



**Saint Joseph's College GHG Inventory
Report Compiled by EcoMotion, Inc.**

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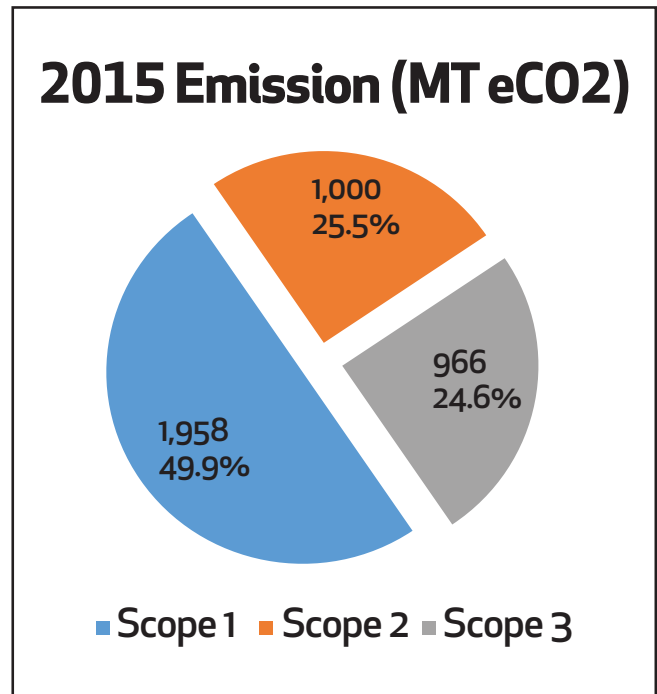
Executive Summary:

Saint Joseph’s College’s net emissions totaled 3,915 metric tons of carbon dioxide equivalent (MT eCO₂) in FY 2015. Emissions per full-time enrolled student are 1.38 MT eCO₂. Emissions per 1,000 square feet of building space are 8.7 MT eCO₂. These results are in line with the decreasing trend of emissions since the College started measuring in 2009.

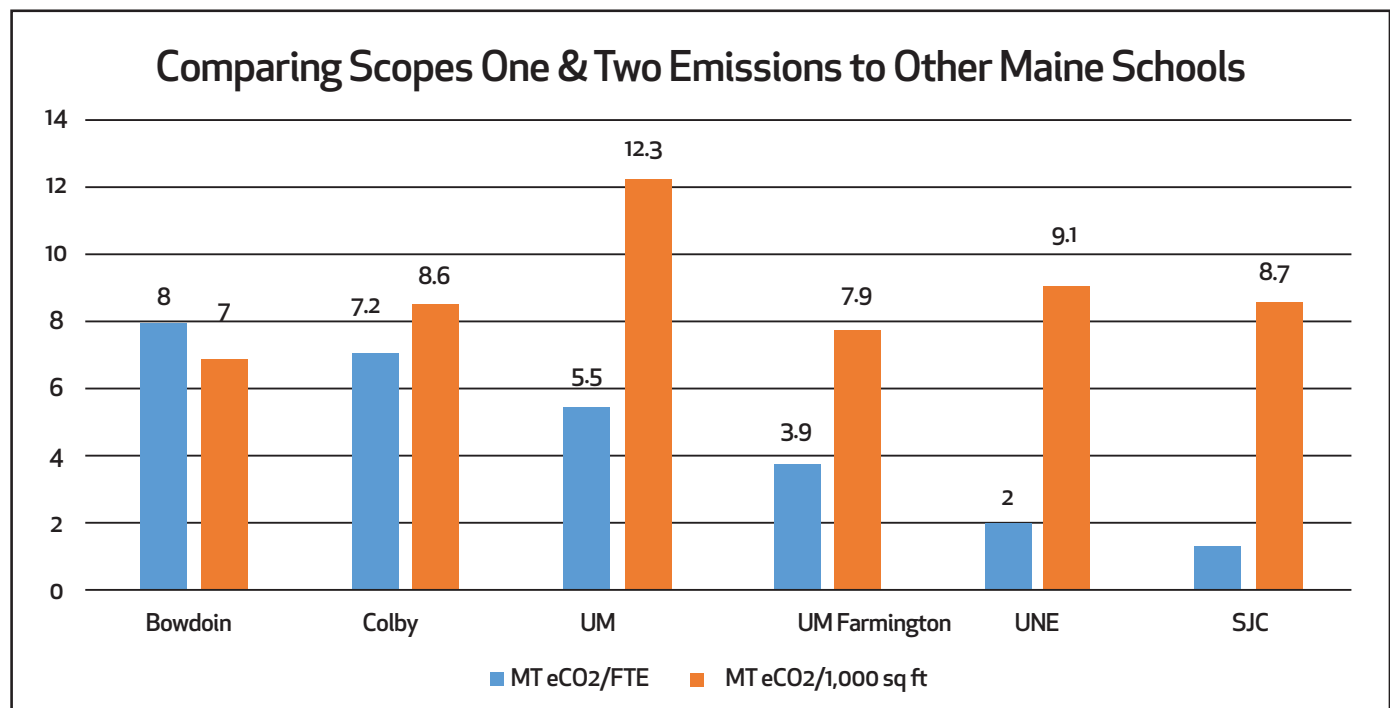
About 50% of the campus emissions is attributed to on-campus combustion of fuels, 25% is attributed to electricity purchases, and the remaining 25% is attributed to commuting. On campus composting activities offsets 0.2% or 9 MT eCO₂.

The high quality and quantity of data collected in 2015 to calculate emissions makes this inventory a reliable baseline for reporting and planning purposes. The inventory and all the data will be submitted to Second Nature to enable Saint Joseph’s College to comply with the American Colleges and Universities Presidents’ Climate Commitment.

The chart below compares the Scope One and Two emissions from other Maine schools. Compared to these schools, Saint Joseph’s College has average emissions per building square footage and the lowest emissions per FTE student.



