



OSU Carbon Action Plan

Oregon State University Carbon Action Plan: Everyone Needs to Lead

Materials linked from the October 11, 2018 Faculty Senate agenda.

Oregon State University Carbon Action Plan: Everyone Needs to Lead

Table of Contents

| | | |
|------|--|----|
| I. | EXECUTIVE SUMMARY | 3 |
| II. | MEANINGFUL ACTIONS..... | 3 |
| III. | OUR RESEARCH AND EDUCATIONAL CULTURE | 5 |
| IV. | OUR FOOTPRINT | 6 |
| A. | OSU’s Comprehensive Footprint..... | 6 |
| B. | OSU’s Greenhouse Emissions | 7 |
| C. | Three Key Areas..... | 9 |
| V. | ENGAGEMENT..... | 10 |
| A. | Learning What Works..... | 11 |
| B. | All Colleges and Divisions | 11 |
| C. | Process | 13 |
| VI. | APPENDICES..... | 13 |
| A. | Glossary..... | 14 |
| B. | References..... | 16 |

Acknowledgments

The OSU Carbon Action Plan evolved out of a collaboration between the OSU Sustainability Office and the OSU Policy Analysis Laboratory (OPAL). However, the development of the OSU Carbon Action Plan is the result of a committed group of faculty, staff and students working together to create a plan that enables OSU to engage in strategic and tactical steps to reduce overall greenhouse gas emissions and achieve net carbon neutrality by 2025. It is therefore important to acknowledge all of those who contributed to the plan's development, and who spent many hours of their time working through the details of the plan and process for implementation.

This plan was written in collaboration with the following people:

Erika Allen Wolters, Logan Adams, Sarah Boege, Rick Colwell, Sally Duncan, Stephen Naimoli, Ann Scheerer, Court Smith, and Shawn Williams

The Carbon Action Plan had several contributors who participated in meetings, outreach, graphics, and provided additional guidance for the plan's development:

Saul Boulanger, Emily Bowling, Kyle Brumback, Sarah Chaney, Carly Culin, Nathan Davis, Jynwaye Foo, Carter Frantz-Geddes, Joseph McQuillian, Marshall Moses, Jenny Christion Myers, Chloe Noelle, Andrea Norris, Rima Reeves, Amanda Rhodes, Myma Cavazon Sanchez, Tara Sanders, Inara Scott, Graham Shaw, Tracy Speelhoffer, and Brian Stroup

I. EXECUTIVE SUMMARY

Oregon State University signed in 2007 the American College and University Presidents Climate Commitment, now known as the Carbon Commitment. OSU's relatively early participation designated it a "Charter Participant." In 2009, OSU created and released its first Climate Plan, with a strategic focus on carbon reduction. Since 2009, limited engagement has demonstrated a need for a more integrative, holistic approach to carbon action planning. Recognizing that shared leadership is essential in order to achieve net greenhouse gas neutrality by 2025, the current plan seeks engagement and commitment from the entire OSU community.

The 2016 OSU carbon action planning key concepts are:

1. An approach that encourages every OSU unit (e.g. each college and division) and individual to create a carbon action plan. This University carbon action planning process is the vehicle and guidance framework to engage units and individuals in preparing carbon action plans to reduce greenhouse gases and monitoring the results. Unit and individual plans will be flexible and adaptive, allow actions appropriate to that unit or individual, and make them accountable for the outcomes.
2. While greenhouse gases will be the focus of plans, plans should also be designed to inform our interaction with ecological processes, economic conditions, and social practices.
3. A support team will guide each unit in preparing a carbon action plan that includes strategies, actions, monitoring, and lessons learned. The support team will also be a resource to help identify the best practices that have worked in other similar situations, for both units and individuals.
4. The plan and subsequent college and division actions will engage OSU across its mission, goals, and activities worldwide.
5. Success is built on what we learn from experience. The actions that will reduce greenhouse gases are initiated and iteratively adapted based on the outcomes of the experiments designed into carbon action plans.
6. Indicators will identify high level tracking measures that link to IPCC and OSU's historic performance.
7. The plan and subsequent actions will organize efforts based on Sustainability Tracking, Assessment & Rating System™ (STARS) concepts and calculations, while recognizing this system has limits and keeping in mind our broader ecological, economic, and social concerns.

II. MEANINGFUL ACTIONS

To achieve meaningful greenhouse emissions reduction, words and plans are not enough. Actions *must* follow specific goals. The action goal is that Oregon State University achieves net zero greenhouse gas emissions by 2025. To do this OSU must model its goal in the management of its lands and facilities. Oregon State University's mission "promotes economic, social, cultural and environmental progress for the people of Oregon, the nation and the world" (OSU 2015b:1). A signature area of achievement is "advancing the science of sustainable earth ecosystems."

Each student attending The University should understand the ecological, economic, and social principles for citizenship in a world where change and learning are constant. These aspirations have to be backed up with real achievements. While we know in 2016 the critical need to keep average world temperatures from rising more than 2 degrees Celsius, the actions to limit temperature rise have to come from everyone, and the exact actions that will succeed in saving humanity from itself will have to emerge from a wide diversity of efforts.

