

PLU 2011 GHG Inventory Report

Executive Summary

Education in the 21st century must take seriously the environmental and social challenges threatening our world. Pacific Lutheran University has dedicated itself to becoming a just, diverse and sustainable campus. This means enacting new campus initiatives, teaching pedagogies and student-faculty research opportunities in support of sustainability on our campus.

Sustainability at PLU focuses on three key components: care for people, care for the planet, and prosperity, both now and in the future. These are values that emphasize the inseparable interrelationships between environmental, economic, and ethical principles that call on all individuals and communities to ensure that our present way of life does not degrade that of future generations, but leaves the world a better place for all. The desire for a richly diverse learning community committed to justice and sustainability is rooted in our mission and Lutheran heritage.

Much of the work on sustainability at PLU is supported by the Sustainability Department and the Sustainability Committee with faculty, staff and student representation. Over the years, significant strides toward becoming an environmentally responsible and sustainable campus have been made. Many programs are aimed at inspiring a cultural shift toward sustainability. Future work on sustainability will continue our current efforts to make our campus and culture a model of environmental stewardship, social justice and economic responsibility. Such work will help us to live out our mission, prepare our students for the world, and solidify our position as a leader in sustainability.

In recent years, the university's programs and practices regarding diversity, justice and sustainability have broadened and deepened. The work ahead calls for a clearer vision and definition of these values and how they relate to each other in our community, and we will renew and broaden the campus-wide commitment to these values and their intersections.

The third annual Greenhouse Gas Inventory Report helps to serve as an objective value to our success. As a signatory to the American Colleges and Universities Presidents' Climate Commitment, PLU has been reporting emissions since 2008, and is continuing these updates with this report for the campus' 2011 emissions. It was determined the net campus emissions for the 2011 fiscal year were 19,131 Metric Tonnes Carbon Dioxide Equivalent (MT CO₂e), taking into account Scope 1, 2, and 3 emissions. This report also captures the campus trend for emissions, showing a continued decrease over the past 3 years. This trend data will help PLU track against interim emissions reduction goals and milestones as they continue to refine a plan to carbon neutrality. As a signatory to The ACUPCC, PLU has made an institutional commitment to reduce greenhouse gas emissions from campus operations and achieve a carbon neutral footprint.

Introduction

This 2011 report captures emissions from fiscal year 2011 and will be used by the University to track progress and establish realistic interim reduction goals. PLU contracted with consultants from the McKinstry Co. to assist in compiling this inventory and emissions report for the 2010/11 academic year. The findings in this report are the result of a joint effort from McKinstry and members of the PLU staff. The results of this report and other annual inventories are used to track against long term and interim emissions reduction goals set by the university.

INTERIM EMISSIONS REDUCTION GOALS

- **10%** reduction in **total scopes 1, 2, & 3** emissions by **2018** by equipping the Library, Rieke or Olson with a smart control system.
- **100%** reduction in **air travel emissions** by **2014** through a program offsetting air travel emissions.
- **38%** reduction in **total scopes 1, 2, & 3 emissions** by **2016** with the installation of a geothermal plant.

Reporting Protocol, Boundaries & Emissions Factors

GHG accounting and reporting was based on the principles set forth in the World Resource Institute (WRI) GHG Protocol. These are:

Relevance – Ensure the GHG Inventory appropriately reflects the GHG emissions of the university and serves the decision making needs of users – both internal and external to the university.

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Completeness – Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.

Consistency – Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.

Transparency – Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.

Accuracy – Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

PLU's 2011 GHG inventory is based on university data for the 2010-2011 fiscal year (June 1, 2010 – May 31, 2011), and was calculated using the Clean Air Cool Planet Campus Carbon Calculator v6.7. Data was collected from a variety of sources, and some incomplete data was extrapolated to provide PLU with an estimate based on the best available data.

