

# St. Cloud State University

## Greenhouse Gas Emissions Inventory 4.0

### **FY 2015-2016**



**ST. CLOUD STATE**  
U N I V E R S I T Y™

**Report Issue Date: 1.15.17**

*Prepared to meet the requirements of the  
Second Nature Carbon Commitment*

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# A. Executive Summary

## Overview

In 2009, St. Cloud State University President Earl H. Potter III signed the American College & University Presidents Climate Commitment (ACUPCC), now known as the Second Nature Carbon Commitment. Signatories of the Carbon Commitment have agreed to create Climate Action Plans for accelerating research and educational efforts to equip society to re-stabilize the earth's climate and reduce their campus greenhouse gas (GHG) emissions. They have also agreed to publicly share their greenhouse gas emissions inventory, climate action plan, and subsequent progress reports.

St. Cloud State University has completed three prior Greenhouse Gas Emissions Inventories, documenting emissions for fiscal years 2004–2014. This document shall serve as St. Cloud State University's fourth Greenhouse Gas Emissions Inventory, and records the emissions for fiscal years 2015 and 2016. This information can be used to track trends and evaluate progress towards the university's goal of becoming climate neutral by 2035, with a short-term target of a 15% reduction by 2017 and a mid-term target of a 40% reduction by 2024 relative to 2009 emissions.

## Methodology

Under the direction of Phil Moessner, Assistant Vice President for Facilities Management, GLTArchitects created this inventory, interviewing campus sources and vendors to collect data on six separate categories:

- **Institutional Data**
- **On-Campus Stationary Fuel Use**
- **Purchased Electricity**
- **Agriculture (Fertilizer Use)**
- **Refrigeration**
- **Transportation**

Emissions were only tracked for properties owned by the University. The temporal boundary for the inventory was set at FY 2015–FY 2016.

The data gathered was entered into the *Campus Carbon Calculator*, a tool maintained by the Sustainability Institute of the University of New Hampshire. This is the calculator that is used by more than 90% of the U.S. colleges and universities that publicly report their emissions. The calculator converted the information into greenhouse gases, and reported it as CO<sub>2</sub> equivalents (eCO<sub>2</sub>) to estimate the carbon footprint of the University. The eCO<sub>2</sub> is reported in metric tons.

It should be noted that version 9.0 was used for this inventory. Since the last inventory that utilized version 7.0, updates have been made to the calculator to more accurately account for emissions based on the latest research. All of the source data from the previous study was reentered into to the new calculator. As a result, some of the emissions values in this report may not match those of the prior report.

## Results

SCSU emitted 38,675 metric tons of eCO<sub>2</sub> in FY 2016. Total emissions were 8,242 metric tons less than in FY 2009, a reduction of 17.6 percent.

SCSU emits approximately 3.0 metric tons of eCO<sub>2</sub> per student.

Emissions normalized to building area in FY 2016 were 11.79 metric tons of eCO<sub>2</sub> per thousand square feet. This number has been trending downward as SCSU has renovated buildings, pointing to increased energy efficiency. It is also a result of eliminating the use of #6 oil and instead using natural gas in on-campus stationary plants.

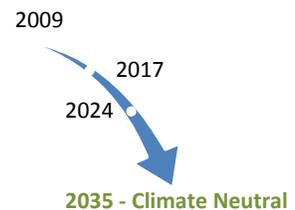
The most significant source of eCO<sub>2</sub> emissions for SCSU is electricity purchased from Xcel Energy. This source, coupled with transmission and delivery (T & D) losses, accounted for 42.3 percent of SCSU's total GHG emissions in FY 2016.

On-campus stationary sources of GHG emissions, such as boilers, accounted for 11,094 metric tons of eCO<sub>2</sub>, or 28.7 percent of total emissions. Refrigerants were responsible for 1.2 percent of emissions, while fertilizers contributed 0.02 percent of emissions.

Air travel was responsible for 10.2 percent of emissions, and daily commuting accounted for 16.2 percent of emissions in FY 2016. Direct transportation (university-owned vehicles) was responsible for 0.8 percent of emissions, and other directly financed travel (namely rental vehicles) was responsible for an additional 0.6 percent of emissions.

## Greenhouse Gas Emissions Target

Carbon neutrality goals were established as part of St. Cloud State University's 2012 Climate Action Plan. The targeted carbon neutrality date for St. Cloud State University is 2035, with a short-term target of a 15% reduction by 2017 and a mid-term target of a 40% reduction by 2024 relative to 2009 emissions. St. Cloud State University has reached its short-term target, with total emissions for FY 2016 at 17.6% less than in 2009.



