

The Greenhouse Gas Emissions of The College of New Jersey



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Abstract

Determining the Greenhouse gas emissions of The College of New Jersey is an important first step in reducing the environmental impact of the campus. In order to plan an appropriate method of reducing the emissions, a benchmark must first be created. The calculations of emissions from The College of New Jersey was done through a carbon calculator spreadsheet obtained from Clean Air Cool Planet. From the most recent data available it was determined that in Fiscal Year 2007, there was 39,925 Metric Tons of eCO₂ emitted by TCNJ. This number was lower than fiscal years 2002-2006 emissions but further actions must be taken to reduce the carbon footprint of the campus as much as possible.

Introduction

- There has been increasing concern regarding the effect of greenhouse gases on the environment. Climate change is a serious and urgent issue as indicated by the constantly growing amount of scientific evidence.¹
- The source of climate change can be attributed to human activities and through more than a decade of research and discussion, it has been concluded that there is no other plausible explanation for the observed warming for at least the past 50 years.¹
- The earth's climate has exceeded the bounds of natural variability and this has been true since 1980.² Current levels of greenhouse gases are higher now than at any time in at least the past 650,000 years.¹ These gases have long (decades to centuries) atmospheric lifetimes and accumulate in atmosphere and a build up in concentration.²
- New evidence suggests that there is a significant chance that the climate system is more sensitive than was originally thought, which provides more of an incentive to solve this problem. Changes in the earth system may be amplifying global warming.²
- Examples of amplification include more release of carbon dioxide from the air due to an increase in respiration due to warmer climate. Warmer air also holds more water vapor which traps more heat. The typical increase in global warming will be amplified due to these occurrences. The likely outcome is more frequent heat waves, droughts, extreme precipitation events as well as wire fires, heat stress, vegetation changes and sea level rise.²
- In order to take action and reduce the amount of greenhouse gasses emitted, it is first necessary to know how much is being contributed to the atmosphere. The College of New Jersey has decided to assess their emissions and use the information to plan an effective strategy of reducing their carbon footprint.
- The program used to aid in this assessment was Clean Air Cool Planet Campus Carbon Calculator. This tool has been recognized as the leading authority on campus greenhouse gas tracking, helping more than 200 North American campuses in the past year.³
- From the results of the inventory, the college can effectively take steps to reduce the contribution it has to the environment.

Experimental

- Information for the emissions inventory was compiled from the appropriate departments across campus.
- The raw data from these departments was transferred to the Clean Air Cool Planet Campus Carbon Calculator v 5.0 where the emissions were calculated in terms of carbon dioxide equivalents (eCO₂).
- From these calculated emissions, graphs were constructed comparing various aspects of the inventory.

Fiscal Year	Scope 1 Emissions	Scope 2 Emissions	Scope 3 Emissions	Net Emissions
2002	27,806	2,297	8,688	38,792
2003	30,026	1,836	8,591	40,455
2004	30,094	2,718	8,434	41,246
2005	29,353	3,311	8,517	41,181
2006	34,065	5,755	8,535	48,356
2007	28,267	2,979	8,679	39,925