Therefore, this carbon action plan is designed to foster broad engagement among members of the OSU community. The plan seeks to have individuals, colleges and divisions create carbon action plans that factor their knowledge and experience into actions to live in accord with ecological principles, economic responsibility, and social awareness. OSU has taken steps along this path already, but recognizing that clear guidelines and objectives are important to achieve any goal, the OSU carbon action plan outlines strategic and tactical methods for developing and implementing greenhouse emissions reduction planning for divisions, colleges, and individuals by providing guiding documents, carbon calculators, and OSU emissions reports that help establish a baseline for planning and inspire action.

OSU campuses breathe in and out in three different ecosystems—wet coastal, moderate valley, dry high desert. The OSU research and education footprint is worldwide and encompasses its land, sea, sun, and space research and education missions. As a university with 29,576 students, over 196 academic degree programs, outreach to every Oregon county, students from 113 countries, and research partnerships on all continents (OSU 2015a), OSU has a big footprint. Collectively, we face a daunting but worthy and collaborative opportunity across those geographies and social systems to reduce our own contribution to anthropogenic temperature increases.

The goal of this process is that everyone will take personal leadership to meet the goal of net zero greenhouse gas emissions by 2025 and to live more sustainability as new ecological, economic, and social processes emerge from these efforts. It is both in our culture at OSU, and our mission, goals, and strategic plan. OSU's carbon action plan closely meshes with OSU's (2015b) three strategic plan goals:

1. Provide a transformative educational experience for all learners—

Climate change and sustainability are an important part of the educational experience at OSU. Many classes cover topics of climate and sustainability. In addition, our climate action plan adds OSU's concerns about greenhouse gases and human impacts on ecosystems into orientations for new/transfer students.

2. Demonstrate leadership in research, scholarship and creativity while enhancing preeminence in these areas of distinction—innovating and integrating discoveries to address truly grand challenges, and fundamental needs for sustainable growth and prosperity.

To prevent runaway climate change, OSU needs to lead in developing and extending the frontiers of knowledge regarding natural, water, economic, social, and human resources for meeting the grand challenges going forward.

3. Strengthen impact and reach throughout Oregon and beyond—

OSU recognizes its responsibility to provide research and educational leadership throughout the world. Eleven percent of our student population is international. They will take back to their home countries the behaviors they see modeled during their educational experience.

III. OUR RESEARCH AND EDUCATIONAL CULTURE

Oregon State University has a well-deserved reputation for its culture of cross-disciplinary, collaborative approaches to climate change and sustainability questions, infusing its local-to-global research agendas, and its integrated course offerings. Our Carbon Action Plan is necessarily forward-looking, and depends upon baseline and repeated measurements that inform comparative metrics through time. But it is just as important to recognize the prevailing culture of OSU – much harder to quantify – as represented by its education, research, and extension ventures. It is one of only two land-, sea-, space- and sun-grant universities designated in the country. For OSU’s Carbon Action Plan to be plausible, it is critical that it builds upon and fortifies the foundations of achievement our students and faculty have developed steadily over many decades.

- Growing demand from students has resulted in sustainable food purchasing/consuming options offered by OSU Housing and Dining in all campus dormitories.
- Students created the Student Sustainability Initiative that works on climate, energy, transportation, food, and water. They have taxed themselves since 2008 to support these programs and share in the goal for net neutrality in greenhouse gas emissions by 2025.
- The Associated Students of OSU’s Environmental Affairs Task Force teams with students and faculty to develop awareness of our impact on the world around us and plans activities, projects, lectures, campaigns, movies, and debates. The Task Force promotes student participation and encourages collaboration to keep our values in sustainable practices firmly before the campus community.

Among faculty, many cross-disciplinary activities have advanced climate change knowledge. For example, one of the earliest global climate models was developed at OSU in the 1980s. It examined the causes of past climate change as well as how the climate might change in the future. This was the precursor for The Center for Analysis of Environmental Change, which helped generate the development of the Willamette Valley Planning Atlas in partnership with University of Oregon and EPA. There are numerous other examples demonstrating OSU’s partnerships, grants, and interdisciplinary research and education that highlights the evolution of environmental and climate issues, reiterating OSU’s culture and commitment to “advancing the science of sustainable earth ecosystems” and demonstrates its leadership in research and scholarship on climate change.

The culture of OSU continues to distinguish the university community by advancing the physical, biological, social, and economic sciences of sustainable earth ecosystems while bettering human economic well-being and social progress. As such, OSU has redesigned itself to be interdisciplinary with programs, departments, schools, and colleges like Environmental Science at both the graduate and undergraduate levels. Other examples include:

- The Sustainability Double Degree Program in the College of Agricultural Sciences;

- Forest Ecosystems and Society in the College of Forestry;
- The Natural Resources Graduate Degree;
- The Marine Resource Management Program in the College of Earth, Oceanic, and Atmospheric Sciences;
- The Cooperative Institute for Marine Studies,
- Environmental Arts and Humanities Educational, Research, and Outreach Programs; and
- The School of Public Policy combining Political Science, Sociology, and Economics.

