



Western Washington University

Climate Action Plan

June 2010

The Western Washington University Climate Action Plan is a collaboration of faculty, administration, staff and students working to reduce greenhouse gas emissions at Western Washington University

Website: <http://www.wvu.edu/sustain/>

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In the Greater Community

- City of Bellingham
- Washington State Department of Ecology
- The Northwest Clean Air Agency
- Recycling Services Incorporated
- Association for the Advancement of Sustainability in Higher Education
- Clean Air Cool Planet

At Western Washington University

- Office of the President: Karen Morse, Bruce Shepard
- Business and Financial Affairs Office: Kathy Wetherell
- Facilities Management: Tim Wynn, Ron Bailey
- Assistant to the President for Sustainability: George Pierce
- Huxley Department of Environmental Studies: Gene Myers
- Woodring College of Education: Victor Nolet
- Associated Students Recycle Center: Rich Neyer
- University Residence Hall Sustainability Committee

We are grateful to graduate student researcher Joseph Hayes and undergraduate work study student Corey Havens for their contributions to this study and to the Office of Sustainability.

The WWUCAP team looks forward to working together with these and many other dedicated sustainability-minded colleagues in 2010-2011 and beyond!

Seth Vidaña, Campus Sustainability Coordinator

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Office of Sustainability

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Background to the Climate Action Plan (CAP)

About the Western Washington University CAP Working Group

The WWUCAP working group was created under the auspices of the Office of Sustainability and at the behest of Facilities Management in June 2008 in response to the need to create a Climate Action Plan as part of the President's Climate Commitment endorsed by President Shepard and signed by former WWU president, Karen Morse, in January 2007.

The working group is officially composed of staff and student workers from the Office of Sustainability and personnel from Facilities Management. Unofficially, it is comprised of many constituents across campus and in the greater community.

Why Western Washington University Should Take Action

Anthropogenic climate change is the most significant problem of our time (IPCC, 2009). Recognizing this, almost all developed countries are taking action to reduce greenhouse gas emissions, with both the Kyoto Protocol increasing its influence and the European Union implementing its recent Emissions Trading Scheme.

Global warming is now recognized as one of the most important threats to ecological sustainability and human civilization. Global surface temperatures are on course to increase by between 2.5°F and 10.5°F by the year 2100, with regions in the northern parts of North America and Asia heating by 40 percent above the mean increase. Locally, rising temperatures are compromising the snow packs that supply water, increasing the incidence of floods and forest fires in the region, and threatening to cause Bellingham Bay to rise (NWF 2009). Beyond the geographic borders of our **bioregion**, studies are rolling in at an alarming rate that confirms the global nature of the threat of climate change such as the below from the Royal Society for the Protection of Birds:

“We hear a lot about climate change, but our paper shows that its effects are being felt right now. The results show the number of species being badly affected outnumbers the species that might benefit by three to one. Although we have only had a very small actual rise in global average temperature, it is staggering to realise how much change we are noticing in wildlife populations. If we don't take our foot off the gas now, our indicator shows there will be many much worse effects to come. We must keep global temperature rise below the two degree ceiling; anything above this will create global havoc.” (RSPB 2009)

A changing climate is not only an environmental threat. It also has implications on social equity, our public health, and our local economy. The World Health Organization (WHO) has this detail to add:

“Modest global warming since the 1970s was already causing over 150,000 excess deaths every year by 2000, according to a study by the World Health Organisation. This assessment was based on studies on the impact of climate-sensitive illnesses like diarrhoeal disease, which is the second leading infectious cause of childhood mortality, and accounts for a total of around 1.8 million deaths each year.” (RSPB 2009)

The goal of a sustainable future will require a paradigm shift. This is described by foremost scientists in the field of societal change as reported in the Proceedings of the National Academy of Science:

“A high and sustainable quality of life is a central goal for humanity. Our current socio-ecological regime and its set of interconnected worldviews, institutions, and technologies all support the goal of unlimited growth of material production and consumption as a proxy for quality of life. However, abundant evidence shows that, beyond a certain threshold, further material growth no longer significantly contributes to improvement in quality of life. Not only does further material growth not meet humanity’s central goal, there is mounting evidence that it creates significant roadblocks to sustainability through increasing resource constraints (i.e., peak oil, water limitations) and sink constraints (i.e., climate disruption). Overcoming these roadblocks and creating a sustainable and desirable future will require an integrated, systems level redesign of our socio-ecological regime focused explicitly and directly on the goal of sustainable quality of life rather than the proxy of unlimited material growth.” (PNAS 2009)

Reaching our goal will require significant changes in our community – in our infrastructure, in our technology, and in the decisions we make as residents, business owners, academics, educators, etc. In addition, the strategies included in Western’s Climate Action Plan must not only reduce greenhouse gas emissions, but also meet the needs of low-income communities. Part of sustainability is consideration of economic equity and social justice. Historically, we have seen poor people throughout the world and in our community suffer the most from both the impacts and the suggested mitigations of environmental threats and catastrophes. Our plan must make social justice a priority.

As such, the solutions our community proposes and implements must be sensitive to a broader set of societal concerns. Addressing climate change locally is not only an opportunity to reduce greenhouse gas emissions, but also an opportunity to build a positive, community-based movement which results in increased empowerment, civic pride and improved quality of life.

But we do not start from scratch. Bellingham is known throughout the region as a pioneering green city that is willing to lead social change through innovative and creative strategies – from free energy efficiency assistance to low income residents to record-setting participation in curbside recycling to green business programs and biodiesel production. We have active sustainable businesses and vibrant civic organizations and non-profit entities with which we have already forged long-lasting and mutually-beneficial relationships. We benefit from businesses and residents who care about solving the climate crisis and creating a sustainable, socially just bioregion. This tangible gift to Western Washington University is, in part, financial since the natural beauty of Western Washington University’s setting is part of what draws students to attend our institution. Our community is also nourished by the resources and intellectual capital at Western Washington University. The university’s commitment and action to address its own climate footprint is an inspiration and provides valuable lessons for the

community as a whole. We have already begun to extend our expertise and intellectual capital built through the work of addressing our climate footprint into the greater community as consultants to businesses wanting to emulate our example (WWU O of S 2009).

Western Washington University is already demonstrating national and regional leadership in committing to reduce its GHG emissions. On January 12, 2007, Western Washington University's then-President Karen Morse signed the **President's Climate Commitment** that endorses meeting the goals outlined by the Association for the Advancement of Sustainability in Higher Education (AASHE 2009).

There were three goals for compliance with the commitments inherent in the President's Climate Commitment (See Appendix A: AASHE President's Climate Commitment full text):

1. Create a carbon emissions inventory
2. Assess the feasibility of emissions reduction through campus initiatives
3. Create an institutional model for emissions reduction to move toward carbon neutrality through Climate Action Plan.

This committed Western Washington University to:

- Reduce campus energy use and costs
- Implement GHG reduction technologies developed by campus researchers
- Prepare for future climate regulations and energy price volatility
- Create demand for low-cost renewable energy technologies through purchasing power
- Appeal to a campus community that has a strong culture of environmental ethics
- Collaborate with local communities and the City of Bellingham

Western Washington University Climate Action Plan (WWUCAP)

WWUCAP was formed to develop a strategy for significantly reducing Western Washington University's GHG footprint without compromising its operations. The first of the three goals above was carried out by the Office of Sustainability in 2007-08. The WWUCAP fulfills the second two goals of the President's Climate Commitment as listed above.

How to Read this Action Plan

The primary Climate Action Plan findings and motivations for embracing them are stated in the Executive Summary on page 6. All terms that are in **bold** type are to be found in the Glossary beginning on page 41. Sources cited in the text are found in the References section beginning on page 43. All sources for information in this document are found in the Bibliography section beginning on page 45.

EXECUTIVE SUMMARY – WWU CLIMATE ACTION PLAN 2010

The President’s Climate Commitment, signed in January 2007, establishes a plan by which Western would reach climate neutrality in a self established period. “Climate neutrality” refers to reaching net zero carbon emissions through a combination of reducing our carbon output to the barest minimum possible and balancing our remaining carbon production with off-campus options such as University-sponsored carbon reduction and sequestration projects. In 2009, the state of Washington passed legislation to require annual reporting of greenhouse gas emissions and targets for reductions against a 2005 baseline. This Climate Action Plan seeks to make WWU a regional leader in the drive for a stable climate by exceeding state requirements and reaching climate neutrality by 2050.

Final Conclusions of the WWU Climate Action Plan

The Plan concludes that the University may take the following actions to reach climate neutrality:

- **Commit to reducing net greenhouse gas emissions** to 36% below 2005 levels by 2020. This report demonstrates that this target can be met through execution of identified on-campus projects and, if necessary, University-sponsored carbon reduction and sequestration projects. This goal will also allow us to meet the state mandated greenhouse gas emissions reductions targets (RCW 70.235) well within the required timelines.
- **Commit to long-term climate neutrality** by researching system-wide opportunities for energy conservation and efficiency. Through behavior change programs such as the “10 X 12” Program and potential infrastructure changes outlined in Energy Savings Company (ESCO) projects, we forecast a climate neutral campus by 2050. Student leadership in the area of renewable energy has already demonstrated a high level of support for measures to reach this goal.
- **Provide a model** to the campus to incorporate greenhouse gas reduction criteria and sustainability into the institutional decision-making process. This model behavior can help guide decision making by every member of the campus community: administrators, faculty, staff, students and contractors.
- **Support the continuation of the WWUCAP and sustainability initiatives.** Allocate resources for permanent sustainability staff roles and incorporate greenhouse gas reduction criteria and reporting into their mandates. Create CAP Implementation Team to research reduction opportunities and funding opportunities; report progress to the WWU Board of Trustees on a cyclical basis.

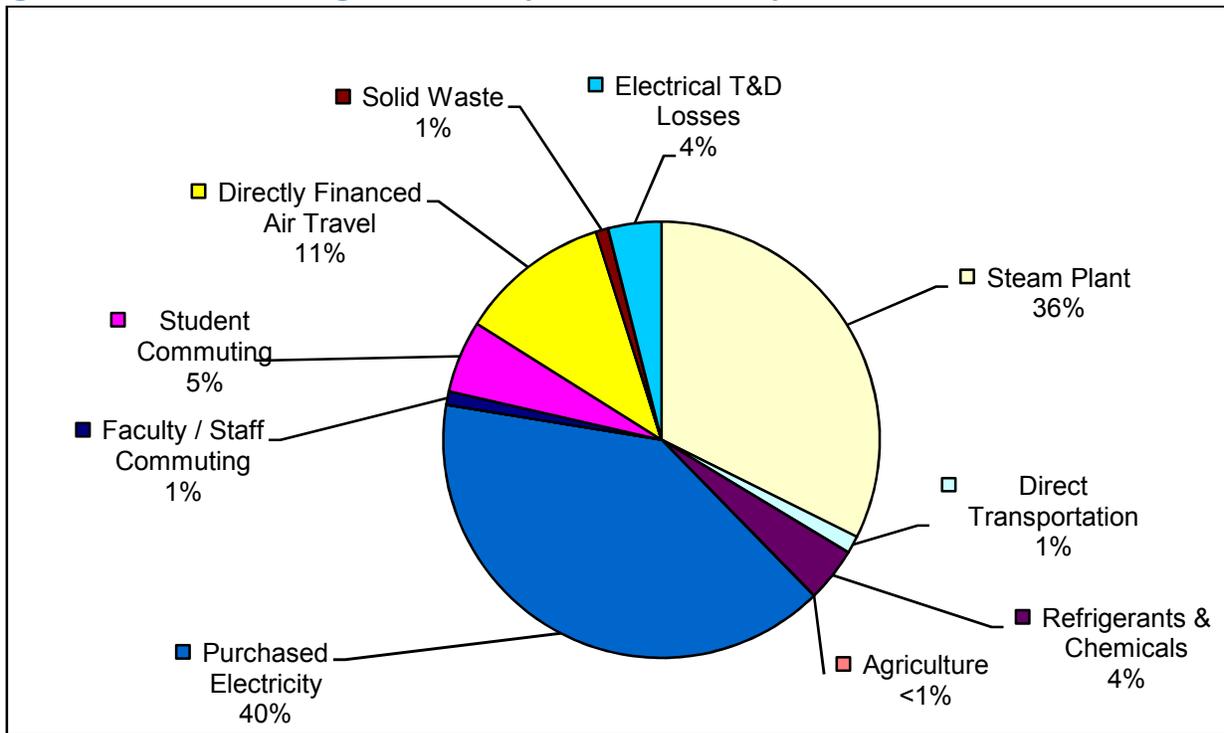
Funding

Financial investments in energy conservation and efficiency, on-campus carbon-neutral energy production and University-sponsored carbon reduction projects are contingent on current funding opportunities and will follow standard university budgeting procedures.