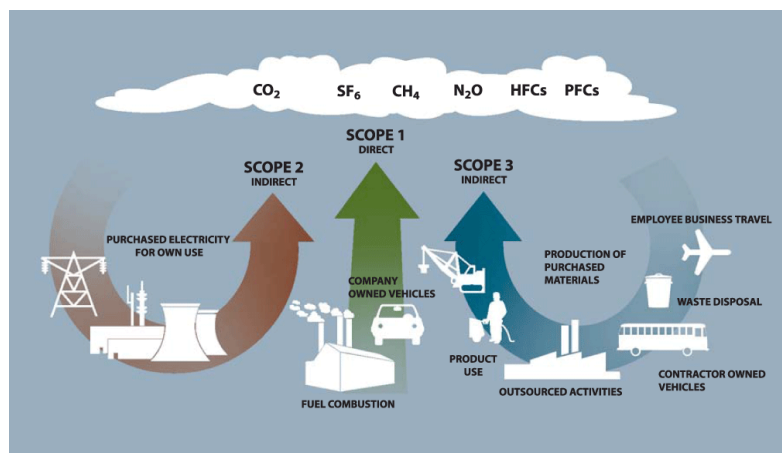
Through discussions with PLU, it was determined that the scope of this report would be limited to PLU activities at the main campus. Additionally, it was agreed that PLU would use the WRI Operational Control Approach in determining organizational boundaries on the campus. Under this approach, PLU is accounting for GHG emissions from all operations under its operational control, which refers to the authority to introduce and implement operating policies, and is consistent with the ACUPCC reporting guidelines. The guidelines require that this report capture emissions from scopes 1, 2 and 3, discussed later.

Comparing this inventory with peer institutions reveals that most inventories focus on required emissions sources. This inventory aims to document all PLU emissions, regardless of the required mitigation responsibilities.

Pacific Lutheran University reports emissions based on default values from the CACP calculator, with the exception of the electricity fuel mix. PLU references a custom electricity mix from the local provider, Parkland Light and Water. The University feels that this most accurately reflects the carbon emissions on campus rather than using a national or regional average. PLU recognizes that this local mix could change, impacting their emissions over time. Parkland's custom fuel mix is primarily hydroelectricity from Alder Dam, which greatly reduces the emissions from electricity use on campus. Using this hydroelectric heavy emissions factor results in very low emissions for purchased electricity, and therefore does not show dramatic decreases in the overall campus emissions although there has been great emphasis on reducing electricity consumption.

Description of Emissions Sources

Throughout this report, emissions are grouped into three different Scope categories. Scope 1 emissions are direct GHG emissions occurring from sources that are owned or controlled by the institution. Scope 2 emissions account for indirect GHG emissions that are a consequence of activities that take place within the organizational boundaries but that occur at sources owned or controlled by another entity, such as purchased electricity. Scope 3 emissions are all indirect emissions not covered in Scope 2, and focus on cultural emissions associated with travel, waste, and commuting habits of the university community. By understanding where university emissions are concentrated, PLU will be better prepared to strategically approach reduction to meet the ACUPCC requirements of achieving a carbon neutral campus.



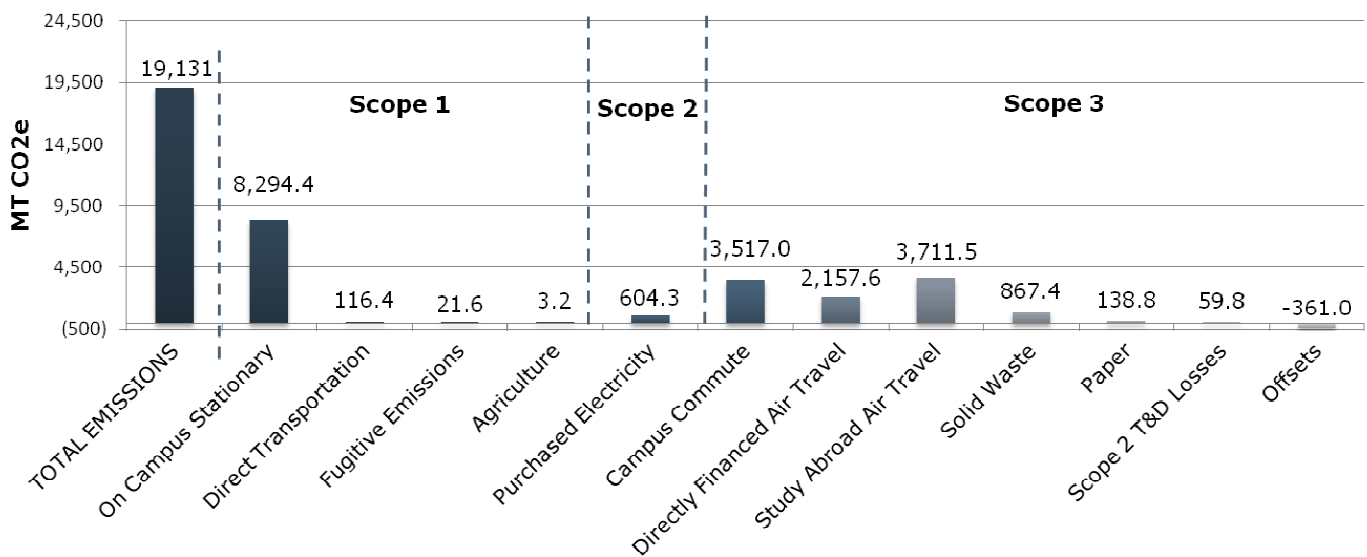
Summary of Operational Boundaries of GHG Emissions. WRI.

