable wind energy to the electrical grid.
Greenhouse gases (GHG)	For the purposes of the American College and University Presidents' Climate Commitment (ACUPCC), the six gases covered under the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).
IPCC	The Intergovernmental Panel on Climate Change is a scientific body established to provide policymakers with an objective source of information on climate change. The IPCC doesn't perform research or monitor climate data. Instead, it offers analysis of research and climate data as an

	objective body representing a broad range of views and expertise, as well as wide geographical coverage.
Kyoto Protocol	An agreement among 160 countries (representing over half of the earth's population) that calls for stabilization and then reduction of greenhouse gases to below emissions levels in the common base year of 1990.
Metric ton or tonne (t)	One metric tonne (1000 kilograms) or 2204.62 pounds.
Mitigation strategies	Distinct groups of actions that will reduce or mitigate net emissions.
Net emissions	The calculated sum of greenhouse gases emitted minus renewable energy certificates, composting activities, and carbon offsets.
Renewable energy source	Any source of energy that is replenished rapidly by natural processes. Renewable sources include, but are not limited to, wind, solar, hydroelectric, biomass, geothermal, tidal or sea currents, etc.
Renewable Energy Certificates	(RECs) Tradable certificates that represent a unit of energy produced by a renewable energy source. RECs are purchased in increments of 1,000 kilowatt hours (1,000 kWh = 1 megawatt) and represent the "green attribute" associated with renewable power. Owners of RECs can claim that they are using renewable energy equal to the amount of RECs they own.
Scope 1	A reporting category that accounts for direct GHG emissions from sources the institution owns or controls.
Scope 2	A reporting category that accounts for indirect GHG emissions from the generation of purchased electricity consumed by equipment or operations owned or controlled by the institution.
Scope 3	A reporting category that accounts for indirect GHG emissions from all other sources that occur as a consequence of the institution's activities but are not owned or operated by the institution.
Total emissions/Gross emissions	The calculated sum of greenhouse gases emitted due to SOU-related activities.

3. Executive Summary

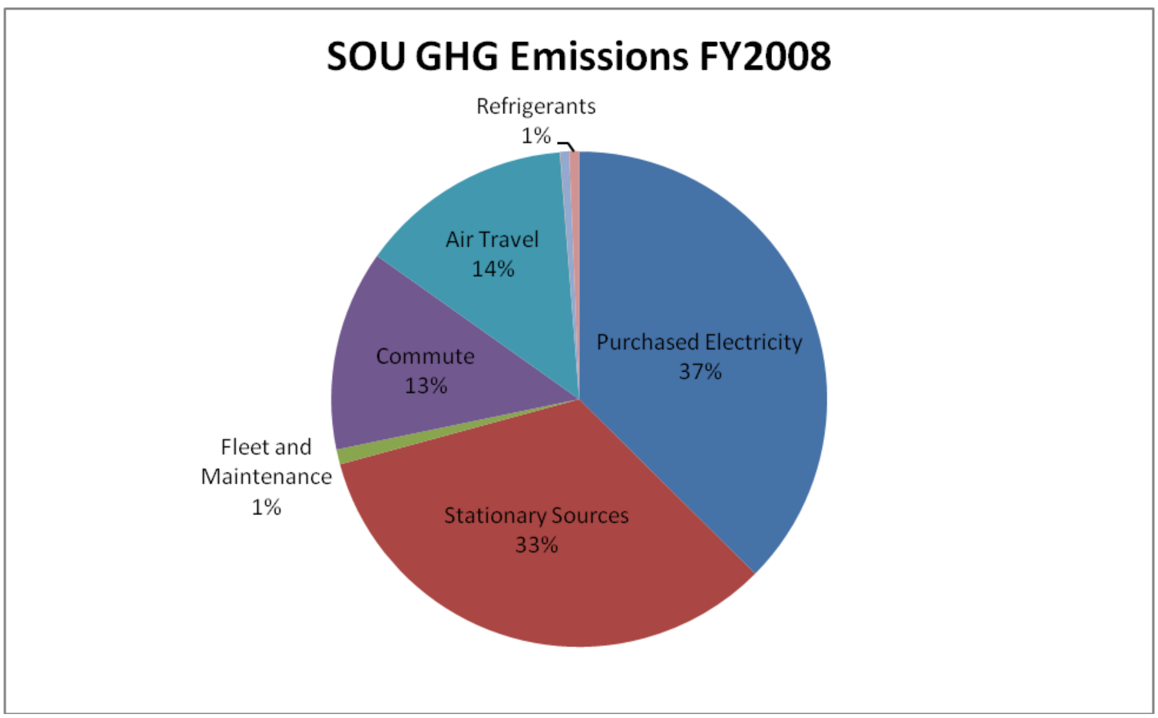
In September 2007, SOU President Mary Cullinan signed the American College and University Presidents' Climate Commitment (ACUPCC) as a Charter Signatory, joining the presidents of 284 other colleges and universities in committing their institutions to achieving a long-term goal of climate neutrality. Since then, the presidents of all seven institutions in the Oregon University System have signed this commitment and the total number of ACUPCC signatories has increased to over 650.

The current targets toward climate neutrality for Southern Oregon University are:

- By 2010, arrest the growth of greenhouse gas emissions and begin to reduce greenhouse gas emissions.
- By 2015, achieve greenhouse gas levels that are 5 percent below 1990 levels.
- By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.
- **By 2050, achieve CLIMATE NEUTRALITY.**

Emissions Profile

The greenhouse gas (GHG) inventory for Southern Oregon University for FY2008 reveals that purchased electricity and stationary sources (natural gas used in steam production) are the two major emissions sources—accounting for 70% of campus emissions. Transportation (commuting by students, faculty and staff, and fleet and maintenance travel) accounts for 27% of overall campus emissions. The following chart illustrates these emission sources.



In Fiscal Year 2008, SOU's total gross emissions were 13,247 metric tonnes (t) of carbon dioxide-equivalent (CO_2e). Net emissions were 4,206 t CO_2e due to student-funded purchases of renewable energy certificates (RECs) of 9,041 t CO_2e.

Mitigation Strategy

With early action, it is hoped that SOU will be able to mitigate its emissions, while preserving its financial sustainability, by using a combination of the following four primary mitigation strategies:

1. Retro-commissioning
2. Energy conservation measures
3. On-site, renewable energy installations
4. Carbon offsets, renewable energy certificate purchases, and other off-site measures

4. Introduction

Although there is uncertainty about the magnitude of impending climate change and the influence of humans, there is a strong consensus among scientists that warming of the planet's atmosphere and oceans poses a significant threat to human economic and social well being in the foreseeable future. The Intergovernmental Panel of Climate Change (IPCC), established by the United Nations Environment Programme and the World Meteorological Organization, is considered by many to be the most authoritative source for scientific information on climate change and the role of greenhouse gases. The latest IPCC report, released in 2007, cites observational evidence that:

- Human activity has led to higher atmospheric concentrations of carbon dioxide and methane than the natural range over the last 650,000 years, and higher concentrations of nitrous oxide than the natural range over the past 10,000 years.
- There is over 90 percent confidence that most of the warming of the climate is due to increased greenhouse gas concentrations caused by human activity.
- Anthropogenic warming—climate change associated with human activities—and rising sea levels will continue for centuries, but the amount of warming and sea level rise will be determined by human activity in the coming decades.[1]

In September 2007, SOU became one of 284 charter signatories to the American College and University Presidents' Climate Commitment (ACUPCC) with the signing of the commitment by President Mary Cullinan. According to its website, the American College and University Presidents' Climate Commitment is:

> "…a high-visibility effort to address global climate disruption undertaken by a network of colleges and universities that have made institutional commitments to eliminate net greenhouse gas emissions from specified campus operations, and to promote the research and educational efforts of higher education to equip society to re-stabilize the earth's climate. Its mission is to accelerate progress towards climate neutrality and sustainability by empowering the higher education sector to educate students, create solutions, and provide leadership-by-example for the rest of society."[2]

By signing the ACUPCC, President Cullinan committed SOU to the following actions:

> Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
>
> i. A target date for achieving climate neutrality as soon as possible.
> ii. Interim targets for goals and actions that will lead to climate neutrality.

iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
iv. Actions to expand research or other efforts necessary to achieve climate neutrality.
v. Mechanisms for tracking progress on goals and actions.

4.1. SOU's Green Efforts to Date

Southern Oregon University is committed to becoming a leader in sustainability among universities of its size and level of resources. The University has pursued a number of energy conservation strategies since the early 90s.

Energy Conservation Report

In 1993, through the Oregon Department of Energy, an Energy Conservation Report was prepared for Southern Oregon State College by Environmental & Engineering Services of Corvallis. This report contained a list of potential energy efficiency measures that were recommended for the campus. Over the next decade, many recommendations of this report were implemented, including lighting retrofits to replace incandescent and T12 fluorescent light sources in campus buildings.

Performance Contract

In 1998, Southern Oregon University entered into a performance contract with Johnson Controls Inc. to implement the following energy conservation measures: installation of a new chiller system and cooling tower at the Main Heat Plant, installation of a direct digital control (DDC) system in many campus buildings, and installation of variable frequency drives on selected pieces of mechanical equipment in campus buildings.

Solar Pioneer I

In 2000, a 5-kilowatt photovoltaic array was installed on the roof of the Hannon Library as part of the Solar Pioneer I project. The University was one of the local "solar hosts" for the Bonneville Environmental Foundation's first renewable energy project, its first community solar project, and at the time it began operating, the largest solar power plant in the Pacific Northwest. The Solar Pioneer I project was a collaborative effort by the City of Ashland, BEF, the Bonneville Power Administration, the State of Oregon, and Avista Energy.

Resource Conservation Management

Facilities Management & Planning (FMP) has achieved significant reductions in natural gas consumption through implementation of a Resource Conservation Management (RCM) program. Using the scheduling capabilities of the University's Johnson Controls Metasys DDC system, adjustments were made to the operating schedules of heating, ventilating and air conditioning (HVAC) equipment in individual campus buildings to provide heating/cooling at only those times that each building is actually occupied. This effort required working with the Building Manager of each campus building to identify times in the evenings/nights and on weekends when building HVAC systems could be switched to “unoccupied” status. This effort resulted in a 10.81% reduction in the consumption of natural gas and a 3.27% reduction in the consumption of electricity for FY2007 as compared to FY2006.

Submetering

Beginning in 2005, submeters were installed in all campus buildings (including auxiliary buildings) to measure the consumption of steam condensate, water and electricity. Monthly utility consumption data is compared with the previous year’s values and correlated with actual heating and cooling degree-day data in order to compensate for weather variations. The comparisons are used to evaluate building performance and identify potential operating problems within each building. FMP utilizes utility consumption data from the sub-meters and its FAMIS computerized maintenance management system to bill auxiliaries for utilities based on actual consumption data. This provides the auxiliaries with an incentive for energy conservation.

Green Energy Fee

In spring 2007, SOU students voted with an 85-percent majority to establish a Green Energy fee. SOU is the first university in Oregon (and one of the first in the U.S.) to offset *100 percent* of its energy consumption—both electricity and natural gas—with clean, renewable power. The U.S. Environmental Protection Agency recognized Southern Oregon University as its Individual Conference Champion for 2007–08 for purchasing more green power than any other school in the Cascade Collegiate Conference. The EPA also recognized SOU as one of the Top 20 largest purchasers among higher education institutions within the Green Power Partnership for 2008-2009.

Sustainability Council

In April 2007, President Mary Cullinan established the SOU Sustainability Council to: (1) advise her and the Executive Council in matters relating to sustainability and environmental impact; (2) promote environmental stewardship; (3) coordinate efforts of individuals and groups on campus; and (4) educate the campus community about sustainable practices.

Boiler Replacement Project

In fall 2008, in Phase 1 of the Boiler Replacement Project, two of the four existing boilers in the Main Heat Plant were replaced with a new 200 HP boiler and a new 400 HP boiler with high-efficiency/high turndown burners (with oxygen trim control and forced draft fan variable speed drives), improved boiler staging controls, and flue gas economizers on each boiler. In summer 2009, in Phase 2A, seismic upgrades were made to the Main Heat Plant in preparation for complete replacement of the boilers. The remaining two boilers will be replaced in Phase 2B of the project when funding has been established. It is anticipated that the University's natural gas consumption for steam production will be reduced by at approximately 14% when all of the boilers have been replaced.

Higher Education Center and LEED Platinum Certification

In September 2008, construction was completed on SOU's first "green" building, the Higher Education Center in Medford. This 68,700 SF educational building is jointly owned and operated by Southern Oregon University and Rogue Community College. With the installation of a 56-kilowatt solar photovoltaic on the roof of the building, the Higher Education Center is projected to earn Leadership in Energy and Environmental Design (LEED) Platinum Certification, the highest level of certification from the U.S. Green Building Council. It is anticipated that the Higher Education Center will be the first LEED Platinum Certified building in the Oregon University System, and the only LEED Platinum Certified building in Oregon outside Multnomah County.

Solar Photovoltaic System, Higher Education Center

In fall 2009, a 56-kilowatt solar photovoltaic system was installed on the roof of the Higher Education Center. A solar monitoring package and weather station were also provided in the project to permit performance data to be displayed on an interactive touch-screen monitor in the lobby of the building for educational purposes.

Conversion to Virtual Servers

The University's IT Department is in the process of replacing its aging physical servers with a virtual server environment. In the proposed virtual server environment, all physical servers including the core campus information systems and departmental database services would be consolidated to run on seven physical servers in a virtual server configuration using disk space from the centralized Storage Area Network.

Best Practices in Food Services by Sodexo

In August 2009, Sodexo became the food services provider for SOU. Representatives of Sodexo's Office of Sustainability & Corporate Social Responsibility reviewed conditions at the SOU food service venues and issued a "Report on Sustainability Achievements and Suggested Next Steps", which identified existing best practices and best practice opportunities. Among the existing best practices were: commingled recycling for glass, aluminum, cardboard, plastic and paper; the conversion of yellow grease to biodiesel (by an outside vendor); and the elimination of all Styrofoam products. The report listed best practice opportunities which included: operating the dishwasher, ovens, fryers, and cooking equipment only when needed; investigation of local commercial composting opportunities; increasing the percentage of locally grown products; and adopting a formal 100% Energy Star (or equivalent) kitchen equipment procurement strategy. The report also recommended the creation of a water conservation committee composed of Sodexo and SOU staff members. Among the sustainability initiatives implemented by Sodexo are: providing re-usable “Eco Containers” and the opportunity for students and other patrons to go trayless as a means to reduce food waste, water waste and normal wear and tear on the dishwashing machines. Sodexo is also talking with ECOS about teaming on initiatives to compost food waste and grow fresh garden produce on campus.

