

A row of black metal bike racks is positioned on a sandy path. The racks are made of thick, dark metal and are arranged in a line that recedes into the distance. In the background, there are large, leafy trees and a building with a tiled roof. A red bicycle is parked near one of the racks, and a dark-colored car is visible further back. The sky is clear and blue.

California State University Channel Islands Greenhouse Gas Inventory 2010-2013

June 2014

Material for this report was compiled by Patricia Ligeralde, Sustainability Intern for Academic Affairs and Austin Eriksson, Sustainability Operations Analyst for Facilities Services. Ms. Ligeralde also served as the report's primary editor. Her work was overseen by Dan Wakelee. Dave Chakraborty from Facilities Services played a critical role in facilitating access to data and assisting with preparation of the report.

The project team thanks all those who contributed time and information in the preparation of this report. In addition to those listed above the following members of the campus community provided important data and assistance: Raudel Banuelos, Michael Bourgeois, Janson Chapman, Jason Miller, Alisha Perez, Lisa Ayre-Smith, Motoko Kitazumi and Jerilee Petralba.

Introduction

The 2010-2013 Greenhouse Gas (GHG) Inventory is a continuation of an earlier study initiated by California State University Channel Islands (CI). CI conducted its initial GHG inventory in 2008-2010. The current inventory builds upon the previous study to correct errors improving the data available and provide current information about CI's emissions and overall carbon footprint. The inventory will allow CI to analyze its greenhouse gas contributions, begin formal planning to reduce GHG emissions and improve the University's sustainability.

As CI develops, as a campus community of students, faculty and staff; it faces the challenge of limiting the environmental impacts of its growth. CI was founded in 2002 as the 23rd campus in the CSU system. By 2012, CI grew to more than 4,900 students, 700 employees, and 6,800 alumni. The university offers 23 undergraduate majors, 6 graduate degrees, and 10 teaching credential programs. Since 2012, CI has occupied a total building space of 1,049,826 square feet at its main campus near Camarillo, California.

Following the GHG inventory from 2008-2009 and 2009-2010, this comprehensive review of emissions for the campus illustrates the impact of changes in facilities, operations, academic programs and CI community. The CSU Chancellor's Office completed a Greenhouse Gas Report encompassing the years 1990 through 2006 for all CSUs (<http://www.calstate.edu/cpdc/peu/sustainability.shtml>). However, that report had limits, which affected the true representation of CI's carbon footprint and emissions from campus operations prior to this study.

Environmental Sustainability was a priority identified in the University's 2008-2013 strategic plan. The campus participated in the Sustainability Tracking Assessment and Rating System (STARS) developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). CI earned a Silver STARS rating and has the potential to achieve a Gold Rating when several obstacles are overcome. The STARS report, along with the GHG inventory allows CI to identify both the challenges and opportunities as it works to reduce its carbon footprint and become a more sustainable campus.

Inventory Process

This inventory was conducted from the spring of 2013 until the end of spring 2014 with the assistance of a student worker (Patricia Ligeralde) and input from variety of different departments on campus. The inventory was organized based on the minimum data requirements of the Clean Air Cool Planet Calculator (CA-CP) along with the previous inventory of the campus. The data required different departments of the campus to come together and assist in completing the inventory.

The Clean Air Cool Planet Campus Carbon Calculator (<http://cleanair-coolplanet.org/campus-carbon-calculator/>) version 6.85 was utilized as the tool for estimating campus emissions. A complete guide to of recommended practices and use of the calculator is available for the public (http://cleanair-coolplanet.org/wp-content/uploads/2013/02/v6.5_Users_Guide.pdf). The tool is extensively used among higher education institutions seeking to quantify and reduce their carbon footprint.

Appendix B identifies the sources from the campus utilized in this inventory. The input of data in the Campus Carbon Calculator triggers calculations with the calculator producing estimates of the campus emissions. The results of these calculations produce estimates of the number of metric tons of carbon dioxide produced by CI for the current fiscal year and a projection of future years.

Consistent with the previous inventory, since CI Power Plant is a commercial venture, owned by Site Authority, an auxiliary of CSU Board of Trustees, it is noted that the emissions from CI Power Plant were not included in the GHG inventory. The CSU system may consider including emissions from Site Authority and other similar ventures within the system in system's overall greenhouse gas inventory.