## Conclusion

St. Cloud State University has made significant strides in reducing its greenhouse gas emissions. The greatest impact on its carbon emissions SCSU could make would be to reduce or eliminate its reliance on purchased electricity and to continue to find alternatives to fossil fuel combustion in its stationary on-campus plants.

The challenge going forward will be to maintain these reductions and to implement additional measures to further reduce GHG emissions. This will require the participation and support of the entire St. Cloud State University community and its partners.

## **B. Acknowledgements**

### **St. Cloud State University**

#### **Facilities Management**

Phil Moessner  
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## C. Summary and Overview

St. Cloud State University has been a signatory of the Second Nature Carbon Commitment (formerly The American College and University Presidents' Climate Commitment) since 2009.

The Second Nature Climate Leadership Network represents 35.7% of all higher education students in the U.S. and 18.9% of U.S. Higher education institutions. More than 600 higher education institutions have signed one of the two climate leadership commitments.

As a signatory to the Second Nature Carbon Commitment, St. Cloud State University has committed to eliminating our greenhouse gas (GHG) emissions in a reasonable period of time. An inventory of current and past GHG emissions has been completed and will be updated periodically to measure our progress. Additionally, SCSU has agreed to create and implement a Climate Action Plan with a target date and interim milestones for achieving campus climate neutrality. We have agreed to integrate sustainability into the curriculum and make it part of the educational experience. SCSU has also agreed to make the action plan, inventory, and periodic progress reports publically available.

This report summarizes the fourth Greenhouse Gas Emissions Inventory for St. Cloud State University. The inventory includes data collected for fiscal years 2015 and 2016. The inventory was prepared in accordance with the guidelines established by Second Nature. This report also includes some analysis, comparing the new results to those of the previous inventories and to measure the progress that St. Cloud State University is making towards established emissions goals.

### *Carbon Commitment Requirements*

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#### **1. Develop a Climate Action Plan to achieve carbon neutrality**

- a. Create institutional structures to guide development and implementation of plan.
- b. Complete a comprehensive inventory of all greenhouse gas emissions and identify near term opportunities for greenhouse gas emissions.
- c. Complete Climate Action Plan, to include:
  - Target date for achieving carbon neutrality
  - Interim dates for meeting milestones
  - Mechanisms and indicators for tracking progress
  - Actions to make carbon neutrality a part of the curriculum and other educational experiences for all students
  - Actions to expand research in carbon neutrality.
- d. Review, revise, and resubmit the climate action plan not less frequently than every 5 years.

#### **2. Submit an annual evaluation of progress**

- a. Complete an annual evaluation of progress, which includes a greenhouse gas inventory.
- b. Make the action plan and annual evaluations of progress publicly available by submitting them to Second Nature's reporting system for posting and dissemination.

## D. Methodology

The group on campus primarily charged with providing data for the inventory was Facilities Management, under the direction of Phil Moessner, Assistant Vice President for Facilities Management. GLTArchitects was hired to facilitate the process, identify the information needed, track the information, create a history and journal of the collection effort, calculate the GHG emissions, publically post the information to the Second Nature website, and prepare this report.

This inventory includes data from fiscal years (FY) 2015 and 2016, covering the period of time from July 1, 2014 to June 30, 2016. The inventory includes data related to all properties owned by the University, including the main campus and the Minnesota Highway Safety Research Center. Leased spaces (University Welcome Center, Coborn Plaza Apartments, and the Twin Cities Graduate Center) were not included in the study. Institutional data was collected, including building square footages; operational budgets; and staff, faculty, and student counts. This allows for limited peer-to-peer comparisons to be made based on per person and per square foot calculations.

SCSU agreed to collect data from the operational boundaries required by the Carbon Commitment, namely all Scope 1 and Scope 2 emissions and part of Scope 3 emissions. Scope 1 refers to the GHG emissions occurring from sources that are owned or controlled by the institution, including on-campus stationary combustion of fossil fuels, mobile combustion of fossil fuels by university owned/controlled vehicles, and "fugitive" emissions. Fugitive emissions result from releases of GHGs from refrigeration and fertilizer use. Scope 2 emissions refer to indirect emissions generated in the production of electricity consumed by the institution. Scope 3 emissions refer to all other indirect emissions – those that are a consequence of the activities of the University, but occur from sources not owned or controlled by the institution. Scope 3 emissions required to be tracked by the Carbon Commitment include all air travel, and staff, faculty, and student commuting to and from campus. Emissions resulting from transportation paid for by the University also fall under Scope 3. Transmission and delivery losses for purchased electricity are also included in Scope 3. Data was gathered from both on-campus sources as well as University vendors. Where possible, data from vendors was cross-checked with data from University sources to verify accuracy.

