



Greenhouse Gas Emissions Inventory Report FY16

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Executive Summary

This document is a summary of the Greenhouse Gas Emissions Inventory performed for fiscal year 2016 (FY16) for Lakeland Community College. Compiling this data annually serves to measure and assess current conditions and identifies variables that impact emissions, energy requirements and areas that might generate cost savings. It also gives a baseline from which comparisons can be made to assess continued improvements in efficiency and the use of advanced technologies that would increase Lakeland's fiscal goals, as well as its goals toward environmental and social responsibility.

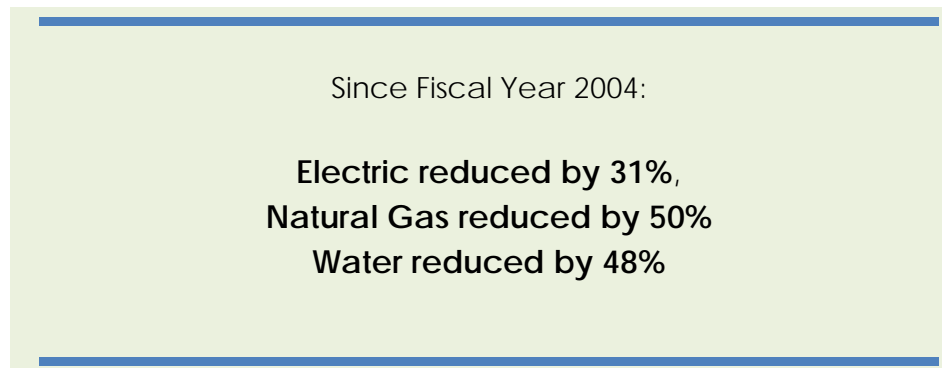
Previous inventory reports from FY04 through FY15, as well as a Glossary of Terms from the V9 Carbon Calculator, are available online at Lakeland's Sustainability webpage, www.lakelandcc.edu/web/about/sustainability.

Results and Discussion

Lakeland has utilized the most recent version of the Campus Carbon Calculator (v9.0), which includes updated emissions factors. The Calculator and technical support is available through the Department of Sustainability at the University of New Hampshire. All of the data gathered for FY16 was entered into the Calculator, along with data obtained for v 6.4 of the original GHG inventory FY04, and those compiled through FY15. The total metric tons of carbon dioxide equivalent (eCO₂), as well as the other greenhouse gases, were calculated based on this information. (See the comprehensive 'Annual Summary' on pg. 5 of this report.)

Lakeland has offset some of its emissions through the carbon sequestering ability of the abundant trees and woodlands which the campus is fortunate to have, as well as the low-mown areas. Additionally as a positive improvement from previous years, the methane generated from the sanitary landfill that Lakeland uses is captured and turned into electricity, reducing a greenhouse gas that is about twenty times as potent a gas as carbon dioxide.

The following are highlights that illustrate the results of the FY16 Greenhouse Gas Emissions Inventory.



Total Emissions by Sector

Although all the areas under each scope contribute to overall emissions, the sectors highlighted reflect the greatest impact. Net emissions since FY04 have gone down by 40% with an 8% reduction since last year.

Lakeland Greenhouse Gas Emissions
Metric Tonnes eCO₂ FY04 - FY16

| Fiscal Year | Scope 1 | Scope 2 | Scope 3 | Offset Forest Lands | Net Emissions |
|-------------|----------|-----------|-----------|---------------------|---------------|
| | | | | | Metric Tons |
| FY04 | 2,642.40 | 10,286.00 | 16,144.90 | | 29,073.00 |
| FY05 | 2,439.60 | 10,694.20 | 16,276.30 | | 29,409.90 |
| FY06 | 2,600.10 | 10,830.70 | 16,472.80 | | 29,903.30 |
| FY07 | 2,553.60 | 8,010.50 | 15,969.30 | | 26,533.20 |
| FY08 | 2,580.60 | 8,228.60 | 16,431.50 | | 27,240.50 |
| FY09 | 2,510.20 | 7,239.20 | 16,376.10 | | 26,125.30 |
| FY10 | 1,844.10 | 5,759.80 | 16,894.00 | | 24,497.70 |
| FY11 | 1,694.60 | 5,434.80 | 16,969.00 | | 24,098.30 |
| FY12 | 1,212.90 | 5,228.60 | 16,152.80 | | 22,653.80 |
| FY13 | 1,400.90 | 4,974.60 | 14,820.70 | | 21,196.20 |
| FY14 | 1,570.50 | 5,008.70 | 13,008.60 | 769.80 | 18,548.30 |
| FY15 | 1,586.50 | 5,505.60 | 12,704.00 | 769.80 | 18,740.75 |
| FY16 | 1,339.80 | 5,013.70 | 11,805.50 | 769.80 | 17,301.70 |