This is likely attributed to the increase in student population, especially online students.



Introduction

Saint Joseph's College's campus-wide sustainability program, Attainable Sustainable, has embarked on an exciting initiative for its members and the greater College community. In recent years, Saint Joseph's College and Attainable Sustainable have seen a number of accomplishments and advances in sustainability initiatives. These include signing the American College and University Presidents' Climate Commitment (ACUPCC) in 2009.

As a signatory of the American College and University Presidents' Climate Commitment (ACUPCC), Saint Joseph's College pledged to conduct a greenhouse (GHG) inventory. A GHG inventory is an accounting of major sources of GHG emissions that are associated with a particular entity. This inventory informs the College of its ecological footprint in significant detail.

In 2015, EcoMotion was hired to support Saint Joseph's College. EcoMotion is a mission-driven sustainability consulting firm that works with schools to build institutional capacity to implement sustainability commitments across operations, planning, policy, and engagement. With the EcoMotion partnership in place, the firm's Boston-based office will work closely with the College community to strengthen efforts on multiple tracks. EcoMotion's tasks include conducting a Greenhouse Gas Inventory, developing a Climate Action and Sustainability Plan (both requirements of the Presidents' Climate Commitment), advising on Saint Joseph's newly established Green Revolving Fund, formalizing Eco-Reps and E-Team

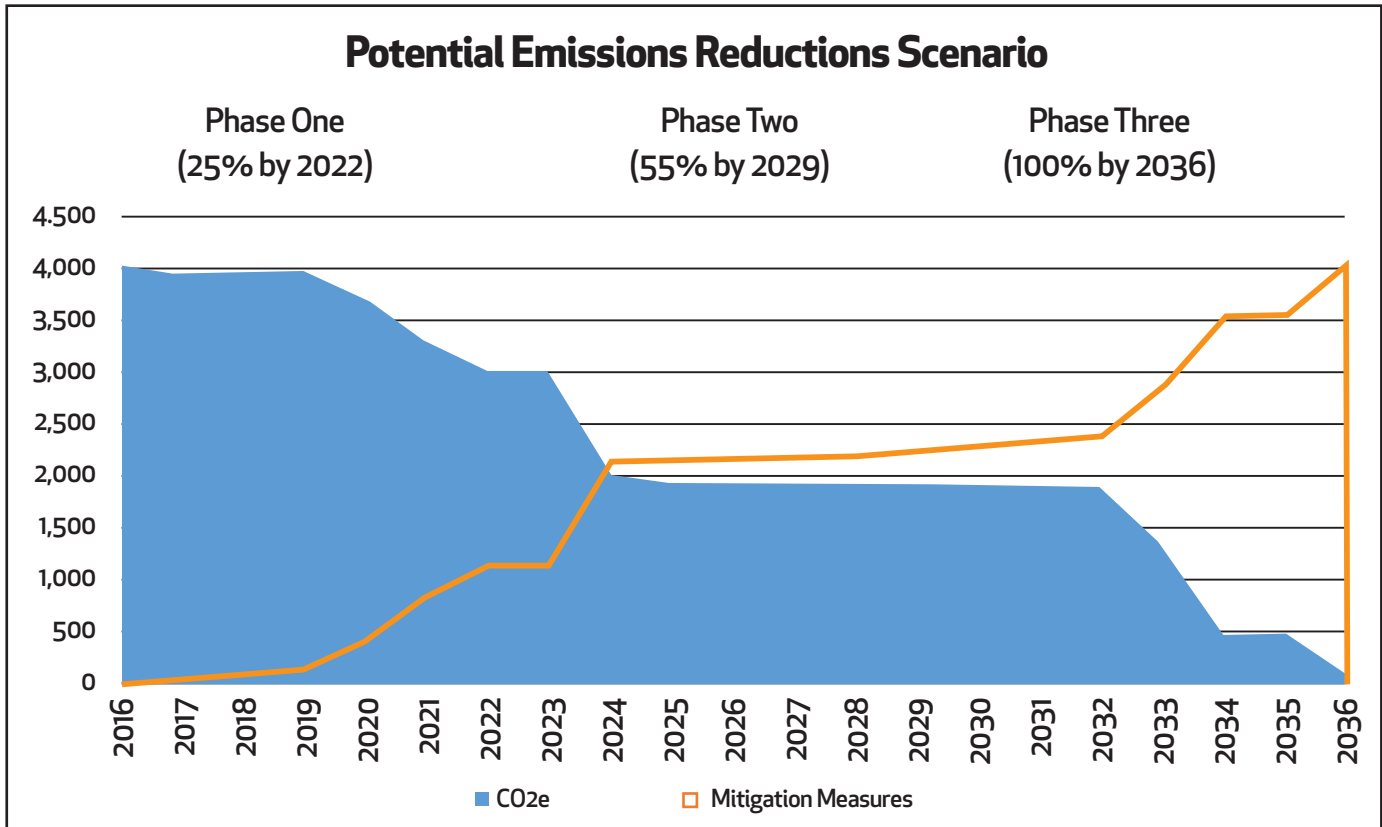
engagement, along with providing strategic marketing and communications to document sustainability progress and foster community awareness.

Increasing the resources allocated to strengthening Saint Joseph's College's sustainability commitments and actions are timely, complementing and reinforcing the goals outlined in Saint Joseph's College's strategic plan, Sustaining the Promise.

A Path to Carbon Neutrality

The graphic below presents an illustration of how carbon neutrality can be achieved. Actions that reduce emissions, also known as carbon mitigation measures, come in various sizes and scopes. Looking forward, there will be small steps and large steps that in combination will achieve the goal of carbon neutrality by 2036. Phase One is a period of significant planning, hence the relatively flat start. Towards the end of Phase One the campus is expected to implement significant energy efficiency retrofits, reducing electricity, oil, and propane. At the beginning of Phase Two the campus will start generating significant amounts of electricity with renewables. The remaining building systems that use fossil fuels will be replaced with renewable options. In Phase Three, transportation programs will be implemented, and what vehicles are used will be more fuel efficient. What emissions remain towards the end of Phase Three will be mitigated by managing forests and carbon offsets. Emissions reduction strategies and measures are described in the Climate Action and Sustainability Plan.