In all of these programs, climate is a key focus. The interdisciplinary nature of these programs allow for students to engage in comprehensive learning about climate from different subject areas and for faculty to engage in cross-disciplinary, collaborative research and teaching. The societal goal for universities is innovation in education, research, and extension. These are areas of strength at OSU and areas that can be built upon to come up with innovative climate actions.

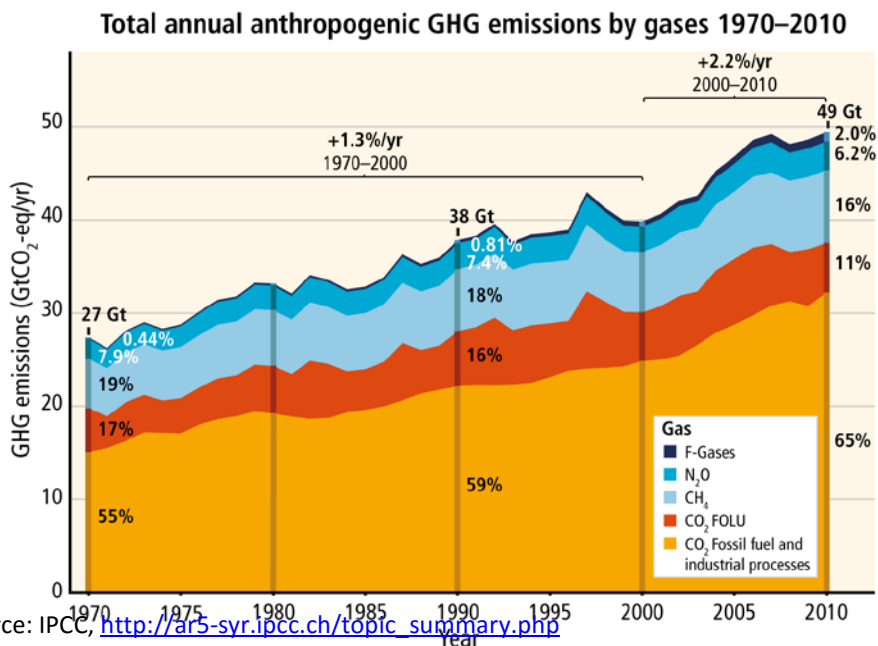
IV. OUR FOOTPRINT

A. OSU's Comprehensive Footprint

OSU lives in a world system in which we are part of, but certainly not the whole problem. The argument is made that our portion of the total impact is small, so unless others do more, our efforts will have little impact. As Figure 1 shows the anthropogenic footprint is large. We contribute to this footprint in equal or greater proportion to others. As an educational institution we have an international impact. What we teach travels worldwide. What we do must be worldwide, too.

OSU's impact goes beyond just the core campus. OSU owns lands adjacent to the historic campus, in McDonald-Dunn Forest, at the Bend campus, for offices and facilities around the State, at research sites in state and in many countries, and its ships travel the world's oceans and seas. OSU programs influence all US states, most countries of the world, the world's oceans, and the Earth's atmosphere. In evaluating OSU's climate impact, the systems that OSU influences need to be carefully defined and their boundaries noted.

As well as having a broad physical footprint, OSU and its research and teaching programs affect all of the