Limits of the Study

The study is primarily limited to data collected within Scope 1 and 2 emissions utilized by the CA-CP Campus Carbon Calculator. Scope 1 emissions are those directly produced by sources owned or controlled the campus. Scope 2 emissions are those generated off campus, which are purchased by the institution. Given the limited resources available to complete the inventory, it was not possible to capture the whole representation of Scope 3 emissions. The absence or inability of certain Scope 2 and 3 data in usable formats prevented its inclusion in the inventory. In the coming year, the campus will seek to gather additional resources in order to obtain a better representation of Scope 3 emissions. Better data in depicting the commuting patterns from students, staff and faculty are necessary to compile a realistic picture of Scope 3 emissions. (For definitions

of greenhouse gases, Scope 1, 2, and 3 emissions, and other definitions please see the ACUPCC Implementation Guide glossary beginning on page 34 http://www2.presidentsclimatecommitment.org/pdf/ACUPCC_IG_Final.pdf).

During the preparation of this study, a review of data from the 2008-2009 and 2009-2010 GHG inventory revealed errors. Once the errors were identified (as specified by Appendix A), data for the prior years were revised. Other data recorded in the previous inventory were also revisited and adjusted due to the disparities between the sequential years. All were noted in the inventory with a comment in the cell holding the number. (Appendix A includes a detailed description on the corrections made from the previous inventory).

Data reported in this study is limited to facilities and property controlled and managed by the university (including student housing). It does not reflect activities of the CI Site Authority (including University Glen and CI Power co-generation during this period). Power and steam produced by the CI Power co-generation plant (located adjacent to the campus and owned and operated by CI Power) and consumed by the campus are reflected as purchased electricity and purchased steam in this inventory. There is no data associated with off-campus facilities for the period covered by this inventory.

Results

The inventory records emissions from various campus sources. There sources include: fertilizer, natural gas, purchased electricity and steam, university fleets, refrigerants and chemicals, solid waste and wastewater. The revised numbers from the 2008-92009 inventory revealed that CI released 14,563.7 MTeCO₂ and 14,526.4 MTeCO₂ the following year. (Appendix A includes a detailed description on the corrections made on the previous GHG inventory). Based on current data, CI produced 14,038.2 metric tons of eCO₂ for 2010-2011. The campus MTeCO₂ decreased during 2011-2012 to 13,386.8, revealing a net decrease of 651.4 MTeCO₂ in the two-year period of 2010-2011 and 2011-2012. The following year, 2012-2013, CI's emissions increased to 14,539.7 MTeCO₂ as indicated in Table 1. This is a net increase of 1,152.9 MTeCO₂ from the year 2011-2012. The average net emission among the three-year time span for CI is 13,988.2 MTeCO₂.

Table 1 reveals that CI increased direct transportation emissions by an average of 37.7 MTeCO₂ from 2010-2011 to 2012-2013. The campus develops to meet the demands of the increasing enrollment numbers. Therefore, more staff and vehicle fleets are necessary in order to maintain the campus.