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Inventory Results

Well tracked data for Scope 1 and Scope 2 were available for the university. Some Scope 3 data, specifically other directly financed air and ground travel, were based upon best available data. To improve future reporting, PLU has implemented a new tracking system to accurately record air miles which will greatly increase the accuracy of the reporting, but records will not be available until the FY 2013 inventory. For this inventory, the air miles were generated based on best available data to produce an estimate using recommended conversion factors. PLU choose to report on all data collected, and make assumptions for unknown parameters in order to present the most comprehensive footprint information available. Although not all of these emissions are required reporting for ACUPCC, PLU continues to view their GHG inventory holistically and report on full emissions. PLU acknowledges that their reported emissions are likely to change as they evolve their data collection protocols. The table and graph below represent the 2011 PLU GHG emissions by scope and source.

Summary of PLU FY2011 Emissions by Scope



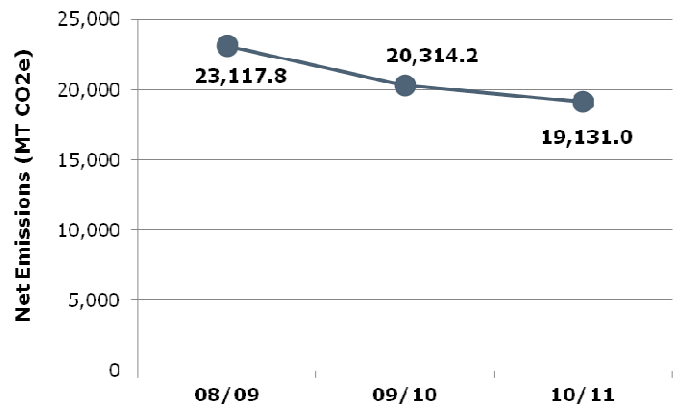
The 2011 Greenhouse Gas Inventory for the PLU campus is reported as 19,131 MT CO₂e, including Scope 1, 2, and 3 metrics. Understanding where emissions are coming from will help PLU focus reduction goals and track their progress as they reduce emissions across all three scopes. 400.4 MT CO₂e in offsets from purchased RECs and composting efforts brings this annual net emissions level to 19,131 MT CO₂e.

PROGRESS IN EMISSIONS REDUCTION

The 2010 GHG Inventory shows PLU's significant strides in GHG emission reduction, particularly through the campus effort to reduce usage of natural gas and electricity. Increases in specific metrics could be opportunities for PLU to focus on (ie waste and paper) but increases may also be attributed to more accurate reporting that captured a higher percentage of the actual campus use. It should be noted that the 2008 inventory omitted reporting on some metrics such as chemicals, refrigerants. Even with more thorough reporting for 2009 and 2010, the campus emissions are showing a continued annual decrease.

PLU has developed interim goals for the campus that will be used to measure progress towards carbon neutrality.

PLU Emissions Trend



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- **10%** reduction in **total scopes 1, 2, & 3** emissions by **2018** by equipping the Library, Rieke or Olson with a smart control system.
- **100%** reduction in **air travel emissions** (part of scope 3) by **2014** through a program offsetting air travel emissions.
- **38%** reduction in **total scopes 1, 2, & 3** emissions by **2016** with the installation of a geothermal plant.