Campus Master Plan Update

The University is in the process of having an update to its Campus Master Plan for 2010-2020 developed. The master plan update provides a framework for sustainability planning and adopts the following policies:

1. All major renovations and new construction will meet energy efficiency performance targets consistent with the Presidents’ Climate Commitment and the implementing Climate Action Plan that will accompany that commitment.
2. All new construction and major renovations by the University will be designed and constructed to meet a minimum of Silver rating under the U. S. Green Building Council’s LEED Rating System. The costs and benefits of certifying to a higher level will also be evaluated.
3. The OUS-established goal for carbon neutrality will be pursued, assuming that funding strategies can be identified that recognize the potential for increased capital costs, accompanied by reduced operating costs.
4. For projects serving the University but built and operated by private partners, the University will offer incentives as available to encourage the builder to meet the LEED Silver minimum standard.
5. The University will create an Energy Master Plan that will address energy consumption in a comprehensive way and identify the most cost-effective means to comply with the Presidents’ Climate Commitment. As part of energy master planning, the University will evaluate the potential to create an “eco-district” with the campus and surrounding neighbors.
6. In line with the energy master planning process, the University will continue to evaluate opportunities to develop renewable energy infrastructure.[3]

5. SOU's Climate Commitment

Southern Oregon University is bound by Executive Order 06-02, enacted by Governor Ted Kulongoski in July 2007 and ratified by the Legislature with HB3543, which sets the following state greenhouse gas emissions goals:

- By 2010, arrest the growth of greenhouse gas emissions and begin to reduce greenhouse gas emissions.
- By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.
- By 2050, achieve greenhouse gas levels that are at least 75 percent below 1990 levels.[4]

The University is also required to comply with the State Energy Efficiency Design (SEED) program. The SEED program was originally established in 1991 by the Oregon State law ORS 276.900-915, which directs state agencies to work with the Oregon Department of Energy to ensure cost-effective energy conservation measures (ECMs) are included in new and renovated public buildings. The SEED program was revised in 2001 to require that all state facilities constructed after June 30, 2001 exceed the energy conservation provisions of the Oregon State building code by 20 percent or more.[5]

In September 2007, President Mary Cullinan signed the American College and University Presidents' Climate Commitment and committed Southern Oregon University to setting a target date and interim milestones for becoming climate neutral. For the purposes of the ACUPCC, climate neutrality is defined as having no net greenhouse gas emissions, to be achieved by minimizing GHG emissions as much as possible and using carbon offsets or other measures to mitigate the remaining emissions. To achieve climate neutrality under the terms of the Commitment, all Scope 1 and 2 emissions, as well as those Scope 3 emissions from commuting and institution-funded air travel must be neutralized.

In this Climate Action Plan, Southern Oregon University has set the following greenhouse gas emissions goals:

- By 2010, arrest the growth of greenhouse gas emissions and begin to reduce greenhouse gas emissions.
- By 2015, achieve greenhouse gas levels that are 5 percent below 1990 levels.
- By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.
- **By 2050, achieve CLIMATE NEUTRALITY.**

The ACUPCC also requires the University to initiate two actions from a list of "tangible actions" to reduce greenhouse gases while the comprehensive Climate Action Plan is being developed. Southern Oregon University commits to initiating the following tangible actions:

a. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council's LEED Silver standard or equivalent.

b. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.

The full text of the ACUPCC can be found in Appendix 1.

5.1. Sustainability in the SOU Strategic Plan

Sustainability figures prominently in the commitments, goals and objectives stated in the Southern Oregon University strategic plan, "Building the New SOU: Strategic Plan for Distinction and Sustainability 2009-2014", which has been developed to provide structure for decision-making, to strengthen thematic coherence for area plans, and to underscore the university's goals, values, and commitments for the next five years. The second of the University's three "Commitments" states that SOU is committed to:

> Engaged students, faculty, and staff committed to diversity, *sustainable practices*, and responsiveness to regional and global needs

Goal 1, Academic Distinctiveness and Quality, includes the following objective relating to sustainability:

H. Emphasize vibrant, sustainable, academic and residential/commuter communities.

Goal 2, Commitment to the Arts and the Bioregion, includes the following objectives relating to the environment and sustainability:

A. Expand and promote nationally and internationally known arts and *environmental programs*.
B. Strengthen partnerships with regional arts and *environmental organizations*.
E. Intentionally integrate the arts and *sustainability* throughout the curriculum and the university culture.

Goal 3, Community Catalyst, includes the following objectives relating to the environment, sustainability and the bioregion:

B. Position SOU as a leader in sustainability, diversity, creativity, and culture.[6]

6. Education, Research and Public Engagement

Education

Southern Oregon University is committed to serving and supporting a variety of environmental programs including the Environmental Studies undergraduate program, the Master of Science in Environmental Education, the Certificate in Sustainability Leadership, and programs at the Deer Creek Center for Field Research and Education and the Crater Lake Science and Learning Center. SOU offers a wide range of educational offerings related to the environment, ecology and sustainability (http://www.sou.edu/sustainable/programs.html).

Bachelor of Science in Environmental Studies

Capitalizing on the unique and varied environmental settings in southern Oregon, the Environmental Studies (ES) program prepares its students for success in a broad range of environmental careers. The ES curriculum provides students with the interdisciplinary academic knowledge and the practical experiences necessary for them to successfully address complex environmental issues, both regional and global.

The Department of Environmental Studies offers a Bachelor of Science in Environmental Studies that prepares students for a wide variety of employment in such organizations as governmental agencies, industry, non-profits and environmental consulting firms, as well as graduate and professional schools in areas such as environmental policy and management, law, public policy, and environmental science.

Master of Science in Environmental Education

The Master of Science in Environmental Education is a 1½ year master's program, which provides field-oriented courses that broaden students' scientific understanding of the environment, exposes students to environmental problems and associated social conflicts, and prepares students to become effective environmental educators.

Center for the Environment

The SOU Center for the Environment, housed in the University's College of Arts and Sciences, is the newly-created home for important and wide-ranging programs and initiatives of Southern Oregon University. It is the base of operations for the Department of Environmental Studies, with a current B.S. in Environmental Studies (with several concentrations) and a planned B.S. in Environmental Science. The Department's core and affiliated faculty bring a variety of backgrounds to bear in service of this integrative, interdisciplinary effort.

The SOU Center for the Environment is an integral component of the University's commitment and ongoing efforts towards sustainability. Through the expansion and enhancement of the University's programs, the University will not only inform the community and the nation, but it will provide trained experts—its graduates—who will assist in positioning SOU and the region as leaders in sustainability. SOU is committed to enabling the best ideas and work of students, faculty and community members.

Deer Creek Center for Field Research & Education

Southern Oregon University, in partnership with the Siskiyou Field Institute, is actively developing the Deer Creek Center for Field Research and Education. The 870-acre site is located adjacent to the Illinois River canyon, the Siskiyou Mountains and the Kalmiopsis Wilderness Area—one of the largest wilderness areas in the state of Oregon. The Deer Creek Center is surrounded on three sides by public land providing easy access to land far beyond the boundaries of the site. The site includes areas dominated by serpentine soils and the unique flora and fauna associated with them. Fens with carnivorous cobra lilies and a number of endemic plants are some of the most distinctive features.

Crater Lake Science & Learning Center

The recently opened Crater Lake Science and Learning Center is located just below the rim of Crater Lake. It is operated jointly by the National Park Service, the Oregon Institute of Technology and Southern Oregon University. The facilities include recently refurbished historic buildings at the Park Headquarters. The program serves teachers and students from the region, providing instruction and interpretation primarily in the summer and fall. The program works closely with Park interpreters. There are expanding opportunities for SOU graduate students to work in these programs.

Certificate in Sustainability Leadership Program

This certificate, offered through the School of Business, is an interdisciplinary program designed to prepare individuals for leadership roles in organizations committed to sustainable practices. The program is designed to give students a strong foundational understanding in the three E's of sustainability: Economy, Environment, and Equity, also known as the "Triple Bottom Line". It provides students with a broad understanding of all of the major applied areas of sustainable organizational leadership including alternative transportation, waste reduction, renewable energy, green building, corporate social responsibility, fair trade, localization, community finance, and other emerging sustainable business practices.

National Sustainable Advisor Program

SOU is a co-sponsor of the National Sustainable Advisor Program provided by Sustainable Living Programs in the Rogue Valley. The National Sustainable Advisor Program offers a 9-month certificate training program and exam specifically designed to provide working professionals with the knowledge and skills to create buildings that are energy and resource efficient, healthy working and living environments, environmentally responsive and cost effective. The National Sustainable Advisor

Program is a Cascadia Sustainability Partner and endorsed as a Level 400 Mastery course under the U.S. Green Building Council's Education Provider Program.

Research

The University's planning process for research related to the achievement of climate neutrality is in nascent form. The College of Arts and Sciences is planning the development of the Masters in Applied Science Program, which has a planned focus on sustainable development. With development of this program, the University intends to bring a greater graduate research focus to our environmental science and sustainability efforts. Although SOU is primarily an undergraduate institution, a modest amount of student and faculty research is conducted on subjects related to sustainability and climate change.

John Rodin, Associate Professor of Biology
Dr. Rodin's fundamental interests are in Plant Physiological Ecology with special reference to trees and forest ecosystems. Recent projects have included stable isotopes in tree ring cellulose as indicators of plant water use and climate change, the effects of wind and leaf movements (leaf flutter) on canopy light dynamics and its impact on photosynthesis, the effects of elevated CO_2 and temperature extreme events (global change) on tree seedling physiology, and the genotype/phenotype interactions of conifers in common garden experiments.

Gregory Jones, Professor of Geography & Environmental Science
Dr. Jones is a professor and research climatologist in the Department of Environmental Studies who specializes in the study of how climate variability and change impact natural ecosystems and agriculture. His research interests include climatology, hydrology, and agriculture; phenology of plant systems; biosphere and atmosphere interactions; climate change; and quantitative methods in spatial and temporal analysis. He conducts applied research for the grape and wine industry in Oregon, has given hundreds of international, national, and region presentations on wine-related research, and is the author of numerous book chapters, reports, and articles on wine economics, grapevine phenology, site assessment methods for viticulture, climatological assessments of viticultural potential, and climate change.

Student Research

Students in the SOU Environmental Studies Program frequently conduct research in collaboration with community organizations on capstone projects such as the following:

> "Measuring Applegate Valley Community Support for a Biomass Drop Site," Tom Carstens, November 2008.
>
> Using a county-wide mail survey and an economic analysis, this Environmental Studies capstone project assessed the feasibility of operating a biomass electrical

plant in the Applegate Valley. The project was done in collaboration with the Applegate Partnership and the Greater Applegate Community Development Corporation.

"An Assessment of the Jacksonville Woodlands Trail System: A Contingent Valuation Approach," Sean McLeod, Spring 2009.

Using a trailhead survey, this Economics capstone assessed the willingness of Jacksonville residents to pay for an expanded trail system in the woodlands adjacent to town. The project was done in collaboration with the Jacksonville Woodlands Association.

"Crater Lake National Park: Who Goes There Exploring the Meaning of Nature with Visitors," Althea Godfrey, summer 2009.

Using interviews with park visitors, the McNair program research explores the origin and consequences of nature-based recreation to help understand the trend of declining park visitation. The project was done in collaboration with the National Park Service.

"Nocturnal Monitoring of Mammals in North Mountain Park: An Exploratory Study," Emily Jablonski, Laura McFaden, and David English, Fall 2009.

Using trip cameras and track-plates, this Environmental Studies capstone developed a strategy of measuring the frequency and distribution of mammals in North Mountain Park. The findings will be used to develop interpretive materials for park programs. The project was done in collaboration with North Mountain Park.

Public Engagement

Case Studies on Corporate Sustainability

This course, which is being taught as part of the Sustainabilty Leadership Program in the School of Business, allows students to work with various regional and local companies to examine how companies are implementing and measuring sustainability initiatives in the private sector. Students look at corporate practices from various perspectives including alternative transportation, waste reduction, renewable energy, green building, corporate social responsibility, fair trade, localization, community finance, and other emerging sustainable business practices.

President's Breakfast on Sustainability

On May 9, 2008, a President's Breakfast focused on sustainability was held on the SOU campus. The discussion centered on sustainability initiatives and opportunities and laid an excellent foundation for further communication and partnership. Attendees included Representative Peter Buckley and representatives from the Ashland City

Council and the cities of Talent, Phoenix, Central Point, and Grants Pass; the Ashland Chamber of Commerce; the Ashland and Medford School Districts; the Ashland Food Cooperative; Ashland Sanitary and Recyling; and the Southern Oregon Land Conservancy.

Southern Oregon Town Hall Broadcasts on Sustainability

In 2009, Southern Oregon Public Television (SOPTV) and RVTV, in partnership with Southern Oregon University, produced a series of "Southern Oregon Town Hall" broadcasts on sustainability. The first broadcast, "Seeking Sustainability for Your Community" dealt with community sustainability issues facing county and municipal governments in southern Oregon. Follow-up "Seeking Sustainability" broadcasts have focused on "Community Survey", "In Our Homes", "In the Workplace", "In Community Practices", and "In Collaboration".

Sustainability Council

The SOU Sustainability Council offers presentations by experts on sustainability to the University and the broader community. In November 2008, the Sustainability Council co-sponsored a presentation by the Portland planning consultant and former Ashland Planning Director, John Fregonese on "Environment, Equity, and Economy: How does Ashland Measure up to the Triple Bottom Line of Sustainability?" In April 2008, the Sustainability Council co-sponsored (with the Ashland Food Cooperative) a public forum with Elizabeth Royte, the author of *Bottlemania: How Water Went On Sale and Why We Bought It*.

