



**CASTLETON STATE COLLEGE OF VERMONT  
CLIMATE ACTION PLAN**

**For the American College and University  
Presidents' Climate Commitment  
July 25, 2011**

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## **Executive Summary**

Global climate change is occurring at an unprecedented rate and the causes are the actions of human beings. Current rates of climate change are predicted to threaten our shared world and the futures of our children and their children.<sup>1</sup> Human society needs to come together and act now to first understand and then remedy the threats resulting from anthropogenic climate change. Castleton State College of Vermont joined this global change movement when President Dave Wolk signed the American College and University Presidents' Climate Commitment at spring convocation 2008. This action not only signaled the College's dedication to address the threat of global climate change but also marked the next step in advancing sustainable living and learning for the students, faculty and staff at Castleton in order to educate the next generation of environmentally responsible citizens.

In the spring of 2005, students in the Anthropology of Environment class at Castleton State College, Vermont chose for their service-learning to create a comprehensive recycling program at the College.<sup>2</sup> The key element of the student's plan was to engage students in the recycling system. The plan was presented by students to the President's Cabinet and approved. That summer students, faculty, administration, staff, and community partner Casella Waste Management came together as the Green Team to implement the recycling program. From this collaborative effort emerged Castleton's Green Campus Initiative. President Dave Wolk officially kicked off Castleton's Green Campus Initiative at Orientation 2005. Since that time all first year students have

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<sup>1</sup> "Intergovernmental Panel on Climate Change," 2010 from website <http://www.ipcc.ch/organization/organization.htm>; retrieved January 29, 2010; Feb 25, 2009 - A Report of Working Group I: The Physical Science Basis of Climate Change, based on IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.). Intergovernmental Panel on Climate Change, "A Report of Working Group I: The Physical Science Basis of Climate Change," February 25, 2009 based on IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (eds.) Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.), Cambridge University Press, Cambridge, United Kingdom and New York, 114. NY, USA from IPCC website 2010 <http://www.ipcc.ch/organization/organization.htm>. Retrieved 29 January 2010. ).

<sup>2</sup>ADVANCING RECYCLING PRACTICES AT CASTLETON COLLEGE OF VERMONT, prepared by students in Anthropology and the Environment class April 26, 2005 (updated January 2006 section on Recycling Other Buildings)

participated in this student-led recycling program, and since then the Green Campus Initiative has grown greatly in scope and importance to the College community. Many other student-led green projects and programs have developed such as the Sustainability Club, an Eco-Rep program in the residence halls, bio-diesel production, real-time electric metering in all buildings, a bicycle on campus program, a Green Intern program, Greenhouse Gas Emissions Inventories, and annual Earth Day Festivals. Castleton College is proud to boast that virtually every student who graduates from the College will have participated in some aspect of the Green Campus Initiative.

As student enthusiasm grew, institutional support for the Green Campus Initiative increased greatly. As a result the College has instituted numerous energy efficiency measures such as replacing old lighting with low energy bulbs, adopting an Indoor Environmental Quality Requirements policy, purchasing hybrid vehicles for the fleet, and other green products such as post-consumer paper for copying and non-toxic cleaning supplies. As well, the College purchased a low-energy dishwashing system in the main dining hall, switched to post-consumer paper and plastic ware, and, by student request, instituted trayless dining. The College has also incorporated green building design into all new structures. Our new Student Campus Center was awarded the Gold LEED designation in 2010, and our soon-to-be new residence hall has been designed to achieve a similar LEED status. In 2007 President Wolk signed the Talloires Declaration committing the College to live and teach sustainability. In 2008, President Wolk publicly signed and enthusiastically endorsed the College to the Presidents' Climate Commitment; that same year he created the Working Group on Sustainability composed of interested students, faculty, administrators and staff to oversee sustainability efforts. In 2009 the Faculty Assembly approved a revised Mission of the College to include the teaching and practice of environmental sustainability.