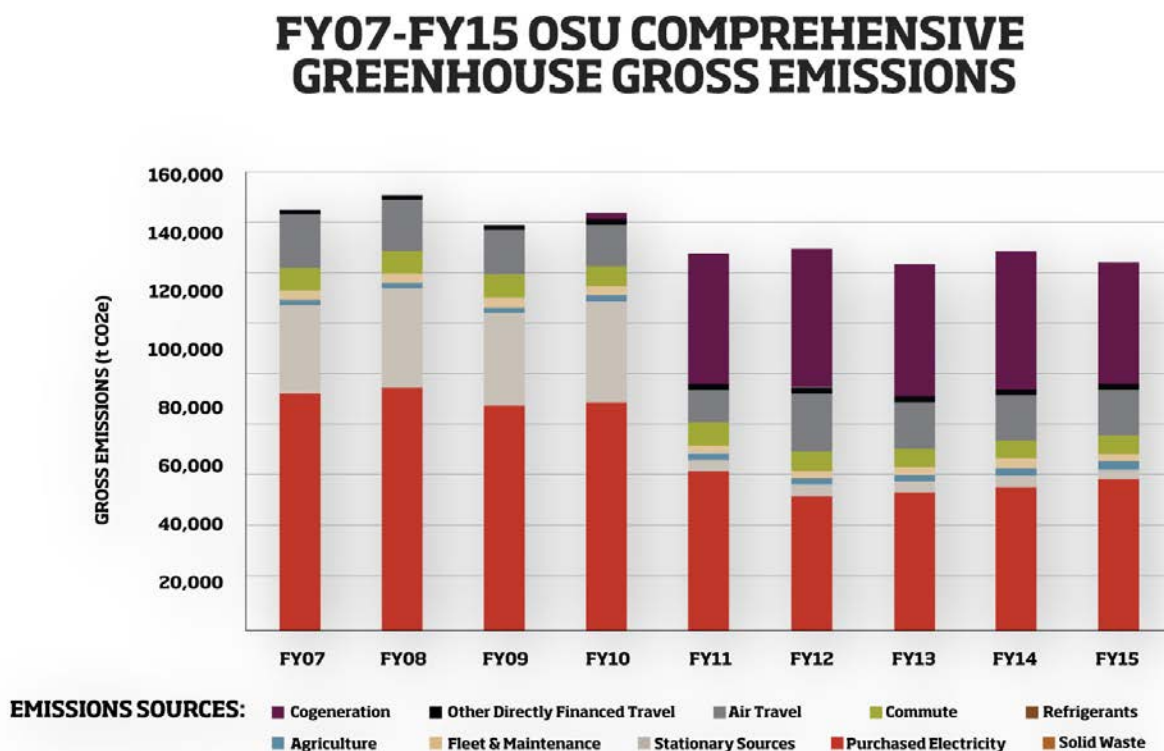


major drivers of climate change. Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. As a major research institution, OSU both studies and contributes to all of these drivers. The University has the responsibility to put its knowledge and understanding to use in reducing the impacts of climate change.

B. OSU's Greenhouse Emissions

OSU has maintained a comprehensive greenhouse gas (GHG) emissions report since FY07. Figure 2 illustrates the total (gross) GHGs emissions from FY07-FY15. Improvement has been made over the last nine years. Purchased electricity has decreased and, with the new energy center built in 2010, cogeneration gives the institution more control of its energy sources. However, there are areas where OSU could have a greater impact.

Figure 2. OSU Comprehensive Greenhouse Gas Gross Emissions



As a signatory of the Carbon Commitment, [OSU has committed to the goal of climate neutrality, or no net greenhouse gas emissions \(GHGs\)](#). There are three ways that OSU can further address this goal: 1) through the reduction of direct emissions such as energy used to heat buildings (Scope 1, Figures 3 & 4), 2) by reducing purchased electricity from non-renewable resources, or generating more of our own energy on-site through renewable energy options like solar (Scope 2, Figures 3 & 4), and 3) encouraging faculty, staff, and students to consider their own carbon footprint when traveling to and from school

and all OSU related travel (particularly airline travel) and focusing on overall reduction of waste by choosing sustainable options (like the Eco2Go reusable food containers) (Scope 3, Figures 3 & 4).

Figure 3. Scope 1, 2, and 3 Emissions
Source: World Resources Institute, 2009

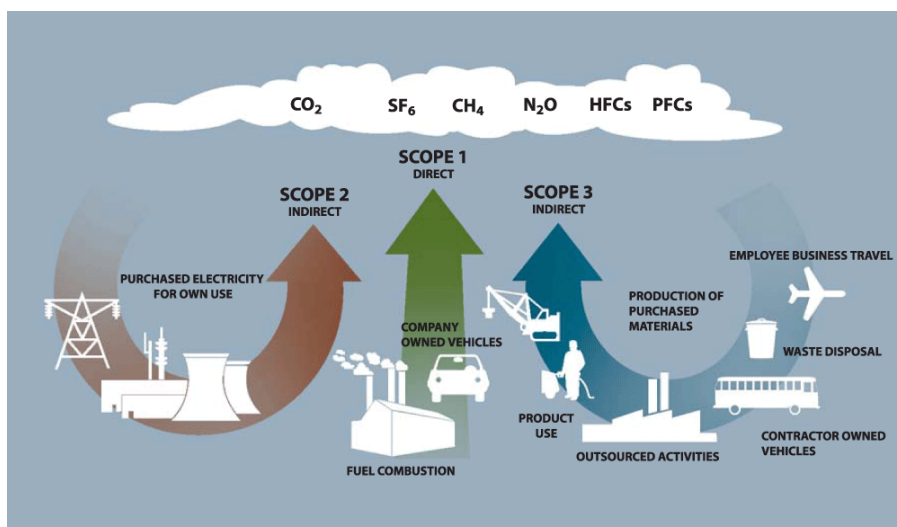


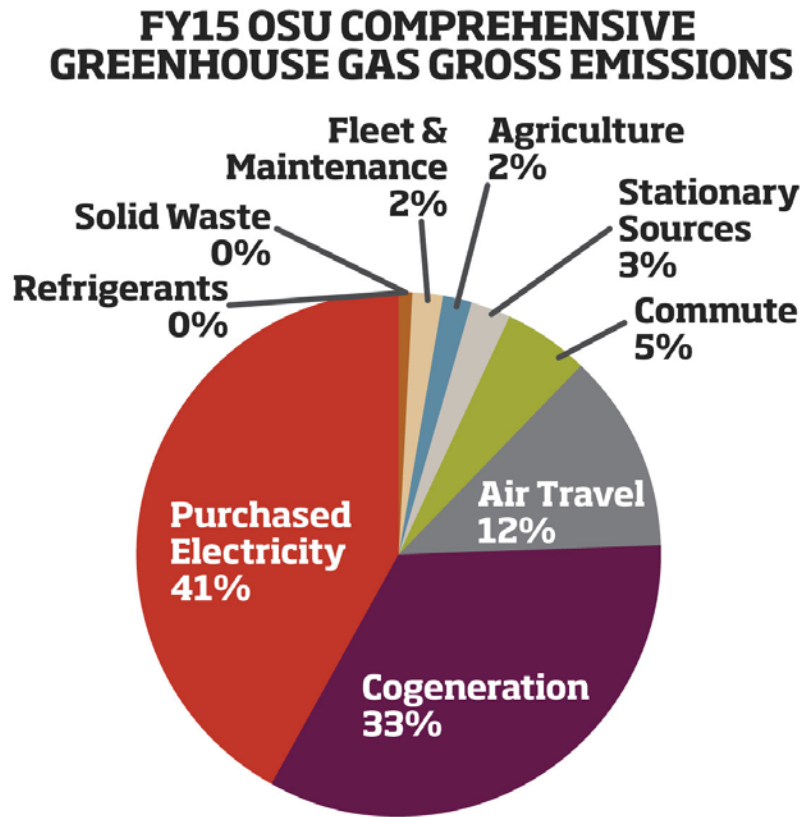
Figure 4. Scope 1, 2, and 3 Emissions Defined