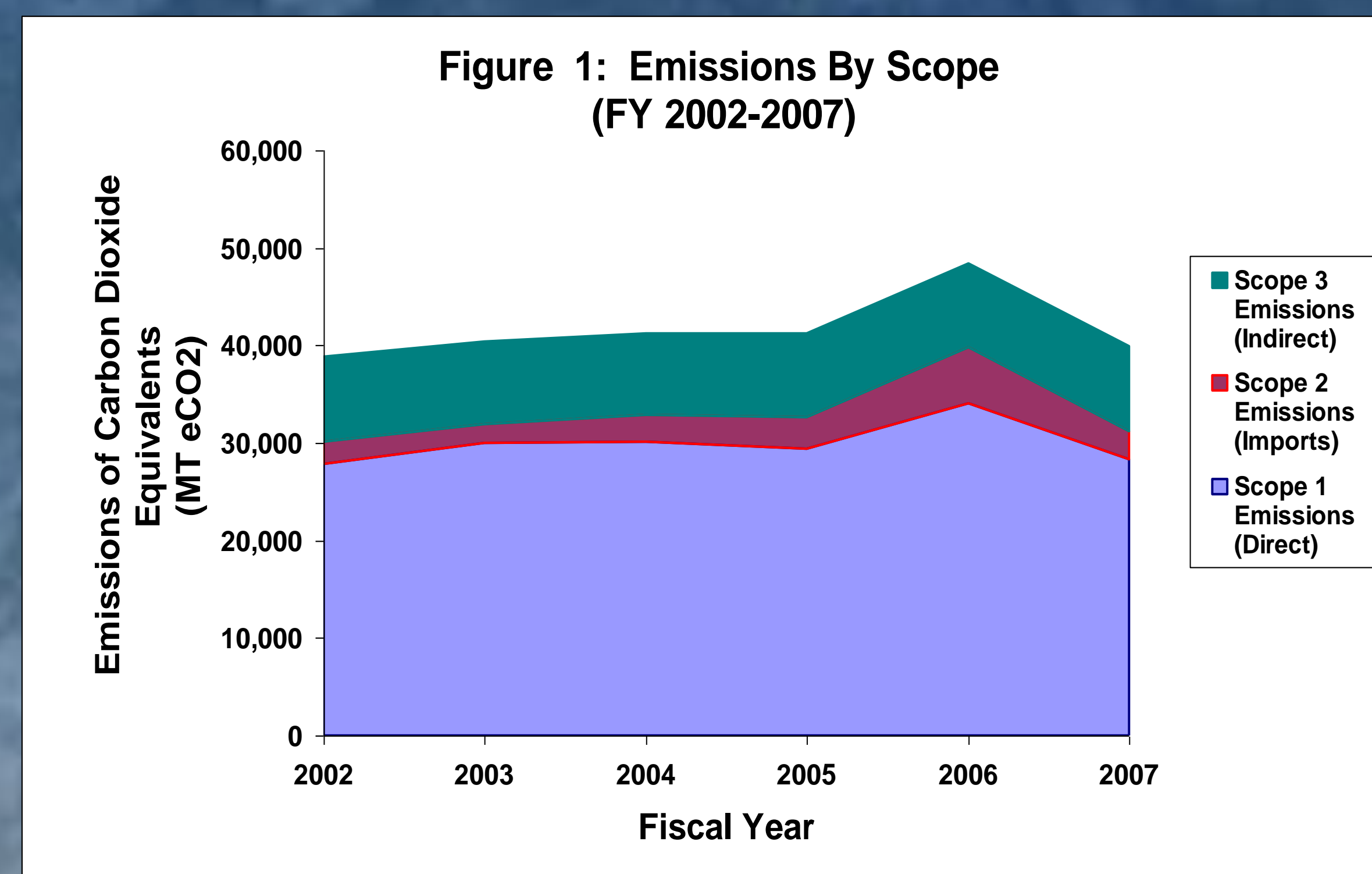


Figure 1: This graph depicts the trend of greenhouse gas emissions of The College of New Jersey campus which is divided into 3 scopes where Scope 1 consists of the direct sources of greenhouse gas emissions from sources that are owned by institution through the production of electricity and heat, Scope 2 includes the greenhouse gas emissions from imports of electricity or steam and Scope 3 contains the contributions from all indirect sources such as transportation and solid waste.