Potential Emissions Reductions Scenario

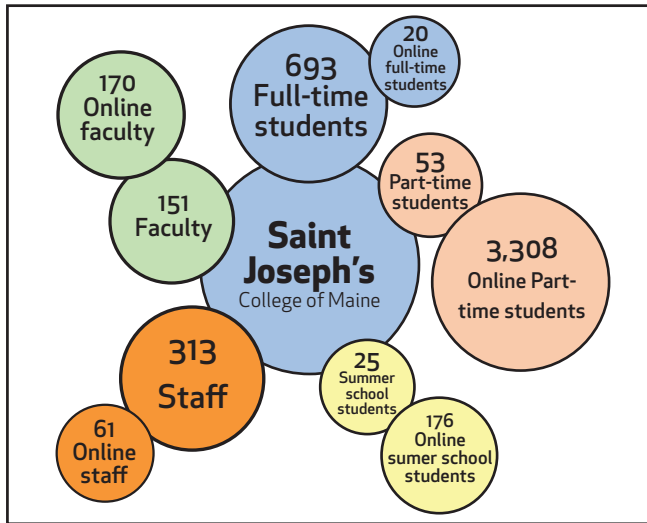


Saint Joseph's College Population at a Glance

Saint Joseph's College's student population is expected to grow, both on campus and online. Business as usual would see total emissions rise with the increase of on-campus students, additional buildings, resources, etc. However, by implementing mitigation measures with the population increases in mind, the emissions per building square foot will head in the right direction. From an emissions-per-student perspective, increasing population, especially online students who have a negligible carbon footprint, will decrease the emissions per student.

To calculate FTE students, EcoMotion used the IPEDS Method recommended by ACUPCC and the US Department of Education's Institute of Education Sciences. The full-time equivalent student population of Saint Joseph's College is calculated by adding the full-time students to the part-time enrollment multiplied by the factor (.392857). The result is 2,832 FTE students.





Organizational Boundaries

This inventory measures emissions with an “Operational Control Approach,” meaning it accounts for GHG emissions from operations under Saint Joseph’s College control. This control approach refers to the authority Saint Joseph’s has to introduce and implement operational policies that impact emissions. This approach continues on the path set forth by Saint Joseph’s when GHG inventories were conducted for FY 2009 and FY 2013.

Operational Boundaries—Sources of Emissions
This inventory updates Scope One, Scope Two, and Scope Three emissions that were measured in 2009 and 2013.

1. Scope One: Direct emissions from sources that are owned or controlled by Saint Joseph’s College
 - On-campus oil and propane usage
 - Vehicle fleet emissions
 - Refrigerants
 - Fertilizers used on sport fields
 - Animal husbandry
2. Scope Two: Indirect emissions from sources that are neither owned nor operated by Saint Joseph’s College, but which products are

directly linked to on-campus energy consumption

- Electricity purchased from a third party

3. Scope Three: Other indirect emissions that are a consequence of Saint Joseph’s activities but are from sources that are not owned by or controlled by the college

- Faculty/staff/student commuting
- Solid waste/recycling/composting processing
- Waste water processing
- Paper purchases

Temporal Boundaries

For Scope One and Two, this inventory measures two 12-month periods: FY 2014 (ending June 30, 2014) and FY 2015 (ending June 30, 2015). Scope Three is measured for only FY 2015.

Tools Used

The inventory followed protocols outlined in the GHG Protocol of the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI). Emissions were calculated using Clean Air Cool Planet’s Campus Carbon Calculator. This tool was selected because it is consistent with the GHG Protocol standards and was recommended by Second Nature, AASHE, and other institutions that are participating in the American College and University President’s Climate Commitment.



Campuse Carbon Calculator

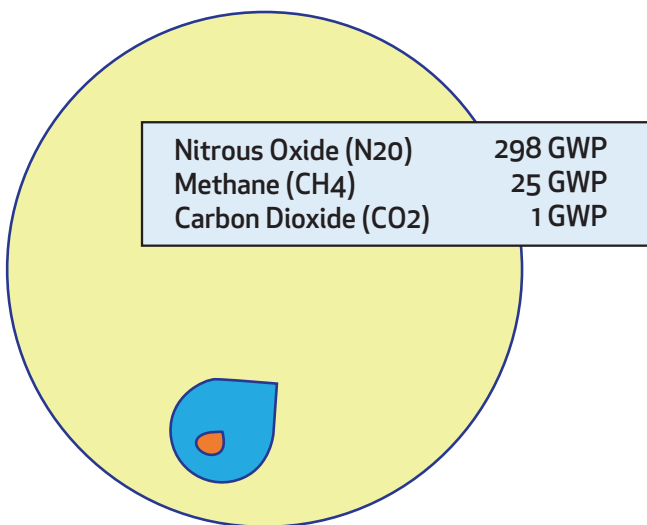


Global Warming Potentials

Global warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. Greenhouse gasses have distinctive levels of heat trapping attributes so GWP compares these attributes to the heat trapped by a similar mass of carbon dioxide (referred to as “CO2 equivalent” or “eCO2”). Values of GWP are assumed to have a 100 year atmospheric lifetime period as a factor of carbon dioxide. The Campus Carbon Calculator v.8 used for this inventory uses the GWPs from the Fourth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) published in 2007. The emissions in this inventory are reported in Metric Tons (MT) of eCO2 (and will be referred to as such), following the procedure of the IPCC convention.

Global Warming Potentials

*100 year time horizon



Global Warming Potential factor based on the Intergovernmental Panel on Climate Change Fourth Assessment Report

Results

The GHG inventory for 2015 resulted in a total of 3,915 MT eCO2 (1.38 MT eCO2 per FTE student or 8.7 MT eCO2/1,000 square feet of building space). Composting activities reduces emissions by 9 MT eCO2 (0.2 percent). Total emissions are broken down by scope in the pie chart below.