Western Washington University's Greenhouse Gas Emissions Inventory

The Western Washington University Green House Gas (GHG) emissions inventory includes ten emissions sources: electricity consumption; steam use/natural gas consumption (“other on-campus stationary” in the below spreadsheet); the university fleet (“direct transportation” in the pie chart); student commuting; faculty and staff commuting; faculty and staff air travel; fugitive emissions from coolants; solid waste; energy Transmission and Distribution (“Electrical T & D Losses” in pie chart).

Figure 1: Western Washington University GHG Emissions by Source in Fiscal Year 2007



FY 2007	
Sources	e CO ₂ Metric Tonnes
Other On-Campus Stationary	13301
Direct Transportation	539
Refrigerants & Chemicals	1660
Agriculture	5
Purchased Electricity	16405
Faculty / Staff Commuting	408
Student Commuting	2208
Directly Financed Air Travel	4605
Solid Waste	382
Scope 2 T&D Losses	1623
Total GHG emissions	41136

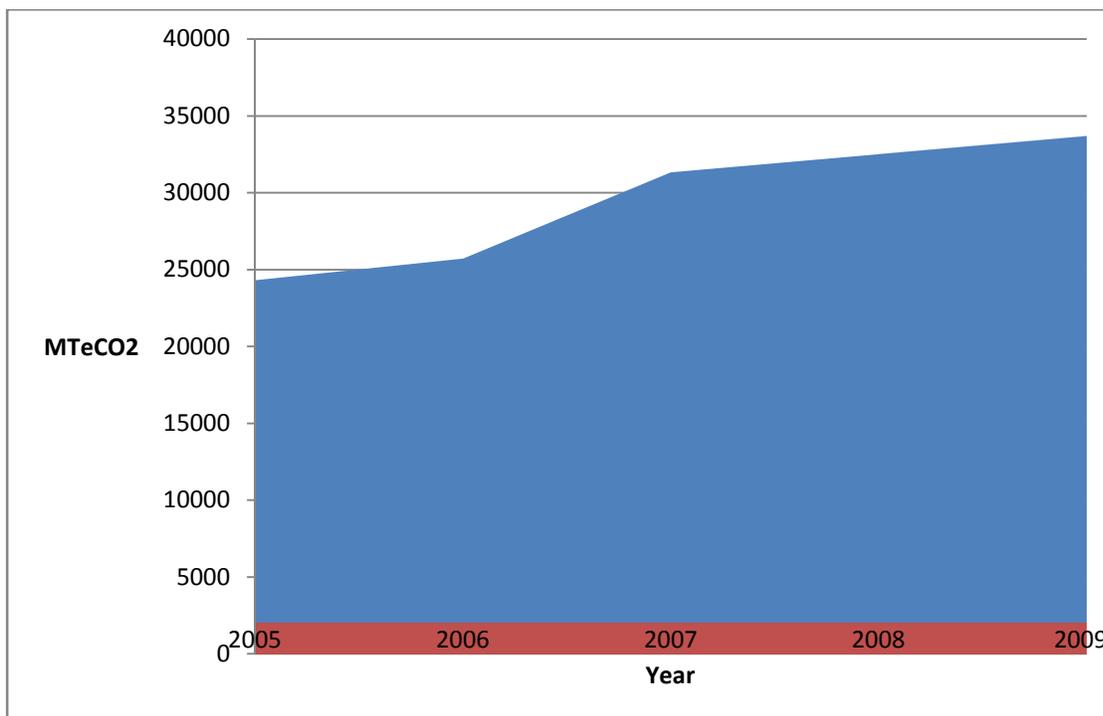
In 2007, total GHG emissions from the nine sources that register as 1% or more were approximately 41,136 metric tons of CO₂ equivalent (Figure 1). For a campus population of 15,272 (WWU Quick Facts 2007), this corresponds to almost 3 tons eCO₂/person/year or 16 lbs. eCO₂/person/day, nearly a sixth of the total average per capita emissions for Americans (UNDP 2007-08 Human Development Rpt).

The geographic boundary for the Western Washington University inventory was defined as campus buildings on the central campus, all student housing on and off campus, and in-county satellite university offices and business properties. Three notable items are the largest emissions sources, the importance of pursuing increased efficiencies in buildings and increased use of alternatives to fossil fuel-based travel. It is clear that with our current green energy credits purchase, the preponderance of our greenhouse gas production is a result of burning natural gas in our steam plant at 36%, followed by air travel and commuters, giving transportation a total responsibility for 18% of Western Washington University's 2007 greenhouse gas emissions even with changes due to the student bus pass increase in use of mass transit.

Western Washington University Emissions Trend

Western Washington University has some data for Fiscal Year (FY) 2004-2005 through 2009, but not all the same categories of data for each year. Figure 2 displays WWU's GHG aggregate emissions over the last five-year period.

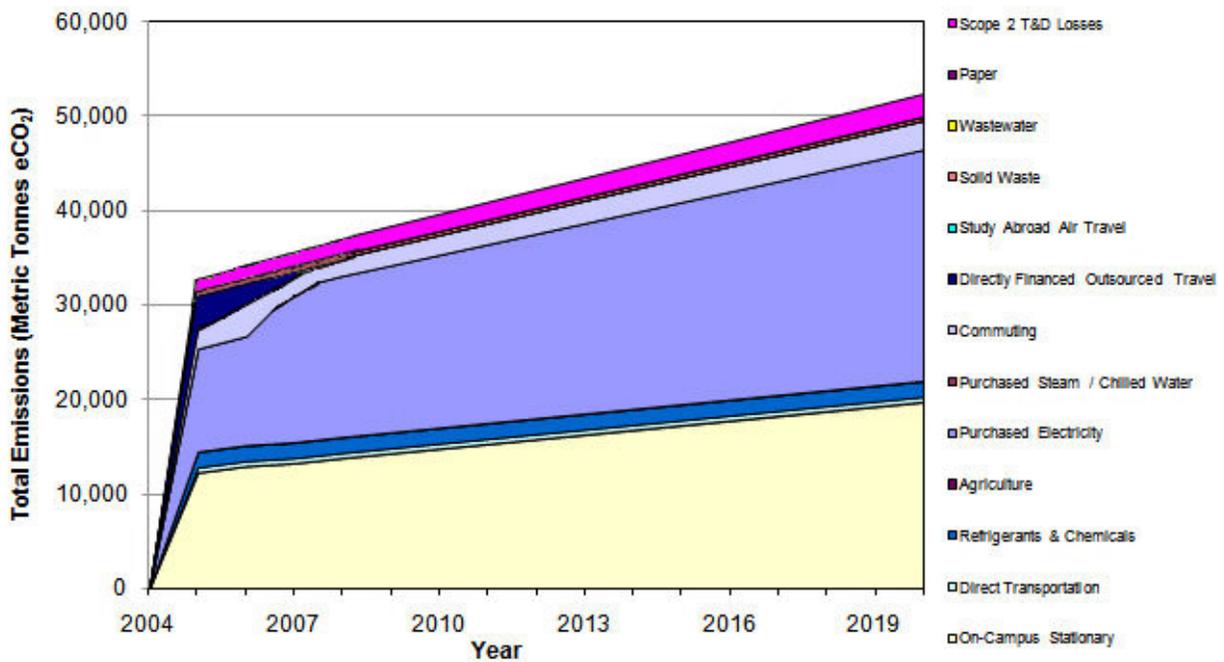
Figure 2: Western Washington University GHG Emissions FY 2005-2009



The Clean Air Cool Planet (CACP) calculator extrapolates this data of Greenhouse Gas production projections to the year 2020. There is a dip in that trajectory caused by a lack of

specific projection data from 2007 onward for air travel (labeled in Figure 3 below as “directly financed outsourced travel”). In spite of the interruption of the trajectory, we can see below what our projection to the year 2020 looks as it rises steadily to over 50,000 MTCO₂ e. From 2007 onwards, growth was projected using the standard CACP multiplier for population increases on campus. The annual gross square footage increase estimate was applied to electricity, steam, gas, waste, water supply, and refrigerant, while the annual population increase estimate was applied to commute and air travel calculations. The “on-campus stationary” source of GHGs is the Steam Plant burning natural gas on Western Washington University’s campus (light yellow in Figure 3 below).

Figure 3: Western Washington University Emissions Trend from 2005 to 2020



Emission Reduction Targets

The WWUCAP study identified a range of mitigation strategies available to Western Washington University that fall into three main categories.

1. Behavioral change projects
2. Infrastructure projects
3. University-Sponsored Carbon Reduction Projects

At present, WWUCAP implementation is focused on projects in the first and second categories due to desire on the part of WWU to make local changes and produce monetary savings that can be recycled to fund more projects. However, we expect the third category of mitigation to be necessary to completely reach climate neutrality as no alternatives exist for actions such as air travel. These project lists are by no means exhaustive and the energy savings calculations are fairly conservative by design. It is essential for this program to identify more intensive and additional reduction opportunities as they evolve.

Feasibility Analysis

This study drew heavily from the experiences and lessons learned at Western Washington University during the Greenhouse Gas Emissions Inventory process in how to effectively engage with the campus and community stakeholders. The feasibility study was conducted based on the following actions:

- Engaged with campus decision makers and stakeholders
- Inventoried GHG emissions
- Evaluated projects to meet targets
- Analyzed GHG emission targets
- Evaluated financial feasibility for some portions of the plan enough to determine eligibility for consideration. Further transparent and open financial feasibility study and budgeting would need to take place for specific recommendations to be implemented. All financial investments would follow standard university budgeting procedures.