Castleton's Climate Action Plan sets a three phase timeline to achieve climate neutrality. Based upon the data collected from 1990 to 2006 Greenhouse Gas Emissions Inventory, Phase I seeks to reduce greenhouse gas emissions by 25 percent in ten years, by 2021, by continuing to incorporate energy efficiency measures including green building design for all new construction, energy efficient retrofitting of existing structures, energy use reductions tied with the real-time electric metering program, and the creation of a composting program to reduce our solid waste stream. Phase II sets the greatest reduction rate of 75 percent. This ambitious goal is set to coincide with the 250<sup>th</sup> anniversary of Castleton College in 2037. Phase II carbon reduction measures will be achieved with the installation of a renewable-powered heating and energy producing facility and institutional policies and advanced technologies to decrease emissions from commuter and fleet transportation. Phase III seeks to achieve carbon neutrality by 2057 by reducing the remaining 25 percent through advances in green technologies and, if necessary, the purchase of carbon offsets. These mitigation efforts will be tracked by biennial greenhouse gas emissions inventories. As a first step toward achieving the goals of this Commitment, it is strongly recommended that the College perform an updated Greenhouse Gas Emissions Inventory and commission a Comprehensive Thermal Efficiency and Energy Use Audit for all buildings as soon as possible. It is further

recommended that the Sustainability Work Group oversee the revisions and implementations of the Climate Action Plan.

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### **About the Presidents' Climate Commitment**

As of this writing, 667 presidents have signed on their colleges and universities to The American College and University President's Climate Commitment (ACUPCC). The introduction of the text of that Commitment reads:

We, the undersigned presidents and chancellors of colleges and universities, are deeply concerned about the unprecedented scale and speed of global warming and its potential for large-scale, adverse health, social, economic and ecological effects. We recognize the scientific consensus that global warming is real and is largely being caused by humans. We further recognize the need to reduce the global emission of greenhouse gases by 80% by mid-century at the latest, in order to avert the worst impacts of global warming and to reestablish the more stable climatic conditions that have made human progress over the last 10,000 years possible.

While we understand that there might be short-term challenges associated with this effort, we believe that there will be great short-, medium-, and long-term economic, health, social and environmental benefits, including achieving energy independence for the U.S. as quickly as possible.

We believe colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society. These colleges and universities will be providing students with the knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop.

We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs,

attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities.<sup>3</sup>

In the fall of 2007, more than 500 students signed a petition to encourage President Dave Wolk to sign Castleton College onto the American College and University President's Climate Commitment, and at the 2008 spring Convocation, President Wolk publicly signed and enthusiastically endorsed the College to this important commitment. That year, the College submitted its first Greenhouse Gas Emissions Inventory to ACUPCC and agreed to participate in Recyclemania and institute an Energy Star appliances purchasing policy. Castleton College is also an active member of the Association for the Advancement of Sustainability in Higher Education (AASHE) that strongly supports the ACUPCC.

The writing of this Climate Action Plan is the next step in fulfilling the Commitment. The Climate Action Plan charts a course for the College to achieve carbon neutrality as soon as possible. The Plan sets short-term and long-term goals and mitigation strategies to achieving a zero-carbon footprint. It also describes current sustainability efforts at the College, analyzes baseline greenhouse gas emissions data, and establishes a means to track, revise, and implement the Plan.

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<sup>3</sup> From "Text of the American College and University President's Climate Commitment" at <http://www.presidentsclimatecommitment.org/about/commitment>. Retrieved June 22, 2011.

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## **About Castleton and Sustainability**