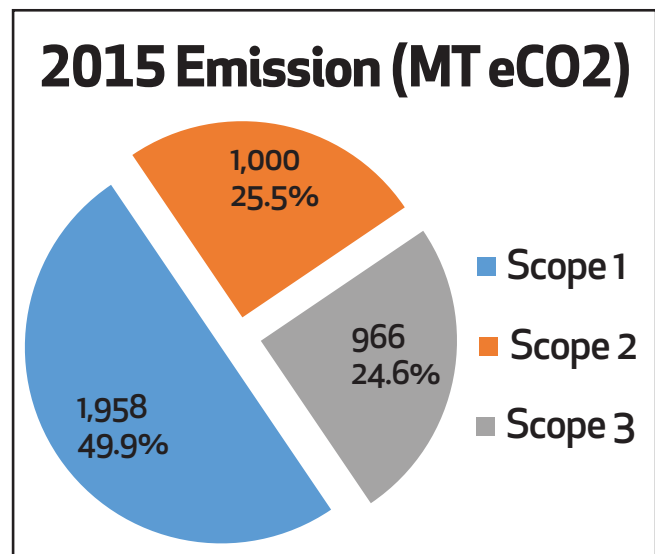
Metric Tons (or Tonnes)	Unit of weight equal to 1,000 kilograms, or 2,204.6 pounds
Long Tons (UK)	A British measurement equivalent to 2,240 pounds, not to be confused with the US “short ton”
Short Tons (US)	US measurement also known as a short ton, equals 2,000 pounds

Source:

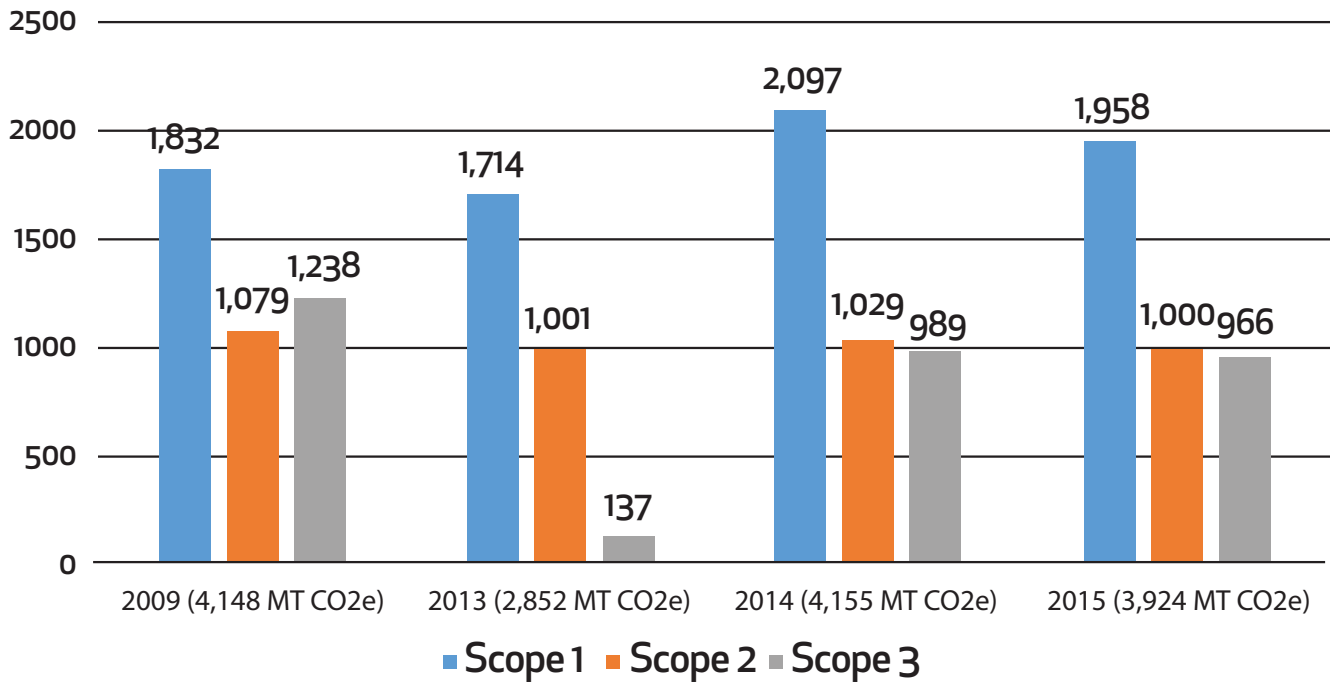
www.ipcc.ch/publications_and_data/ar4/wg1/en/errataserrata-errata.html#table214

GHG Inventory Results: Four Studies

This inventory represents the fourth year of results calculated by Saints Joseph’s College. Data has improved in quality and quantity since 2009, especially for Scopes Two and Three. Scope Two emissions went down from 2009 to 2015. This can be attributed to the utility cleaning its power mix as well as electricity savings from energy efficiency projects like lighting and appliance upgrades. Scope One emissions have gone up due to an increase in oil- and propane-fueled equipment, and new data from fertilizer usage and animals at the farm are now included. The decrease in Scope One emissions from 2014 to 2015 is attributed to switching three boilers from oil to cleaner-burning propane. No commuting data was calculated in 2013.