Emissions Targets for Western Washington University

There are several ways to set emissions targets. The boldest approach would be to set a target based on the carbon emissions levels that climate change science suggests must be achieved to stop the effects of global warming. Other approaches would be to set no target, or to set a target that closely follows business as usual. In recent Washington State legislation (RCW 70.235), Western Washington University will be held to an emissions target shared by all state institutions: by 2020 reduce emissions by 15% from 2005 emission levels; by 2035, reduce emissions to 36% below 2005 levels; and by 2050, reduce emissions to 57.5% below 2005 levels

The CAP Working Group supported the State's mandated emission reduction targets, but saw an opportunity to seize a leadership position by meeting the State requirements on an advanced schedule. The WWUCAP Working Group saw the opportunity to be the first University in Washington State to meet the 2035 standard (36% below 2005 emission levels) and the first University in Washington State to become climate neutral by 2050. (Appendix B: WWU Gross CO₂ Emissions with Advanced State Standards 2005 to 2050) The CAP study based its recommendation of minimizing campus emissions and investing in University-sponsored carbon reduction project to reach climate neutrality, on a calculation of what it would take to honor the goal of President's Climate Commitment and honor the voice of the students expressed through their leadership in the area of renewable energy. (Appendix B: WWU Gross CO₂ Emissions with Advanced State Standards 2005 to 2050).

We analyzed an emissions target appropriate for Western Washington University based on the identified projects and their projected financial feasibility. This goal to reach 36% below 2005 levels by 2020 will reverse our current trend of increasing emissions and will bring well beyond the state's mandated target for that year. WWU will exceed the requirements of the State RCW and set the bar high for other institutions to follow. This should be followed closely by an in-depth emissions reduction feasibility study and assessment in 2012 to focus on setting a target for actual carbon neutrality. Reaching it will be a challenge, but the process has started and an implementation team can make it a reality.

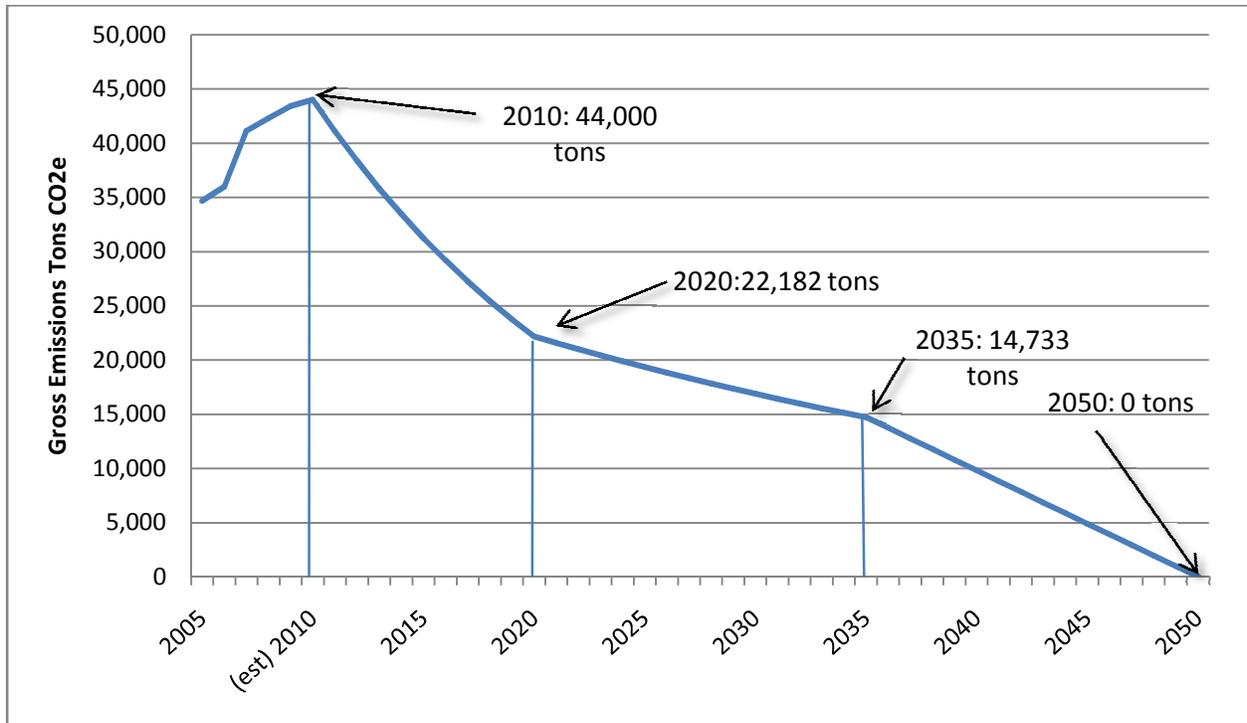
With consideration of the GHG inventory and evaluation of various emissions reduction efforts, the WWUCAP findings show that Western Washington University can make a firm commitment to reach 36% below 2005 emissions levels by the year 2020. At Western Washington University, 80% of the calculations data is verifiable through electrical and natural gas records. The first year for which records exist for the remaining 20% of our GHG emissions is 2005. To reach this 2005 emissions goal, Western Washington University would:

- Use aggregate emissions targets as a metric in campus communication and planning
- First focus on identifying additional cost effective GHG mitigation opportunities on campus, such as energy efficiency
- Implement infrastructure-related emissions reduction projects, starting with the most cost effective (i.e., highest \$/MTCO₂e) projects, and then use the savings from those projects to invest in additional projects or University-sponsored carbon reduction projects.

The Western Washington University target is more aggressive than is required by Washington State law (15% below 2005 levels by 2020), or by the President's Climate Commitment (eventual technical carbon neutrality with no target date). This Climate Action Plan puts Western Washington University on a fast trajectory toward carbon neutrality and to be the first

University in Washington State and one of the first in the nation to achieve this goal (Appendix C: Carbon Neutral U.S. Universities 2009).

Figure 4: WWU Gross CO2 Emissions with “Advanced State Standards” 2005 to 2050



Emissions Reduction Projects

There are a wide variety of reduction options available for organizations attempting to reduce net GHG emissions, such as procurement of renewable energy, funding of alternative transportation programs, investments in energy efficiency and the purchase of university-sponsored carbon reduction projects. In some cases, the smaller required investment is focused on institutional and educational shifts, while capital projects can run in the millions of dollars. Mitigation options can make decisions about the best path overwhelming, especially since the options appear difficult to compare. However, the encouraging results of our study show that significant emissions reductions can be achieved in areas that result in significant cost savings over the long run.

The WWUCAP study first conducted a broad survey across Western Washington University to identify projects that would result in GHG emissions reductions, and then estimated the emissions reductions from those projects. Further evaluation of those projects can use the most common metrics extant for investment decisions: capital cost and payback. This future study

could then combine the results into a comprehensive dual metric, \$/ MTCO₂e, which reflects the net present value of the project (including upfront costs and energy savings over time) and the quantity of GHG emissions reduced by the mechanism. This is a common metric used in cost benefit analysis for GHG reduction project effectiveness. It is beyond the scope of this study to make those detailed fiscal analyses but they should be part of the scheduled two-year update of this plan in 2012.

As economic metrics and models evolve to include triple-bottom-line accounting for everything from purchased products to waste, we will see an increasing return on conservation investments. When products and services begin to cost what their lifecycle expenses truly are, avoided costs will increase and in turn, save the University money.

Types of Emissions Reduction Projects

WWUCAP broke down the range of mitigation strategies available to Western Washington University into three main categories: Behavior Change Projects, Infrastructure Projects, and University-Sponsored Carbon Reduction Projects. Listed below are the descriptions of each category along with the types of projects for which the study collected and analyzed data. Campus academic and business units were consulted to ensure implementation feasibility, and conservative estimates were used throughout the assessment process. Many of the projects were already in some stage of conception or implementation, although they had never been explicitly compared for their relative GHG reduction effectiveness.

At present, WWUCAP implementation is focused on projects in the first two categories, namely Behavior Change and Infrastructure Projects. It is expected that these will cost money but are expected to produce monetary savings that can be recycled to fund more projects. The third category is seen as an option once emissions have been minimized through behavior change and infrastructure projects.

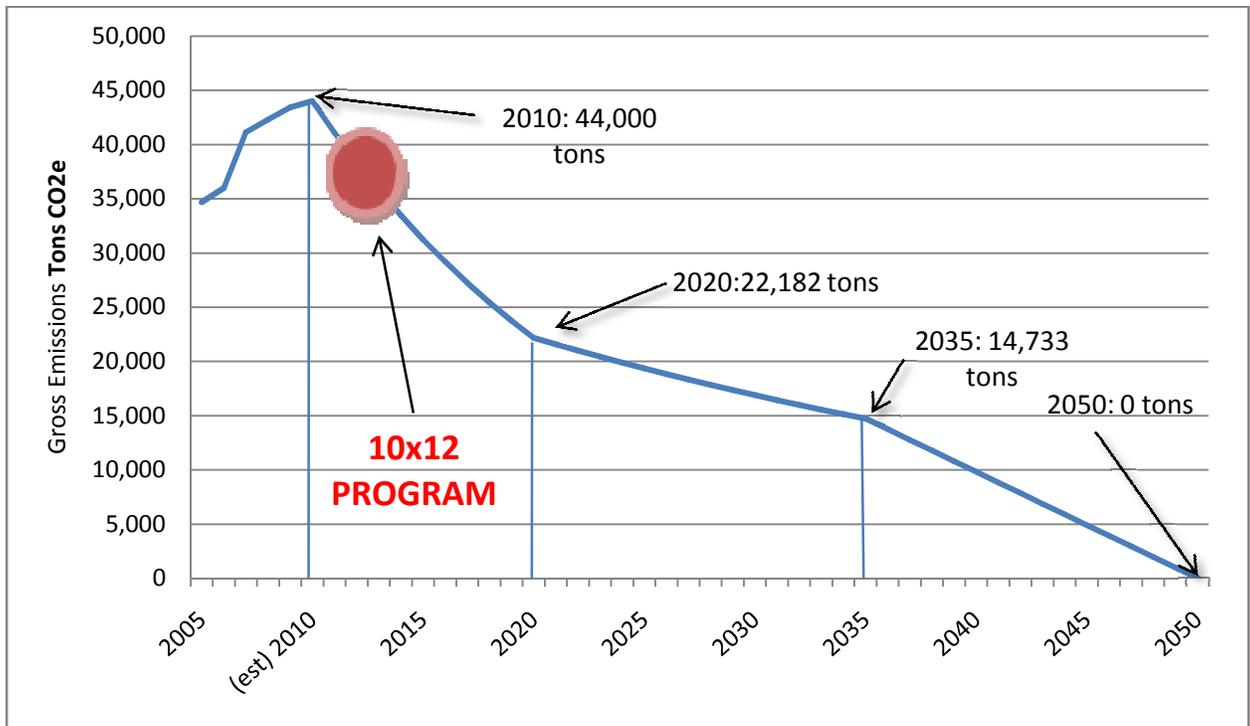
It is important to note that the WWUCAP working group finds that this initial effort represents the tip of the iceberg of the campus's potential for GHG emissions reductions. To realize the greatest potential, the project identification and assessment process must be an ongoing effort that engages the entire Western Washington University community to adjust its institutional approach to business operations and its educational mission.

1. **Behavior Change Projects** – These are Western Washington University initiatives that will allow and encourage individuals to conserve more energy. These projects require some capital investment and a significant dedication to coordination and planning and can only be considered after financial feasibility studies and open and transparent budgeting processes have been pursued for each initiative. They also have a quick payback and an ability to establish a culture of environmentally sustainable practices.