Ashland City Council and Commissions

SOU adjunct instructor, Carol Voisin, was elected to Ashland's City Council in 2008. The Oregon League of Conservation Voters endorsed Carol in the election, stating "Carol will be a much needed unifying voice on the City Council rebuilding Ashland's legacy of leadership on environmental issues."[7] Among Carol's top priorities on the Council are practical sustainability measures that reduce the city's carbon footprint and make Ashland more self-sufficient. Carol also emphasizes sustainability in her University Seminar class.[8]

Larry Blake, Director of Campus Planning and Sustainability, serves on the City's of Ashland's Planning Commission and is the Planning Commission Liaison to the Transportation Commission. He also represents SOU as an *ex officio* member of the Transportation Commission. As part of the Croman Mill master planning effort, City of Ashland planning staff and the Planning Commission are currently developing design guidelines for sustainable building practices such as solar orientation and "green streets". Over the next two years, the Transportation and Planning Commissions will be involved in the development of a new Transportation System Plan for Ashland, which will include planning for alternative transportation and pedestrians, as well as vehicles.

Climate Masters Program

Southern Oregon University is part of a joint effort with the University of Oregon's Climate Leadership Initiative (CLI) Institute for a Sustainable Environment, Oregon State University, the Rogue Valley Council of Governments Rogue Community College, and the Rogue Valley Transportation District to make the Climate Masters Program, developed by the CLI, available in the Rogue Valley. The Climate Masters at Home Program, developed in 2007 and based on other successful "Master" programs, provides 10-week training on reducing personal GHG emissions, followed by at least 30 hours of volunteer outreach on the topic. A similar program, Climate Masters at Work, supports businesses in reducing GHG emissions.

Ecology Center of the Siskiyous (ECOS)

The Ecology Center of the Siskiyous (ECOS) is a student organization that strives to expand environmental awareness and environmental responsibility. ECOS operates a productive and educational community garden, with garden plots available to members of the community. At the community garden, ECOS composts coffee grounds and food scraps from campus coffee shops and food services operations. ECOS operates a Bicycle Program which assists students with bicycle repairs and "builds" bicycles for use by students on campus. ECOS sponsors educational events, such as Earth Day, which are open to the community. ECOS recycles batteries, electronics, and ink cartridges; and offers free reusable coffee mugs and canvas tote bags to students.

Oregon Student Public Interest Research Group (OSPIRG)

The Oregon Student Public Interest Research Group (OSPIRG) is a statewide, student-directed and student-funded non-profit organization that gives students the resources to take on pressing issues and get results on issues ranging from tackling global warming, working for more public transit, addressing poverty, to lowering the cost of healthcare and college. Students use a portion of their student fees to hire a team of OSPIRG staff —organizers, researchers, advocates, and lawyers—to work full time for students on their campus, in Salem, and in Washington, D.C. where the fights are being fought. OSPIRG was started at the University of Oregon in 1971 and is now on over 100 campuses nation-wide.

7. Campus Emissions

The American College and University Presidents' Climate Commitment requires its signatories to track and report emissions of the six greenhouse gases covered under the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). Carbon dioxide is intended to be the main focus of the GHG inventory because emissions of PFCs and SF_6 generally do not originate on campuses, and emissions of CH_4, N_2O, and HFCs are likely to have a minor impact on an institution's total emissions. In the GHG inventory, emissions of each gas are calculated separately, and then combined into units of carbon dioxide equivalents (CO_2e). Carbon dioxide equivalents are a metric measure used to compare the emissions from various greenhouse gases based on their global warming potential (GWP).[9]

Emissions Sources

The GHG Protocol defines direct emissions as those produced by sources that are owned or controlled by the reporting entity. It defines indirect emissions as those that are a consequence of the activities of the reporting entity, but which occur at sources owned or controlled by another entity. The GHG Protocol further breaks down these direct and indirect emissions into the following three broad "scopes" to help delineate direct and indirect emission sources, improve transparency, and facilitate fair comparisons:

- **Scope 1** - Direct emissions occurring from sources that are owned or controlled by the institution, including on-campus stationary combustion of fossil fuels, mobile combustion of fossil fuels by institution owned/controlled vehicles, and "fugitive" emissions.
- **Scope 2** - Indirect emissions generated in the production of electricity consumed by the institution.
- **Scope 3** - All other indirect emissions that are a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution.

"Fugitive" emissions are defined as intentional or unintentional releases of greenhouse gases, including the leakage of HFCs from refrigeration and air-conditioning equipment, as well as the release of CH_4 from institution-owned farm animals.

In their GHG inventories, the ACUPCC requires its signatories to include emissions from Scopes 1 and 2, as well as some Scope 3 emissions—institution-funded air travel and daily commuting to and from the campus by students, faculty, and staff (to the extent that data are available). For the purposes of the Commitment, commuting does not include student travel to and from campus at the beginning and end of term or during break periods.

Although emissions from institution-funded air travel and commuting are the only Scope 3 emissions sources on which ACUPCC signatories are required to report, the ACUPCC encourages its signatories to investigate and report on other Scope 3 emissions, such as waste disposal; embodied emissions from extraction, production, and transportation of purchased goods; outsourced activities; contractor owned-vehicles; and line loss from electricity transmission and distribution.[10]

Boundaries

The boundaries for Scopes 1 and 2 include all of the gross square footage (GSF) of University-owned buildings (and the associated fleet vehicles) for the Ashland Campus and the Higher Education Center in Medford—which is jointly owned and operated by SOU and Rogue Community College and opened in September 2008.

Weight data for solid waste generated on the Ashland Campus is estimated because Ashland Sanitary and Recycling, Ashland's solid waste hauler, doesn't weigh solid waste and recycling. The University pays a flat annual rate for solid waste disposal and recycling. The weight of solid waste is estimated using waste volume and pickup frequency data. Ashland Sanitary and Recycling has recently been purchased by Recology. The University will contact Recology about the possibility of obtaining weight data for solid waste in the future.

Difficulties were encountered in collecting natural gas consumption data for the apartments in the Family Housing complex and the 32 single-family houses that are owned by Student Housing and rented to students. Electricity and natural gas are metered separately for each apartment and house and billed directly to the tenants. As that natural gas consumption data becomes available, it will be included in future GHG inventories.

Monitoring and Reporting

The University's emissions data will be reported annually to the Association for the Advancement of Sustainability in Higher Education (AASSHE) as required by the ACUPCC and will be publicly available on the AASHE website. The SOU Sustainability Office will be responsible for managing this process and will also make this information available on the Sustainability Council website: http://www.sou.edu/sustainable/

Current Emissions

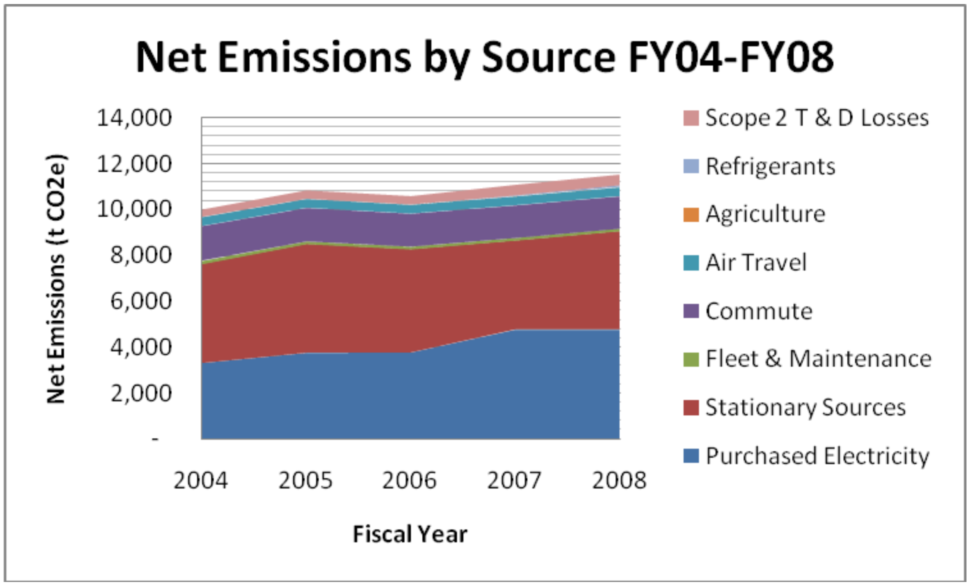
In 2007, the Oregon University System (OUS) contracted with Good Company of Eugene to compile the first greenhouse gas inventory for the Oregon University System and its seven institutions, using 2004 calendar year data. The 2004 greenhouse gas inventory for SOU can be found at: www.ous.edu/dept/capcon/files/OUS_GHG_Inventory-July2007.pdf.

In 2009, OUS contracted with Sightlines to compile a comprehensive greenhouse gas inventory for the Oregon University System for fiscal years 2004-2008. In FY2008, SOU had total gross emissions of 13,247 metric tonnes (t) of carbon dioxide-equivalent (CO_2e). Net emissions for FY08 were 4,206 t CO_2e due to the purchase of 9,041 t CO_2e of Renewable Energy Credits through the Green Energy Fee. The following chart summarizes the greenhouse gas inventory data for SOU for fiscal years 2004-2008.

SUMMARY FINDINGS

	FY2004	FY2005	FY2006	FY2007	FY2008
Scope 1					
Stationary Sources	4,310	4,726	4,482	3,860	4,261
Vehicle Fleet	141	122	121	122	124
Agriculture	3	3	3	3	3
Refrigerants				42	82
Total Scope 1	4,454	4,851	4,606	4,027	4,470
Scope 2					
Purchased Electricity	3,318	3,763	3,779	4,777	4,780
Total Scope 2	3,318	3,763	3,779	4,777	4,780
Scope 3					
Air Travel	380	380	380	380	1,780
Scope 2 T & D Losses	328	372	374	472	473
Commuting	1,780	1,722	1,688	1,673	1,669
Solid Waste	75	75	75	75	75
Total Scope 3	2,563	2,549	2,517	2,600	3,997
Total Gross Emissions	10,335	11,163	10,902	11,404	13,247
Renewable Energy Credits	-	-	-	-	(9,041)
Net Emissions	10,335	11,163	10,902	11,404	4,206

In compiling their GHG inventories, the ACUPCC allows its signatories to use any methodology and/or calculator that are consistent with the standards of the Greenhouse Gas Protocol. The GHG Protocol, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is the most widely-used international accounting tool for quantifying GHG emissions. The ACUPCC recommends use of Clean Air Cool Planet's Campus Carbon Calculator because it was designed specifically for campuses and is the most commonly used tool for campus emissions inventories.[11] Both the 2004 and the 2008 OUS greenhouse gas inventories use the Campus Carbon Calculator developed by Clean Air Cool Planet.



1990 Emission Levels

In 2009, the Oregon University System contracted with Good Company to estimate 1990 building energy use and the associated greenhouse gas emissions for the system's seven institutions. Executive Order 06-02, enacted by Governor Ted Kulongoski, requires emissions reductions to be relative to 1990, the base year for consideration by the Kyoto protocol. The Oregon University System wanted to establish this baseline to ensure compliance with the Governor's stated intent.

The task of establishing such a baseline was challenging. Few OUS institutions had maintained comprehensive records of facilities operations dating back to 1990. In their analysis, Good Company used 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). Their method assesses the value of CBECS as a proxy for current energy use by the OUS institutions and estimates 1990 use with the resulting proxy values. Energy use corrections were made to account for changes in building square footage. The energy use data was used to calculate greenhouse gas emissions. Adjustments were made to account for the changes in the electricity generation mix of the regional grid since 1990.[12] Good Company estimated the 1990 GHG emissions for Southern Oregon University to be 10,710 t CO_2e. A full description of their methods in included as Appendix 3.

7.1 Climate Action Plan Facilities Assessment

In 2009, McKinstry was hired by the Oregon University System to conduct an analysis of the existing building energy usage and the resulting GHG emissions of the seven public university campuses in the system. The purpose of this study was to evaluate and quantify the energy conservation and carbon reduction opportunities at the building level.

McKinstry conducted facility energy audits on six buildings on the SOU campus—Central Hall, the Education/Psychology Building, Taylor Hall, McNeal Pavilion, Greensprings Residence Hall, and the Hannon Library—to determine the Rough Order of Magnitude (ROM) for energy, carbon, and cost savings potential for each building. This analysis is considered a ROM study and is therefore not of investment grade.

McKinstry established proxy building categories to consolidate building area by building occupancy type. Building characteristics and project potential were assumed to be similar for all buildings in each of the proxy categories for the purpose of the report. Costs and savings were calculated by square foot based on the results from the on-site analysis. Using those square foot values as a proxy, the values were extrapolated across all of the buildings of each proxy category on the SOU campus. McKinstry did not survey buildings in the administration, student union, or science and research categories on the SOU campus. Average results for these categories were extrapolated from buildings on the Portland State University and University of Oregon campuses.[13]

Based on the findings from the on-site energy audits, McKinstry identified and quantified the baseline Metric Tonnes Carbon Dioxide Equivalent Emissions (MTCDE) and potential carbon mitigation strategies that could be implemented to reduce the campus emissions associated with facility energy use. McKinstry identified the following four mitigation strategies that could result in net zero GHG emissions for the SOU facilities:

- **Mitigation Scenario 1**
  Includes retro-commissioning and savings resulting from operations consolidated to reduce run times during times when buildings are unoccupied (evenings and weekends).
- **Mitigation Scenario 2**
  Includes implementation of energy conservation measures such as controls, variable frequency drives, lighting retrofits, new equipment, etc.
- **Mitigation Scenario 3**
  Includes the installation of solar, biomass, and co-generation. For SOU, McKinstry included only solar photovoltaic.
- **Mitigation Scenario 4**
  Includes purchasing offsets as required to reach carbon neutrality after the implementation of scenarios 1-3.[14]

Mitigation Strategies 1 and 2

The McKinstry assessment estimates that approximately 23% of the University's existing energy use and 15% of the existing carbon emissions can be reduced through retro-commissioning (Mitigation Strategy 1) and energy conservation projects (Mitigation Strategy 2). McKinstry extrapolated the costs to implement these mitigation strategies into today's dollars to be approximately $8.5 million, with an annual cost savings of $200,000. The annual reduction in carbon emissions from implementing these strategies is estimated to be **795 t CO_2 e**. [15]

These findings are summarized in the following table. For more detailed information on the energy conservation measures identified by McKinstry in the buildings they surveyed on the SOU campus, a full listing of these measures and their accounting is included in FIM tables from the McKinstry assessment located in Appendix 2.