GHG Inventory Results: Four Studies (MT eCO₂)

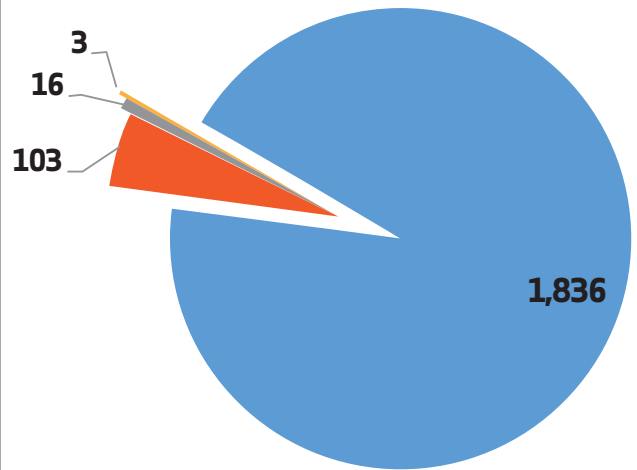


Scope One Emissions

Scope One emissions account for 1,958 MT eCO₂ or 49.9 percent of overall emissions. Scope One emissions at Saints Joseph's College are generated from on-site combustion of oil, propane, gasoline, and diesel as well as off-gassing from refrigerants and agriculture (synthetic fertilizers and animal husbandry). Space heating and water heating fueled by oil and propane combustion are the largest sources of emissions at Saint Joseph's College.



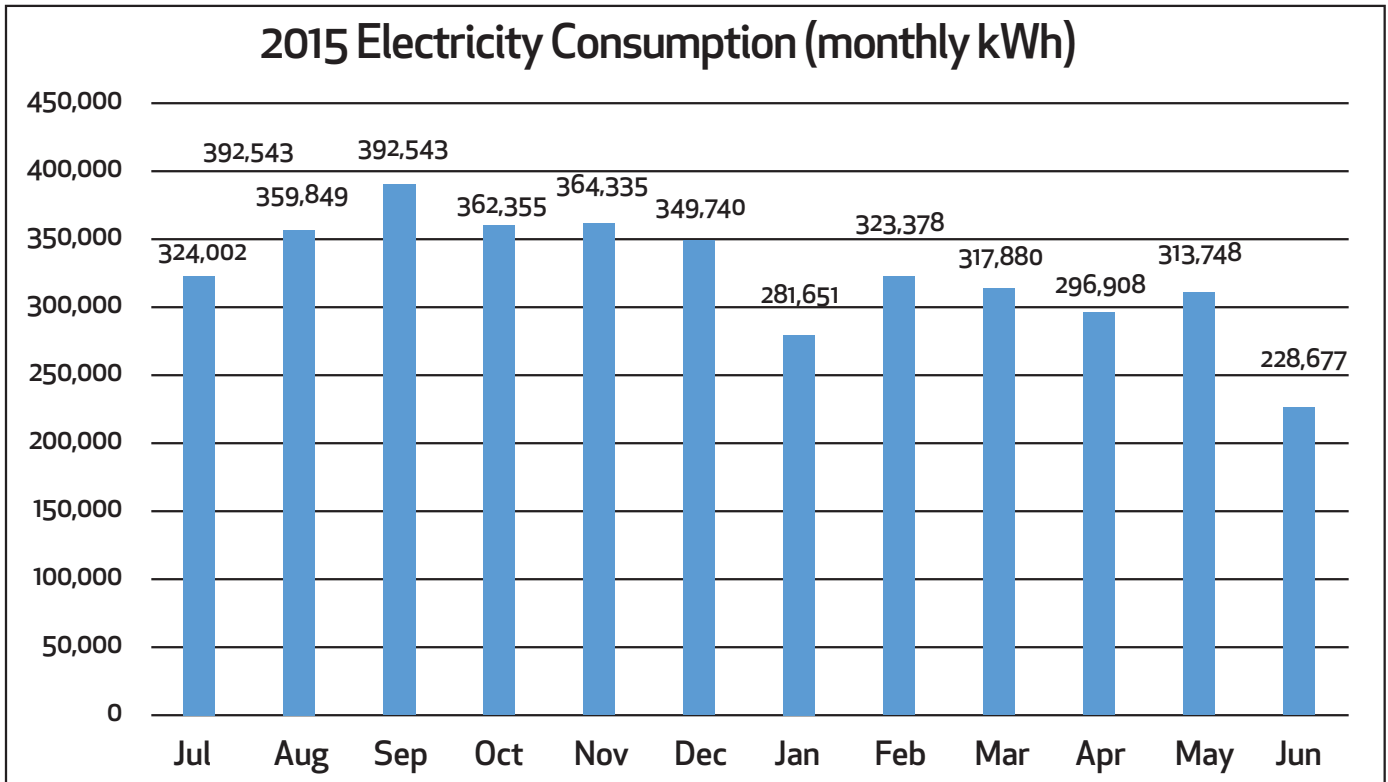
2015 Scope One Emissions (MT eCO₂)



- On Campus Stationary Sources
- Direct Transportation
- Agriculture
- Refrigerants

Scope Two Emissions

Scope Two emissions are indirect emissions associated with electricity purchased from the local utility provider to power the main campus and multiple off-campus meters. The 4,001,282 kWh purchased from Constellation in FY 2015 is the source of 999.5 MT eCO₂ or 25.5 percent of the total campus emissions. The chart below shows the electricity consumption over the 2015 fiscal year. The usage is fairly flat except for months when the school is on break. Fall and winter months experienced higher electricity usage, likely from lights being on longer as the days are shorter.