These projects include:

- **10 X 12 Program:** Consider the pilot interdepartmental Departmental Sustainability Coordinator program to reduce energy resource usage in participating buildings by 10% by the end of 2012. This program would build infrastructure to create a system of decentralized, building-based coordinators within Western Washington University eventually, realizing energy savings and other resource conservation benefits. If the pilot year proves successful, consider expanding the program each year until the whole campus is operating with ongoing conservation measures in every building and increasing efficiency over time, leveraging utility savings to increase participation and expansion to other buildings.

Figure 5: WWU Gross CO2 Emissions Reduction with Proposed “10x12” Program

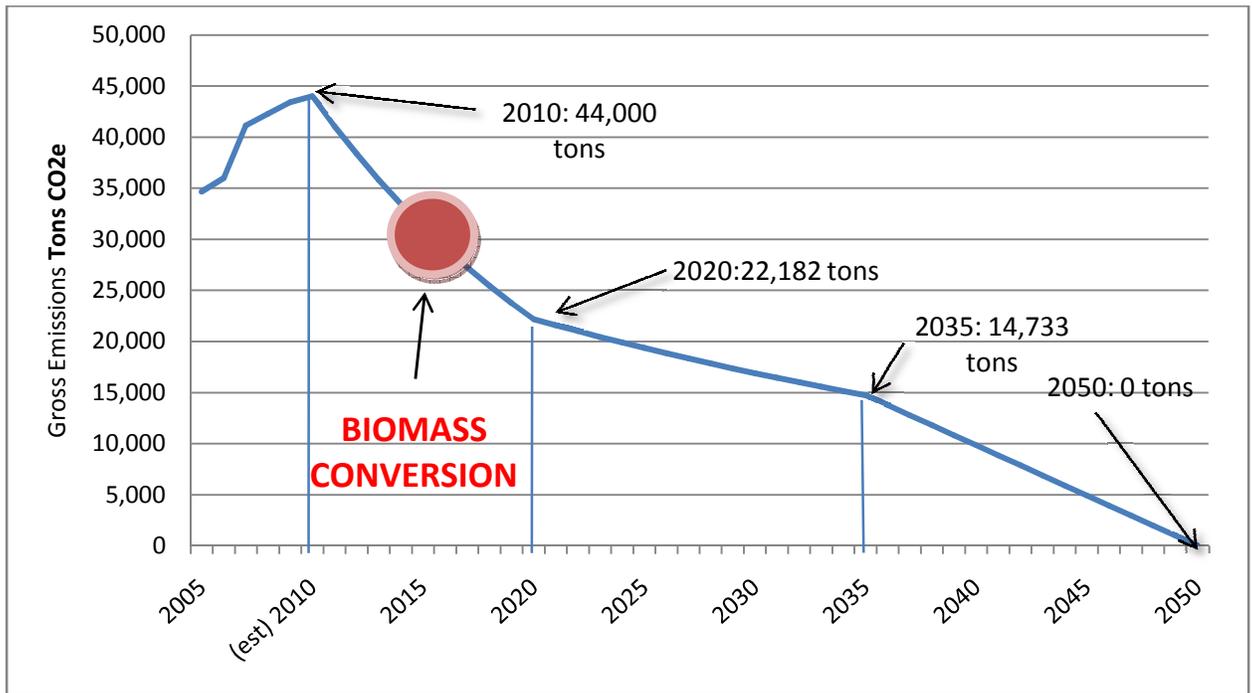


- **Introduce Western Washington University fleet biking:** Reduce the amount of motorized vehicle driving by preferentially using bikes for transport on campus and for short distances when transporting only one person and no significant equipment/materials for work.
- **Implement high priority bicycle plan projects & programs:** Implement Western Washington University bicycle programs and projects aimed at increased bicycle commuting over the next 15 years, as outlined in the 2020 Long Range Development Plan.
- **Increase utilization of videoconference room(s):** Investigate how much air travel could

be reduced by increasing the use of remote meeting technologies and publish that data with faculty and staff in charge of setting meetings with remote colleagues.

- Increasing occupant awareness and electricity curtailment: increase building occupant awareness by publishing building data, baseline awards, outreach campaigns, and efficient use of an energy management system.
 - Consider expanding food service composting to include an all-campus composting program. Also consider siting an on-campus composting operation at the Outback Outdoor Experiential Learning Program site with targeted education and tours of the closed-loop of food to food again. Compostable wastes are generated in kitchens, bathrooms, from grounds operations, and dining halls as well as staff and faculty lounges. Consider providing expanded composting collection to divert these wastes to compost systems and how to create an on-site facility (see Appendix F: Summary of the analysis and quantification of Western Washington University waste management/landscaping reduction-to-carbon-saved).
 - Consider conducting clothing modification workshops: as part of the Sustainable Art theme in the annual Faculty and Staff Art show, to help Western Washington University members repurpose old clothing and create usable items to keep warm without resorting to personal heaters in the winter.
 - Create a campus culture of collaboration and success in sustainability through celebratory events such as sustainability-themed art shows (e.g. April 2010 Western Gallery “Northwest Artists Speak: Environmental Issues” show, student “Trashion Show” in 2010), collaborative inter-departmental art projects with used materials, etc.
- 2. Infrastructure Projects** – Aim to enhance efficiency of Western Washington University energy systems. Some have a significant upfront cost, but many have a short payback time (less than 5 years) and generate savings that can be further invested. Projects on which we have gathered information include:
- Steam plant biofuels: Consider conducting a study of the viability of switching to biofuels to power the steam plant for a potential 80% to 100% reduction in greenhouse gases (NexTerra 2009, MWCC 1996) from that facility through the use of renewable fuel resources that are by some calculations net carbon neutral.

Figure 6: WWU Gross CO2 Emissions Reduction with Proposed Biofuels at Steam Plant



- Monitor-based commissioning: Consider expanding the existing program that analyzes operation of building Heating Ventilation and Air Conditioning (**HVAC**) systems and lighting to locate and correct inefficiencies.
- Steam plant cogeneration: Consider conducting an update of the 2002 study that examined whether installing equipment at the steam plant to cogenerate steam and electricity was feasible and decide if it would be a better investment now with changing market forces. A preliminary study of the natural gas costs at the time of the 2002 study and now show a fourfold increase in gas cost, whereas the electrical costs have doubled in that time.
- Steam plant steam flue gas heat capture increase: Investigate promising new technologies that may allow capture of more waste heat from flue gas than is now possible.
- Expand electric vehicle fleet: The study investigated purchasing a group of electric vehicles (Chrysler GEM) through existing/new vendor contracts to replace a subset of Western Washington University fleet. Consider this study's findings when making any fleet purchases.
- Automated lighting controls: Consider installing a variety of lighting controls to reduce operating hours of lighting systems, such as motion sensing, light sensing and wireless-based control technologies.

- Fluorescent lighting retrofits: Consider installing high frequency efficient ballast in remaining 50% of Western Washington University fluorescent lighting fixtures that have not already been switched to save energy.
- Onsite photovoltaic system: Consider installing solar panels on available roof space of campus buildings to generate solar energy. Investigate emerging solar technologies such as the electricity-generating solar motor and consider them for feasibility on this campus and/or at extended campus locations.
- Efficient capture of reusables and recyclables at residence halls move-out time: consider support for best practices from peer institutions (WSU Move Out/Pitch In, 2009) to collect reusables from residence hall students through moving the collection inside to avoid rain spoilage and garbage contamination.
- Efficient computer settings: where possible, expand the use of the Environmental Protection Agency's Energy Star Setting and active sleep/standby mode management (free software available from EPA).
- Efficient workstation electricity use: study use of workstation space heaters, foot warmers, and fans to determine viable non-electric alternatives and consider installation of power strips to reduce phantom loads by monitors and other electronics when turned off. (Wattstopper, 2009; CAL Berkley 2009).
- Set all Western Washington University printers to default two-side printing mode and to reduced margins. Add a footer where feasible that explains this non-standard paper use as part of Western Washington University's commitment to reducing waste and its climate footprint.
- Consider Requiring deconstruction over demolition in bids for remodel jobs.
- Request that all 1% for the Arts State monies be required to include a sustainability theme either in materials or concept and execution.
- Consider Residence Halls for paper recycling baseline studies and education efforts.

3. **University-Sponsored Carbon Reduction Projects**

Though the CAP Working Group saw much potential in the ability of behavior change and infrastructure projects, the group acknowledged that there currently exists no way to eliminate all of GHG's emitted as a result of university-related operations.

University-sponsored air-travel is a prime example; connections with organizations nationally and globally will likely require WWU employees to use air-travel to arrive at locations in a timely manner, however there currently no carbon-neutral travel options available, nor do we forecast their emergence in the next decades. In order to balance all of the University's carbon emissions to a net-zero state, investment in University-Sponsored Carbon Reduction Projects of some type will be necessary. In the coming years, Western Washington University will investigate local and regional

opportunities that offer tangible environmental, social and economic benefits to the local, regional and global community. Investment in these types of projects are available through many nationally-recognized organizations, and are now accepted as valid tools for encouraging infrastructure investments in carbon removal systems. These opportunities, can be grouped under three categories; Renewable Energy Credits, Energy Efficiency Projects, and Carbon Sequestration Projects.

Renewable Energy Credits (RECs) – In many jurisdictions, the markets for energy and the environmental attributes of energy production are separate. Western Washington University can green its electricity supply by making an investment in green power credits, also known as Renewable Energy Credits. One REC covers the technological and environmental attributes of one megawatt hour of electricity generated from renewable sources (see Appendix E: Renewable Energy Credits). RECs are third-party certified, increase the demand for renewable energy in the utilities markets, and are recognized as a sound method for compensating for carbon emissions from essential energy consumption. Western Washington University itself may invest in more RECs once possible funding infrastructures have been fully examined and collaboratively agreed to by all stakeholders. (Appendix G: Western Washington University Greenhouse Gas Calculations).

Energy Efficiency Projects (EEPs)– The funding of off-campus energy efficiency projects (EEPs) may provide a low-cost/high carbon avoidance option given the economies of scale employed in many of the large energy efficiency projects available to potential investors. EEPs are routinely calculated for carbon-avoidance per dollar invested, which investing organizations can claim to balance their GHGs. EEPs are now recognized as valid tools for encouraging infrastructure investments in carbon removal systems.

Carbon Sequestration Projects (CSPs) – The funding of off-campus projects which capture or retire carbon from the atmosphere may also provide low-cost/high carbon avoidance, with potential local environmental and economic benefit (see Appendix E: Carbon Offsets Analysis).

If Western Washington University continues with the present REC purchases, total net emissions from electrical use may flat-line, but no progress toward either the interim goal of technical carbon neutral, nor toward the ultimate goal of actual carbon neutral status will be made since other sources of GHG emissions will continue to grow.

Calculations using the Clean Air Cool Planet (CACP) model show that to achieve 36% below 2005 levels of GHG emissions, Western Washington University will need to reduce its carbon output ~6.6% per year until 2020.