The data gathered was entered into the *Campus Carbon Calculator*, a tool maintained by the Sustainability Institute of the University of New Hampshire. This is the calculator that is used by more than 90% of the U.S. colleges and universities that publicly report their emissions. This calculator is recommended by the Second Nature because it is comprehensive, relatively easy to use, and easily accessible. It should be noted that version 9.0 was used for this inventory. Since the last inventory that utilized version 7.0, updates have been made to the calculator to more accurately account for emissions based on the latest research. All of the source data from the previous study was reentered into to the new calculator. As a result, some of the emissions values in this report may not match those of the prior report. The calculator converted the information into greenhouse gases, and reported it as CO<sub>2</sub> equivalents (eCO<sub>2</sub>) to estimate the carbon footprint of the University. The eCO<sub>2</sub> is reported in metric tons.

## E. Inventory Results

### Institutional Data

SCSU's FY 2016 operating budget returned to a level near that of FY 2009, after peaking in FY 2014.

Total student enrollment peaked in FY 2011 at 18,650 and ended at 15,461 in FY 2016. Compared to FY 2009, the student head count was 17 percent less, and a greater portion of students in FY 2016 were part-time students.

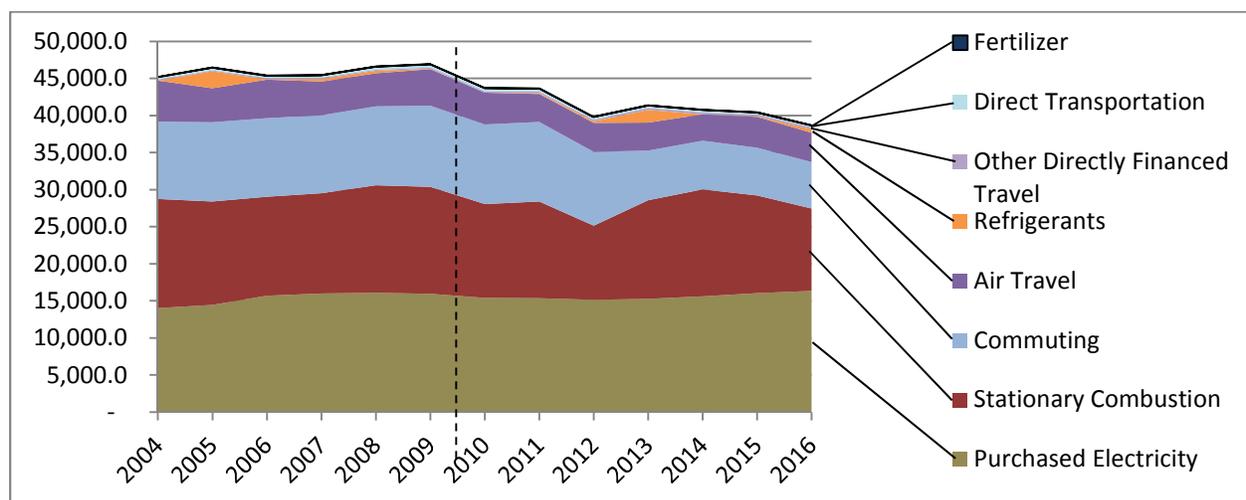
Since FY 2009, the faculty/staff full-time-equivalent has been reduced about 12 percent, with a decrease in the number of full-time employees and an increase in part-time employees.

The total building area for FY 2016 is the same as FY 2014, at 3,280,469 square feet.