Emissions From:	Fiscal Year			% of 2011 Net Emissions
	08/09	09/10	10/11	
Co-gen Electricity	0.0	0.0	0.0	0%
Co-gen Steam	0.0	0.0	0.0	0%
Other On-Campus Stationary	11,841.6	9,711.3	8,294.4	43%
Direct Transportation	120.7	149.0	116.4	1%
Refrigerants & Chemicals	0.0	10.0	21.6	0%
Agriculture	4.2	9.0	3.2	0%
Purchased Electricity	675.1	662.7	604.3	3%
Purchased Steam / Chilled Water	0.0	0.0	0.0	0%
Faculty / Staff Commuting	1,096.1	1,199.2	1,222.7	6%
Student Commuting	2,396.0	2,317.1	2,294.3	12%
Directly Financed Air Travel	2,048.2	2,157.5	2,157.6	11%
Other Directly Financed Travel	0.0	0.0	0.0	0%
Study Abroad Air Travel	4,130.1	4,061.1	3,711.5	19%
Solid Waste	739.1	314.8	867.4	4%
Wastewater	0.0	0.0	0.0	0%
Paper	0.0	57.4	138.8	1%
Scope 2 T&D Losses	66.8	65.5	59.8	0%
Additional Offsets	0.0	-101.9	-95.5	0%
Non-Additional Offsets	0.0	-298.5	-265.5	-1%
Scope 1	11,966.5	9,879.3	8,435.5	43%
Scope 2	675.1	662.7	604.3	3%
Scope 3	10,476.3	10,172.6	10,452.1	54%
All Scopes	23,117.8	20,714.6	19,492.0	
All Offsets	0.0	-400.4	-361.0	
TOTAL NET EMISSIONS	23,117.8	20,314.2	19,131.0	

In addition to the overall campus emissions reduction over the past few years, a few specific areas deserve specific attention. It should be noted that although the Scope 2 emissions for purchased electricity is relatively low (due to the hydroelectric fuel mix), PLU has placed great emphasis on reducing electricity consumption. Between the FY 2010 and FY 2011 reporting periods alone, PLU reduced electricity consumption by 680,149kWh or 4%. This is a significant savings for the campus, and should be recognized as an accomplishment.

Data Collection Methodology

Below is a summary of how data for this report was collected, and any calculations or extrapolations used to generate the GHG inventory report.

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GENERAL UNIVERSITY DATA

University Population – The online PLU Factbook was referenced for student counts for the 2010-11 enrollment. Summer school student enrollment was provided by the PLU Office of Institutional Research. For faculty and staff population, the PLU Human Resources department provided employee counts.

SCOPE 1 EMISSIONS

Stationary Combustion – This accounts for the total direct emissions from stationary combustion on the PLU campus. Stationary combustion refers to the burning of fuels to produce electricity, steam, heat, or power using equipment in a fixed location such as boilers, burners, heaters, furnaces, incinerators, kilns, ovens, dryers, and engines. Any biogenic carbon dioxide emissions that result from the combustion of biomass or biomass-based fuel are not included in scope 1. Complete records of all natural gas, propane and other combustion utility bills were provided by the PLU Sustainability Department.

Mobile Combustion from Direct Transportation – Accounts for the total direct emissions from mobile combustion in PLU-owned fleet such as cars, trucks, tractors, and buses. These emissions were captured from PLU fuel records supplied by the PLU Mechanic.

Fugitive Emissions – Data for emissions due to the intentional or unintentional release of GHGs in the production, processing, transmission, storage, and use of fuels and other substances were supplied by the PLU Engineers. This includes releases of hydro fluorocarbon during the use of refrigeration and air conditioning equipment and methane leakage from natural gas transport. The CACP calculator identifies specific emissions factors for each type of refrigerant used on campus based on the Global Warming Potential (GWP) for the individual refrigerant.

Agricultural Emissions – This captures emissions from on-campus fertilizer application, provided by the PLU Grounds Department.