Next Steps

Include Lifecycle Analysis in GHGI Updates

During the course of the greenhouse gas inventory process, the WWUCAP team recognized that the emissions inventory does not fully reflect the complete climate footprint of this institution. The Western Washington University emissions inventory is only a subset of our campus's total climate footprint, as it excludes the full lifecycle carbon emissions associated with some of Western Washington University's activities. The next step is that Western Washington University should take a leadership role in documenting and reporting additional optional sources of emissions such as procurement (university purchases including office supplies, furniture, food) and construction. A lifecycle analysis includes greenhouse gas emissions from all stages of a product or service's lifecycle, including mining, manufacturing, transportation, retail, use, and disposal.

Emissions Mitigation Project Evaluation Criteria and Selection Process

WWUCAP identified and collected data for approximately 20 emissions mitigation projects. In order to select the projects with a noticeable GHG emissions reduction potential and a quick payback, the next step is to rank each of the projects based on four criteria:

- 1. Project and Operating Costs:** The total investment needed to complete a project, including staff time, and the annual operations and maintenance costs.
- 2. Payback or Internal Rate of Return:** The length of time before the accumulated cost savings from a project equals the original investment.
- 3. \$/MT CO₂e:** Estimated dollar amount per Metric Ton CO₂ equivalent Western Washington University could recoup at a net present savings over the lifetime of the project

$$\text{Capital cost Payback (years)} = \frac{\text{Annual savings (Total NPV)} - 1}{\text{\$/ MTCO}_2\text{e} \cdot (\text{Total years of project}) \text{ Annual MTCO}_2\text{e avoided} (1+r)^n - 1}$$
$$\text{Total NPV} = -(\text{Capital cost}) + (\text{Annual savings}) \cdot \frac{r(1+r)^n}{r}$$

Where r = discount rate, and n = total years of project

- 4. Annual GHG Reduction Potential:** This is calculated by multiplying the amount of energy avoided annually (electricity, natural gas or other fossil fuels) by its emissions factor of combustion.

Knowing that public perception of many of these projects may vary regardless of their cost effectiveness (e.g., solar installation remains expensive in the short term but projects a visible image of proactive action towards renewable energy), the WWUCAP Implementation Team should also rank the projects based on their perception value. After ranking, the projects that are most consistently at the top in their individual category will be chosen for the final list of projects for the feasibility study. The chosen projects must then be subjected to actual mitigation potential and financial feasibility analyses in the context of rapidly changing budget constraints and greenhouse gas reduction opportunities.

Observations & Opportunities

The WWUCAP study was focused on determining an emissions reduction target for Western Washington University. Much of its research and campus interaction was geared to fulfill that goal, but in the process of the study, some critical implementation steps were identified. Below we outline them as final WWUCAP observations.

Commitment and Tracking

1. Make a commitment to meet the Western Washington University 2020 target

Through a combination of infrastructure improvements, behavior change, and University-sponsored carbon reduction projects, it is possible for Western Washington University to reduce net carbon emissions to 36% below 2005 levels by 2020. This level of reductions in emissions would exceed new State requirements to stop or slow Global Climate Change. It would also place Western Washington University at the top of institutions of higher education that are taking responsibility for their carbon footprints, perhaps even priming Western Washington University to be first in the State of Washington to reach climate neutrality.

2. Make a commitment to meet the long term goal of Climate Neutrality by 2050.

The university should make a long-term commitment to climate neutrality, defined as net zero emissions and impact on the Earth's climate achieved by minimizing GHG emissions as much as possible, and using University-sponsored carbon reduction projects or other measures to mitigate the remaining GHG emissions. This long-range target for the year 2050 will allow for the motivation and planning needed to make the significant emissions reduction needed over the next 40 years. The financial feasibility of this goal is not calculable, given that the technology and implementation planning will all change in scope. We will need to identify additional energy efficiency and conservation projects as new opportunities emerge.

3. Continue to identify additional cost-effective GHG mitigation opportunities.

The projects evaluated in our research are by no means exhaustive. There are many other opportunities for energy conservation at Western Washington University. The university should continue developing energy efficiency and energy conservation projects, since these types of projects tend to be very cost-effective. They can also be used to leverage the energy and creativity of our campus community of students, faculty and staff to come up with new ideas and collaborative, real-world solutions as yet unidentified. We did not get a chance to explore some projects with tremendous energy savings potential, for example:

- Building-level conservation competition
- Best energy conservation and implementation idea/competition (all campus)
- Lifecycle analysis for the complete GHG footprint of purchased products
- Green procurement study
- Automated and Western Washington University-wide GHG information management system a visible dashboard in Western Washington University website/dashboard.

4. Include aggregate GHG emissions targets in long-term planning documents.

Western Washington University is committed to inventorying its GHG emissions on a cyclical basis. Aggregate GHG emission targets should be included in long-term campus planning documents such as a campus Sustainability, the Strategic Action Plan or the Institutional Master Plan to ensure the commitment of the university to climate change mitigation. Additionally, aggregate GHG emissions can also be used as metrics for broader environmental performance that would be relevant to university stakeholders in judging the desirability of Western Washington University growth.

Funding

5. Secure funds for energy efficiency projects.

Western Washington University should complete grant funding requests for Federal monies in the recently passed American Resource and Recovery Act (The White House, 2009). As reported in the Fact Sheet released April 27, 2009:

“The White House today announced that the U.S. Department of Energy Office of Science will invest \$777 million in Energy Frontier Research Centers (EFRCs) over the next five years. In a major effort to accelerate the scientific breakthroughs needed to build a new 21st-century energy economy, [46 new multi-million-dollar EFRCs](#) will be established at universities, national laboratories, nonprofit organizations, and private firms across the nation.”

Implementation

6. Establish a WWUCAP Implementation Team to coordinate GHG emissions reduction.

Existing Sustainability Committee Completes Mandate

Western Washington University’s Sustainability Committee comprises dedicated staff and faculty who work on a diversity of sustainability issues and are active and visible at Western Washington University. This Committee was tasked with carrying out the mandates inherent in the signing of the President’s Climate Commitment. Due to the complexities and demands of the Climate Action Plan, it will be necessary to formulate a new committee to focus on implementation of this plan.

WWUCAP Implementation

To effectively implement this Climate Action Plan, it will be necessary to establish a WWUCAP Implementation Team to oversee the work of moving to carbon neutrality and to coordinate events and efforts as a clearinghouse for sustainability work at Western Washington University.

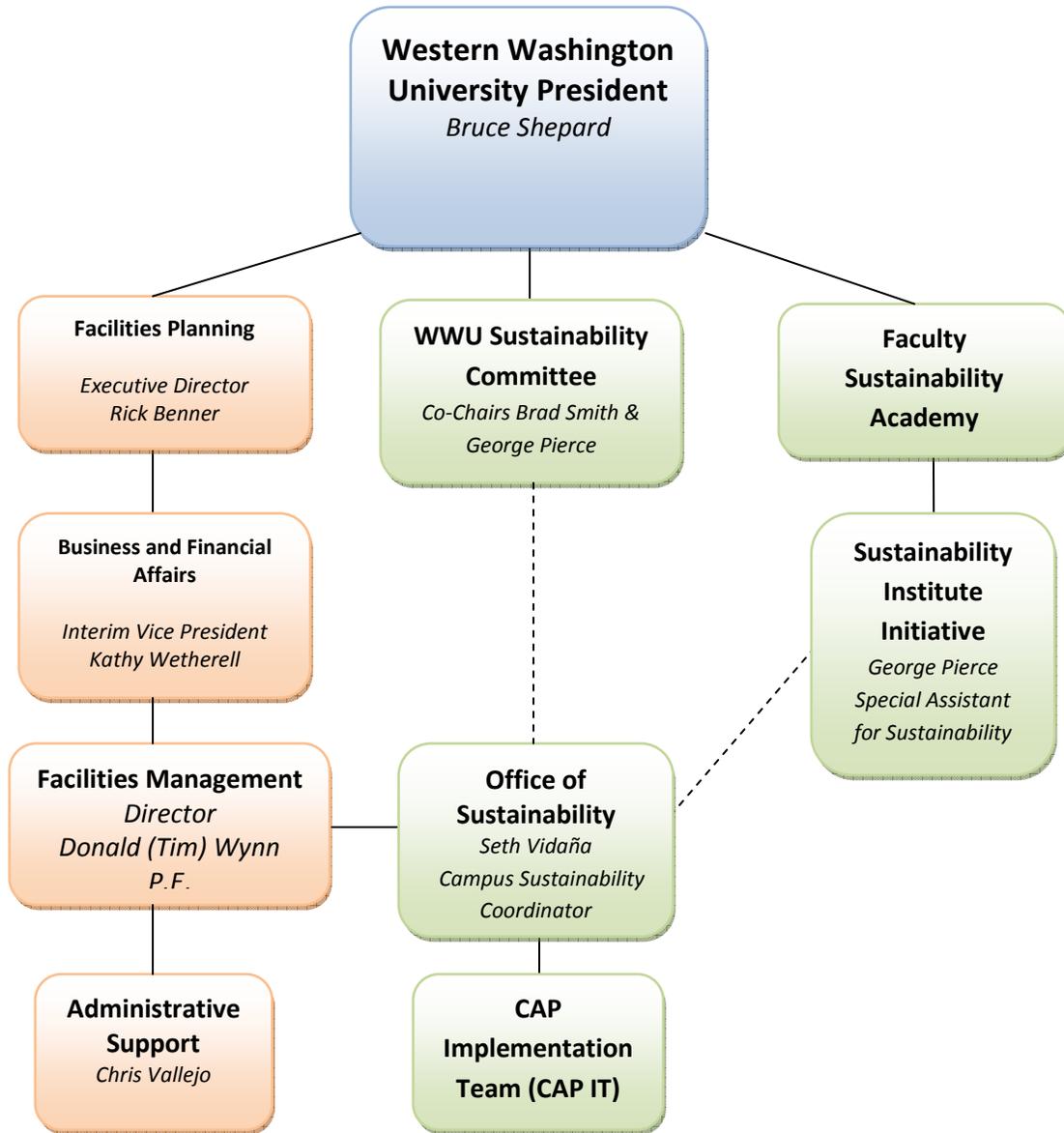
WWU Sustainability Committee

This committee can be further increased to have staff, administrators, students, and faculty members, as well as community and business representatives to represent all the stakeholder groups affected by implementation of the CAP. Members of this committee should be people who are knowledgeable about different aspects of the CAP and are motivated to both coordinate existing sustainability efforts and to build on what has already been done (WWU Sustainability Efforts, 2009). This is a committee focused on action, willing and able to mobilize diverse populations at Western Washington University and in the greater community to maximize effect and minimize redundancy. The mission of this committee could be expanded to realize the University's goal of achieving carbon neutrality.

WWUCAP Implementation Team

In addition to a WWUCAP Sustainability Committee, Western Washington University has already hired a Sustainability Coordinator to implement WWUCAP recommendations as endorsed by the Board of Trustees. This Sustainability Coordinator will need an implementation team of staff to support action on the CAP findings and to carry out the increase in duties this Action Plan requires. With staff, volunteers, student interns, faculty advisors, and overall direction from the WWUCAP Sustainability Committee, the Sustainability Coordinator and the CAP Implementation Team (CAP IT) would perform implementation through planning, tracking, monitoring, assessing and reporting GHG reduction to an actual carbon neutral stance for the whole University (Figure 5: Western Washington University Proposed Sustainability Committee Organizational Structure below).