### Greenhouse Gas Emissions

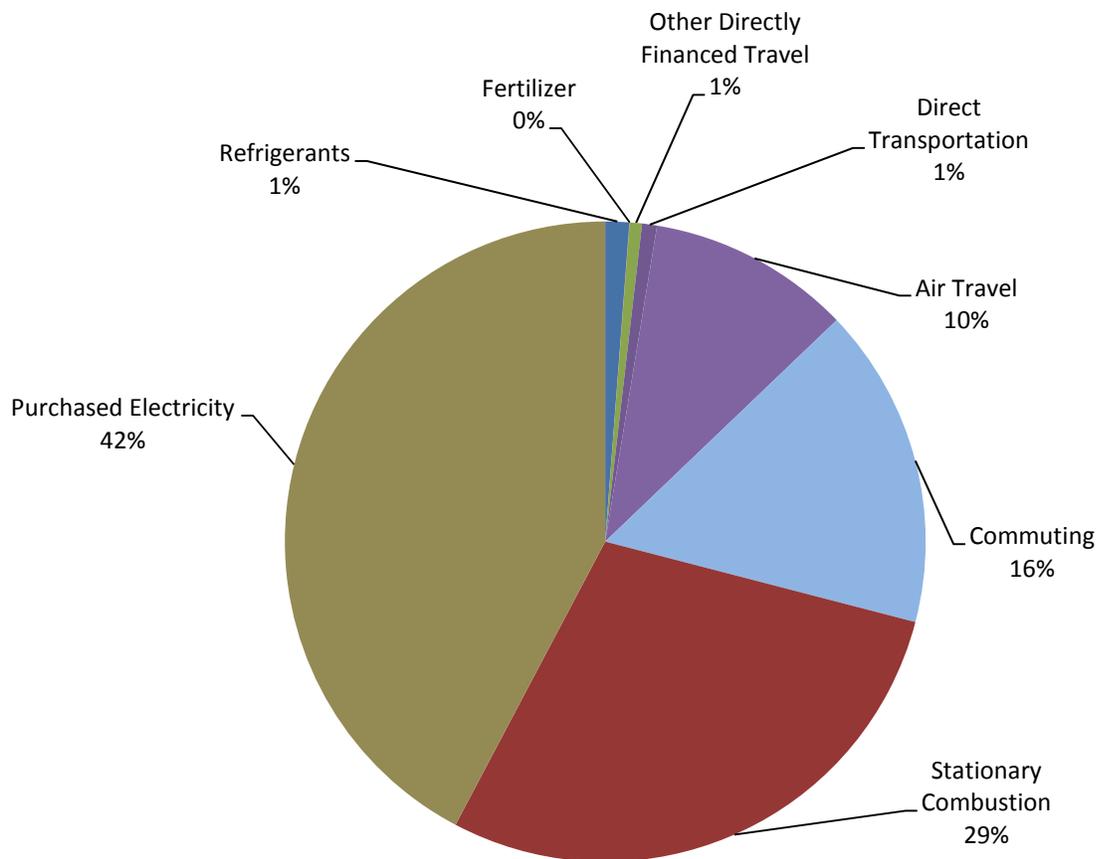
The greenhouse gas emissions are tracked in metric tons of carbon dioxide equivalents (eCO<sub>2</sub>). Fiscal year 2009 serves as St. Cloud State University's emissions baseline. That year, SCSU saw total eCO<sub>2</sub> emissions of 46,916.8 metric tons. In FY 2016, SCSU emitted 38,675 metric tons of eCO<sub>2</sub>. Therefore, the 12-month period of FY 2016 saw a release of 8,242 metric tons fewer eCO<sub>2</sub> emissions compared to FY 2009, a reduction of 17.6 percent.

#### Total Emissions by Sector (in Metric Tons of eCO<sub>2</sub>)



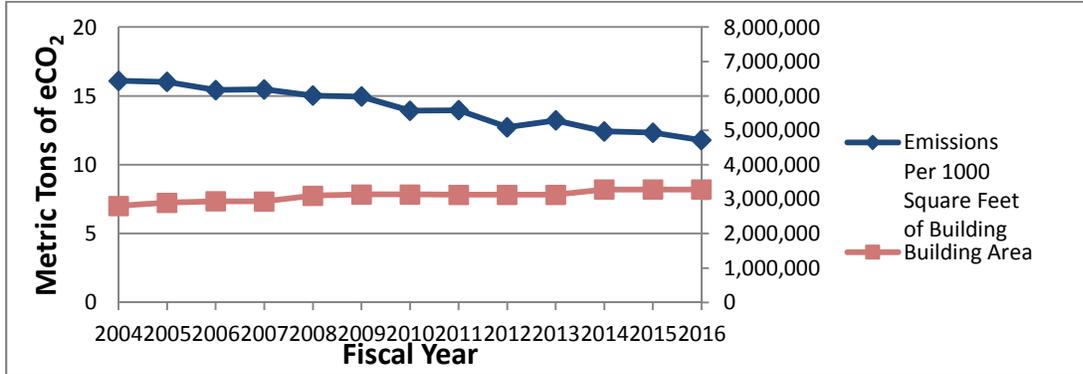
For FY 2016, purchased electricity (including transmission and delivery losses) was responsible for 42.3 percent of emissions. On-campus stationary sources such as boilers accounted for 28.7 percent of emissions. Air travel was responsible for 10.2 percent of emissions, and daily commuting totaled 16.2 percent of emissions. Direct transportation was responsible for 0.8 percent of emissions, and other directly financed travel was responsible for an additional 0.6 percent of emissions. Refrigerants were responsible for 1.2 percent of emissions, while fertilizers contributed 0.02 percent of emissions.