Utility Emissions Coefficients

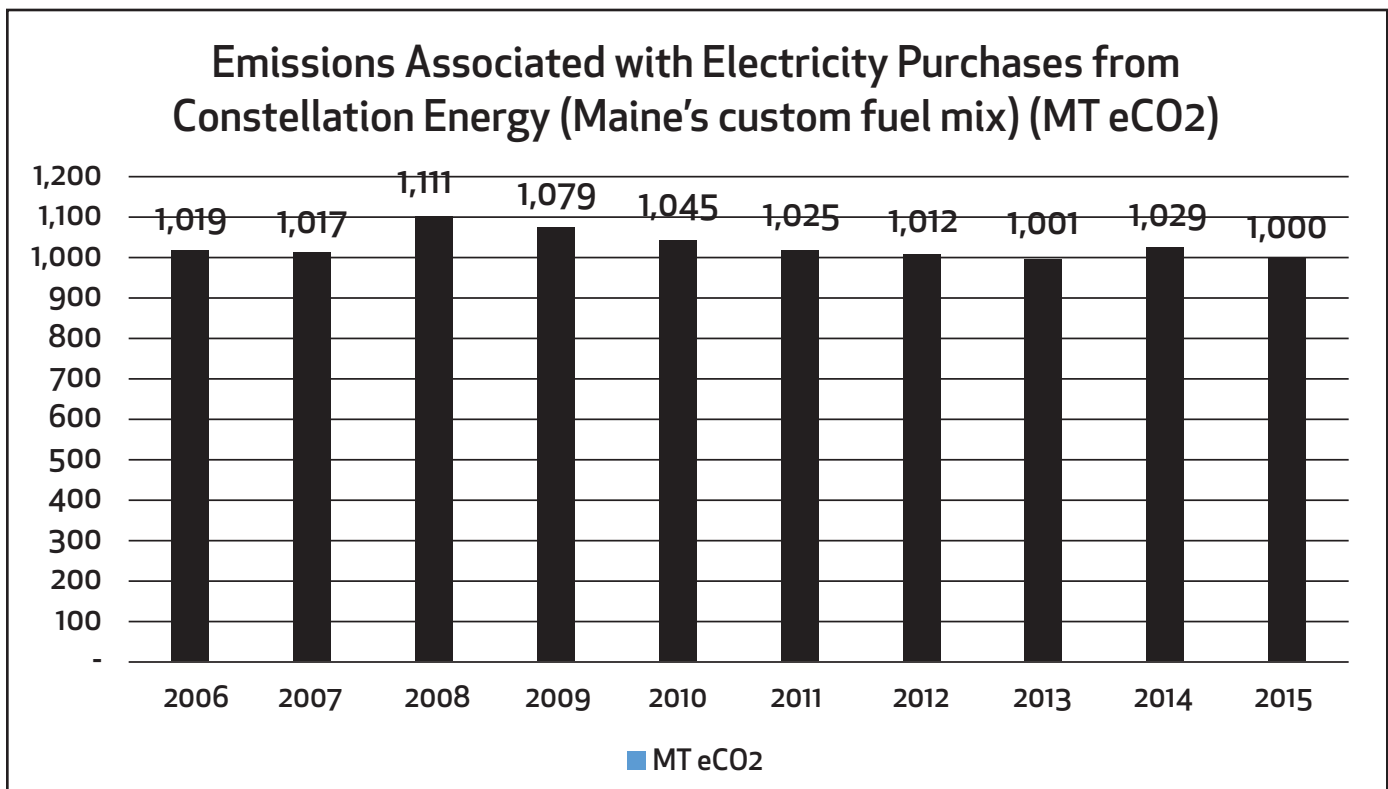
Electricity purchased by Saint Joseph’s College is delivered by Central Maine Power Company, but the electricity itself is supplied by Constellation Energy Services. Constellation is one of many suppliers delivering electricity on behalf of Central Main Power. Constellation’s electricity is generated by a mix of fuels with varying emissions levels. Electricity suppliers in Maine must, by Maine law, provide fact

sheets, or “uniform disclosure labels” to educate consumers about the electricity service. The Campus Carbon Calculator takes into account the mix fuels and calculates emissions accordingly. Suppliers like Constellation are likely to continue to “clean up” their fuel mix which will help Saint Joseph’s College see a reduction in Scope Two emissions. As of 2014, Constellation provides electricity with the resources below. An average New England Mix is supplied for comparison.