Scope 1 ■

- Natural Gas 7%
- College vehicle fleet
- Fertilizer
- Refrigerants

Scope 2 ■

- Electricity 28%

Scope 3 ■

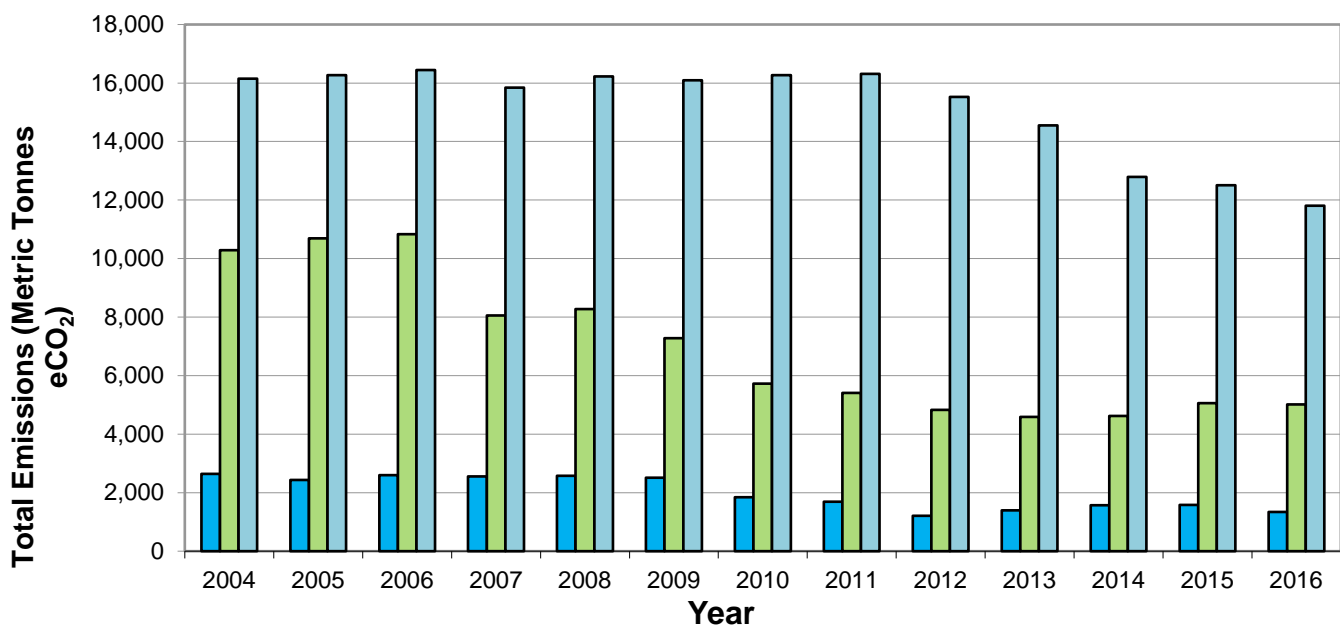
- Commuting: Students, Faculty & Staff 61%
- Solid Waste
- Wastewater discharge
- Paper purchases

Offsets ■

- Sequestration of carbon by woodland and low mow areas

| | |
|---------------------------------|------|
| Percent change from FY04 - FY16 | -40% |
| Percent Change from FY14- FY16 | -8% |

Comparison Graph between Scope 1, Scope 2 and Scope 3

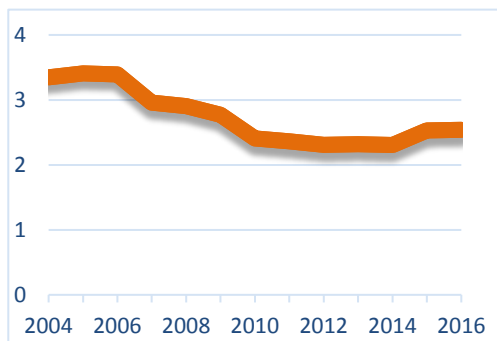


MMBtu of GHG Emissions per Student (FTE) and kBtu/ft² of Building Space

The student body (FTE- fulltime equivalent) fluctuates from year to year. The graph on the left illustrates the relationship between student population changes and energy use per student. The student population has held nearly the same compared to FY15, therefore the energy use per student has remained nearly the same.