### 2016 Total Emissions by Sector



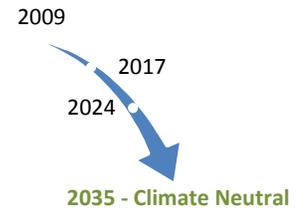
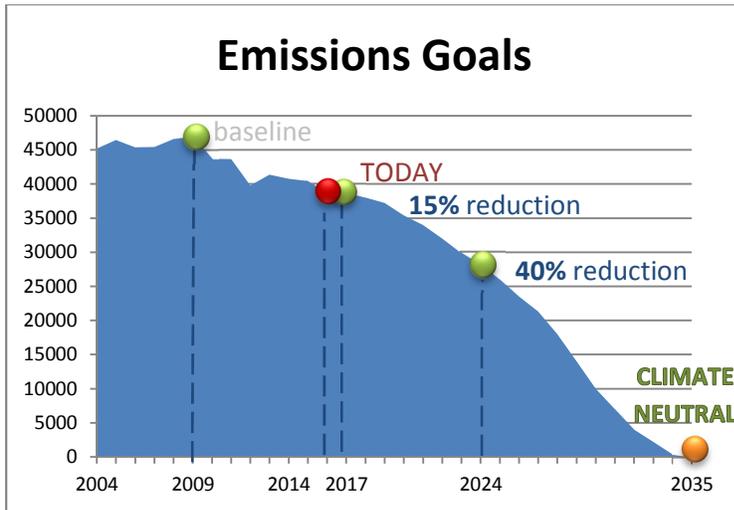
## Total Emissions per 1,000 Square Feet of Building Area (in Metric Tons of eCO<sub>2</sub>)

The campus' building area remained the same from FY 2014 to FY 2016. Therefore, the emissions per 1,000 square feet fell to 11.79 metric tons of eCO<sub>2</sub>.



## Greenhouse Gas Emissions Target

Carbon neutrality goals were established as part of St. Cloud State University's 2012 Climate Action Plan. The targeted carbon neutrality date for St. Cloud State University is 2035, with a short-term target of a 15% reduction by 2017 and a mid-term target of a 40% reduction by 2024 relative to 2009 emissions. St. Cloud State University has reached its short-term target, with total emissions for FY 2016 at 17.6% less than in 2009.



## Scope 1 Emissions

Scope 1 Emissions are direct GHG emissions occurring from sources that are owned or controlled by the institution.

### Stationary Combustion

Stationary combustion refers to the burning of fuels to produce steam, heat or power using equipment in a fixed location such as boilers. In FY 2016, it accounted for 29 percent of SCSU's eCO<sub>2</sub> emissions.

The level of emissions related to on-campus stationary sources has directly correlated to the local weather patterns. For example, the winter was mild during FY 2016.

Since 2009, St. Cloud State University has completely eliminated using #6 fuel oil in its boilers, and instead uses primarily natural gas. This switch resulted in a reduction of 26 kg of eCO<sub>2</sub>/MMBtu. St. Cloud State University participates in Xcel Energy's interruptible gas rates program and the University is required to switch to a back-up fuel source (diesel) if there is a shortage of natural gas. This last occurred in January of 2014.

### Direct Transportation / Mobile Combustion

Mobile combustion refers to the burning of fuels by institution-owned transportation vehicles such as cars, trucks, and maintenance equipment. In FY 2016, it accounted for only 0.8 percent of St. Cloud State University's eCO<sub>2</sub> emissions.

Since 2009, St. Cloud State University has significantly reduced its vehicle fleet. A partnership has been created with Enterprise Rent-a-Car to provide vehicles on an as-needed basis under the state contract.

Minnesota now requires that all diesel fuel sold in the state for vehicle use must contain at least 5% biodiesel (B5), and this is reflected in the calculations. In addition, all gasoline sold in Minnesota must contain at least 10% ethanol (E10). St. Cloud State University no longer directly purchases E85 because of the changes to the vehicle lease arrangement.