SUMMARY FINDINGS BY BUILDING TYPE – MITIGATION STRATEGIES 1 & 2[16]

Building Type	Total SOU Sq. Ft. for Building Type	% Total Sq. Ft.	MTCDE Base	MTCDE Reduced/yr. - Mitigation Strategies 1 & 2	Estimated Cost
Academic	252,957	20%	2,594	376	$ 4,487,457
Science	80,998	6%	394	57	$ 1,099,953
Phys. Ed.	122,389	10%	371	91	$ 658,453
Residential	381,783	30%	371	30	$ 1,210,252
Administrative	150,672	12%	595	86	$ 655,423
Library	147,159	12%	275	40	$ 58,864
Student Union	125,000	10%	792	115	$ 365,000
Campus Total	**1,260,958**	**100%**	**5,392**	**795**	**$ 8,535,402**

According to McKinstry, the primary project opportunities for reducing carbon emissions are:

- Select upgrades to the building automation systems;
- Retro-commissioning of existing systems;
- Installation of variable frequency drives on pump and fan motors;
- Miscellaneous lighting retrofits of the remaining lighting fixtures with T-12 fluorescent tubes and incandescent lamps; and
- Select envelope improvements.[17]

Mitigation Strategy 3

The McKinsty assessment estimates that approximately 16% of the University's current electrical load could be supplied by implementing a 2.2 megawatt photovoltaic project (Mitigation Strategy 3). The annual reduction in carbon emissions from implementing these strategies is estimated to be 260 t CO_2 e. The McKinsty assessment states that the purchase of carbon offsets would be a cheaper alternative, but it will become more cost-effective to implement renewable energy technologies as Cap and Trade markets are established and mature.[18]

8. GHG Emissions Mitigation

The Good Company study "1990 GHG Baseline for Building Energy Use in the Oregon University System" considers only Scope 1 emissions from stationary sources (natural gas) and Scope 2 emissions from purchased electricity, and does not include Scope 3 emissions. Since Governor Kulongoski's greenhouse gas reduction goals were intended to include *all* GHG emissions, an estimate of Scope 3 emissions must be added to Good Company's estimated 1990 GHG baseline of 10,710 t CO_2 e to provide an estimate of total GHG emissions for SOU.

As a proxy for 1990 Scope 3 emissions, it may be reasonable to use the lowest total Scope 3 emissions from the Greenhouse Gas Inventory for Fiscal Years 2004-2008—2,517 t CO2 e in FY2006. Adding the lowest total Scope 3 emissions is conservative in the sense that it would force SOU to make larger reductions than assuming a higher value would. Adding 2,517 t CO2 e to the 1990 GHG baseline for building energy use gives us a total 1990 GHG estimate (Scopes 1, 2 and 3) of 13,227 t CO2 e. Since SOU's total gross emissions for 2009 of 12,732 t CO2 e is less than this figure, the University has already met Governor Kulongoski's goal for 2010—to arrest the growth of GHG emissions and begin to reduce GHG emissions.

If we assume that SOU can reduce GHG emissions by 795 t CO2 e (from 2009 total gross emissions) in the next five years through retro-commissioning and energy conservation projects (as proposed by the McKinsty assessment), the University's 2015 emissions would be approximately 11,937 795 t CO2 e. Coincidentally, this figure turns out to be 90% of the total 1990 GHG estimate. Thus, SOU would meet Governor Kulongoski's greenhouse gas reduction goal for 2020—to achieve GHG levels that are 10 percent below 1990 levels—five years early.

It may not be reasonable to assume that SOU would achieve 795 t CO2 e in emissions reductions by 2015 through retro-commissioning and energy conservation projects alone. As noted above, the McKinsty assessment extrapolated the cost to implement these strategies to be over $8.5 million, in today's dollars; funding sources would be required to make those investments. However, It would be reasonable to assume that SOU could achieve these GHG emissions reductions through a comprehensive GHG emissions mitigation strategy as described in the following section.

Campus Growth

The Energy Use Projection by Proxy (Campus Growth) chart in the McKinsty assessment assumes that the gross square feet (GSF) of facilities on campus would increase by 72,151 GSF (22,151 GSF in academic space and 50,000 GSF in science/research space) in 2013. SOU will receive $5.9 million in state capital construction funding for an addition to the Theatre Arts Building at the end of the 2009-2011 biennium (*if* the institution is able to match that amount in private funding) so it is possible that academic space on campus would increase by 22,151 GSF by 2013. However, it is not likely that SOU will be able to obtain state capital construction funding and matching funds for a 50,000 GSF addition to the Science Building by 2015. Increases in energy use on the SOU campus due to campus growth will be significantly less than assumed in the McKinsty assessment. Also, new construction on the campus will be designed to achieve LEED Silver (or greater) Certification so the additional increment of energy use (on a per square foot basis) will be substantially less than that of existing campus buildings.

In future years, a significant shift in energy use on the campus could occur *if* the Cascade Residence Hall complex (192,573 GSF) is replaced with new student housing through a public-private partnership, as is proposed in the Campus Master Plan Update for 2010-2020. The Cascade Residence Hall complex (including Cascade Kitchen, the central dining facility for the residence halls on campus) accounts for *over 60%* of the overall steam consumption in campus buildings. The Cascade Residence Hall is one of the least energy-efficient buildings on campus—with little or no insulation in the building envelope, single-glazed windows, an antiquated heating system, and a dysfunctional temperature control system in the wings of the residence hall. If new student housing (meeting green building standards) were designed and constructed by a private developer to replace the 600+ beds in Cascade Residence Hall, there would be a significant decrease in carbon emissions on campus.

Offsets

Since student approval of the “Green Energy” fee in spring 2007, SOU has purchased renewable energy certificates and carbon offsets through the Bonneville Environmental Foundation to offset 100% of the institution’s natural gas and electricity consumption. Originally, BEF purchased green tags or RECs to offset both types of emissions. BEF now purchases RECS to offset 100% of the SOU’s electricity consumption, and purchases carbon offsets to offset 100% of the SOU’s natural gas consumption.

Purchases of RECs incentivize the development of carbon-neutral renewable energy by providing a production subsidy to electricity generated from renewable sources. The Bonneville Environmental Foundation obtains the RECS that SOU purchases from the following wind farms in the Northwest: the Nine Canyon Wind Project in Kennewick, WA; the Stateline Wind Project in Walla Walla, WA; and the St. Leon Wind Project in St. Leon, Manitoba, Canada. Purchases of carbon offsets help to pay for projects which reduce GHG emissions. The Bonneville Environmental Foundation obtains the carbon offsets that SOU purchases from the Wilton Wind Project in Wilton, ND. According to the Bonneville Environmental Foundation, SOU purchased 11,509,890 kWh (11,509.89 RECs, 1,000 kWh each) of RECs to offset 100% of its electricity consumption, reducing emissions by an estimated **7,366.546 t CO_2 e** in FY2009. In addition, SOU purchased carbon offsets of **3,978.963 t CO_2 e** in FY2009.[19]

To meet the goal of achieving climate neutrality by 2050, the purchase of offsets will be a necessity because it's virtually impossible to eliminate all greenhouse gas emissions. As recommended in the AASHE wiki, *Cool Campus! A How-To Guide for College and University Climate Action Planning*, SOU will pursue advanced technologies, techniques, and products to achieve "deep conservation"[20] reducing actual carbon emissions to the greatest extent possible, and will rely on the purchase of offsets to make up the shortfall toward the institution's GHG emission targets.

8.1 GHG Emissions Reduction Strategies

This Climate Action Plan is intended as a tool for adaptive management, not a rigid program of specific actions on a precise schedule. This initial plan will be publicized to the SOU community and beyond, and ideas will be solicited for improving the plan.

SOU expects that additional opportunities for reducing greenhouse gas emissions—beyond those outlined here—will be identified in the future. The University also expects that technologies will advance and new economic structures will be developed which will present additional opportunities for reducing emissions. These changes may allow us to accelerate our timeline to achieving climate neutrality.

On the other hand, methods for estimating lifetime carbon emissions for many purchased goods and services are evolving, and as these methods become more complete, they will likely cause the University to increase its estimated emissions. Likewise, a number of external factors beyond our control also affect our emissions, and may result in delaying the date when we achieve climate neutrality.

SOU commits, therefore, to use all means within its capabilities to reduce the institution's actual total greenhouse gas emissions, within the financial constraints of continuing operations. The University will continue to use renewable energy credits and carbon offsets to offset remaining emissions, thus eventually achieving climate neutrality, but our intent is to minimize the need for offsets by reducing actual emissions.

In order for SOU to make significant progress toward achieving climate neutrality by 2050, the University will need to pursue a broad range of emissions reduction strategies, which are described in the following section. It should be noted that RECs and carbon offsets are <u>not</u> included in the reduction goals stated for Scopes 1, 2 and 3.

SCOPE 1

Reduction Goal: ***SOU proposes to reduce its Scope 1 emissions from 4,470 t CO_2e in FY2008 to 3,886 t CO_2 e in 2015.***

Stationary Sources

For FY08, emissions from stationary sources were the largest source of emissions for SOU, contributing 4,261 t CO_2e. The vast majority of emissions in this category result from the combustion of natural gas in the production of steam in the Main Heat Plant. The amount of natural gas consumed for steam production varies from year to year, depending on outdoor air temperatures and the dates when the boilers begin and end operation for the heating season. Over the past five years, annual emissions from stationary sources have ranged from 3,863 t CO_2e in FY07 to 4,729 in FY05, with an average annual emissions level of 4,330 t CO_2e.

Emissions Reduction Strategies

1. **Increase efficiency of the steam production systems that *derive* energy from fossil fuels.**

   Increasing the efficiency of steam production on campus can make significant reductions in both carbon emissions produced by stationary sources and utility costs.

   Proposed Actions:
   - Replace the two remaining 50+ year-old boilers in the Main Heat Plant.
   - Strengthen preventative maintenance program for the boilers.

2. **Increase efficiency of the distribution system that *delivers* energy produced with fossil fuels.**

   After steam is produced, it must be distributed through the University's steam tunnel network to campus buildings. The distribution system includes numerous pumps, heat exchangers, radiators, valves, tanks, etc. Improving the efficiency of the distribution system is a cost-effective way to reduce emissions.

   Proposed Actions:
   - Repair/replace insulation on steam and hot water piping.
   - Repair and maintain the steam condensate system.
   - Evaluate the possibility of using a heat source other than steam to heat Cascade Residence Hall.

3. **Increase efficiency of building air handling and water heating systems that *consume* energy produced with fossil fuels.**

   After steam is delivered to campus buildings, it must be utilized in air handling units, heat exchangers, etc. to produce heated air and water for distribution throughout the buildings. Improving the efficiency of the heating and distribution systems in campus buildings can reduce overall steam consumption.

Proposed Actions:

- Modify or replace outdated HVAC systems in campus buildings.
- Install variable frequency drives.
- Utilize demand-controlled ventilation.
- Convert constant volume dual duct and multi-zone HVAC systems to function as variable volume systems with hydronic reheat.
- Retro-commission the Science Building and other campus buildings.
- Install DDC systems in remaining campus buildings without those systems.

4. Decrease steam consumption in campus buildings by upgrading the building envelopes.

Many of the older campus buildings have un-insulated walls, minimal insulation in the ceiling and roof systems, and single-glazed windows. Improving building envelopes is typically very capital-intensive and has long returns on investment. In addition to reducing heating and cooling loads, building envelope improvements can extend the life of the shell of the building and have a positive impact on occupant comfort.

Proposed Actions:

- Retrofit insulation in exterior walls and roofs/attics.
- Replace single-glazed windows with high performance windows.
- Install weatherstripping.

5. Decrease steam consumption in campus buildings through conservation.

Decreasing the demand for steam to heat campus buildings is a low cost means of reducing carbon emissions from the combustion of fossil fuels.

Proposed Actions:

- Adjust HVAC scheduling for individual campus buildings to go to "unoccupied" status when the buildings aren't occupied (evenings, weekends and holidays).
- Consolidate the scheduling of classes into a minimum number of classroom buildings on the Ashland campus in the evenings and on weekends to reduce heating requirements.
- Offer more on-line and distance education classes to reduce classroom use.
- Institute voluntary programs to conserve energy such as keeping doors and windows closed in the winter.

6. Minimize climate impact of stationary sources through the use of alternative technologies and fuels.

After efficiency measures have been implemented and overall energy consumption has been reduced, there will still be significant emissions from stationary sources.

Through the utilization of alternative technologies and fuels, emissions from stationary sources can be further reduced.

Proposed Actions:

- Increase use of less carbon intense biofuels.
- Utilize geothermal heat pumps or solar hot water systems.

Vehicle Fleet

For FY08, emissions from the University's fleet vehicles were 124 t CO_2e. These emissions resulted from fleet vehicles operated by University departments and Motor Pool van rentals.

Vehicle Fleet Emissions Reduction Strategies

1. **Minimize climate impact of fleet vehicles through the use of fuel-efficient vehicles or vehicles which utilize alternative technologies and fuels.**

   As fleet vehicles are replaced, purchase vehicles which get better gas mileage or utilize alternative technologies or fuels to reduce carbon emissions.

   Proposed Actions:

   - Replace existing fleet vehicles with vehicles that get better mileage, or with hybrid or electric vehicles.

2. **Reduce miles traveled by the vehicle fleet.**

   The most efficient way to reduce emissions produced by fleet vehicles is to reduce the miles traveled by those vehicles. Reducing miles traveled by fleet vehicles also reduces costs for fuel.

   Proposed Actions:

   - Reduce or eliminate unnecessary trips.
   - Utilize "runners" to pick up materials and equipment from vendors for Facilities operations.
   - Create separate Facilities shops on upper and lower campuses to reduce driving back and forth to FMP.
   - Discourage employees from returning to FMP for breaks.

Refrigerants

For FY08, emissions from refrigerants contributed 82 t CO_2e. These emissions resulted from the escape of refrigerants into the atmosphere—mainly from refrigeration equipment.

Refrigerant Emissions Reduction Strategies

1. **Encourage alternatives to refrigerants.**

   By reducing the amount of climate-impacting refrigerants in use on campus, the chances of leaking and maintenance-related issues are likewise reduced.