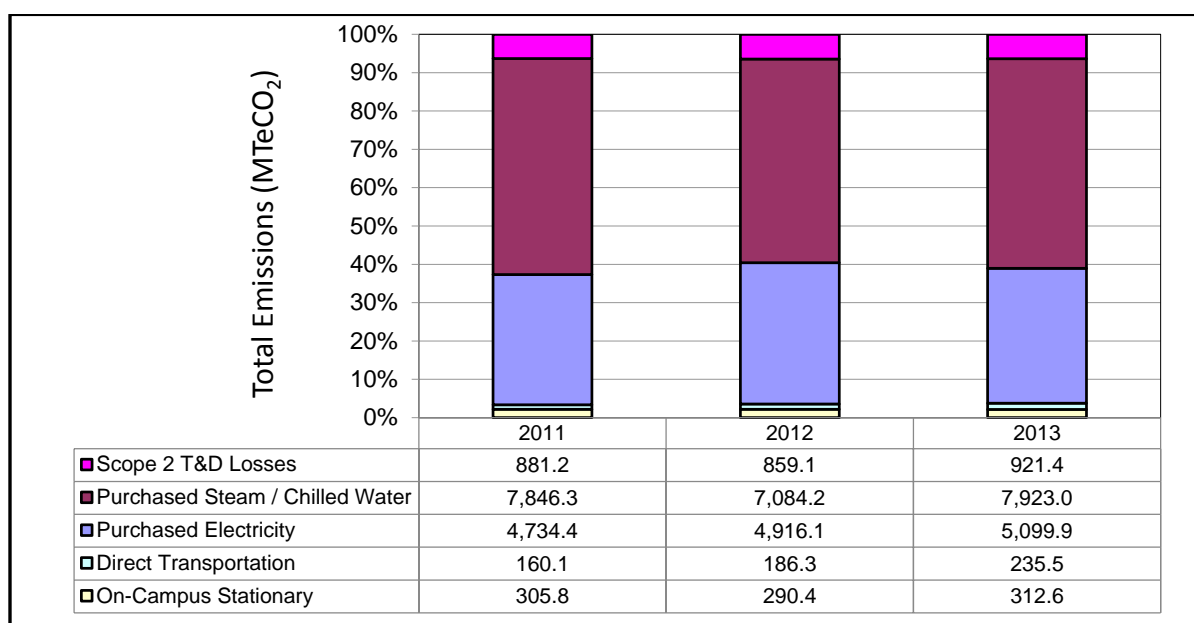
CI's solid waste is taken to facility that captures methane that generates electricity. The process prevents the emission of methane to the atmosphere. The electricity generated is sold to Southern California Edison Company, which provides electricity to the campus. Therefore, solid waste is still counted as a negative emission in the inventory accounting for 0% of reported emissions eCO₂ sources.

Table 1. Overview of Annual Emissions

CI Campus Emissions		2010-2011		2011-2012		2012-2013	
		Energy Consumption	eCO ₂	Energy Consumption	eCO ₂	Energy Consumption	eCO ₂
		MMBtu	Metric Tons	MMBtu	Metric Tons	MMBtu	Metric Tons
Scope 1	Other On-Campus Stationary	5,749.4	305.8	5,485.3	290.4	5,877.1	312.6
	Direct Transportation	2,176.3	160.1	2,534.0	186.3	3,193.7	235.5
	Refrigerants & Chemicals	-	54.2	-	5.7	-	3.9
	Agriculture	-	4.8	-	4.3	-	3.8
Scope 2	Purchased Electricity	57,571.3	4,734.4	59,780.1	4,916.1	62,015.4	5,099.9
	Purchased Steam	123,343.8	7,846.3	111,363.2	7,084.2	124,549.5	7,923.0
Scope 3	Study Abroad Air Travel	213.8	41.8	200.3	39.2	195.2	38.2
	Solid Waste	-	(10.8)	-	(19.9)	-	(22.0)
	Wastewater	-	20.4	-	21.8	-	23.3
	Scope 2 T&D Losses	12,185.6	881.2	11,773.5	859.1	12,688.6	921.4
Offsets	Additional	-	-	-	(0.4)	-	-
	Non-Additional	-	-	-	-	-	-
Totals	Scope 1	7,925.7	524.8	7,992.3	486.7	9,070.9	558.8
	Scope 2	180,915.2	12,580.8	171,143.4	12,000.3	186,564.9	13,023.0
	Scope 3	12,399.4	932.6	11,973.9	900.2	12,883.8	961.0
	All Scopes	201,240.3	14,038.2	191,109.6	13,387.2	208,519.5	14,539.7
	All Offsets		-		0.4		-
Net Emissions		14,038.2		13,386.8		14,539.7	

Chart 1 reveals the distribution of significant sources of emissions. Some emissions are negligible to the point where they emit 0% of the emissions by CI. As indicated in Chart 1, the percentage of these significant sources stayed consistent within the five years that inventory has done. There was no alarming increase of these sources. For instance, in 2010-2011 purchased electricity accounted for 4,734.4 MTeCO₂, 4,916.1 MTeCO₂ the following year and 5,099.9 MTeCO₂ in 2012-2013. For all three reported years, purchased electricity accounted for 35% of the emission sources.