State agencies, of which SCSU is a part of, are required to achieve strict reductions in fuel usage in agency-owned on-road vehicles and increase their use of alternative fuels.

SCSU was the first higher education member of the Drive Electric Minnesota Initiative. This organization is a partnership of state and local government, utilities, private business and nonprofit entities working together to bring electric vehicles and plug-in charging infrastructure to Minnesota. SCSU has purchased four GEM vehicles that are 100% electric powered. Because they are recharged from the regular power grid, their emissions are included in the Purchased Electricity category.

## Fugitive Emissions

Fugitive emissions are due to the intentional or unintentional release of eCO<sub>2</sub> in the production, processing, transmission, storage and use of fuels and other substances. Emissions resulting from the use of refrigeration equipment and fertilizers would fall under this category. Refrigerants and fertilizer combined accounted for only 1.22 percent of the 2016 emissions.

Refrigerants will continue to contribute an ever smaller quantity of eCO<sub>2</sub> emissions. The refrigerants with the worst ozone-depleting potential (designated as Class I substances) have already been completely phased out in the United States, except for exemptions allowed under the Montreal Protocol. Class II substances, which are transitional substitutes for many Class I substances, are being phased out now. As a developed country and a party to the Montreal Protocol, the U.S. must incrementally decrease HCFC consumption and production, with a reduction to at least 90 percent below baseline in 2015 and a complete HCFC phaseout by 2030.

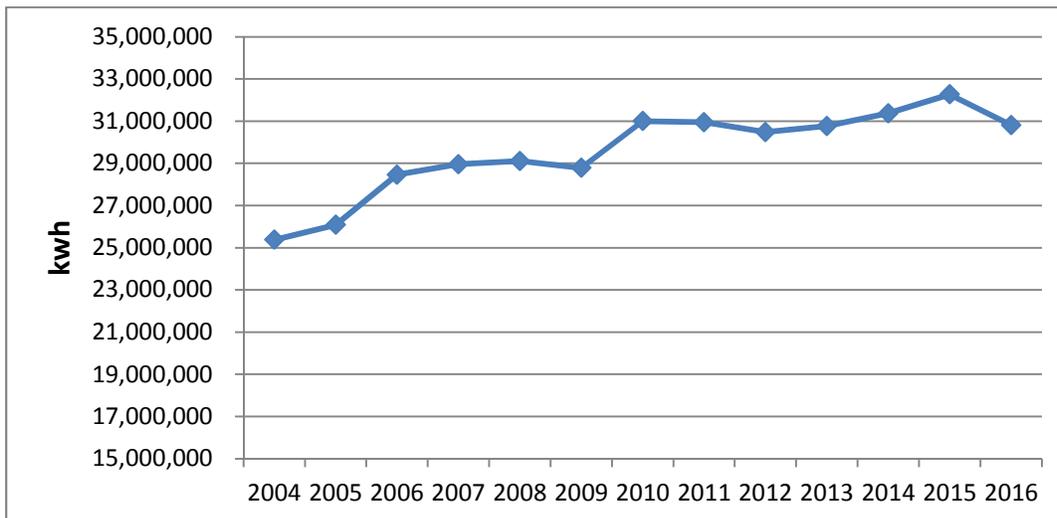
## **Scope 2 Emissions**

Scope 2 Emissions are indirect GHG emissions that are a consequence of activities that take place within the organizational boundaries of the institution, but that occur at sources owned or controlled by another entity.

### Purchased Electricity

The most significant source of eCO<sub>2</sub> emissions for SCSU is purchased electricity. This source, coupled with transmission and delivery (T & D) losses, accounted for 42.3 percent of SCSU's total GHG emissions in FY 2016.