   Proposed Actions:
   - Promote the use of air, water or geothermally-cooled equipment.

2. Lessen climate impact of refrigerants.

   In some cases, there are no suitable alternatives to climate-altering refrigerants. In those cases, the impact of the refrigerants must be reduced.

   Proposed Actions:
   - Encourage use of low global warming potential (GWP) refrigerants.
   - Ensure that preventative maintenance is performed on refrigerant-containing equipment.

Agriculture

For FY08, emissions from agriculture contributed 3 t CO_2e. These emissions resulted from the application of fertilizers by Landscape Services.

Agriculture Emissions Reduction Strategies

1. **Minimize climate impact of landscape maintenance.**

   Synthetic fertilizers have significant environmental and climate impacts.

   Proposed Actions:
   - Increase the utilization of compost or other low-emissions fertilizer.

SCOPE 2

Reduction Goal: ***SOU proposes to reduce its Scope 2 emissions from 4,780 t CO_2e in FY2008 to 4,360 t CO_2 e in 2015.***

Purchased Electricity

For FY08, emissions from purchased electricity were the second largest source of net emissions for SOU, contributing over 4,780 t CO_2e. Electricity use has increased by approximately 44% since FY04.

Purchased Electricity Emissions Reduction Strategies

1. **Increase efficiency of the electrical system.**

Efficiency and conservation projects are the most cost-effective ways to reduce emissions. Each kilowatt saved is one that doesn't need to be purchased. Efficiency projects provide more light, heating, cooling or ventilation per unit of energy consumed.

Proposed Actions:

- Utilize energy-saving performance contracts.
- Implement lighting retrofits.
- Install variable frequency drives.
- Retro-commission building systems.
- "Virtualize" computer servers.

2. Decrease user electricity consumption through conservation efforts.

Utilize equipment or systems to reduce energy consumption by automatically shutting off or powering down equipment when spaces aren't occupied or when equipment isn't being used. Encourage voluntary energy conservation practices. Conservation projects are relatively low in cost and provide lasting educational and behavioral benefits.

Proposed Actions:

- Install occupancy sensors to control interior lighting.
- Implement computer power management.
- Consolidate the scheduling of classes into a single classroom building on the Ashland campus during the summer to reduce air conditioning requirements.
- Institute voluntary programs to raise awareness and transform behavior such as turning off unused equipment and not using electric heaters in the winter.

3. Minimize climate impact of electricity generation.

Even when electrical systems are functioning at top efficiency and no unnecessary electricity is being consumed, there will still be emissions from electricity generation. Generating energy from alternative sources reduces the University's carbon footprint.

Proposed Actions:

- Utilize a Power-Purchase Agreement (PPA) or other funding mechanism to have solar photovoltaic systems installed on the roofs of campus buildings with suitable solar access.
- Evaluate the potential of operating a co-generation plant.
- Explore the potential for wind power.

SCOPE 3

Reduction Goal: ***SOU proposes to reduce its Scope 3 emissions from 3,997 t CO_2e in FY2008 to 3,778 t CO_2 e in 2015.***

Air Travel

For FY08, emissions from institution-funded air travel were the third largest source of net emissions for SOU, contributing over 1,780 t CO_2e.

Air Travel Emissions Reduction Strategies

1. **Encourage alternative transportation modes.**

   Other modes of transportation compare well to flying in terms of speed and convenience but have a lower carbon impact.

   Proposed Actions:
   - Incentivize carpooling.

2. **Restrict reimbursements for air travel.**

   A restriction on travel may be necessary to reduce emissions from air travel.

   Proposed Actions:
   - Eliminate or reduce reimbursements for flights less than 150 miles from the point of origin.

3. **Encourage alternatives to travel.**

   While in-person attendance at distant meetings is required in some cases, technologies such as teleconferencing offer opportunities to reduce air travel emissions. Travel time can be reduced while still allowing desired levels of interaction.

   Proposed Actions:
   - Expand teleconferencing opportunities to the entire campus community.

Commuting

For FY08, emissions from commuting were the fourth largest source of net emissions for SOU, contributing over 1,669 t CO_2e. Emissions from student, faculty and staff commuting to campus are included in this category. Emissions from commuting were estimated using data from a survey of students, faculty and staff so actual emissions from this category are likely understated.

Commuting Emissions Reduction Strategies

1. **Encourage alternative modes of transportation/commuting to reduce the number of vehicle miles driven.**

The most effective method for reducing emissions from commuting is to reduce the number of vehicle miles driven to and from by students, faculty and staff in single-occupant vehicles.

Proposed Actions:

- Make free bus passes available to students, faculty and staff; and encourage the use of public transportation for commuting to campus.
- Work with the Rogue Valley Transportation District to expand their bus routes and schedules to meet the transportation needs of students, faculty and staff.
- Raise campus parking permit rates to encourage use of public transportation.
- Encourage students, faculty and staff to ride a bike or walk to campus, when feasible.
- Provide changing rooms with showers and covered/indoor bike parking opportunities for bicycle commuters.

2. Minimize climate impact of commuting.

When the use of alternative modes of ground transportation is not feasible, minimize the impact of commuting to campus by car.

Proposed Actions:

- Implement an “Eco Driving Program” to teach campus motorists how to drive in a more energy-efficient manner.
- Offer reduced cost or free carpool parking for student, faculty and staff.
- Expand the Ride-Share Program in the Commuting Resource Center.
- Collaborate with Ashland Ride Share to utilize their hybrid vehicles to augment Motor Pool vans.
- Offer reduced cost parking permits for hybrid vehicles and scooters.
- Provide charging stations for electric vehicles; encourage use of bio-fuel vehicles.

Solid Waste

For FY08, emissions from solid waste contributed 75 t CO_2e. These emissions result from methane released from solid waste that SOU sends to the landfill. SOU’s solid waste is hauled to Rogue Disposal’s Dry Creek Landfill where methane is captured and used to generate electricity. This technology reduces SOU’s emissions from solid waste, but reduction of the overall waste stream is necessary to meet emission reduction goals. Ashland Sanitary and Recycling, our previous waste hauler, was recently acquired by Recology. This may create new opportunities to quantify solid waste emissions and divert more solid waster from the landfill.

Solid Waste Emissions Reduction Strategies

1. Decrease the volume of the waste stream.

While the solid waste generated by SOU produces relatively low levels of emissions, there are opportunities to reduce these emissions through diversion of solid waste.

Proposed Actions:

- Work with Sodexo to reduce food waste from campus food service operations.
- Work with Recology to expand and enhance the campus recycling program.
- Promote recycling in the residence halls through competitions such as RecycleMania.
- Compost all compostable materials on the campus.

2. Minimize climate impact of solid waste.

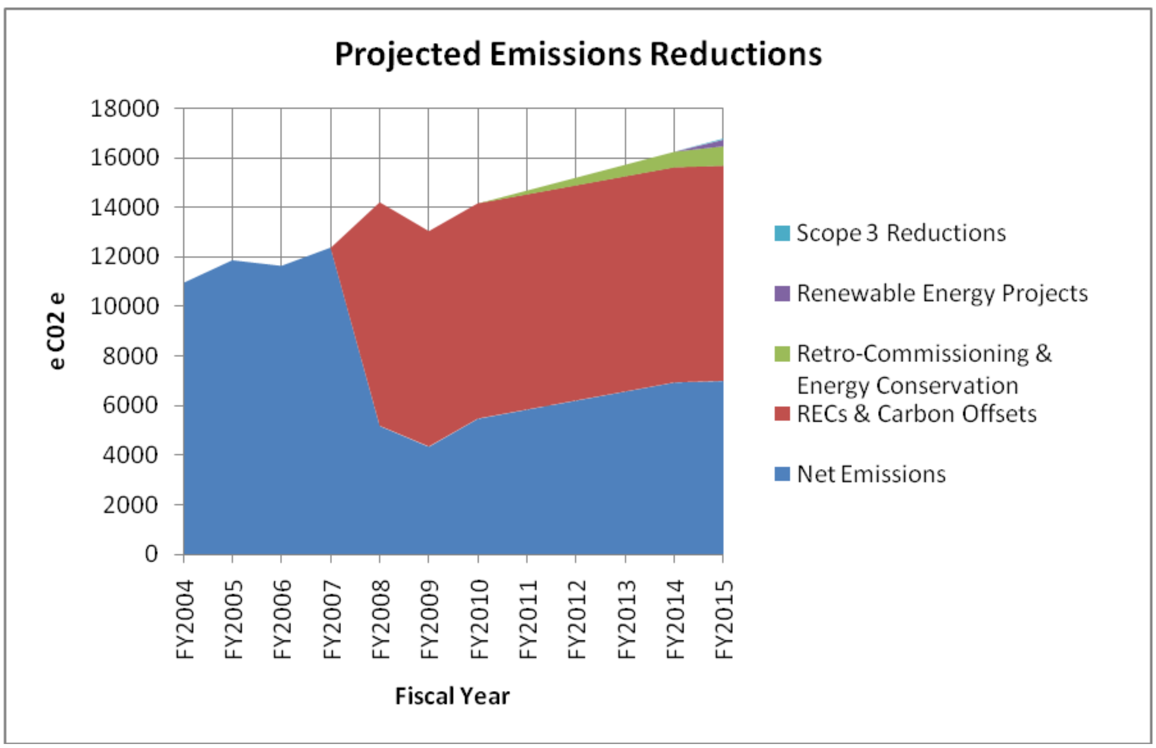
Since Rogue Disposal is already generating electricity from methane at the landfill, there may be few options to lessen climate impact in a cost-effective manner.

Proposed Actions:

- Work with the waste hauler to improve efficiency of the system.

Graphical Representation of Mitigation Strategies

The following illustration graphically represents the emissions mitigation strategies that are proposed by the Climate Action Plan.



9. Barriers, Solutions and Financial Analysis

Barriers

With the current economic downturn and resulting budget cuts, Southern Oregon University's opportunities for funding energy conservation measures and other emissions mitigation strategies are more limited than in previous years. It is difficult to propose the use of institutional funds to reduce GHG emissions when staff positions are being eliminated and Services and Supplies budgets are being cut due to funding reductions. The Oregon University System and SOU are pursuing other funding sources and partnerships with the private sector to provide the investment capital needed to implement the University's emissions mitigation strategies.

Solutions

OUS Solar Feasibility Study

In spring 2009, the Oregon University System hired BacGen of Seattle to conduct solar feasibility studies at each of the OUS institutions. The intent of this study was to determine the system's near-term generating capacity on buildings and land to facilitate the OUS goal of net zero energy. Solar feasibility studies were conducted on the following buildings on the SOU campus: Hannon Library, Music Building, McNeal Pavilion, and the Education/Psychology Building. The solar potential of the buildings was ranked in the following order of priority: McNeal Pavilion (high roof), Music Building and Hannon Library.

OUS Solar Power Purchase Agreement

In 2009, the Oregon University System issued a Request for Proposals for a Solar Power Purchase Agreement. Through this agreement, a solar contractor will work with the OUS institutions to install solar photovoltaic systems on the roofs of buildings on each campus. The solar contractor will be responsible for all of the costs of the installations and will receive all of the federal, state and utility rebates and incentives, including the renewable energy credits. In exchange for the roof leases for the solar photovoltaic systems, each institution will be able to purchase the renewable power generated by the PV systems on its roofs at a fixed rate, which will be no higher than the rate the institution is currently paying for electricity.

OUS Energy-Saving Performance Contract

In 2010, the Oregon University System plans to issue a Request for Proposals for an Energy-Saving Performance Contract to implement energy conservation measures in the buildings on its campuses. After the Energy Saving Company (ESCO) has been selected, the selected ESCO will conduct investment grade energy audits of buildings on each of the OUS campuses. The ESCO will work with each campus to identify which energy conservation measures will be implemented as part of the performance contract. The campuses are developing lists of energy conservation measures they would like to have implemented as part of the performance contract. For example, one of SOU's highest priorities for the performance contract will be the replacement of the two remaining original boilers in the Main Heat Plant. In order to fund the replacement of these boilers, which has a long payback period, the ESCO will need to harvest the energy savings from "low hanging fruit", energy conservation measures with a shorter payback period (such as lighting replacement projects) on campus.

In addition to implementing the energy conservation measures, the ESCO will also provide the financing for the work included in the scope of the performance contract. The Oregon University System will supplement the funding for the energy conservation measures with a portion of the FY09-11 Capital Construction Budget, which would have ordinarily would have gone to the campuses for Capital Repair, Deferred Maintenance/Seismic Remediation, and, possibly, Capital Construction projects. Oregon Business Energy Tax Credit (BETC) Program funds will also be used to supplement the funding for the energy saving performance contract. In addition, the Oregon University System received a State Energy Program grant funded by the Federal American Recovery and Reinvestment Act of 2009 (ARRA), which will supplement the funding for the energy saving performance contract.

Deferred Maintenance/Seismic Remediation Projects

Southern Oregon University will receive $5.9 million of Deferred Maintenance/Seismic Remediation funding in the 2009-2011 biennium to renovate Churchill Hall, built in 1926. Since the State Energy Loan Fund is one of the primary funding sources for this project, energy conservation will be a major focus of this renovation project. The GHG emissions attributable to Churchill Hall should be significantly reduced through replacement of the building's outdated heating system, improvements to the building envelope, and installation of a digital temperature control system. Britt Hall, McNeal Pavilion and Central Hall are also near the top of the OUS Deferred Maintenance/ Seismic Remediation list so it is likely that renovations of those buildings will be funded in the next decade, which will significantly reduce the GHG emissions attributable to those buildings.

SOU Sustainability Initiative

After participating in a meeting of the Sustainability Council in April 2008, Dick Wanderscheid, Director of the City of Ashland's Electrical Utility, proposed that Southern Oregon University and the City of Ashland team up with partners such as the Bonneville Power Administration (BPA), the Oregon University System, the Oregon Department of Energy, and the Northwest Power Planning Council to develop a high profile, electricity conservation pilot project for the University. A meeting of representatives of these organizations to discuss this proposal took place on September 15, 2008. Since that time, the Oregon Department of Energy has reviewed the

University's energy consumption data and forwarded a copy of an Energy Conservation Report that was prepared for the ODOE in 1993. The Bonneville Power Administration has been very supportive of the SOU Sustainability Initiative.