Figure 7: Western Washington University Proposed Sustainability Committee Organizational Structure



7. Assign Sustainability Coordinators at Department or Building Levels

In addition to an overarching Office of Sustainability and Sustainability Coordinator, awareness and coordination at the academic departmental level would be vital to create a culture of energy conservation among faculty and students that leads to reduced emissions. The existing successful EcoRep program and the pilot Departmental Sustainability Coordinator at Woodring College of Education are evidence of this fact within Western Washington University. Over the border, the University of British Columbia sports ample evidence of the efficacy and effectiveness of establishing a decentralized, hands-on, peer-based network of building-based sustainability advocates (UBC, 2008).

Smart building design is often only as smart as the users of it, especially as sustainable design models such as the LEED certification program move toward user-control of ventilation and heating systems. In combination with auto controls where those make the most sense, building coordinators provide essential peer-mentoring for maximum efficiency and are a feedback liaison between the building occupants and the WWUCAP implementation team, and vice versa. Every department needs a sustainability coordinator who is trained in principles of energy savings and can manage and communicate sustainability and GHG reduction data on a departmental level. These coordinators can disseminate information from the Sustainability Coordinator and help implement mandates and policies created by administration and governing student bodies; they can also assess what types of policies are most effective and be a conduit for feedback from building users to decision-making bodies.

8. Create an Integrated Information Management System

The university does not have an integrated system to manage information relevant to GHG emissions generated by Western Washington University activities. Data collection from some potentially important sources (e.g., campus fleet, commute, air travel) is manual and often inefficient. This is particularly true for air travel, where there is no single system that tracks all air travel trips, mileage or carbon emissions. Also, information on different GHG emissions sources is not integrated. Before we performed the inventory, we did not realize the relative size of the different sources of emissions at Western Washington University. This is typical of most institutions, given that climate change mitigation is a fairly recent interest.

Information about Western Washington University GHG emissions sources needs to be better managed, analyzed and communicated across the Western Washington University campus. WWUCAP recommends (dependent on financial feasibility) the creation of an Energy Management System, an integrated energy information system that manages and analyzes greenhouse gas data along with energy indicators. This could be a new technological (software) tool that the university invests in and that can pay for itself in avoided utilities costs. A complete and integrated GHG management system needs to be user friendly and have a web-based computing interface that can be used by staff, students and faculty for transparency and wide accessibility to Western Washington University GHG data. This technological tool can help decision makers manage and analyze energy use, and easily compare how disparate energy projects (e.g., fleet versus electricity efficiency) can yield the greatest emissions and cost reductions. Such a system would include:

- Emissions calculator – to instantly calculate cost and GHG emissions comparisons given certain inputs (e.g., electricity use, fuel consumption)
- Implementation schedule – to generate a project implementation schedule, based on different targets and projected Western Washington University growth data

- Financial impacts – to calculate cash flow analysis of project implementation schedule.

9. Work with administrators at other schools and Western Washington University Office of the President to lobby the state legislature to address energy-efficiency funding obstacles. Although this may be the most difficult recommendation to implement, it may also be one of the most important since funding is probably the most important institutional barrier to emission reduction projects. Western Washington University should work with other Washington schools to push funding reform on two fronts:

- Increase initial funding for energy efficiency projects (i.e. upper-tier LEED buildings) based on long-term reductions in operating costs.
- Ensure savings resulting from change in project scope stay with Western Washington University to fund energy efficiency components that may have been removed during value engineering.

10. Increase Sustainability Education

The university's academic curriculum needs to demonstrate a more serious commitment to addressing climate change. Initiatives taken by the AS Sustainability groups (WWU Sustainability Efforts, 2009) can help jumpstart student-led courses at the grassroots level. Support for faculty initiatives for sustainability education such as the Sustainability Academy and the Sustainability Education for New Teachers programs should continue. Support for administration initiatives for sustainability education such as the Sustainability Institute should continue and grow. Additionally, the Academic Coordinating Council, the representative body of the university faculty with influence over academic matters, can create a core curriculum focused on climate change. At the least, it should create a "flexible course module" on climate change that all faculty could integrate into relevant existing course offerings.

11. Create incentives for alternative transportation

Developing new policies to reduce single occupancy vehicle commuters, and consequently emissions, would cause a heated debate on this campus. Yet the benefits of discouraging single drivers are significant, ranging from extensive cost savings related to parking infrastructure, to reduced traffic congestion in the local community. The following strategies can help:

- Assign a "carbon fee" to parking permits. Funds from this fee collection would go to GHG reduction projects at Western Washington University.
- Reduce parking permit costs to drivers of alternative fuel or high MPG vehicles.
- Install small electric shuttles or "yellow bike" programs to allow off-campus parking commuters to travel to the campus core.
- Create further incentives for the faculty and staff to purchase and use a WTA Bus Pass using the "carbon fee" concept to subsidize low or no-cost sustainable transport to and from Western Washington University.

Methodology

Organizational Structure Research

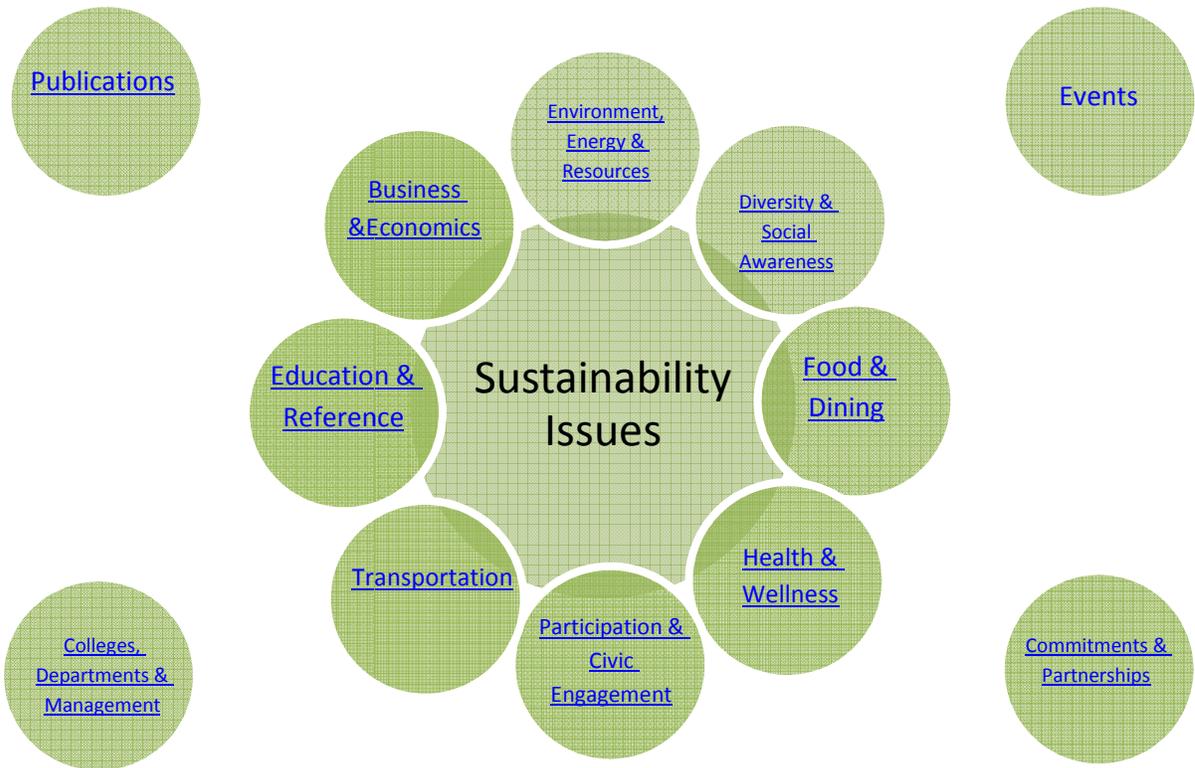
The research methodology for this document included engagement with campus decision makers. A portion of the research included current Western Washington University's decision making process and organizational structure. This was in order to understand how sustainability-related decisions are presently reached and where improvements to the existing system can be made to streamline and expedite what can often be time-sensitive decisions. It will sometimes be important in making rapid response decisions that can address the present accelerated pace of economic and ecological change. To do that, efforts may have to focus on important leverage points within University system. This would be done to create institutional resiliency and an emergency-responder decision tree for sustainability issues. Western Washington University's organizational structure as published was compared to the actual power and decision making processes, to see how those two differ. Personnel interviews were extensive to determine how decisions are reached and who has authority to make or take action. Researchers participated in departmental meetings, college-level sustainability group meetings, sustainability pilot projects, operational meetings, sustainability academy discussions, student-led sustainability initiatives, and community-based sustainability discussions and networking. The CAP working group also attended conferences and researched via web and phone with peer institutions to determine Western Washington University's place within a matrix of sustainability efforts beyond the confines of campus that affect decisions here on campus. All of this informed and infused this work with authenticity and cross-campus and larger community co-creation.

Current Efforts for Sustainability at Western Washington University Research

Efforts toward sustainability on campus currently extant were researched and included in a visual diagram (Figure 7 below) to better understand how these efforts and entities fit together. This research was used to ensure that representation by all the major stakeholder groups was included in the investigation of WWUCAP and strategies for moving toward climate neutral status. This is by definition a moving target, as was most of the work in this report because of the constantly-evolving and emerging groups and efforts that relate to sustainability. However difficult it has been to try to freeze-frame such a dynamic system of interconnected and overlapping groups, it was necessary to both document the activity as baseline information from which to measure future progress, and to ensure some level of accurate representation in this report. It is certain that some level of detail in this diagram was missed and also that by the time this report goes to print, some of the information such as student groups will have changed. In supporting documents for this report, the figure below is linked to a table of detailed information about each stakeholder group and interrelated spheres of influence. This table was omitted in this report due to stakeholder feedback that the report needed to be shorter. The complete document can be requested at sustain@wwu.edu.

Figure 7 Western Washington University Sustainability Efforts Diagram

Western Washington University Sustainability Efforts



Timeframe

Below is a tentative timeline for this years-long project. Note that most activities do not have a definite start or end point, but moved in parallel as the project progresses.

Goals	Tasks	Timeline
Assess and document GHG emissions at WWU	Create GHG Inventory	May 2007 – Dec. 2008
Initial CAP Research	Research WWU environmental decision making hierarchy	April 2007
	Establish Campus Contacts	January – April 2007
	Policy Data Research	July 2008 – July 2009
	Literature Review	Ongoing
Identify and Evaluate Emission Reduction Policies	Identify policy mechanisms and costs	September – November 2009
Implement Strategies	ACUPCC Registry	GHGI: Jan 2007, CAP: June 2010
	Evaluation with decision makers	Ongoing
	Involve stakeholders	Ongoing
	Trends and target analysis	Ongoing
	Implement GHG reductions	Ongoing

Methodology within the Context of a Greater Directive:

Ultimately, this work is within a broader national movement to encourage behavioral change in society and mobilize communities to be accountable for the climate impact of their actions. This work has helped to move Western Washington University to commit to GHG emissions reductions and create the tools necessary to continue to monitor GHG emissions. This research group became a part of a social movement at Western Washington University that defines how local actions can be connected and transformed into a broader movement. The multiplier effect of how this commitment to sustainability practice and principals will contribute to the effective and affective education of students can only be guessed, as they leave Western Washington University and carry this ethic with them into the greater community.