## **Electricity Usage**



## Energy Source for Electricity from Xcel Energy

Source	2004-2009	2010	2011-2012	2013-2014	2015-2016
<b>Coal</b>	<b>48 %</b>	<b>43 %</b>	<b>43.9 %</b>	<b>36 %</b>	<b>35%</b>
Natural Gas	5 %	8 %	6.6 %	13 %	15%
Nuclear	28 %	30 %	29.1 %	28 %	27%
Hydro-Electric	8 %	7 %	7.5 %	7 %	7%
<b>Biomass</b>	<b>2 %</b>	<b>3 %</b>	<b>3 %</b>	<b>3 %</b>	<b>2%</b>
<b>Renewable (Wind, Solar)</b>	<b>7 %</b>	<b>8 %</b>	<b>9.8 %</b>	<b>13 %</b>	<b>14%</b>
Other	2 %	1 %	0 %	0 %	0

St. Cloud State University purchases all of its electricity from Xcel Energy. Minnesota has enacted a Renewables Portfolio Standard that requires Xcel Energy to generate or procure a specific percentage of their electricity from renewable sources as follows:

2010	15 percent
2012	18 percent
2016	25 percent
2020	31.5 percent

Electricity generated by solar, wind, hydroelectric facilities less than 100 megawatts (MW), hydrogen and biomass -- which includes landfill gas, anaerobic digestion, and municipal solid waste -- is eligible for the standards and the objective.

Of the 31.5 percent in 2020, at least 24 percent must be generated by wind energy conversion systems, 1.5 percent solar, 1 percent from either solar or wind, and the remaining five percent can be generated by other eligible energy technology.

Because of this requirement, electricity from Xcel Energy has lower emissions than the rest of its United States sub-region. Therefore, we entered a custom fuel mix into the calculator to more accurately account for the emissions. We obtained the percentages of the fuel mix directly from Xcel Energy.

## Scope 3 Emissions

Scope 3 emissions required to be tracked by the ACUPCC include all air travel, and staff, faculty, and student daily commuting to and from campus. St. Cloud State University is also tracking emissions from other directly financed travel. Scope 3 emissions also include electricity transmission and delivery losses, as noted above. Obtaining Scope 3 data is challenging, as monitoring miles traveled by air, rental vehicle, personal vehicle, bus travel, or light rail is not done systematically.

### Commuting

This category includes emissions from staff, faculty and student daily commuting to and from campus, whether by personal vehicle or public transportation. It does not account for transportation to and from students' permanent residences for weekends or holidays. Student commuting is responsible for 9 percent of St. Cloud State University's 2016 eCO<sub>2</sub> emissions, and staff and faculty commuting account for another 5 percent, for a total of 14 percent of emissions due to commuting.

### **Emissions from Commuting**

Obtaining Scope 3 commuting data is challenging. For the years FY 2004-2012, information from surveys conducted in 2002 and in 2004 that had some of the data needed for determining the commuting habits of the faculty, staff and students, was extrapolated. In 2014, Facilities Management conducted a new survey to obtain more accurate commuting information. The St. Cloud State University Statistical Consulting and Research Center assisted with the survey creation and analysis.

The data from the survey showed that the amount of commuting per person was actually less than previously assumed. Therefore, the apparent reduction in emissions from commuting can be attributed to two items: 1) an actual reduction in the number of commuters; 2) more accurate source data to calculate commuting distances and frequencies. The source data that was used for inventories from FY 2004 to FY 2012 resulted in commuting emissions calculations of 2.9 eCO<sub>2</sub> per faculty and staff member, whereas the data used for FY 2013 and FY 2014 resulted in emissions calculations of 2.1 eCO<sub>2</sub> per faculty and staff member. The source data that was used for inventories from FY 2004 to FY 2012 resulted in commuting emissions calculations of 0.46 eCO<sub>2</sub> per student, whereas the data used for FY 2013 and FY 2014 resulted in emissions calculations of 0.34 eCO<sub>2</sub> per student.

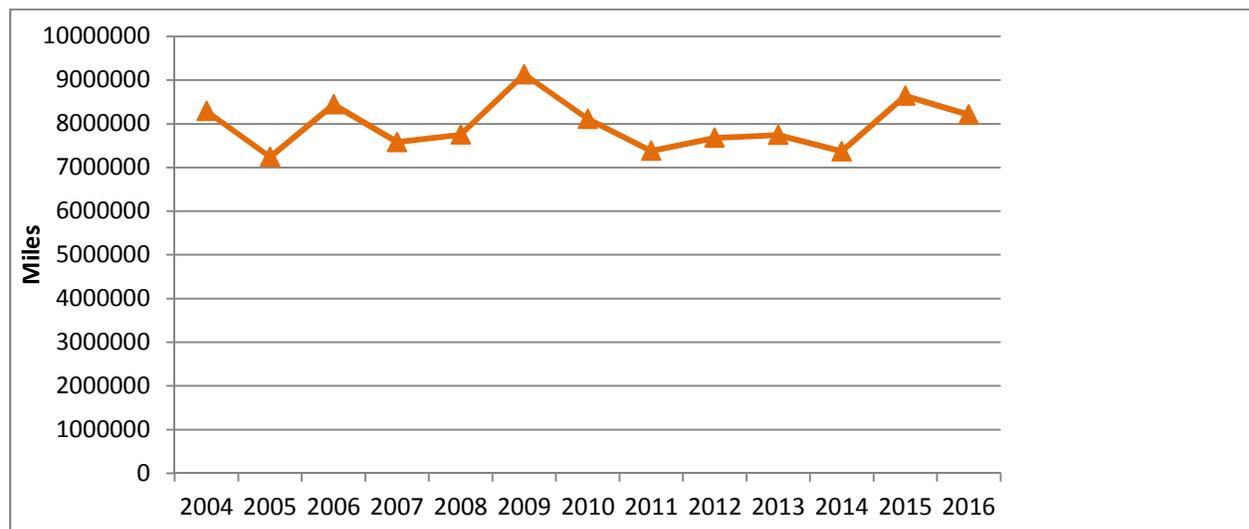
The results were used to calculate the commuting emissions for FY 2013-2016.