BPA Energy Audits

In spring 2009, the Bonneville Power Administration hired Facility Dynamics Engineering to conduct a Screening Report on the Science Building and Cascade and Madrone Residence Halls. BPA then had Facility Dynamics Engineering conduct a more in-depth energy audit of the Science Building, which identifies potential energy conservation measures and the projected costs, energy savings, and payoff for those measures. BPA will fund the implementation of two of the energy conservation measures: ECM #2-2 (scheduling of exhaust fans EF-1, 2, 3 and 4) and ECM #2-4 (replacement of the vacuum pump skid).

BPA Dashboard

Over time, the Bonneville Power Administration is proposing to develop an interactive, dynamic measurement system to monitor all key resource flows. This system would provide dynamic mapping, display energy resource flows, and make this information available to all stakeholders. The system would provide a link between the actions of the various stakeholders (students, faculty and staff) and their impact on energy resource flows. The proposed system would display the measured impacts SOU has on the environment, including waste heat, light pollution, CO_2 emissions, wastewater, etc. The proposed system would display an overall campus-wide view, along with the ability to drill down to specific locations and end-uses for detailed views. Multiple resources (natural gas, electricity, water) would be quantified in primary units (e.g. kilowatt-hours), costs, and externalities (e.g. CO_2).

City of Ashland Conservation Program

The City of Ashland Conservation Program offers rebates and incentives for a range of energy saving measures including lighting replacement, occupancy sensor installation, water closet replacement, appliance replacement, and solar energy installations. SOU has utilized these rebates to implement lighting retrofit projects and the installation of occupancy sensors in campus buildings. These incentives would also be available to an ESCO in an energy-saving performance contract.

The Ashland Electrical Utility was the first utility in Oregon to adopt a net metering policy. Cash incentives offered by the City of Ashland for grid-connected solar electric systems installed by businesses are $1 per Watt up to $10,000 for systems installed on businesses. Unfortunately, this cash incentive is limited to $10,000 per business or institution.

Financial Analysis

Retro-Commissioning and Energy Conservation

The McKinstry assessment estimated the costs of a range of retro-commissioning and energy conservation projects on SOU buildings to be approximately $8.5 million in today's dollars. The annual savings resulting from these projects would be $200,000. With an average project life of 15 years, the net cost savings to the University over this term would be $3.7 million (assuming 3.5% utility cost escalation).

Renewable Energy

The McKinstry assessment also estimated the costs of a 2.2 megawatt solar photovoltaic project, which could supply 16% of the University's electricity load. The project costs for this project would be approximately $16.5 million in today's dollars, however, a significant portion of this amount could be offset through the use of renewable energy incentives available from the state (such as Business Energy Tax Credits), the federal government (tax credits, tax deductions, and depreciation), and utilities. The solar photovoltaic project would save the University an estimated $165,000 annually in electricity bills.

Offsets and Renewable Energy Certificates

Under its present contract with the Bonneville Environmental Foundation, SOU pays $6.50 per REC to offset 100% of its electricity consumption and $9.55 per carbon offset to offset 100% of its natural gas consumption.[21]

10. Implementation

In order for the Climate Action Plan to be successfully implemented, it will need to be integrated with other major planning processes on the campus, including the following:

- Strategic Plan
- Master Academic Plan
- Campus Master Plan

As described in Section 5.1, the Strategic Plan places a significant emphasis on sustainability. Since a requirement of the ACUPCC is to make climate neutrality and sustainability a part of the curriculum and other educational experience for students, this objective should be reinforced in the Master Academic Plan. The Campus Master Plan Update addresses sustainability and includes an outline for an Energy Master Plan.

The President has already made a commitment to making the campus climate neutral by signing the ACUPCC, but it will be necessary for the President to continue to reinforce this commitment to the campus community and maintain a high level of interest in climate action planning.

The following steps will be taken by the University to increase the chances of successfully implementing the Climate Action Plan:

1. The Climate Action Plan Team will continue to meet regularly to monitor progress toward achievement of the University's GHG emissions reduction targets.

2. The Oregon University System or the University will compile annual GHG inventories, which will be reported to the Association for the Advancement of Sustainability in Higher Education (AASHE) and the ACUPCC.

3. The Campus Planning and Sustainability Office will develop and distribute to the campus an annual progress report, which will contain an updated GHG inventory, a listing of measures and projects completed that year, and an assessment of whether climate commitment goals for that year were met. A press release on the annual progress report will be distributed to the media.

4. An annual forum will be held to discuss the University's progress toward achieving its carbon emissions reduction targets.

5. A formal review and evaluation process will be scheduled in the years the Climate Action Plan establishes for achieving interim targets.

Implementation of the Climate Action Plan will be a learning experience. Economic, political and environmental conditions will undoubtedly change in the future. New technologies and opportunities will become available, and resources will likely become more strained. Flexibility and a willingness to change the Climate Action Plan in the future will be required in order for it to be a living document.

10.1 Future Policies

A draft Green Purchasing Policy has been sent to the President's office for review and approval. This policy addresses the two of the "tangible actions" to reduce greenhouse gases required of signatories to the American College and University Presidents' Climate Commitment:

a. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council's LEED Silver standard or equivalent.
b. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.

The full text of the draft Green Purchasing Policy can be found in Appendix 4.

11. Communications Strategy

The Climate Action Plan Team will communicate the Climate Action Plan and its GHG emissions reduction strategies to the campus community through the following means:

1. The Climate Action Plan will be posted on a University website for comment by campus constituents and the broader community. All-campus e-mail messages will be sent to all students, faculty and staff members to make them aware of this opportunity for feedback. A press release on the web posting will be issued to the local media.

2. Campus constituents will be invited to participate in a public forum at which the Climate Action Plan will be presented, and comments will be solicited from the audience.

3. The Climate Action Plan Team will make revisions to the Climate Action Plan based on feedback received from the CAP website and during the public forum.

4. The final roll-out of the Climate Action Plan will be publicized, and the Climate Action Plan will be posted on a public website.

5. Progress toward the goals of the Climate Action Plan will be regularly communicated to the University administration and campus community.

6. The University will encourage ongoing student interest and support in the Climate Action Plan.

7. The University will encourage the faculty to discuss the University's progress toward achieving its carbon emissions reduction targets in the classes they teach.

8. The President will reinforce the commitment to the campus community to maintain interest in achieving the GHG emissions reduction targets.

12. Next Steps

The McKinstry CAP Facilities Assessment recommends that SOU first implement retro-commissioning, operations consolidation, and energy conservation projects, over the next five years. According to the McKinstry assessment, these projects provide the best opportunities for cost-effective implementation, generate immediate savings and carbon reductions, and will improve operations and improve building occupant comfort. The McKinstry assessment stated that it was especially important that these projects take priority as SOU is completing upgrades to its central plant. SOU will utilize the energy saving performance contract and state Deferred Maintenance/Seismic Remediation project funds to accomplish the retro-commissioning and energy conservation projects.

After implementation of the energy conservation projects, the McKinstry assessment recommended that SOU consider moving forward with the implementation of large scale renewable energy technologies, such as solar, bio-mass, wind, or ground source heat pumps. While those projects would be more costly than energy conservation projects, the McKinstry assessment stated that renewable energy projects would insulate the University from price volatility in carbon trading markets when demand and prices for carbon offsets increase.[22] In order to finance renewable energy projects, SOU will have to aggressively explore all potential funding mechanisms and all renewable energy incentives available from the state (such as Business Energy Tax Credits), the federal government (tax credits, tax deductions, and depreciation), and utilities.

The next steps to be taken by SOU in the implementation of the Climate Action Plan are listed in Section 10. The next steps to be taken by SOU in the communication of the Climate Action Plan are listed in Section 11.

Appendix 1

Text of the American College & University Presidents' Climate Commitment

We, the undersigned presidents and chancellors of colleges and universities, are deeply concerned about the unprecedented scale and speed of global warming and its potential for large-scale, adverse health, social, economic and ecological effects. We recognize the scientific consensus that global warming is real and is largely being caused by humans. We further recognize the need to reduce the global emission of greenhouse gases by 80% by mid-century at the latest, in order to avert the worst impacts of global warming and to reestablish the more stable climatic conditions that have made human progress over the last 10,000 years possible.

While we understand that there might be short-term challenges associated with this effort, we believe that there will be great short-, medium-, and long-term economic, health, social and environmental benefits, including achieving energy independence for the U.S. as quickly as possible.

We believe colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society. These colleges and universities will be providing students with the knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop.

We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities. Accordingly, we commit our institutions to taking the following steps in pursuit of climate neutrality.

1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.
    a. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.
    b. Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.

c. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
    i. A target date for achieving climate neutrality as soon as possible.
    ii. Interim targets for goals and actions that will lead to climate neutrality.
    iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
    iv. Actions to expand research or other efforts necessary to achieve climate neutrality.
    v. Mechanisms for tracking progress on goals and actions.

2. Initiate two or more of the following tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.
    a. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council's LEED Silver standard or equivalent.
    b. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.
    c. Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
    d. Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution.
    e. Within one year of signing this document, begin purchasing or producing at least 15% of our institution's electricity consumption from renewable sources.
    f. Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution's endowment is invested.
    g. Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste.
3. Make the action plan, inventory, and periodic progress reports publicly available by providing them to the Association for the Advancement of Sustainability in Higher Education (AASHE) for posting and dissemination.

In recognition of the need to build support for this effort among college and university administrations across America, we will encourage other presidents to join this effort and become signatories to this commitment.

Signed,

The Signatories of the American College & University Presidents' Climate Commitment

Appendix 2

THE FOLLOWING TABLE PROVIDES A LIST OF ALL MEASURES IDENTIFIED IN THE BUILDINGS SURVEYED FOR SOU

Building	FIM Code	Measure	Measure Desc	Therms Savings	kWh Savings	Total Cost Savings	Project Cost	SPB	Measure Life	Annual lbs. CO_2e Reduced	Annual MTCDE Reduced	Project Life MTCDE Savings	Project Life Cost Savings	First Cost per MTCDE Reduced	First Cost/Measure Life MTCDE Reduced	$50/MTCDE Off-Set Purchase Cost
Central	3.33-CEN	HVAC	Insulate Piping	232	0	$238	$2,958	12	20	2,714	1.2	24.6	$4,767	$2,402	$120	$1,232
Central	25.02-CEN	Retro-Commission	Retro-commission equipment operation, AHUs, control points, ventilation, balance and settings	449	1,954	$553	$15,537	28	5	5,763	2.6	13.1	$2,763	$5,942	$8,589	$2,148
Central	13.01-CEN	Envelope	Attic Insulation	466	2,823	$610	$50,048	82	24	6,186	2.8	67.4	$14,647	$17,833	$1,188	$654
Central	25.05-CEN	Operations Management	Manage Building Level Operations Based on Seasonal and Day of Week	674	2,931	$829	$1,200	1	5	8,644	3.9	19.6	$4,144	$306	$743	$3,368
Central	13.02-CEN	Envelope	Roof Insulation	1,347	941	$1,428	$64,500	45	24	16,009	7.3	174.3	$34,273	$8,880	$61	$981
Central	8.01-CEN	Electric	Premium Efficiency Motors	0	12,460	$581	$12,731	22	18	3,240	1.5	26.5	$10,458	$8,661	$370	$8,716
Central	3.17-CEN	HVAC	Pump VFDs on CW / HW loop	0	20,672	$964	$13,085	14	18	5,375	2.4	43.9	$17,350	$5,366	$481	$1,323
Central	9.12-CEN	Lighting	Lighting Occupancy Sensors	0	29,490	$1,375	$6,474	5	15	7,667	3.5	52.2	$20,626	$1,861	$298	$2,195
Total				**3,168**	**71,270**	**$6,578**	**$166,533**	**25**	**15**	**55,597**	**25.2**	**421.5**	**$98,668**	**$6,602**	**$124**	**$21,076**

Building	FIM Code	Measure	Measure Desc	Therms Savings	kWh Savings	Total Cost Savings	Project Cost	SPB	Measure Life	Annual lbs. CO_2e Reduced	Annual MTCDE Reduced	Project Life MTCDE Savings	Project Life Cost Savings	First Cost per MTCDE Reduced	First Cost/Measure Life MTCDE Reduced	$50/MTCDE Off-Set Purchase Cost
Ed/Psych	9.02-EDP	Lighting	Day Lighting Controls	0	497	$24	$1,200	51	15	129	0.1	0.9	$356	$20,473	$1,365	$44
Ed/Psych	25.02-EDP	Retro-Commission	Retro-commission equipment operation, AHUs, control points, ventilation, balance and settings	959	1,787	$1,068	$17,016	16	5	11,685	5.3	26.5	$5,342	$3,210	$642	$1,325
Ed/Psych	16.01-EDP	Electric	Vending	0	9,862	$471	$4,679	10	5	2,564	1.2	5.8	$2,356	$4,021	$804	$291
Ed/Psych	3.17-EDP	HVAC	Pump VFDs on CW / HW loop	0	10,078	$470	$41,524	88	18	2,620	1.2	21.4	$8,459	$34,927	$1,940	$1,070
Ed/Psych	9.15-EDP	Lighting	T12 Lighting Upgrade	0	10,365	$495	$11,344	23	15	2,695	1.2	18.3	$7,429	$9,277	$618	$917
Ed/Psych	13.01-EDP	Envelope	Attic Insulation	995	2,582	$1,142	$5,775	5	24	12,312	5.6	134.1	$27,420	$1,034	$43	$6,703
Ed/Psych	25.05-EDP	Operations Management	Manage Building Level Operations Based on Seasonal and Day of Week	1,438	2,681	$1,603	$1,200	1	5	17,527	8.0	39.8	$8,014	$151	$30	$1,988
Ed/Psych	13.02-EDP	Envelope	Roof Insulation	2,877	861	$2,996	$176,315	59	24	33,883	15.4	369.0	$71,894	$11,469	$478	$18,448
Ed/Psych	8.01-EDP	Electric	Premium Efficiency Motors	0	26,017	$1,213	$24,535	20	18	6,764	3.1	55.2	$21,836	$7,994	$444	$2,762
Ed/Psych	9.12-EDP	Lighting	Lighting Occupancy Sensors	0	32,296	$1,543	$7,090	5	15	8,397	3.8	57.1	$23,146	$1,861	$124	$2,857
Total				**6,269**	**97,026**	**11,026**	**290,677**	**26**	**15**	**98,576**	**45**	**728**	**$176,252**	**$94,417**	**$399**	**$36,406**