| Scope 1 Emissions | Scope 2 Emissions | Scope 3 Emissions |
|---|---|---|
| “Direct” emissions from activities on OSU’s campus | “Indirect” emissions from utility energy production | “Indirect” emissions from transportation and waste disposal |
| Direct GHG emissions from sources owned or controlled by the institution such as combustion of natural gas, gasoline, propane and diesel, and other sources | Indirect emissions from purchased electricity | Emissions from vehicles driven by Faculty, Staff & Student commuters; emissions from employees and study abroad airline travels; recycling & waste disposal; food; embodied emissions |

Source: OSU Sustainability website, Eagan, et al. (2008) and Bentley University website

C. Three Key Areas

Past experience with measuring OSU's greenhouse gases suggest three areas have the greatest potential for reduction. Purchased electricity is 41% of OSU's emissions, cogeneration is 33%, and air travel, commuting, and fleet and maintenance is 19%. Greatest emphasis should be given to these three categories. The quickest and cheapest way to reach net neutrality is through the purchase of greenhouse gas offsets. Offsets, however, do not really address the current practices that generate greenhouse gases.



Figure

Figure 5. OSU Carbon Pie

Most of the electricity is purchased from Pacific Power, whose generation is 63% from coal (OSU 2016:22). This is especially significant since coal has a carbon footprint twice that of natural gas (US Energy Information Administration 2015). OSU does not control Pacific Power's power production, but it significantly affects our carbon footprint. Energy conservation is usually the first step towards reducing greenhouse gas emissions.

Currently, OSU is supplementing on-site energy with five ground-mounted solar electric (photovoltaic) panel systems on over 12 acres of OSU's agricultural lands. Combined, these solar sites can generate more than 2.6 million kilowatt-hours of power per year (between 3% and 4% of OSU's electricity needs across all campuses), which helps offset some of the purchased energy for OSU. Other projects have reduced energy by using solar rooftop arrays that supply limited energy to the buildings they are located on.

While 33% of OSU carbon emissions are from cogeneration, which uses natural gas for heating and electricity production, natural gas is not a renewable resource and will ultimately have to be phased out.

A problem for every university is what to do about travel. This is a very significant aspect of faculty and student learning and activity. Travel to and from campus constitutes 5% of OSU GHG emissions. In 2014, OSU introduced a new zonal parking permit system that raised some permit prices in order to reduce parking stress, but also to encourage carpooling, use of public transportation, and walking or biking to campus. Single occupancy vehicle (SOV) permits are the most expensive option for regular transportation to and from campus. Currently, 80% of faculty and staff have parking permits and most commute to work alone (Tran, 2015). Air travel and student and faculty/staff commuting accounts for 17% of greenhouse gas gross emissions at OSU. As a Scope 3 emission, OSU does not have direct control over travel of faculty, staff or students. However, there are ways that the university can address these emissions through policy, incentives and education.

While electricity, cogeneration, and travel are priority areas, individual actions, embodied emissions, and new innovations are areas that must also receive attention. Each student and staff member needs to become knowledgeable of the actions that they can take on a daily basis to reduce greenhouse emissions. Embodied emissions are included in all the products that people use. An important future area for the University address is the life cycle impacts of food and materials consumed in University activities.

V. ENGAGEMENT: Structure and process for college and division planning, implementation and management

One lesson of the Paris Summit is that every nation, community, college and university, and ultimately each individual must get engaged in the process for achieving net zero greenhouse gas emissions. This goal must become internalized on our behavior and in achieving OSU's strategic mission. Day-to-day setting of goals, development of actions, and evaluation of outcomes must lead toward stopping the impacts of climate change and promote sustainable patterns of living. This is why our plan ties to the mission and goals for the University. All University actions have to serve the dual purpose of addressing the greenhouse gas consequences and meeting University Strategic Plan goals (OSU 2015b).

One of the best planning documents and effective implementation of greenhouse gas reduction actions is Cornell University. Cornell makes sustainability and carbon mitigation significant pieces of their university culture with projects that are designed to reduce GHG emissions, be cost efficient, and show social responsibility.