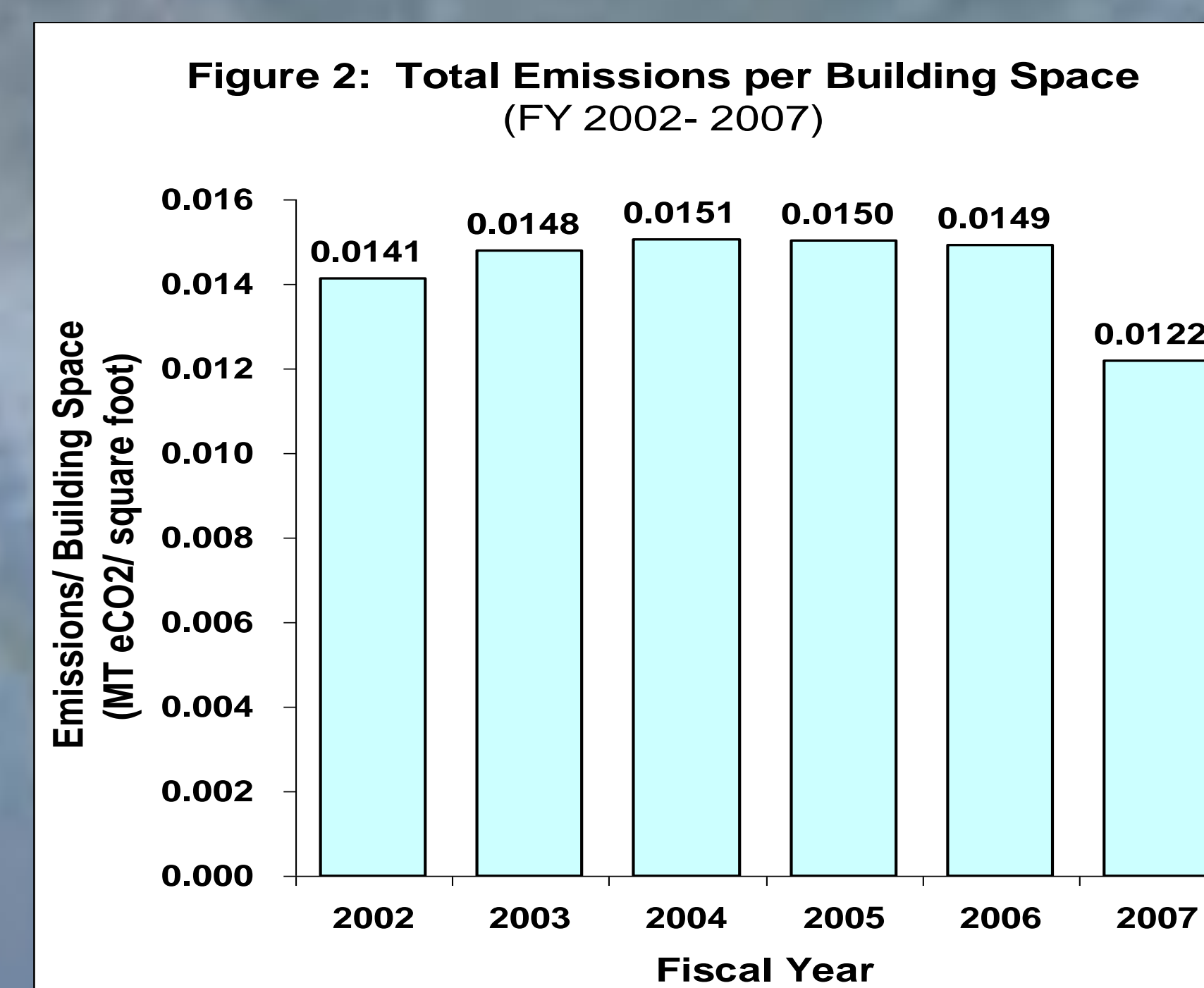


Figure 2: This graph depicts the emissions of the TCNJ campus per square foot of building space from FY 2002-2007. This type of comparison was done due to the majority of emissions resulting from providing heat and electricity to buildings. It can be seen that emissions per square foot of building space have gone down and FY 2007 has the lowest emissions/sq ft of the 2002-2007 time frame.

Source	Emissions (MT eCO ₂)	Percentage
Purchased Electricity	2,979	7%
On-Campus Stationary	28,083	70%
Transportation	8,591	22%
Solid Waste	273	1%
Total	39,926	100%