SCOPE 2 EMISSIONS

Purchased Electricity – This captures the total indirect GHG emissions resulting from the generation of electricity purchased and used by PLU. PLU purchases electricity from the Parkland Light and Water (PLW). The custom fuel mix provided by PLW was used for calculating the campus' Scope 2 emissions. PLU is anticipating this mix to change as the electricity mix for the region changes and will continue to revise future inventories to reflect the appropriate mix.

Purchased Steam – PLU does not purchase any steam or chilled water.

SCOPE 3 EMISSIONS

Commute Transportation – It can be argued that many Scope 3 emissions are not under direct PLU control and should therefore be excluded. Holding the university accountable for personal commute choices and habits could be argued as outside the control of the reporting institution, and should not impact its footprint. PLU feels that it is important to accurately account for all emissions resulting from university existence, and this cannot exclude emissions from choices of the campus population, and are therefore included in this report.

Faculty and staff transportation and commute data from the preliminary 2009 Washington State Department of Transportation (WASDOT) Commute Trip Reduction (CTR) survey. The 2008 STARS student commute survey data was used as an estimate for the 2010 inventory. More recent data was not available based on the state run survey cycle. PLU recognizes that significant efforts have been made to reduce student commuting and therefore a new survey is needed to capture the current patterns. PLU is strategizing to implement new survey practices to better capture faculty, staff and student commutes.

CACP methodology for calculating commuting data bases calculations on FTE student population, giving part-time students equivalent of one-half a full-time student. This may not accurately capture the complex commute patterns of students going to and from campus, but until more accurate tracking is established, the CACP protocol will be used for PLU calculation.

- Commute Preferences – Inputs for commute preferences were determined through the bi-annual CTR survey for faculty and staff, and estimated from the 2007/08 STARS survey for students. PLU recognizes the inaccuracies of using old commute survey data to calculate the current commute patterns, and is currently developing a

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comprehensive survey strategy to deploy. The next campus wide survey is scheduled for distribution in 2012.

- Commute Distance – Faculty/staff commute distance was determined through the 2009 CTR survey conducted by the PLU Human Resources department. Student commute distance of 10 miles was used to maintain consistency from previous reporting years but will be updated when more current data is available.
- Weeks Worked/Trips Per Week – Values entered for the number of weeks commuting were assumed based on PLU data for employee benefits and academic calendars. It was assumed that all employees and students were commuting five days per week, to and from campus.

Air Travel – Air travel accounts for a large portion of most universities GHG emissions. Reported emissions from air travel for PLU are estimates based on best available data and extrapolations. The following bullets explain the methodology to calculate these Scope 3 emissions from PLU.

The Sustainability Manager at PLU has established tracking methodology for the air travel at PLU, and the University is now tracking all air miles. These accurate miles will be used in the next emissions inventory for the 2011/12 academic year.

- Faculty and Staff Air Travel – PLU faculty and staff air travel was reported for the STARS report in 2008. For the 2010 inventory, average miles/faculty member from that report was used to estimate miles traveled with 2010 employee counts. PLU is working to gather more accurate air travel data for the campus.
- Study Abroad Air Travel – The Wang Center at PLU tracked air miles associated with study abroad travel for FY 2011. This was the first reporting year that PLU was able to report actual miles rather than an estimate.

Solid Waste – Total indirect emissions resulting from the disposal of solid waste was calculated based on total volume disposed. Records were provided by the PLU Facilities department.

Paper – Paper used on campus was provided by the campus paper provider. Records were available for paper used on campus as well as the copy center.

Yard Waste/Compost – Organic materials from food and yard waste is composted by PLU. Records for composted material was provided by the PLU Facilities department.

Offsets/RECs – Records for the REC's purchased from Parkland Light and Water were provided by the PLU Facilities department.

Recommended Inventory Improvements

Through the process of collecting, compiling, and reporting the 2011 GHG Inventory, gaps in current data collection processes were identified. The most critical improvements need to be addressed in accurate data collection for air travel miles and commute transportation patterns.

It is recommended that for future commute transportation surveys, PLU consider alternative methods that will reach more respondents. PLU has been working to develop a student focused commute survey to better understand the transportation patterns on campus. It is recommended that PLU explore multiple platforms to publish this survey to increase participation, and ensure that questions are phrased to accurately capture the most useful information for both emissions reporting and to quantify the impact of transportation initiatives on campus.