A. Learning What Works

Each college or division and individual carbon action plan should be seen as an innovation in addressing issues of climate change. Actions have to be measured and evaluated against the goals for achieving climate neutrality. The results of these experiments provide long-term learning for what works and what does not.

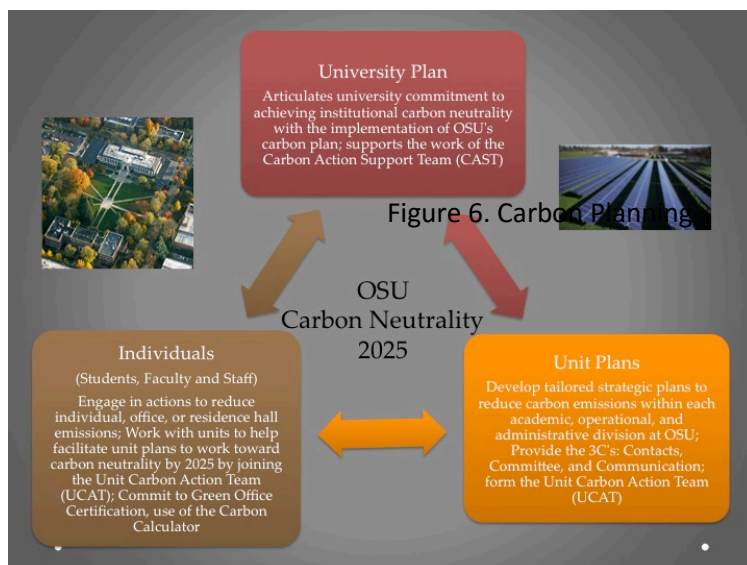
Our study of peers (see web annex v) has helped formulate our planning process, which focuses each unit finding a key contact, forming a committee, and communicating internally and externally.

B. All Colleges and Divisions

The vision is that ultimately all OSU units and individuals in those units will address climate change issues related to their activities. To start, colleges and administrative divisions will be the units where plan/document creation and development occurs. The procedure is envisioned as follows.

1. Administrative Leadership

is needed to establish commitment to carbon action planning. Commitment begins with university leadership, college and division leaders establishing a unit carbon action planning committee. Carbon action planning is how each unit plans to address curriculum and research issues as well as relevant operational actions. From a curriculum and research perspective, this would include efforts to incorporate curriculum changes such as adding more sustainability courses or opportunities for interdisciplinary coordination on climate change reduction research. From an operational perspective, this would include actions to address electricity, heating, and travel patterns while also considering individual actions, embodied emissions, and new innovations. These initiatives also align with [OSU's overarching mission to "promote economic, social, cultural, and environmental progress for the people of Oregon, the nation, and the world."](#) The focus of each college or division will depend on its capacity and expertise.



embodied emissions, and new innovations. These initiatives also align with [OSU's overarching mission to "promote economic, social, cultural, and environmental progress for the people of Oregon, the nation, and the world."](#) The focus of each college or division will depend on its capacity and expertise.

2. Unit carbon action planning includes two groups that design unit carbon action plans. One is unit leaders and key participants on the unit carbon action team. Second is the Carbon Action Support Team (CAST).

Each unit needs a key contact to guide the planning process, implement chosen actions, measure outcomes, and apply of lessons learned. Other unit members who form the **Unit Carbon Action Team** (UCAT) could include the building manager, curriculum coordinator, research team leader, students, staff, and/or professors who work to design and implement the Unit Carbon Action Plan. It is up to the

unit to decide team makeup and size. Some units may assign actions to subcommittees based on a carbon action plan theme or subunit's activities.

The **University Carbon Action Support Team (CAST)** is a group of resource specialists from the OSU Sustainability Office and its partner organizations who are familiar with carbon action planning processes, actions being implemented, what has been tried and found successful within the university and elsewhere, and can guide units in choosing and reviewing their actions. Helpful for unit plans is the OSU Carbon Action Plan Tool (CAPT). This is a guidance document that outlines greenhouse gas reducing actions, identifies best practices, and provides examples of monitoring tools. UCATs can download materials about actions and practices into their plan and then make modifications that reflect the conditions in their unit.

Cornell University created an Excel spreadsheet form covering actions related to energy, climate, water, food, waste, buildings, people, land, purchasing, and transportation. The excel spreadsheet outlines actions to be taken, a checklist for achieved actions, and a point system that provides a ranking for certification (four levels of certification are available). The Cornell program provides both guidance, and the ability to report your level of achieved outcomes for GHG reduction and sustainability. The excel spreadsheet can be found here:

<http://www.sustainablecampus.cornell.edu/initiatives/green-your-office>. PSU and Cornell documents have been the basis for the OSU Climate Action Plan Tool

Typically, the unit carbon action team (UCAT) supported by the University Carbon Action Support Team (CAST), would work together using the CAPT (carbon action planning tool) (see web annex i) to develop the unit carbon action plan. In some cases, for particularly resource-constrained units, the CAST will fulfil the roll of the UCAT as well, working directly with unit contacts or as otherwise guided by unit or university leadership.