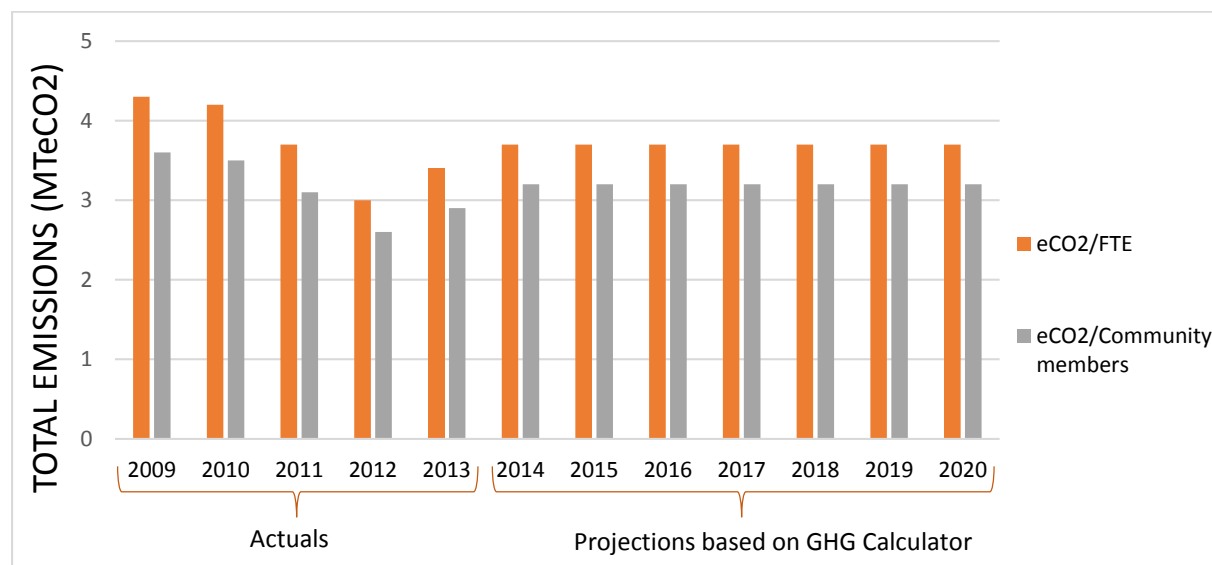
Chart 1. Distribution of eCO₂ Sources (2009-2013)



The revised total emission of eCO₂ per student from 2008-2009 was 4.3 metric tons, with the following year decreasing to 4.2 metric tons per student. The total emission of eCO₂ per member of the campus community (students, faculty and staff) for 2008-2009 was 3.6 metric tons, with the following year also decreasing to 3.5 metric tons, after revision. (Appendix A includes detailed descriptions on the revised numbers). During 2010-2011, the total emission of eCO₂ per student represented was 3.7 MTeCO₂ and the following year it decreased to 3.0 MTeCO₂. During 2012-2013, the MTeCO₂ per student increased up to 3.4. The total emission of eCO₂ per member of the campus community during 2010-2011 was 3.1 metric tons, with a decrease of 0.5 metric tons the following year to 2.6 metric tons. The following year, 2012-2013, the MTeCO₂ per member of the campus community increased up to 2.9. These figures are conveyed in Chart 2. The Campus Carbon Calculator estimates future emissions by applying emissions factors, provided in the inventory, to the actual data inputted. The campus estimates an 8% growth rate among FTES annually. These projected emissions are normalized by the

student growth rate, and as a result, a flat lining of carbon emissions is expected in the future.

Chart 2. Total Emissions per Student and per CI Community Member by year



Conclusion

The inventory results reveal an increase in both total energy consumption and total greenhouse gas emissions during the three year span covered by the inventory. Between June 2010 and June 2013, both energy consumptions and greenhouse gas emissions increased by 4%.

While total emissions increased, it is important to note that the inventory also reveals the emissions per student and per member of the campus community steadily decreased. Since CI began utilizing the inventory in 2008, emissions per student decreased 26% and per member of the campus community by 19%. As indicated by Chart 2, these emissions per student and per member of the CI community are projected to flat line due to normalizing the projections at the annual student growth rate of 8%.