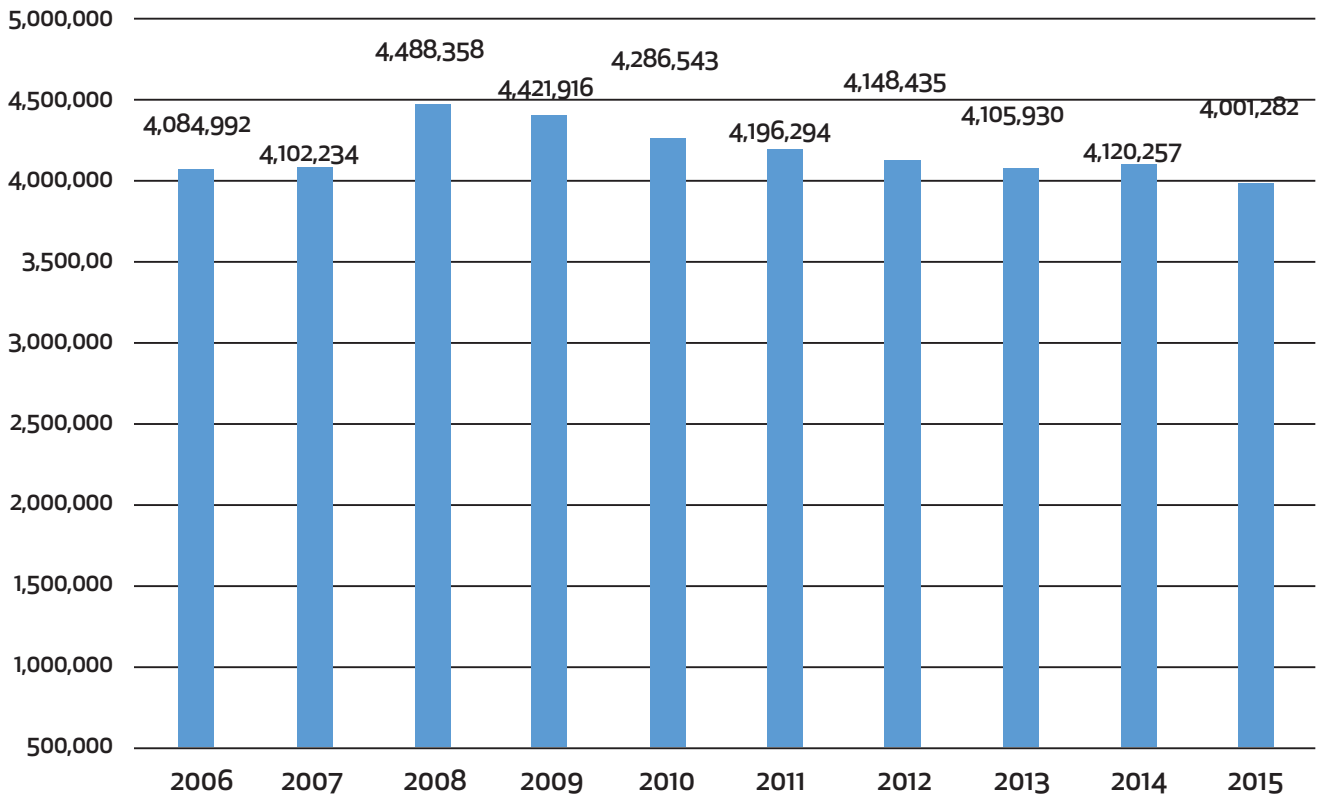
Constellation's Mix New England Mix

Biomass	7.6%	0.7%
Coal	4.0%	5.3%
Diesel	0.6%	0.9%
Efficient Resource	0.1%	0.1%
Fossil Fuel Cogeneration	0.0%	0.0%
Fuel Cells	0.0%	0.0%
Geothermal	0.0%	0.0%
Hydro	19.4%	2.1%
Jet	0.0%	0.0%
Municipal Waste	0.4%	0.4%
Natural Gas	33.0%	44.1%
Nuclear	28.4%	38.0%
Oil	5.1%	6.8%
Solar	0.0%	0.1%
Tidal	0.0%	0.0%
Trash-To Energy	0.7%	0.9%
Wind	0.2%	0.3%
Wood	0.3%	0.4%
Total	100.0%	100.0%

Utility fuel mixes are not available for all years dating back to 2006, so the chart below shows the emissions associated with electricity purchased by Saint Joseph's College assuming the utility fuel mix above. Looking at the historical emissions with an equalized fuel mix shows how emissions are directly correlated with the amount of kWh purchased.



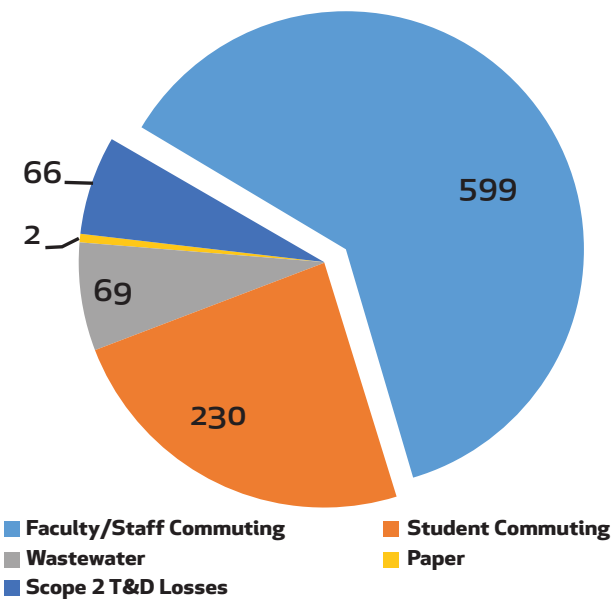
Saint Joseph's College of Maine Annual Electricity Consumption (kWh)



Scope Three Emissions

Scope Three emissions totaled 966.2 MT eCO₂ and accounted from travel by faculty, staff, students, tons of solid waste, waste water treatment, and paper purchases.

2015 Scope Three Emissions (MT eCO₂)



Commuting

Emissions associated with commuting students, faculty, and staff amount to 828.9 MT eCO₂. Transportation-related emissions are notoriously difficult to track and control, but thanks to the efforts of the SJC Sustainable Task Force, a campus-wide survey was conducted in October 2015 to measure emissions associated with commuting students, faculty, and staff. Survey results were used to tabulate emissions. Emissions were calculated in the Campus Carbon Calculator using miles traveled by transportation mode, assumptions for typical automobile fuel efficiency (24 mpg), and emissions. For example, the typical emissions from a student commuter, driving 19 miles one way, four times a week during an average school year, is 1,002 kg of CO₂ (or one MT). Trip distribution data for students, faculty, and staff is broken down on the left.

Students

There are 240 student commuters (25 percent of student population).

Students commute to campus on average 4 days/week, 36 weeks/year.

- 90 percent drive alone, 10 percent carpool occasionally, average trip distance is 19 miles
- Three bike

Total emissions as the result of student commuting is 229.5 MT eCO₂.

Faculty

Faculty commute to campus on average five days/week, 31 weeks/year.

- 80 percent drive alone, 20 percent carpool occasionally, average trip distance is 19 miles
- Nine bike
- Four motorcycle

Staff

Staff commute to campus on average five days/week, 51 weeks/year.

- 90 percent drive alone, 10 percent carpool occasionally, average trip distance is 17 miles
- Two bike
- Five motorcycle

Total emissions as the result of faculty and staff commuting is 599.4 MT eCO₂.

Wastewater

Wastewater (gallons sent to the on-site septic system and soil dispersal areas) data was collected and will continue to be tracked because of the associated emissions of methane, carbon dioxide, and nitrous oxide. In 2015, the 12 million gallons of wastewater that were sent to the septic system resulted in emissions of 69.1 MT eCO₂. Ninety-eight percent of that water is discharged to soil dispersal areas (also known as leach or sludge fields) near campus. Two percent (235,500

gallons) of the wastewater effluent is pumped and hauled out by a third-party contractor.