Building	FIM Code	Measure	Measure Desc	Therms Savings	kWh Savings	Total Cost Savings	Project Cost	SPB	Measure Life	Annual lbs. CO_2e Reduced	Annual MTCDE Reduced	Project Life MTCDE Savings	Project Life Cost Savings	First Cost per MTCDE Reduced	First Cost/Measure Life MTCDE Reduced	$50/MTCDE Off-Set Purchase Cost
Greensprings	12.05-GRE	DHW	DHW Circulation Pump Controls	111	579	$141	$34,560	245	15	1,449	0.7	9.9	$2,115	$52,559	$3,504	$493
Greensprings	25.02-GRE	Retro-Commission	Retro-commission equipment operation, AHUs, control points, ventilation, balance and settings	341	4,376	$554	$29,784	54	5	5,122	2.3	11.6	$2,770	$12,815	$2,563	$581
Greensprings	25.05-GRE	Operations Management	Manage Building Level Operations Based on Seasonal and Day of Week	681	6,565	$1,006	$1,200	1	5	9,675	4.4	21.9	$5,029	$273	$55	$1,097
Greensprings	9.12-GRE	Lighting	Lighting Occupancy Sensors	0	15,171	$707	$12,409	18	15	3,945	1.8	26.8	$10,611	$6,934	$462	$1,342
Greensprings	13.02-GRE	Envelope	Roof Insulation	2,043	322	$2,114	$124,050	59	24	23,990	10.9	261.2	$50,738	$11,397	$475	$13,062
Greensprings	4.01-GRE	Controls	Control System Upgrade	3,405	1,152	$3,552	$60,000	17	15	40,142	18.2	273.2	$53,282	$3,294	$220	$13,660
Total				**6,581**	**28,165**	**$8,074**	**$262,003**	**32**	**15**	**84,323**	**38.3**	**604.7**	**$121,115**	**$6,848**	**$433**	**$30,236**

Building	FIM Code	Measure	Measure Desc	Therms Savings	kWh Savings	Total Cost Savings	Project Cost	SPB	Measure Life	Annual lbs. CO_2e Reduced	Annual MTCDE Reduced	Project Life MTCDE Savings	Project Life Cost Savings	First Cost per MTCDE Reduced	First Cost/Measure Life MTCDE Reduced	$50/MTCDE Off-Set Purchase Cost
McNeal Recreation Center	12.05-MCN	DHW	DHW Circulation Pump Controls	123	601	$154	$5,760	37	15	1,595	0.7	10.9	$2,316	$7,957	$530	$543
McNeal Recreation Center	3.06-MCN	HVAC	Install VFD on Fan motors	0	5,039	$235	$11,737	50	18	1,310	0.6	10.7	$4,229	$19,745	$1,097	$535
McNeal Recreation Center	16.02-MCN	Electric	Reduce plug loads	0	5,792	$270	$300	1	5	1,506	0.7	3.4	$1,350	$439	$88	$171
McNeal Recreation Center	8.01-MCN	Electric	Premium Efficiency Motors	0	8,827	$412	$13,096	32	18	2,295	1.0	18.7	$7,408	$12,578	$699	$937
McNeal Recreation Center	4.05-MCN	Controls	Demand Control Ventilation	1,118	0	$1,149	$7,200	6	15	13,081	5.9	89.0	$17,228	$1,213	$81	$4,451
McNeal Recreation Center	3.09-MCN	HVAC	Energy Recovery Run-A-Round Loop	2,861	-8,837	$2,527	$86,168	34	15	31,176	14.1	212.2	$37,906	$6,092	$406	$10,609
McNeal Recreation Center	9.12-MCN	Lighting	Lighting Occupancy Sensors	0	15,171	$716	$14,432	20	15	3,945	1.8	26.8	$10,742	$8,064	$538	$1,342
McNeal Recreation Center	1.05-MCN	Boiler	Steam trap repair & maintenance	2,213	0	$2,273	$4,009	2	10	25,892	11.7	117.5	$22,735	$341	$34	$5,874
McNeal Recreation Center	13.02-MCN	Envelope	Roof Insulation	2,430	1,767	$2,579	$144,000	56	24	28,894	13.1	314.6	$61,898	$10,984	$458	$15,732
McNeal Recreation Center	9.05-MCN	Lighting	HID Lighting to T8	0	26,252	$1,239	$23,092	19	15	6,825	3.1	46.5	$18,588	$7,457	$497	$2,323
McNeal Recreation Center	4.07-MCN	Controls	Control System Upgrade	2,673	7,231	$3,083	$172,800	56	15	33,158	15.0	225.7	$46,252	$11,486	$766	$11,283
McNeal Recreation Center	25.02-MCN	Retro-Commission	Retro-commission equipment operation, AHUs, control points, ventilation, balance and settings	2,430	27,637	$3,785	$34,638	9	5	35,620	16.2	80.8	$18,927	$2,143	$429	$4,040
Total				**13,849**	**89,479**	**$18,423**	**$517,232**	**28**	**15**	**185,296**	**84.1**	**1156.8**	**$249,579**	**$6,152**	**$447**	**$57,840**

Building	FIM Code	Measure	Measure Desc	Therms Savings	kWh Savings	Total Cost Savings	Project Cost	SPB	Measure Life	Annual lbs. CO_2e Reduced	Annual MTCDE Reduced	Project Life MTCDE Savings	Project Life Cost Savings	First Cost per MTCDE Reduced	First Cost/Measure Life MTCDE Reduced	$50/MTCDE Off-Set Purchase Cost
Taylor	12.05-TAY	DHW	DHW Circulation Pump Controls	182	1,050	$236	$5,760	24	15	2,402	1.1	16.4	$3,539	$5,284	$352	$818
Taylor	9.01-TAY	Lighting	Add exterior lighting photocell	0	2,623	$122	$600	5	15	682	0.3	4.6	$1,835	$1,939	$129	$232
Taylor	1.05-TAY	Boiler	Steam trap repair & maintenance	830	0	$853	$1,484	2	10	9,711	4.4	44.1	$8,527	$337	$34	$2,203
Taylor	25.02-TAY	Retro-Commission	Retro-commission equipment operation, AHUs, control points, ventilation, balance and settings	2,000	1,361	$2,118	$17,966	8	5	23,754	10.8	53.9	$10,590	$1,667	$333	$2,694
Taylor	13.02-TAY	Envelope	Roof Insulation	2,521	655	$2,620	$75,000	29	24	29,666	13.5	323.0	$62,890	$5,572	$232	$16,152
Taylor	13.12-TAY	Envelope	Windows	4,000	655	$4,140	$277,297	67	24	46,970	21.3	511.5	$99,356	$13,012	$542	$25,574
Taylor	9.12-TAY	Lighting	Lighting Occupancy Sensors	0	34,099	$1,590	$7,540	5	15	8,866	4.0	60.3	$23,850	$1,874	$125	$3,017
Total				**9,533**	**40,443**	**$11,679**	**$385,646**	**33**	**15**	**122,051**	**55.4**	**1013.8**	**$175,188**	**$6,964**	**$380**	**$50,690**

Total	**9,533**	**40,443**	**$11,679**	**$385,646**	**33**	**15**	565,035	256	3,970	858,520	**$6,521**	**$421**	**$198,522**

Appendix 3

1990 GHG Baseline for Building Energy Use in the Oregon University System

DRAFT VERSION DATE: 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:

Table 1: 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:

Table 2: 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)*[1]. 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 building constructed in 1989 were included but those constructed in 1990 were not) to estimate electricity and natural gas consumption.

[1] 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/

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 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.

Table 2: 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*[2]. 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)*[3]. 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 as since been replaced by natural gas. Based on interviews with the operations staff, it is assumed that 100%

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

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.

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)*[3]. 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 1 shows this method for in general terms for total energy consumption (electricity and natural gas). Figures 2 shows the specific equations used for electricity and natural gas respectively.

Figure 1: 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 2a: Formula and description of variables to estimate electricity emissions.

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

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 2b: Formula and description of variables to estimate natural gas emissions.

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

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 2c: 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.

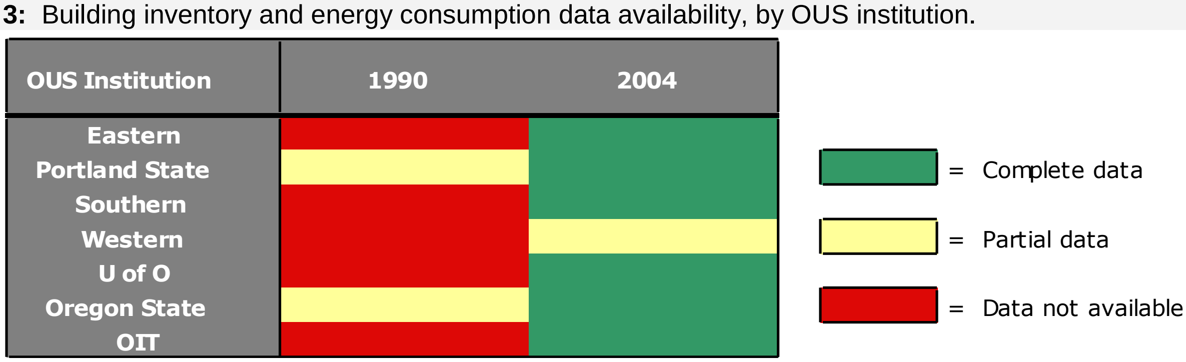
A second source of uncertainty is that CBECS statistics are based on averages from the Western region. This means the average energy intensity statistics are most likely skewed by mixing dramatically different climate zones. For example the heating needs of Phoenix or Los Angeles are dramatically different 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 3: 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 4: Sensitivity analysis for electricity consumption in 1990, by OUS institution**.**

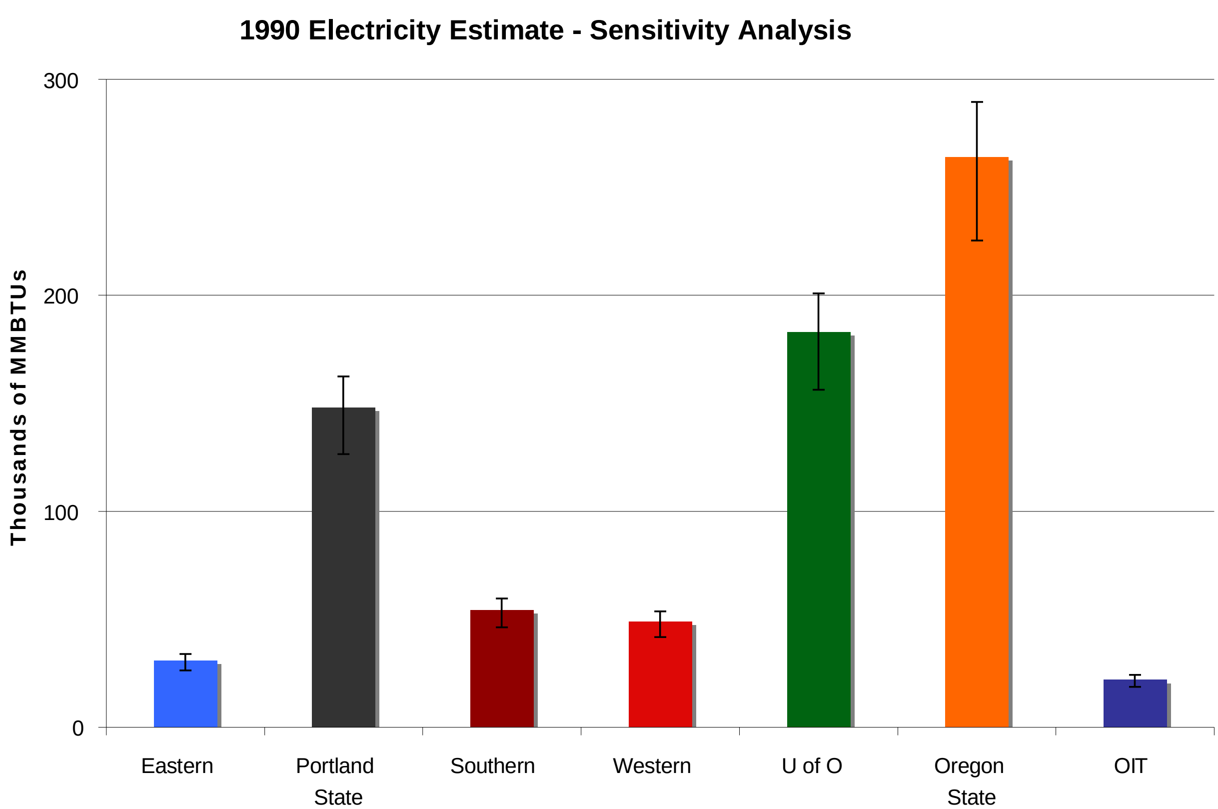
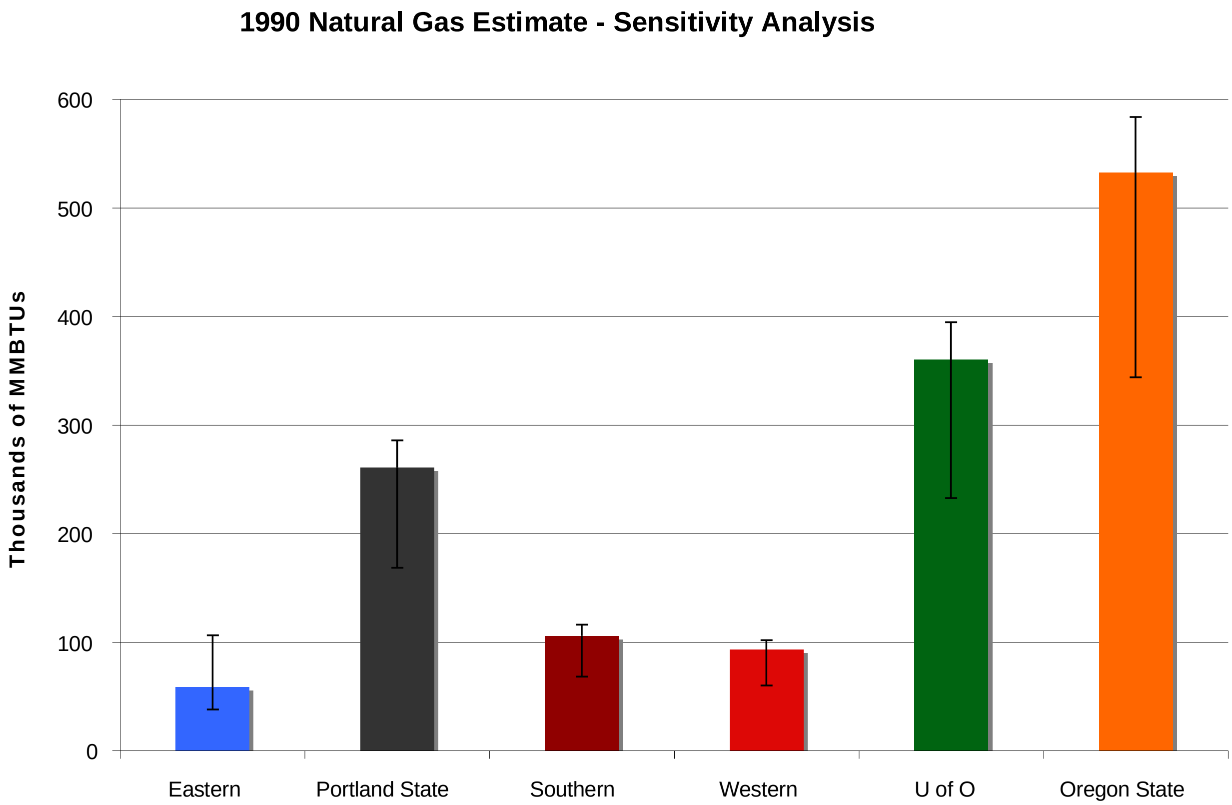


Figure 5: Sensitivity analysis for natural gas consumption in 1990, by OUS institution.