Campus Level: The working group participated in sustainability initiatives and departmental-level meetings as well as student-led sustainability research and activities here on our own campus. The research group networked with other campuses to extend our understanding of what Western Washington University can improve upon here. The working group attended several major conferences on climate change policy and student-led initiatives to exchange information and ideas on institutional change, energy efficiency, emissions reduction, and emissions offsets. The working group networked through conferences such as those put on by the Society for Human Ecology, the Environmental Education Association of Washington and by the Association for the Advancement of Sustainability in Higher Education. By sharing lessons and experiences, the working group joined forces with others who are working with campuses, business and organizations to reduce their emissions of anthropogenic greenhouse gases.

Regional Level: Through participation in county-wide dialogues on issues of sustainability and how Western Washington University will contribute to a growing web of activity for a sustainable future, WWU is positioned to affect and be affected by local land-use decisions, development and demographics. The working group coordinated with our bioregional neighbors in British Columbia, sending staff for sustainability coordination training to the University of British Columbia and engaging in bioregional research for sustaining our shared rich natural heritage.

State Level: Participation to help to set State Teacher Certification Standards that include sustainability (Standard V). We also house the premier State teacher preparation college, Woodring College of Education, which is engaged in a two-year grant-funded study to infuse sustainability curriculum into the preparation of teachers as well as into P-12 education statewide.

National Level: Through the 2007 signing of the President's Climate Challenge, Western Washington University stood in solidarity with others in the climate change movement, contributing our voices towards effecting change, and ultimately contributing to the literature of experiences in mobilizing organizations to reduce greenhouse gas emissions. Woodring College of Education has also hosted a national conference on infusing sustainability education into all P-12 schools in July 2009 that supported and highlighted national efforts toward sustainability literacy and education (SESI 2009).

Global Level: Western Washington University joins the global community in taking responsibility for the consequences of actions and committing to not only halting the advance of global climate change, but investing in infrastructure to reverse current levels of GHG to earlier sustainable levels. Just as the problem of climate change is global, so too must be the solutions.

Conclusion

The climate neutral goal of the ACUPCC President's Climate Commitment is a part of the Western Washington University's larger sustainability goals. Specific recommendations for emissions reductions strategies were channeled through the Sustainability Committee because that would ensure implementation and continuity of this important initiative. Analysis yielded a financially compelling finding (profit in committing to an emissions reduction target), but financial incentives are not enough. To ensure implementation, Western Washington University decision makers will need to continue to portray the shared vision that greenhouse gas reduction is important and attainable. To help maintain the momentum, the Sustainability Committee and WWUCAP Implementation Team will continue this work.

The CAP IT makes these four final recommendations:

- **Commit to reducing net greenhouse gas emissions** to 36% below 2005 levels by 2020.
- **Commit to long-term climate neutrality** by 2050.
- **Provide a model** to the campus to incorporate greenhouse gas reduction criteria and sustainability into the institutional decision-making process.
- **Support the continuation of the WWUCAP and sustainability initiatives** creation of a CAP Implementation Team and resources for sustainability staff. Report progress to the WWU Board of Trustees on a cyclical basis.

Appendices

Appendix A: AASHE President's Climate Commitment

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.

Appendix B: WWU Gross CO2 Emissions with Advanced State Standards 2005 to 2050

Year	Gross CO2 Emissions	Percent change in gross emissions each year	Change in gross tons CO2 each year	Net Emissions Due to REC purchases
2005	34,663	-		34,663
2006	35,998	3.9%	1,335	27,268
2007	41,136	14.3%	5,138	25,363
2008	42,305	2.8%	1,169	18,420
2009	43,421	2.6%	1,116	15,807
(est) 2010	44,000	1.3%	579	-
2011	41,087	-6.6%	2,913	-
2012	38,367	-6.6%	2,720	-
2013	35,827	-6.6%	2,540	-
2014	33,456	-6.6%	2,372	-
2015	31,241	-6.6%	2,215	-
2016	29,173	-6.6%	2,068	-
2017	27,241	-6.6%	1,931	-
2018	25,438	-6.6%	1,803	-
2019	23,754	-6.6%	1,684	-
2020	22,182	-6.6%	1,573	-
2021	21,585	-2.7%	597	-
2022	21,004	-2.7%	581	-
2023	20,439	-2.7%	565	-
2024	19,889	-2.7%	550	-
2025	19,353	-2.7%	535	-
2026	18,833	-2.7%	521	-
2027	18,326	-2.7%	507	-
2028	17,833	-2.7%	493	-
2029	17,353	-2.7%	480	-
2030	16,886	-2.7%	467	-
2031	16,431	-2.7%	454	-
2032	15,989	-2.7%	442	-
2033	15,559	-2.7%	430	-
2034	15,140	-2.7%	419	-
2035	14,733	-2.7%	407	-

2036	13,751	-6.7%	982	-
2037	12,768	-7.1%	982	-
2038	11,786	-7.7%	982	-
2039	10,804	-8.3%	982	-
2040	9,822	-9.1%	982	-
2041	8,840	-10.0%	982	-
2042	7,858	-11.1%	982	-
2043	6,875	-12.5%	982	-
2044	5,893	-14.3%	982	-
2045	4,911	-16.7%	982	-
2046	3,929	-20.0%	982	-
2047	2,947	-25.0%	982	-
2048	1,964	-33.3%	982	-
2049	982	-50.0%	982	-
2050	0	-100.0%	982	-

Conversion Factors	
CF/Therm	100

Unit of Measure	CO ₂ (lb.)	BTU	Metric Tons
per MCF (1000 CF)	115	1,000,000	
per CF	0.115	1,000	
per therm (CCF)	11.5	100,000	
Therms	2,750,000		
CO ₂ (lbs.)	31,625,000		
CO ₂ (tons)	14,345		
MWh	40,000		
lbs CO ₂ /REC	2,153		
lbs CO ₂ /MWh	1,453	58,120,000	26,363
net/MWh	700		
Mtons/REC	0.97658553		

Appendix C: Carbon Neutral US Universities

May 2009

The following is a partial listing of American Universities that have achieved Carbon Neutral Status according to an informal survey of internet data.

For the purposes of this survey, “Actual Carbon Neutrality” is defined as balancing all carbon production with equivalents of carbon dioxide removal from the atmosphere directly as a result of the University’s actions such as reforestation projects that are independently verified.

“Technical Carbon Neutrality” is defined as balancing all carbon production with a mix of direct University action (including buying electricity from carbon-neutral production sources such as is done through Renewable Energy Credits) and the purchase of Carbon Offsets.

University	Actual Carbon Neutrality (Net Zero Carbon Emissions)	Technical Carbon Neutrality (with Offsets)	Date of Achievement of Carbon Neutrality	Website source
Southern New Hampshire University		X	Saturday, May 19, 2007	http://www.snhu.edu/6886.asp
College of the Atlantic		X	December, 2007	http://www.treehugger.com/files/2007/12/and_the_first_carbon_neutral_college_us.php

Appendix D: Renewable Energy Credits

“Renewable energy certificates (RECs), also known as “green tags,” “green certificates,” and “renewable energy credits,” are a relatively new but increasingly popular method of supporting green power. Renewable energy generates two products: electricity and the technology and environmental benefits associated with renewable energy generation ...These benefits are generally referred to as environmental “attributes” and may include a reduction in the air pollution and particulate matter that would have been generated by burning fossil fuels as well as a reduction of greenhouse gas emissions. The electricity and attributes can be sold together, in retail green power programs, or they can be sold separately. RECs represent the technology and environmental attributes of renewable energy and allow customers greater flexibility in “greening” their electricity. That is, customers can continue to purchase their electricity from their existing suppliers and “green” it by supporting a renewable energy source of their choosing” (WRI, 2006).

“Renewable power facilities sell the electricity they generate into the wholesale power market, where it is then bought by retail electricity providers and sold to customers. RECs are sold either directly to retail electricity providers or to third party REC suppliers. When retail electricity providers sell electricity plus RECs to a customer, the product being sold is green power. If RECs are not sold along with the electricity, the product being sold is conventional electricity. In other words, the “greenness” of renewable power follows the REC. If a company can claim ownership of the REC, it also can claim the environmental benefits of the associated green power” (WRI, 2006).

Special note: As of 2006, virtually 100% of Western Washington University’s electrical energy is offset using RECs.

(Source: The above excerpts are taken directly from a report by World Resources Institute, SWITCHING TO GREEN: A RENEWABLE ENERGY GUIDE FOR OFFICE AND RETAIL COMPANIES, published in October 2006.)

Appendix E: Carbon Offsets Analysis

Offsets are described as the process of reducing the net carbon emissions through arrangements with a carbon offset provider specializing in projects that retire or capture carbon from the atmosphere.

Types of Offsets

- *Renewable energy projects*
- *Energy efficiency projects*
- *Biosequestration projects*, such as forestation. Vendors sell offsets in specific units, provide onsite emission calculators, or allow you to enter in the amount of carbon to offset.

Why Offsets are Controversial

Voluntary offsets can be purchased from many organizations, but the lack of formal regulation

of this market means that all voluntary offsets are not equal. Purchasing voluntary offsets requires due diligence to ensure:

- ***Additionality*** – offset credits are only awarded to projects that would not have otherwise happened.
- ***Permanence*** – offsets cannot be reversed, this consideration is especially important for sequestration projects.
- ***Ownership*** – offsets are only counted and sold once, they should receive credit under multiple accounting schemes.
- ***Verification*** – offset projects can be monitored and their quality verified by independent parties.

Some different vendors who use different standards to guarantee the quality of their offsets are:

- Clean Development Mechanism (CDM)
- Voluntary Gold Standard
- Greene

All Offsets are not Made Equal

Since climate change is a global issue, the geographic location of an offset does not affect its efficacy to offset emissions leaving quality the most important factor for adjudicating offsets. Differences among offset vendors complicate generalizations.

Comparison of Offset Vendors

Two recent reports, from the Tufts Climate Initiative and Clean Air Cool Planet have examined a number of offset vendors. While these comparisons included different vendors (the latter being more inclusive because it was not limited to air travel offsets) and ranked the vendors on somewhat different criteria, including quality of offsets and price per ton of carbon offset, their findings offer some useful information for choosing vendors.

Tufts Climate Initiative

- Atmosfair*† Better World Club CarbonCounter.org
- Carbonfund CarbonNeutral Company
- Cleanairpass
- Climate Care
- Climate Friendly Myclimate/Sustainable Travel NativeEnergy
- Atmosclear
- Offsetters SELF Solar Electric Light Fund Terrapass

* Italics indicate evaluation by both reports.

† Bold indicates the vendor received the report's highest ranking.