3. UCATs set goals, identify actions to meet the goals, specify expected outcomes, monitor outcomes based on the STARS framework, and synthesize lessons learned. The Sustainability Office will keep the CAPT up-to-date based on reporting of successful climate actions within The University and elsewhere.

Activities individuals can take will be designed into the unit carbon action plans. The plan will address the question, "What can each member of that unit do to implement the unit's carbon action plan?" For example, OSU Housing and Dining Services could use the carbon calculator to help reduce food and energy waste, along with an overall unit plan that focuses on reducing energy use, adjusting the supply chain, being cognizant of embodied emissions, and increasing reuse.

Some schools, like UC Berkeley offer financial incentives for department/building energy reduction. Berkeley's Energy Management Initiative has resulted in over \$2 million in savings. And, various administrative and academic units have received over \$870,000 for energy reductions. More information is available at <http://sustainability.berkeley.edu/mypower>

The CAST supports units by providing a framework for the planning process, assessment protocol, and integration of lessons learned. Annually (and more frequently if necessary) the CAST will convene unit plan leaders to assess how the planning tool is

working; what actions work best; research, capacity, and leadership needs; and how unit actions are contributing to OSU's goal for net zero greenhouse gas neutrality by 2025.

4. Do a **triennial review** of the plan, outcomes, and lessons learned would result in revisions to action plans, approach revisions, revised monitoring, and continuance of another cycle.

C. Process

For the process to begin, participating units need to identify a leader who will be the contact for and/or guide the process in their unit. Second, name a UCAT committee, and establish contact with the CAST. Units unable to form a UCAT should identify their resource constraints early on so the Sustainability Office is able to plan to support their process in a more hands on way. We envision a 5-step process that has these elements and time lines. All plans will review and update at 3-year intervals.

Figure 6. College and Division Process

| Phase | Task | Time |
|-----------------------|--|--|
| To Begin | Unit leader appoints committee and leader, or expresses intent to proceed without ability to allocating unit resources | Contact Sustainability Office when ready |
| 1. Goals | Establish unit carbon action team, vision, process | 2 hour kick-off meeting |
| 2. Problem | Assess problem | 1-3 2 hour meetings |
| 3. Draft Plan | Design college carbon action plan | 2-4 months drafting plan with committee review |
| 4. Plan Actions | Implement college carbon actions | 1-5 years with continual monitoring |
| 5. Plan Monitoring | Evaluate, Report & Adjust college carbon action plan | iterative |
| Annual Action Forum | Identify lessons learned and make revisions to plans, managed by the Carbon Council | Annually |
| Triennial Plan Review | Revise draft plan | Every 3 years or as necessary |

VI. APPENDICES

The plan has two types of additional materials. The first are appendices that are published with the document. Currently, this is the glossary (Appendix A) and references (Appendix B). In addition, there are a number of annexes that are web sites with important information useful for carbon action planners. These include

i. CAPT (Oregon State University Carbon Action Planning Tool)

This is a web-based tool that allows units to select from a comprehensive list of climate actions that are linked to practices that have been used to address these actions. CAPT is designed to make the creation of unit carbon action plans easy. Actions appropriate to the unit can be downloaded from the CAPT and placed in the unit plan. Other actions the unit wants to try can

be added to the CAPT list. From CAPT, the unit can get ideas practices that address the CAPT-selected actions. The practices can be modified to unit conditions.

ii. Plan for implementation

iii. OSU'S Past Engagement

1. Letter of commitment

2. Past commitments go in appendix

iv. Stars Categories & Subcategories

“STARS[®] is intended to engage and recognize the full spectrum of colleges and universities—from community colleges to research universities, and from institutions just starting their sustainability programs to long-time campus sustainability leaders.”

v. Peer Institutions Climate Action Planning

vi. Climate Council

List of units and leaders, Sustainability and CAST members, University representatives

vii. Extension Program Review

A. Glossary

“**AASHE**” (The Association for the Advancement of Sustainability in Higher Education) is helping to create a brighter future of opportunity for all by advancing sustainability in higher education. ACUPCC became AASHE.

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

“**Carbon Commitment**” is focused on reducing Greenhouse Gas emissions and achieving climate neutrality as soon as possible. (http://secondnature.org/climate-guidance/the-commitments/#Climate_Commitment).

“**Carbon dioxide equivalent**” (CO₂e) represents the quantity of a greenhouse gas multiplied by a Global Warming Potential (GWP) factor, relative to CO₂. This is the “standard unit” used to quantify various greenhouse gasses.

“**Carbon dioxide**” (CO₂) means the chemical compound containing one atom of carbon and two atoms of oxygen.

“**Carbon offsets**” are reductions of greenhouse gases that can be used to counteract emissions from other activities, measured in metric tonnes of CO₂e. While similar, carbon offsets are not the same as Renewable Energy Certificates (RECs).

“Climate Commitment” integrates carbon neutrality with climate resilience and provides a systems approach to mitigating and adapting to a changing climate (http://secondnature.org/climate-guidance/the-commitments/#Climate_Commitment).

“Climate neutrality” refers to achieving net zero greenhouse gas emissions by reducing or mitigating emissions through projects addressing energy efficiency, renewable energy, transportation, solid waste diversion, and other strategies along with a means to offset any remaining emissions with the purchase of carbon offsets, if needed (CSU).