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. Tables 3 and 4 below show the GHG conversions from the underlying data used to generate the graph above.

Table 3: 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

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

Table 4: 1990 estimates of GHG emissions from natural gas (or wood waste), by OUS institution.

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:

Table 5: 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.

Table 6: 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

Table 7: 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.*

Table 8: 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 Table 8 are merely the sums from the previous two tables.*

Appendix 4

SOUTHERN OREGON UNIVERSITY

Policy Title: Green Purchasing Policy

Governing Body:		**Policy No.:**	
Policy Contact:	Larry Blake	**Date Revised:**	Nov. 13, 2009
Custodial Office:	Finance & Administration	**Date Approved:**	
Approved By:		**Next Review:**	
Related Policy:	Governor's Executive Order 06-02		

A. Purpose

The purpose of this policy is to reduce the adverse environmental impact of our purchasing decisions by buying goods and services from manufacturers and vendors who share the University's commitment to environmental stewardship.

B. Definitions

Green Purchasing – The method by which environmental and social considerations are considered with equal weight to price, availability and performance criteria to make purchasing decisions. Also known as "environmentally-preferred purchasing" (EPP), green procurement, affirmative procurement, eco-procurement, and environmentally-responsible purchasing. Green purchasing minimizes negative environmental and social effects through the use of environmentally friendly products. Green purchasing attempts to identify and reduce environmental impact and to maximize resource efficiency.

C. Policy Statement

1. Energy

   a. All new purchases of desktop computer, notebooks and monitors must meet, at a minimum, all Electronic Product Environmental Assessment Tool (EPEAT) environmental criteria designated as "required" (bronze registration) or higher as contained in the IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products, whenever practicable.

   b. Additional consideration should be provided for electronic products that have achieved EPEAT silver or EPEAT gold registration. The registration criteria and a list of all registered equipment are provided at: http://www.epeat.net

   c. All photocopiers purchased or leased shall be capable of double-sided copying/printing whenever practicable.

   d. Copiers and printers shall be compatible with the use of recycled content and remanufactured products.

e. Remanufactured toner cartridges which carry the name of or are certified by the equipment manufacturer should be used in all copiers and printers whenever feasible.

f. Purchase new printers or personal printers only when existing networked printers can't be utilized to reduce the proliferation of printers on campus.

g. Use printing options that require confirmation to print at the device whenever practicable to ensure that unneeded output is not printed.

h. All energy-using appliances purchased by the University shall meet the U. S. EPA Energy Star certification when available and practicable. When Energy Star labels are not available, all purchasing units shall choose energy products that are in the upper 25% of energy efficiency as designated by the Federal Energy Management Program.

i. Where applicable, energy-efficient equipment shall be purchased with the most up-to-date energy efficiency functions. This includes, but is not limited to, high-efficiency space heating systems and high-efficiency space cooling systems. The use of portable electric space heaters shall be reduced to a minimum.

j. When replacing vehicles, University purchasing units shall consider less-polluting alternatives to diesel such as compressed natural gas, bio-based fuels, hybrids, electric batteries, and fuel cells, as available.

k. When practicable, Facilities shall replace inefficient interior lighting (with incandescent and T-12 fluorescent light sources) with energy-efficient equipment. Halogen torchiere lamps shall not be allowed.

l. When practicable, Facilities shall replace inefficient exterior lighting with energy-efficient equipment. Exterior lighting shall be minimized where possible while providing adequate illumination for safety and accessibility.

2. Water

a. Purchase only the most water-efficient appliances available, including, but not limited to, high-efficiency toilets, low-flow faucets and aerators, and upgraded irrigation systems.

b. Discourage the sale on campus of water and other beverages in plastic bottles.

3. Toxins and Pollutants

a. Cleaning solvents shall be biodegradable, phosphate-free, and citrus-based where their use will not compromise quality of service.

b. Industrial and institutional cleaning products that meet Green Seal certification standards shall be utilized by custodial staff and outside custodial contractors.

c. All surfactants and detergents shall be readily biodegradable and shall not contain phosphates.

d. Vacuum cleaners that meet the requirements of the Carpet and Rug Institute "Green Label" Testing Program – Vacuum Cleaner Criteria, are capable of capturing 96% of particulates 0.3 microns in size, and operate with a sound level less than 70dBA shall be used by custodial staff and outside custodial contractors.

e. Whenever possible, products and equipment should not contain lead or mercury. For products that contain lead or mercury, preference should be given to those products with lower quantities of these metals and to vendors with established lead and mercury recovery programs.

f. When maintaining buildings and landscapes, Facilities shall manage pest problems through prevention and the use of environmentally-friendly products. Facilities shall adopt and implement an Integrated Pest Management (IPM) policy and practices using the least toxic pest control as a last resort.

4. Bio-Based Products

a. Bio-based plastic products that are biodegradable and compostable—such as bags, films, food and beverage containers, and cutlery—are encouraged whenever practicable.

b. Compostable plastic products purchased shall meet American Society of Testing and Materials (ASTM) standards as found in ASTM D6400-04. Biodegradable plastics used as coatings on paper and other compostable substrates shall meet ASTM D6868-03 standards.

c. Vehicle fuels made from non-wood, plant-based contents such as vegetable oils shall be encouraged whenever practicable.

d. Bio-based (soy-based) inks are encouraged for printing operations whenever practicable.

e. Paper, paper products and construction products made from non-wood, plant-based contents such as agricultural crops and residues are encouraged whenever practicable.

5. Forest Conservation

a. Ensure that all wood and wood contained in products that SOU buys is certified to be substantially harvested by a comprehensive, performance-based certification system. The certification system shall include independent third party audits, with standards equivalent to, or stricter than, those of the Forest Stewardship Council certification.

b. Purchase or use of previously used or salvaged wood and wood products is encouraged whenever practicable.

6. Recycling

   a. Purchase recycled paper with 30% post-consumer waste composition for all applications.

   b. Facilitate efficient collection of recycling in all campus buildings, including Student Housing. Glass must be recycled separately. Ashland Sanitary permits the following items to be commingled:

      1. Corrugated cardboard
      2. Office paper, opened mail and junk mail
      3. Magazines, catalogs and telephone books
      4. Newsprint and glossy printed advertising materials
      5. Plastic bottles and tubs (yogurt, tofu, cottage cheese, etc.)
      6. Aluminum and tin cans
      7. All metal lids
      8. Aluminum foil
      9. Shoes boxes, frozen food boxes, cereal and cracker boxes
      10. Paper egg cartons
      11. Shredded paper (strips only)
      12. Paper six-pack holders
      13. Gift wrap (no foil)

   c. When specifying asphalt concrete for parking or road construction projects, recycled, reusable, or reground materials shall be used whenever practicable.

   d. Products that are durable, long lasting, reusable or refillable are preferred whenever feasible.

   e. All documents shall be printed and copied on both sides to reduce the use and purchase of paper, whenever practicable.

   f. All surplus computers, monitors and televisions and other electronic devices are considered to be universal waste and must be disposed of as per applicable regulatory guidelines. For information on proper disposal, contact SOU Environmental Health & Safety.

   g. All used printer toner cartridges should be disposed of using a toner cartridge recycling service.

7. Packaging

   a. Packaging that is reusable, recyclable or compostable is preferred, when suitable uses and programs exist. Eliminate packaging or use the minimum amount of packaging necessary for product protection, to the greatest extent practicable.

8. Green Building

a. Green building concepts shall be integrated into architectural designs, construction documents, and the construction of and renovations to all SOU buildings.

b. All new buildings and major renovation projects shall achieve the U.S. Green Building Council's LEED Silver Certification, at a minimum. Where practicable, new buildings shall target LEED Gold or Platinum Certification.

c. When purchasing materials such as paint, carpeting, adhesives, furniture and casework for building maintenance, products with the lowest amount of volatile organic compounds (VOCs), the highest recycled content, and low or no formaldehyde shall be used whenever practicable. Paint used on the campus should meet the Green Seal GS-11 Standard for Low VOC content.

d. The distributors and/or manufacturers of all carpet installed at SOU shall have a carpet recycling plan.

e. The use of chlorofluorocarbon (CFC) and halon-containing refrigerants, solvents, and other products shall be phased out, and new purchases of heating, ventilating, air conditioning, refrigeration, insulation, and fire suppression systems shall not contain these chemicals.

9. Landscaping

   a. All landscape construction, renovations and maintenance performed by SOU Landscape Services staff or outside contractors shall employ sustainable management techniques whenever possible. This includes, but is not limited to, integrated pest management, drip irrigation (where practicable), and composting and use of mulch and compost. Preference shall be given to mulch and compost produced from regionally-generated plant debris and/or food waste.

   b. Landscape structures constructed of recycled content materials are encouraged. The amount of impervious surfaces in the landscape shall be limited, whenever practicable. Permeable substitutes, such as permeable asphalt or pavers, are encouraged for walkways, patios and driveways.

   c. Plants should be selected that are appropriate to the microclimate. Native and drought-tolerant plants that require no or minimal watering once established should be purchased.

10. Food

   a. When purchasing agricultural products, all food contractors shall purchase Oregon-grown products if the products are available and if the vendor can meet the applicable quality standards and pricing requirements.

   b. All food contractors shall agree to work with their food distributors to purchase a minimum of 15% locally grown products. All food contractors shall further agree that

15% is an initial percentage and they shall purchase as much local produce and product as possible.

D. Policy Consultation
IT (Teri O'Rourke), Facilities (Rex Hendricks), Environmental Health & Safety (Byron Patton), and the Sustainability Council

E. Associated Procedures or Other Information
Two of the requirements of this policy relate to "tangible actions" required by the American College and University Presidents Climate Commitment.

Endnotes

[1] Working Group III contribution to the Intergovernmental Panel on Climate Change. Fourth Assessment Report. “Climate Change 2007: Mitigation of Climate Change.” Summary for Policymakers. Bangkok, Thailand. 30 April – 4 May 2007. www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf
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[3] SERA Architects, *Southern Oregon University Campus Master Plan Update: 2010-2020*
[4] 74th Oregon Legislative Assembly—2007 Regular Session, *House Bill 3543*, http://www.leg.state.or.us/07reg/measpdf/hb3500.dir/hb3543.en.pdf
[5] State of Oregon, *State Energy Efficiency Design (SEED) Program*, http://www.oregon.gov/ENERGY/CONS/SEED/index.shtml
[6] Southern Oregon University, “Building the New SOU: Strategic Plan for Distinction and Sustainability, 2009-2014,” http://www.sou.edu/president/pdf/Strategic_Plan_100709.pdf
[7] Oregon League of Conservation Voters, “Oregon League of Conservation Voters Announces Jackson County 2008 Endorsements,” http://www.olcv.org/resources/oregon-league-conservation-voters-announces-jackson-county-2008-endorsements
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[9] American College and University Presidents’ Climate Commitment, *ACUPCC Implementation Guide*, http://www2.presidentsclimatecommitment.org/pdf/ACUPCC_IG_Final.pdf
[10] Ibid.
[11] Ibid.
[12] Good Company, “1990 Baseline Energy Use in the Oregon University System”.
[13] McKinstry, *Oregon University System: Climate Action Plan Facilities Assessment* (Portland, Oregon: McKinstry, 2009), 193, PDF.
[14] McKinstry, *Oregon University System: Climate Action Plan Facilities Assessment* (Portland, Oregon: McKinstry, 2009), 192, PDF.
[15] McKinstry, *Oregon University System: Climate Action Plan Facilities Assessment* (Portland, Oregon: McKinstry, 2009), 196, PDF.
[16] Chart created by author using data from McKinstry *Oregon University System: Climate Action Plan Facilities Assessment*
[17] McKinstry, *Oregon University System: Climate Action Plan Facilities Assessment* (Portland, Oregon: McKinstry, 2009), 196, PDF.
[18] Ibid.
[19] Email message from Michele Martin of the Bonneville Environmental Foundation 1.6.2010
[20] Walter Simpson, Cool Campus! A How-To Guide for College and University Climate Action Planning, ed. Niles Barnes, Julian Dautremont-Smith, Toni Nelson, and Brittany Zwicker (Lexington: Association for the Advancement of Sustainability in Higher Education, 2009), 51.
[21] Email message from Michele Martin of the Bonneville Environmental Foundation 1.14.2010
[22] McKinstry, *Oregon University System: Climate Action Plan Facilities Assessment* (Portland, Oregon: McKinstry, 2009), 198, PDF.