It should be noted that many of the signatories to the Carbon Commitment identified compiling accurate commuting data as being particularly challenging.

## Air Travel

This category tallies emissions resulting from air travel paid for or through the institution. This includes study abroad travel, student academic and athletic trips, and air travel associated with staff training or recruiting. Study abroad air travel is responsible for 5.5 percent of all of St. Cloud State University's 2016 eCO<sub>2</sub> emissions, and other University air travel is responsible for another 4.6 percent, for a total of 10 percent of all of the emissions.

### **Miles of Air Travel**



### **Emissions from Air Travel**

The emissions from air travel have been declining at a faster pace than the change in air travel miles. This appears to be the result of a lower emissions factor per mile in the *Campus Carbon Calculator*. In 2004, the emissions per 1000 miles were 0.67 eCO<sub>2</sub>. In 2016, the emissions per 1000 miles were .048 eCO<sub>2</sub>. The improvement may be the result of more efficient airline practices, such as more passengers per flight, more fuel-efficient airplanes, or a change in the fuel itself.

University policies directly influence the amount of air travel that is undertaken. It is possible that air travel could increase in the future, and the associated emissions would increase as well.

### Other Directly Financed Travel

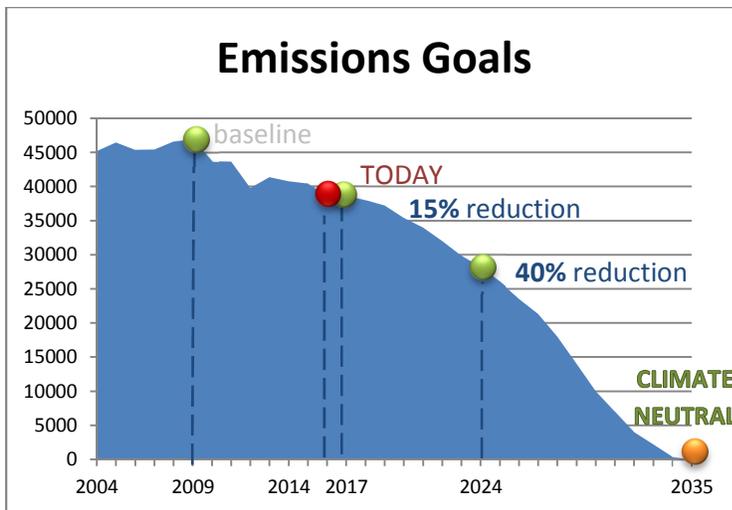
This category includes emissions resulting from transportation provided by others for the benefit of the University, such as rental car miles, charter bus miles, and personal vehicle mileage that was reimbursed by the University. This accounts for less than 1 percent of St. Cloud State University's total emissions. As noted earlier, a partnership has been created with Enterprise Rent-a-Car to provide vehicles on an as-needed basis under the state contract, resulting in a smaller University vehicle fleet.

## F. Conclusion

St. Cloud State University has reached their short-term goal of reducing GHG emissions by 15 percent of FY 2009 emissions by 2017. The results of this greenhouse gas inventory have revealed that the FY 2016 emissions are already 17.6 percent below the FY 2009 numbers.

While many outside factors have contributed to this success, St. Cloud State University should be proud of what they have accomplished.

The challenge going forward will be to maintain these reductions and to implement additional measures to further reduce GHG emissions. This will require the participation and support of the entire St. Cloud State University community and its partners.



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