During 2010-2011 and 2011-2012, CI experienced significant growth among students and campus square footage. CI's student enrollment grew 18% and is approaching the 5,000 mark. The campus also had a 10% increase of total building space to meet the capacity of the growing community. New facilities that opened during this period include: the second floor of Solano Hall, Student Union Building, Napa Hall, Del Norte

Hall, Madera Hall, the Green House, and the Manzanita Nursing Simulation Lab. Del Norte Hall is the most energy efficient facility on campus and will be used as a model for future facilities being constructed in the near future.

The data recorded is limited to the information available during the preparation of the report. It is clear that gaps are present within the inventory. Without the full representation of Scope 3 data, specifically information related to commuting and travel, it is not possible to have a full picture of campus emissions or develop a truly comprehensive strategy to reduce emissions. Future, more detailed, inventories will aid in studying and focusing on what and how the campus could reduce their greenhouse gas emissions and energy consumption. CI will be able to create a framework for assessing progress toward carbon-neutrality and becoming more sustainable by monitoring the campus's energy use.

Appendix A. Corrections to the 2008 – 2010 GHG Inventory

Graphs and estimated emissions are produced in accordance with the data recorded in the inventory instantaneously. However, the GHG inventory of 2008-2010 revealed errors with data recorded. The results for Total Emissions by Scope, Carbon Dioxide Emissions, and Methane Emissions adjusted to erroneous emissions. The entries that generated these errors were associated with HFC-134a and HFC-404a from Refrigerants and Chemicals. The prior inventory recorded the incorrect data set from the Refrigerants and Chemicals log book of the campus. The inventory requires the amount of refrigerants and chemicals that were recovered rather than the amount being used. Therefore, the data from the prior inventory for Refrigerants and Chemicals were revised for all five years (2008-2013). The revisions resulted in notable changes within emissions produced by CI and average emissions per student and per member of the community.

The GHG Inventory from 2008-2009 and 2009-2010 (page 7 <http://www.csuci.edu/sustainability/stars/operations/2008-2010-ghg-inventory.pdf>) states that CI produced 11,471.7 metric tons of eCO₂ in 2008-2009 and 10,842.6 metric tons of eCO₂ the following year. After that data was revised from the previous inventory, the calculator reported the correct emissions for those years. The revised emission for 2008-2009 increased to 14,563.7 MTeCO₂ and the following year decreased to 14,526.4 MTeCO₂. Based on these adjustments, there was a reduction of emissions by 37.3 MTeCO₂ between 2008-2009 and 2009-2010.

The previous inventory also stated that the emissions produced represented an average of 3.4 MTeCO₂ per student and during the following year the total emission per student were 3.1 MTeCO₂. These numbers were also revised once the data was corrected. The inventory found the correct representation of MTeCO₂ per student in 2008-2009 increased to 4.3 metric tons and 4.2 MTeCO₂ the next year. Based on these adjustments, there was a reduction of emissions by 0.1 MTeCO₂ per student.

Lastly, the prior inventory reveals that the emissions produced represented an average of 2.8 MTeCO₂ per member of the campus community in 2008-2009, and 2.6 MTeCO₂ the following year. These numbers were revised after revisiting the data for all the years. The true average emission of eCO₂ per member of the campus community is 3.6 metric tons and 3.5 metric tons the next year. After adjustments, there was a decrease of 0.1 MTeCO₂ per person in the campus community between the years studied. The changes resulted in an overall increase of net emissions for those years and reveal a better representation of the campus' carbon footprint.

Appendix B – Campus Greenhouse Gas Inventory Data Sources

Input worksheet	Contact	Department
Operating Budget	Janson Chapman	University Budget Office
Research Budget	Jason Miller	Academic Affairs
Energy Budget	Alisha Perez	Facilities Services
Student Population	Michael Bourgeois	Institutional Effectiveness
Student Abroad Travel	Lisa Ayre-Smith	Instructionally Related Activities
	Motoko Kitazumi	Center for International Affairs
Faculty	Jerilee Petralba	Academic Affairs
Staff		
Physical Building Data	Austin Eriksson	Facilities Services
Other On-Campus Stationary Sources		
University Fleet		
Refrigerants & Chemicals		
Fertilizer Application		
Scope 2 Electricity and Steam		