The reporting period for this emissions inventory did not include an updated tracking system for air miles, but PLU has implemented a new system that will ensure future inventories capture this critical Scope 3 metric. It is recommended that PLU use lessons learned from this new system to develop tracking for other travel including personal vehicle travel (work related), rental car miles, and bus/rental vehicles miles. As PLU continues to refine their data collection methods for other Scope 3 metrics, future GHG Inventories will represent more accurate emissions.

GHG Reduction Strategies

In Spring 2010, PLU developed a *Climate Action & Sustainability Guide* that captured the university goals and initiatives to

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reduce their greenhouse gas emissions. A summary of these strategies is included below. PLU will continue revising this plan to redefine strategy and actions the campus will take to reduce emissions. The current focus will be on establishing interim goals and milestones as the campus progresses towards carbon neutrality.

STRATEGIES FOR SCOPE 1 & 2 EMISSIONS REDUCTION

This strategic facility plan quantifies the estimated cost and savings associated with the four intervention scenarios that, if implemented, will help PLU meet its goal of carbon neutrality by 2020.

Mitigation Scenario 1 - Scenario demonstrates the impact of low- or no-cost projects on carbon emission and energy use reduction strategies. These measures include retro-commissioning and savings resulting from operations consolidated to reduce run times during partial use periods, i.e., weekends and summertime.

Mitigation Scenario 2 - Scenario involves significantly reducing carbon emissions with conservation projects that require capital investment. These measures include implementation of energy conservation measures such as controls, variable frequency drives, lighting retrofits, new equipment, etc. Measures were selected primarily for carbon savings, although some consideration was given to economics.

Mitigation Scenario 3 - Scenario includes the implementation of Renewable Technology and on site Co-Generation. At this time implementation of renewable technologies is viable, but not as cost effective as mitigation scenarios one and two.

Mitigation Scenario 4 - Carbon Neutrality will be difficult to achieve solely using energy efficiency and renewable projects, therefore, the analysis included a discussion about purchased offsets to mitigate excess carbon that cannot be reduced by implementing other projects.

STRATEGIES FOR SCOPE 3 EMISSIONS REDUCTION

Commute - Understanding the transportation habits, needs and choices of the PLU community is an important first step in addressing how to increase the use of public transportation. More comprehensive student surveys to understand what is driving transportation choices, education about alternative options, carpooling incentives, and establishment of new programs such as Bring Back the Bike will decrease reliance on the single occupancy vehicle (SOV). The addition of a bus pass subsidy for students would also decrease the reliance that students have on SOV trips.

Travel - Air travel reductions are challenging because study abroad programs are beneficial and valuable as part of the college experience. Student air travel is calculated from air miles from for-credit study abroad programs and athletics. To reduce air miles for study abroad activities, the university is investigating students purchasing offsets for their trips or encourage more local destinations or direct flight paths. Athletics could look at the possibility of driving to more local athletic events rather than flying. Air travel from faculty and staff could be reduced by PLU investing in a designated telecommuting room that would make telecommuting to conferences more attractive and feasible.

Waste - PLU is continuing to invest in strategies for effective waste stream reduction from procurement to disposal. Waste stream audits will show progress and reveal areas for improvement with future changes to the current practices. PLU is expanding the recycling program with an emphasis on convenience to encourage higher diversion rates. In order to attain the goal of a zero waste campus, PLU is also prioritizing focus on the upstream waste, to reduce the amount of material brought in to begin with. For example, Dining and Culinary Services is searching for a biodegradable alternative to their plastic lined sandwich wrappers.

Conclusion

This report captures the 2011 GHG Inventory for PLU based upon the most accurate campus data available. As signatories to the ACUPCC, PLU is striving to accurately capture greenhouse gas emissions and continue the process of achieving carbon neutrality. By tracking GHG emissions over time, PLU will better understand their emission sources and how programs implemented are affecting them. This will give campus leaders feedback on the results of their efforts, enabling them to approach carbon reduction in the most strategic manner possible. As PLU continues to develop sustainability and emissions reductions initiatives on campus, these efforts will be published in future updates to both their climate action plan and GHG inventories.