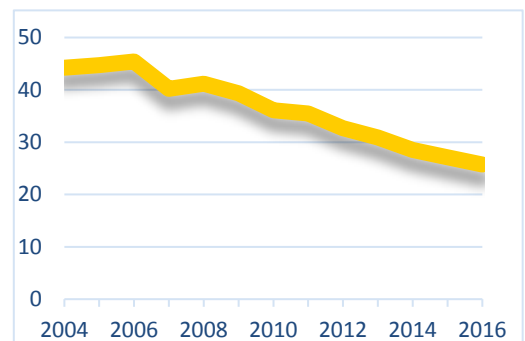
The graph on the right illustrates that Lakeland’s energy use per square foot continues to go down. Lakeland has continued to add improvements by installing energy efficient mechanical equipment when replacing the old and increasing the insulating capacity and reflectivity of new roof materials when replacing existing roofs. Campus room schedules are closely monitored to conserve energy to reduce costs and greenhouse gas emissions. It is now standard when renovating rooms to incorporate energy efficient lighting and window shades that reduce the amount of air conditioning needed to cool a space, while still maintaining filtered light to the interior and view of the exterior landscapes.

Energy Use/Student population



Total Emissions per Student (Metric Tons eCO2 / Student FTE)

Energy Use/Building Square Footage



Total Emissions per square foot (kg eCO2 / ft²)

Fiscal Year 2016 Summary

Lakeland Community College has performed Greenhouse Gas Emissions Inventories since Fiscal Year 2004 offering a comprehensive look at greenhouse gases emitted annually based on consumption patterns. Summarizing an inventory gives a quick look at large amounts of data that represent total greenhouse gas emissions that the campus is responsible for and what different sectors contribute. By far the largest sector of emissions is student commuting. In the sectors of energy (electricity and natural gas) Lakeland has consistently improved. Lakeland is a national leader in the area of energy efficiency and has dramatically reduced energy costs along with the financial uncertainty that volatile energy prices bring to the college. Lakeland offers a standard of excellence and best practices model for others to follow.

**Annual Summary
FY16**

As a final part of this summary, the following chart contains a concise overview of total emissions by scope, reflecting a distillation of all data points gathered from the college for FY16.

| MODULE | Summary | | | | | |
|-----------------|--|-----------------------|-----------------|-----------------|------------------|------------------|
| WORKSHEET | Overview of Annual Emissions | | | | | |
| UNIVERSITY | Lakeland Community College | | | | | |
| Select Year --> | 2016 | Energy Consumption | CO ₂ | CH ₄ | N ₂ O | eCO ₂ |
| | | MMBtu | kg | kg | kg | Metric Tonnes |
| Scope 1 | Co-gen Electricity | - | - | - | - | - |
| | Co-gen Steam | - | - | - | - | - |
| | Other On-Campus Stationary | 23,124.4 | 1,226,057.1 | 109.6 | 2.2 | 1,229.4 |
| | Direct Transportation | 1,391.0 | 100,090.9 | 17.9 | 6.1 | 102.4 |
| | Refrigerants & Chemicals | - | - | - | - | 8.0 |
| | Agriculture | - | - | - | - | - |
| Scope 2 | Purchased Electricity | 27,105.2 | 4,974,391.2 | 85.2 | 124.8 | 5,013.7 |
| | Purchased Steam/ Chilled Water | - | - | - | - | - |
| Scope 3 | Faculty / Staff Commuting | 13,679.3 | 976,066.8 | 212.0 | 70.9 | 1,002.5 |
| | Student Commuting | 137,490.6 | 9,817,159.0 | 2,101.0 | 703.7 | 10,079.4 |
| | Directly Financed Air Travel | 125.9 | 24,545.7 | 0.2 | 0.3 | 24.6 |
| | Other Directly Financed Travel | 412.4 | 29,563.9 | 5.8 | 2.0 | 30.3 |
| | Study Abroad Air Travel | - | - | - | - | - |
| | Student Travel to/from Home (OPTIONAL) | - | - | - | - | - |
| | Solid Waste | - | - | (152.4) | - | (3.8) |
| | Wastewater | - | - | 1,491.3 | 10.4 | 40.4 |
| | Paper | - | - | - | - | 125.9 |
| | Scope 2 T&D Losses | 2,736.6 | 502,223.1 | 8.6 | 12.6 | 506.2 |
| Offsets | Additional | | | | | (1,055.4) |
| | Non-Additional | | | | | - |
| Totals | Scope 1 | 24,515.5 | 1,326,148.0 | 127.5 | 8.3 | 1,339.8 |
| | Scope 2 | 27,105.2 | 4,974,391.2 | 85.2 | 124.8 | 5,013.7 |
| | Scope 3 | 154,444.8 | 11,349,558.5 | 3,666.5 | 799.8 | 11,805.5 |
| | All Scopes | 206,065.4 | 17,650,097.7 | 3,879.2 | 933.0 | 18,159.0 |
| | All Offsets | | | | | (1,055.4) |
| | | Net Emissions: | | | | |

END OF REPORT