Paper Purchases

In 2015, a total of 1,800 pounds of paper were purchased, 100 pounds were 100 percent recycled content. 1,700 pounds of paper had 0 percent recycled content. Emissions associated with the production and purchase of paper accounts for 2.4 MT eCO₂.

Solid Waste and Recycling

In 2015, it is estimated that a total 408 tons of solid waste was generated and hauled away to be incinerated as fuel for local energy suppliers. An additional 51.25 tons of material was sorted and recycled. Composting activities divert 30.45 tons from the incinerator and furthermore offsets 9 MT of eCO₂.

Solid waste is first collected at the building level. Staff, faculty, and/or students empty small trash bins into "community stations" located at each building. The on-campus waste ends up in three 15-yard containers which get picked up three times a week by Troiano Waste Services then hauled to local landfills that have methane recovery systems. Saint Joseph's College pays a flat fee for this service and the containers are picked up if they are full or not. At this time the containers are not weighed by Facilities or Troiano as it leaves campus.

The Campus Carbon Calculator requires an input of short tons of solid waste and how the waste is processed, whether the waste is incinerated, taken to a landfill, and have methane recovery and electricity generation systems in place. Since containers are not always full when they are picked up, accurate weight is difficult to report at this time, but the Facilities Department estimates one ton of waste in each container.

EcoMotion reached out to Troiano Waste Services to inquire about how waste is processed and discovered waste is hauled to the “Waste-To-Energy Plant” in Portland, Maine, operated by ecomaine. The waste is incinerated and the heat powers a steam turbine generator. The flue gasses go through a five-step pollution control system to remove nitrogen oxide, mercury, dioxin, acid gas, and particulates. The Campus Carbon Calculator actually considers this method a carbon offset because the waste is being turned into a fuel source (closing the loop) for electricity generation. That electricity would otherwise be generated by a utility’s fuel mix (as seen in the Scope 2 section). According to the Campus Carbon Calculator, the result of 408 tons of solid waste being used to generate electricity has negligible emissions impacts. If, however, that amount of waste went to a typical landfill with methane recovery and a gas flaring system, emissions would be 126 MT eCO₂. The fact that the College’s waste is used to generate electricity is note-worthy and minimizes the environmental impact of solid wastes.

Recycling programs decrease the amount of waste hauled, associated fees and emissions. Currently recycling is prevalent on campus in staff offices, residence halls, and Pearson’s Café. Pearson’s Café has a dedicated 30-yard container used for kitchen recyclables and is picked up weekly by Troiano. Approximately 46 tons is recycled from the 30-yard container annually.

Recycling from the rest of the campus is taken to the compactor located at the ball field parking lot. Green and blue bins located in staff offices are picked up by housekeeping and brought to the recycling compactor. Recycling bins from the student rooms in the residence halls are collected by Eco-Reps once a week and

also brought to the compactor. When the compactor is full (1.75 tons), it is delivered to ecomaine’s recycling facility where it is sorted and processed. The compactor was picked up three times in 2015, recycling 5.25 tons in total.

At this time there is one compactor on campus. From 2001 to 2012 it was compacting on-campus landfill waste, but starting in 2012 it was converted for single-sort recycling.

Composting stations in Pearson’s Café divert 17,400 gallons of food scraps per year. That equates to 30.45 tons per year. The heterogeneous mixture of food scraps is taken to Pearson’s Town Farm adjacent to the main campus to be composted and eventually used as soil. Composting activities are considered carbon offsets, reducing Saint Joseph’s College emissions by 9 MT eCO₂.

Waste	408 tons
Recycling	51.25 tons
Composting	30.45 tons
Diversion Rate	20%



Future Considerations and Data Requests

Travel for Sports Teams

Sports teams travel in a leased coach bus. Fuel consumption data for FY 2015 was not retrieved in time for this report. For the next update, Saint Joseph's College will have this data included in Scope Three.

Emissions Associated with Food

Emissions associated with food consumption are not measured in the Campus Carbon Calculator, so they were omitted this year. Future versions of the Campus Carbon Calculator are expected to include food. Saint Joseph's College wants to develop a culture that is conscious of the emissions associated with food. It is important to educate the campus community about the production and transportation of food and the amounts of energy, land, and water it takes to bring food from the farm to the table.

Conclusion

The practice of reducing GHG emissions is new to most institutions. While many of the policies, programs, and initiatives are familiar (they address energy efficiency, water use, purchasing, transportation, etc.), they are presented in the Climate Action Plan in a new way and with a new focus. Many assumptions are made, making the practice of measuring actual results all the more important to direct mid-course programmatic changes as need be.

In 2015, Saint Joseph's College's emissions measured 3,924 MT eCO₂, but 9 MT eCO₂ are offset by composting, resulting in net emissions of 3,915 MT eCO₂. The College will diligently track climate action results to verify reductions and to gauge the savings measures' impacts toward the goals set. The Campus Carbon Calculator can be used along the way as a tool to track how emissions reduction projects reduce

emissions over time and how the College can reach carbon neutrality by 2036.

Metrics that will be tracked for Facilities, operations, and campus-wide activities include resource savings, economic savings, and carbon reductions:

Resource Savings

- Kilowatt-hour savings
- Gallons of oil
- Gallons of propane
- Gallons of gasoline and diesel
- Recycling diversion rate
- Water savings

Economic Savings

- Electricity bill savings
- Oil and Propane delivery savings
- Waste hauling savings
- Other resource savings

Greenhouse Gas Savings

- Source of emissions reductions
- Metric Tons of emissions reductions
- Percentage of reduction goal achieved in each phase

Economic values will be considered and analyzed to track discrepancies with the Plan, and to update the Plan accordingly. Which strategies are successful? Which areas need additional support? What new opportunities are on the horizon? A working draft will be maintained with annual updates; every two years the GHG Inventory and Climate Action Plan will be updated and reissued.

Finally, Saint Joseph's College will make the GHG Inventory and Climate Action Plan easily accessible to its students and stakeholders.