“Embodied emissions” (also embedded emissions) are all the emissions created over the entire lifecycle of the item from creation to disposal, but not including direct emissions from usage.

“Emissions categories” are high-level groupings of related emissions sources. Air travel, ground transportation and agriculture are examples of emissions categories.

“Emissions sources” are distinct sources of greenhouse gases. Athletics air travel, student commute and fertilizer are examples of emissions sources.

“Global Warming Potential factor” (GWP) means the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. For instance, methane (CH₄) has a GWP of 23, meaning that every gram of methane will trap 23 times as much solar radiation as a gram of CO₂.

“Greenhouse gas” (GHG) is any gas that contributes to anthropogenic global warming including, but not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

“IPCC” (Intergovernmental Panel on Climate Change) is a scientific body established to provide policymakers with an objective source of information on climate change. The IPCC performs no research, nor does it monitor climate data; 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.

“Metric ton”, “tonne,” or “metric tonne” (MT) means one metric tonne (1000 kilograms) or 2204.62 pounds.

“Mitigation strategies” are distinct groups of actions that will reduce or mitigate net emissions. Three are used here: conservation and efficiency; renewable energy and fuels; and carbon offsets and renewable energy certificates (RECs).

“Net emissions” is the calculated sum of GHGs emitted minus renewable energy certificates, composting activities and carbon offsets.

“Renewable Energy Certificate” (REC) is a tradable certificate that represents a unit of energy produced by renewable energy sources. Owners of RECs can claim that they are using renewable energy equal to the amount of RECs they own.

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

“**Renewable energy source**” means 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.

“**Scope 1**” emissions are those generated directly by systems owned and operated by the university. This includes heating fuel. <http://www.environment.admin.cam.ac.uk/what-are-we-doing/carbon/scope-1-2-and-3-emissions>

“**Scope 2**” emissions are from purchased sources of electricity. This is often the scope that organization has the least control over, but is something with which top AASHE performers have a solid grasp.

“**Scope 3**” emissions are from sources not controlled by, or out of the control of, the university. This includes commuter travel, waste, and procurement.

“**STARS**,” The Sustainability Tracking, Assessment & Rating System™ is an AASHE sponsored transparent, self-reporting framework for colleges and universities to measure their sustainability performance use three Scope categories.

“**Total emissions**” or “Gross emissions” are the calculated sum of GHGs emitted due to OSU-related activities.

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

B. References

Bentley University “What is a Carbon Footprint?” <http://www.bentley.edu/offices/sustainability/what-carbon-footprint>

Creutzig, Felix, Patrick Jochem, Oreane Y. Edelenbosch, Linus Mattauch, Detlef P. van Vuuren, David McCollum, and Jan Minx. 2015. Transport: A roadblock to climate change mitigation? *Science* 350(6263), pp. 911-912.

Douglas, M.J., Watkins, S.J., Gorman, D.R. and Higgins, M., 2011. Are cars the new tobacco? *Journal of Public Health*, 33(2), pp.160-169.

Eagan, D.J., Calhoun, T., Schott, J. and Dayananda, P. (2008). Guide to Climate Action Planning: Pathways to a Low-Carbon Campus. National Wildlife Federation <https://www.nwf.org/Campus-Ecology/Resources/Reports/Guide-to-Climate-Action-Planning.aspx>

IPCC (Intergovernmental Panel on Climate Change). 2014 Climate Report 2014, Synthesis Report, Summary for Policy Makers https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf.

O'Brien, K., 2015. Political agency: The key to tackling climate change. *Science*, 350(6265), pp.1170-1171.

OSU (Oregon State University). 2016. Greenhouse Gas Inventory Fiscal Year 2015. http://fa.oregonstate.edu/sites/fa.oregonstate.edu/files/sustainability/docs/fy15_ghg_report.pdf.

OSU (Oregon State University). 2015a. Enrollment Summary – Fall Term 2015. <http://oregonstate.edu/admin/aa/ir/sites/default/files/enroll-fall-2015.pdf>

OSU (Oregon State University). 2015b. Strategic Plan 3.0 | 2014-18: Focus on Excellence. <http://leadership.oregonstate.edu/files/strategic-plan/osu-strategicplan-final-revised2.pdf>

Purdy, Jedediah. 2015. *After Nature: A Politics for the Anthropocene*. Harvard University Press.

Smith, Greg and Brandon Trelstad. 2009. Oregon State University Climate Plan: A Strategic Plan for Climate Neutrality. Sustainability Program. <http://fa.oregonstate.edu/files/sustainability/docs/osuclimateplan2009.pdf>

Trang, Tran. 2015, Preliminary findings: Single occupancy vehicles and parking permits. Oregon State University Policy Analysis Laboratory. http://liberalarts.oregonstate.edu/sites/liberalarts.oregonstate.edu/files/opal/opal_brief_2015_single_occupancy_vehicles_and_parking.pdf

US Energy Information Administration. 2015. How much carbon dioxide is produced when different fuels are burned? Retrieved from <https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11>.