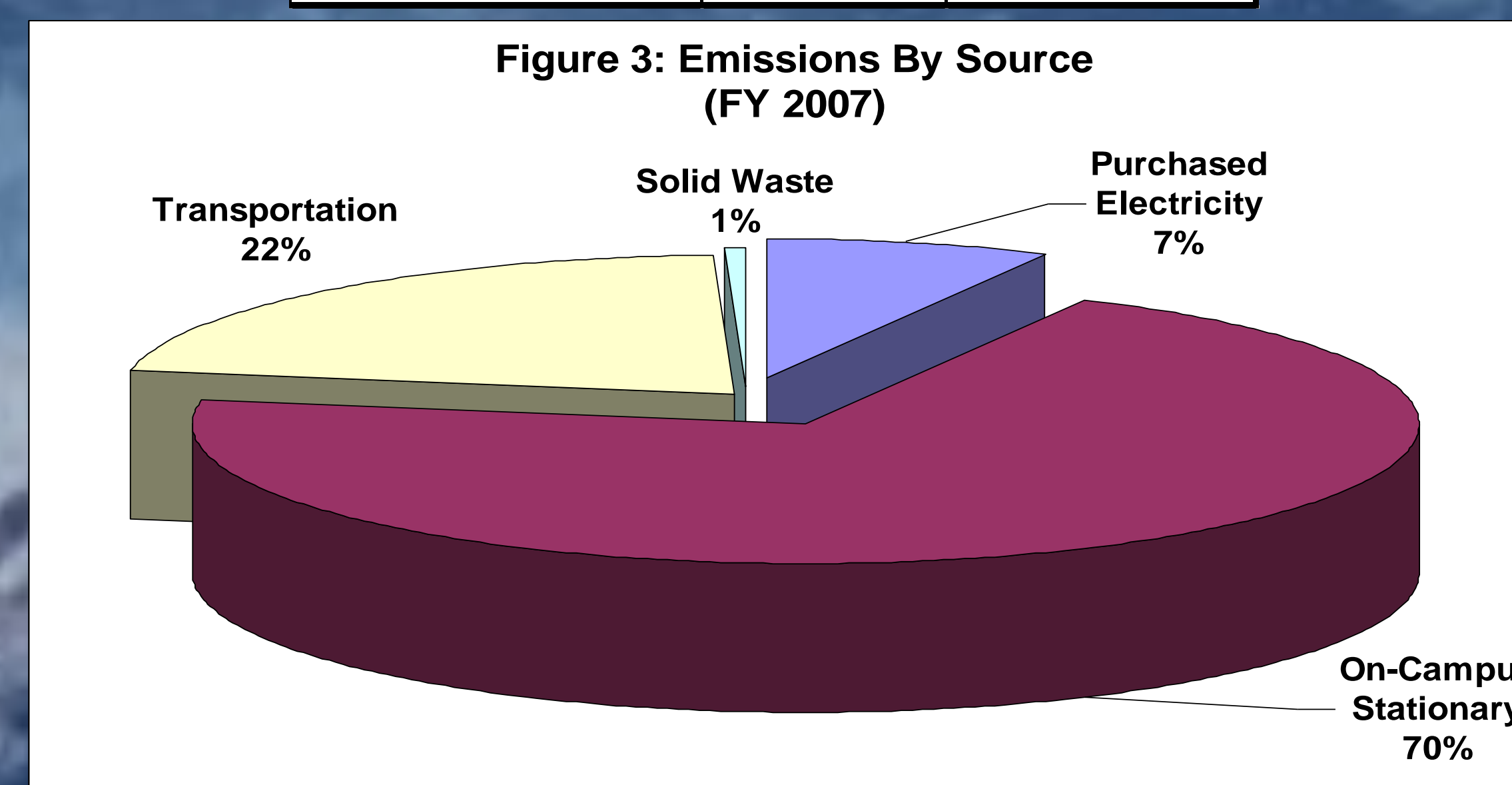


Figure 3: The greenhouse gas emission of the TCNJ campus in Fiscal Year 2007 can be seen above, where the total emissions of 39,926 MT eCO₂ were divided by source. Table 2 displays the raw data for this graph. It is evident that supply of heat and electricity are the major sources of emissions.

Results and Discussion

- The emissions were divided into three scopes depending upon whether the emissions were directly or indirectly from the institution. Scope 1 was the contribution of emissions from direct sources that are owned by the institution such as production of electricity and heat. Scope 2 included the greenhouse gases from imports of electricity or steam, which are purchased from outside sources. Scope 3 included all indirect sources such as transportation and solid waste.
- The trend from 2002-2007 is clearly depicted in Figure 1. **It is evident that Scope 1, which included the production of electricity and heat for all of the buildings on campus, contributed the most to the greenhouse gas emissions of the campus.**
- From Figure 1, the emissions from FY 2002-2007 can be described as relatively constant which is surprising when considering the recent growth of the campus.
- Fiscal Year 2006 was the only large increase in emissions. This increase can be traced back to the opening of the library, which initially had energy usage problems. Since then, that problem has been mediated and the energy usage has gone back to normal.
- Due to TCNJ's constant growth, it was necessary to consider building space when analyzing the emissions. This analysis can be seen in Figure 2.
- The 2007 emissions per square foot was the lowest out of the FY 2002-2007 range.
- **Since FY 2002, there has been a 13% decrease in greenhouse gas emissions when analyzed as emissions per sq. ft. of building space.** This may indicate the better usage of energy in providing heat and electricity to the building areas.
- Figure 3 compares the emission sources for FY 2007 where **on-campus stationary sources contributed 70% of the greenhouse gas emissions of campus.** This large percentage included all of the fuels purchased by the university other than gas or diesel fuel used in vehicles. Most of the fuel was used for heating the university buildings and consisted primarily of oil, coal or natural gas.
- **Transportation, 22% of TCNJ's total emissions in FY 2007, was a significant portion of the emissions and surpassed the contribution from purchased electricity (7%).** Solid Waste had the least contribution with only 1% of the campus' emissions.
- **Through analysis of the emissions over the past few years, it is evident that the carbon emissions have been relatively constant. When analyzing the emissions in terms of building space, a reduction of emissions was observed.**
- The continuation of the inventory is essential in assessing TCNJ's yearly progress in reducing the college's environmental impact.

References

- ¹ Stern Review: The Economics of Climate Change. 2006.
- ² Kart, Thomas. Trenberth, Kevin. "Modern Global Climate Change." *Science Magazine*. Vol. 302. 5 December 2003. p1719-1722.
- ³ Clean Air Cool Planet 2007 Annual Report. www.cleanair-coolplanet.org

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