Clean Air Cool Planet

- AgCert/DrivingGreen

- Atmosfair
- Bonneville Environmental Foundation Carbon Clear
- Carbon Neutral Company
- Carbon Planet
- Carbonfund
- Certified Clean Car
- Climate Care
- Climate Friendly
- Climate Neutral Group
- Climate Trust
- ClimateSAVE
- CO₂balance
- Myclimate/Sustainable Travel NativeEnergy
- Conservation Fund: Go Zero DriveNeutral eBlueHorizons Envirotrade/Plan Vivo
Greenfleet Leonardo Academy
- Natsource/Dupont/BlueSource
- Offsetters SELF – Solar Electric Light Fund Terrapass
- TIST – Int'l Small Group & Tree Planting Service World Land Trust

Of the 4 vendors that received the Tufts Climate Initiative's recommendation without reservation and the 8 best vendors identified by the Clean Air Cool Planet report, 3 received the support of both: Atmosfair, Myclimate/Sustainable Travel, and NativeEnergy.

- Atmosfair – www.atmosfair.de – \$55.64/ton CO₂ (2.120 tons of CO₂)¹² A German non-profit that focuses on air travel offsets. Projects comply with CDM and meet the Gold Standard. Projects include both renewable energy and energy efficiency. This website is the least user friendly and has a few translation errors.
- Myclimate/Sustainable Travel – www.sustainabletravelinternational.org – \$15.25/ton CO₂ (1.51 tons of CO₂) Myclimate is based in Switzerland, Sustainable Travel is the North American distributor; information here pertains to Sustainable Travel where the two differ. Projects comply with CDM and meet the Gold Standard. The Tufts Climate Institute notes that the Swiss site provides a better calculator and has more expensive offsets.
- NativeEnergy – www.nativeenergy.com – \$14.25/ton CO₂ (2.526 tons of CO₂) NativeEnergy is a forprofit, Native American energy company that supports Native American, farmerowned, and communityrun renewable energy projects. NativeEnergy offers both Renewable Energy Credits and offsets. Projects have Greene certification.

Additional Useful References

Voluntary Offsets for AirTravel Carbon Emissions: Evaluations and Recommendations of Voluntary Offset Companies, a report from the Tufts Climate Initiative that provides a more extensive examination of air travel offsets, available at

www.tufts.edu/tie/tci/pdf/TCI_Carbon_Offsets_Paper_Jan07.pdf.

A Consumer's Guide to Retail Carbon Offset Providers, a report from Clean AirCool Planet that examines the quality of specific voluntary offset vendors, available at www.cleanair-

coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf.

¹² All values are based on a roundtrip flight between San Francisco (SFO) and Washington, DC (DCA) based on the calculators provided by the website. The values are given to show the variability in online calculators. Price for atmosfair converted from Euros.

Appendix F: Summary of the Analysis and Quantification of WWU Waste Management/Landscaping Reduction-to-Carbon-Saved

Practices	GHG Emissions Reductions	WWU-Specific CO ₂ Reductions	Potential Reductions
I. Waste Management Practices			
1. Increase the reuse/recycling of cardboard boxes	3.87 tons CO ₂ e per ton of cardboard reused/recycled	3.87 tons CO ₂ e per ton x 137.79 tons recycled cardboard = 533.24 tons CO ₂	Virtually all cardboard is recycled
2. Increase the recycling of plastic film (LDPE)	1.9 tons CO ₂ e per ton of LDPE (plastic film) recycled	Plastic film not recycled at Western	Recycling is not viable, Recycling Center runs education programs on reduction
3. Increase the recycling of paper	4.3 tons CO ₂ e per ton of general paper recycled	4.3 tons CO ₂ e per ton x 224.58 tons paper recycled = 965.7 tons CO ₂	Clearly marked classroom and office bins would help capture more paper, the potential is not known. Targeting dorms is biggest issue
4. Increase the reutilization of reusable plastic pallets instead of wood pallets	800 lbs CO ₂ e per reusable plastic pallet	Western is not shipped reusable plastic pallets, we recycle all wooden pallets, 7.5 tons of wooden pallets, 4.5 tons of other wood	We aren't shipped plastic pallets, and don't use them for shipping. Manufacturers would have to develop program, including taking them back after use.
5. Duplex copying	1.9 tons CO ₂ e for every 2000 reams of paper double sided	There are no numbers on the amount of double-sided printing on	All computer labs have this feature, transitioning all offices would make all 20 million sheets double-sided
6. Reduce margins default setting on all campus printers to .5 inches	Saves roughly 5% of paper use, and 5% of CO ₂ E	A pilot project is currently underway	If all margins on campus were reduced, we would save 1 million sheets of paper yearly, or 2,000 reams and 1.9 tons of CO ₂
7. Increase commercial food waste composting instead of landfilling it as garbage	1.01 tons of CO ₂ e per ton of food waste	Food waste is measured in volume, not weight, 225,720 gallons of food compost	This represents a majority of food waste on campus
II. Landscape Practices			
1. CO ₂ -Absorbent Landscaping -bamboo	35% more CO ₂ e removed from air than comparable planting of trees	No bamboo	For every acre of bamboo planted, we could save an additional 1 ton of CO ₂ per year, based on the 2.6 tons an acre of trees absorbs per year
2. Keep green waste out of landfill	2.5 tons of CO ₂ e per acre per year	2.5 tons of CO ₂ e per acre x 33.3 acres green recycling = 83.25 tons CO ₂ e	We compost all green waste, the only potential is in converting more grass to shrub and wild areas
3. Avoid use of trimming and mowing equipment.	315 lbs of CO ₂ e per acre per year	315 lbs of CO ₂ e per acre x 38.7 acres unmown = 6.1 tons CO ₂ e	Converting more lawn to shrub and wild areas would continue to reduce CO ₂ emissions and other resource use.

Appendix G: Western Washington University Greenhouse Gas Calculations

Fiscal Year	Green Power (kWh)	Green Power Cost	All University Electricity (kWh)	All University Electricity Cost	All University Nat. Gas (therms)	All University Nat. Gas Cost
04-05			36,247,331	\$ 1,898,312	2,326,450	\$ 1,698,626
05-06	28,965,658	\$ 306,167	38,435,045	\$ 2,162,473	2,454,126	\$ 1,900,583
06-07	37,700,000	\$ 357,401	39,211,066	\$ 2,375,808	2,514,030	\$ 2,462,976
07-08	38,058,800	\$ 241,369	39,273,366	\$ 2,432,426	2,729,989	\$ 2,732,449
08-09	42,401,600	\$ 212,071	40,107,833	\$ 2,618,169	2,738,032	\$ 2,697,930

Emissions Source	04-05	05-06	06-07	07-08	08-09
Solid Waste	381.55	381.55	381.55	381.55	381.55
Scope 2 T&D Losses	1,622.49	1,622.49	1,622.49	1,622.49	1,622.49
Other on-Campus Stationary	12,308.90	12,984.40	13,301.30	14,443.90	14,940.10
Direct Transportation	539.10	539.10	539.10	539.10	539.10
Refrigerants & Chemicals	1,660.37	1,660.37	1,660.37	1,660.37	1,660.37
Agriculture	4.53	4.53	4.53	4.53	4.53
Purchased Electricity	10,924.50	11,583.80	16,405.17	16,431.20	17,051.20
Faculty/Staff Commuting	408.76	408.76	408.76	408.76	408.76
Student Commuting	2,208.73	2,208.73	2,208.73	2,208.73	2,208.73
Directly Financed Air Travel	4,604.14	4,604.14	4,604.14	4,604.14	4,604.14
Total GHG Emissions	34,663.08	35,997.88	41,136.15	42,304.78	43,420.98

CO ₂ Offset	04-05	05-06	06-07	07-08	08-09
GP Purchase (kWh)	0	28,965,658	37,700,000	38,058,800	42,401,600
eCO ₂ via CA-CP Calculator	0	(8,730)	(15,773)	(15,923)	(18,409)
Adjusted eCO ₂ based on Location	0	(8,730)	(15,773)	(23,885)	(27,614)
GHG Emissions w/Offsets	34,663.08	27,267.98	25,363.15	18,420.13	15,807.03

NW RECs
Iowa RECs
Remaining CO₂

Western Washington University Greenhouse Gas Calculations continued

	Total Emissions	CO₂ Offset	Net Emissions	Offset Cost	Student Contrbtn	% Chng Emsns
2005	34,663	0	34,663	\$ -		
2006	35,998	(8,730)	27,268	\$ 306,167	\$ 306,167	3.9%
2007	41,136	(15,773)	25,363	\$ 357,401	\$ 357,401	14.3%
2008	42,305	(23,885)	18,420	\$ 241,369	\$ 241,369	2.8%
2009	43,421	(27,614)	15,807	\$ 212,071	\$ 212,071	2.6%

GLOSSARY OF TERMS

Anthropogenic

Effects, processes or materials are those that are derived from [human](#) activities, as opposed to those occurring in [natural environments](#) without human influence (Wikipedia, 2009).

Bioregion

A political, cultural, and environmental system based on naturally-defined areas that are delineated through physical and environmental features, including [watershed](#) boundaries and [soil](#) and [terrain](#) characteristics (Wikipedia, 2009).

CACP (Clean Air Cool Planet)

Clean Air Cool Planet creates partnerships in the United State to implement solutions to climate change and build constituencies for effective climate policies and actions (CACP, 2009).

Calculator

The database tool that measures Western Washington University emissions and can be used to help create a climate action plan, analyzing viable long-term strategies to reduce a Western Washington University's climate footprint.

Carbon Neutrality

“Carbon neutrality” refers to reaching net zero carbon emissions through reduction of our carbon output to the barest minimum possible and then to balance our remaining carbon production with University-sponsored carbon removal and sequestration projects.

EU ETS (European Union Greenhouse Gas Emission Trading Scheme)

European Union Greenhouse Gas Emission Trading Scheme is the largest multi-country, multi-sector Greenhouse Gas emission trading scheme worldwide (EU, 2009).

GHG (Greenhouse Gas)

Greenhouse Gas. Specifically the 6 gases recognized by the Kyoto Protocol: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF₆) (IPCC, 2009).

GWP (Global Warming Potential)

Global warming potential is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of carbon dioxide (whose GWP is by definition 1). A GWP is calculated over a specific time interval and the value of this must be stated whenever a GWP is quoted or else the value is meaningless (Wikipedia GWP, 2009).

HVAC (Heating Ventilation and Air Conditioning)

Heating Ventilation and Air Conditioning is a system that provides heating, ventilating, and/or cooling within or associated with a building. (EERE, 2006).

IPCC (The Intergovernmental Panel on Climate Change)

The Intergovernmental Panel on Climate Change. “The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation” (IPCC, 2009).

kWh (kilowatt hour)

kilowatt hour is equivalent to 1000 watt hours: “One watt hour is equivalent to one watt of power used for one hour. This is equivalent to 3,600 joules. For example, a sixty watt light bulb uses 60 watt hours of energy every hour. Similarly, a 100 watt light bulb uses 50 watt hours in thirty minutes” (Wikipedia Watt Hour, 2009).

MTCO₂e (Metric Ton Carbon Dioxide Equivalent)

Metric Ton Carbon Dioxide Equivalent is equal to 1000 kilograms or 2204 pounds of Carbon Dioxide (IPCC, 2009).

NPV (NetPresent Value)

NetPresent Value. An economic term that is “the difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project” (Investopedia, 2009).

WWUOP (Western Washington University Office of the President)

Western Washington University Office of the President is the system-wide headquarters of Western Washington University (WWUOP, 2009).

UNFCCC (The United Nations Framework Convention on Climate Change)

The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The treaty aimed at reducing emissions of greenhouse gas in order to combat global warming” (Wikipedia UNFCCC, 2009).

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