Castleton College of Vermont has been described by President Dave Wolk as the “small college with a big heart.” According to Castleton’s website, “With 1900 full-time [and 200 part-time] undergraduate students, Castleton is small enough to be a community where individuals matter, yet large enough to offer a diverse and challenging curriculum with more than 30 academic programs, 40 student clubs and organizations, and 20 varsity sports” (bracketed text added).<sup>4</sup> Effective teaching is the primary mission of the College. Class sizes are small with a student to faculty ratio is 14 to 1. The campus also enhances the feeling of community. Twenty buildings are located on 165 acres in beautiful, rural Vermont. All of the buildings have been renovated or rebuilt and enlarged within the last six years to update the physical space for better learning and living. There have been significant renovations to the Fine Arts Center and science building, a large addition of a TV studio and Communications wing to Leavenworth Hall, and a new Student Campus Center, which was awarded the Gold LEED certification in 2010. As well, the Facilities building will be razed and rebuilt beginning in 2011. In addition, sporting facilities have been substantially enhanced including a new sports stadium, renovated fields and gyms, and the purchase of an indoor ice rink in the nearby City of Rutland. In conjunction with this growth, the number of students seeking on-campus housing has increased in recent years resulting in the construction of three small and energy efficient residence halls. Another residence hall will be started this year, which has also been designed to achieve a LEED certification. Even with a commitment to green building for future construction, increased populations and the added square footage of building on campus makes reducing our carbon footprint an even greater challenge.

In spite of its growth in size and numbers, Castleton has made an institutional commitment to advance sustainability and foster a culture of responsible environmental citizenry of its students and employees. Castleton’s Mission was revised and approved by the Faculty Assembly in 2009 to include the important concepts of civic engagement and sustainability. Castleton’s Mission reads:

Castleton, the 18th oldest institution of higher education in the United States, emphasizes undergraduate liberal arts and professional education while also offering selected graduate programs.

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<sup>4</sup> See “Facts and Figures” at [www.castleton.edu](http://www.castleton.edu). Retrieved June 16, 2011.

The College is dedicated to the intellectual and personal growth of students through excellence in teaching, close student-faculty interaction, numerous opportunities for outside-the-classroom learning, and an active and supportive campus community.

**Castleton strives to learn, use, and teach sustainable practices. The College prepares its graduates for meaningful careers; further academic pursuits; and engaged, environmentally responsible citizenship.**

As a member of the Vermont State Colleges, Castleton is committed to supporting and improving the region's communities, schools, organizations, businesses, **and environment.** (underscoring and bold added)

The underscored sections were added to the Mission to express the College's commitment to the importance of living and learning sustainability.

Sustainability has been advanced across the college community in multiple ways. Faculty has enhanced and added curricula related to sustainability. New courses such as Science of Sustainability, Anthropology and the Environment, and a summer Sustainability class for high school students have been added. Additionally, existing courses such as Environmental Harm and Mitigation Strategies, Globalization and the Environment, and Environmental Ethics have placed greater focus on environmental sustainability. A number of course-embedded service learning projects related to sustainability have also been done in recent years including the creation of the campus recycling program that partnered with Casella Waste Management, the first greenhouse gas emissions inventory co-taught with staff from Clean Air-Cool Planet, a food waste reduction campaign, a real-time electric metering program, a bicycle program, a campus rain garden project, and an annual watershed cleanup project partnered with the Nature Conservancy. Students and faculty have also attended and presented on the sustainability efforts at Castleton at many national conferences including AASHE conferences (2010, 2008, 2006), Smart and Sustainable Campus conferences (2009, 2008), and Greening of the Campus conferences (2009, 2007).

Students have had the greatest impact on advancing sustainability practices at the College, and there have been numerous student-led sustainability projects and programs since Castleton's Green Campus Initiative began. From its beginning in 2005, students have managed and been the principle laborers of a comprehensive recycling program. In fact, virtually every Castleton student has actively participated in collecting and processing recycling as part of their first year seminar class. In 2006, students created the Sustainability Club (to be renamed the Green Campus Club in fall 2011) that has produced bio-diesel fuel, organized energy saving awareness campaigns, and sponsored annual Earth Day celebrations. In fall 2007, students of Community Action Seminar, as their service-learning project, researched and proposed that the College install sub-meters, also known as real-time meters or smart meters, in all buildings on campus to raise awareness for the community of energy use. The following semester, the Student Government Association voted to expend \$8,000 from student activity funds to purchase the first sub-meters to be installed in residence halls. Residence Life staff has created an Eco-Rep program which has engaged students and staff in various programs including

Sustainable Theme Living Community in the residence halls, light bulb exchange programs where students turn in incandescent lights for low-energy compact fluorescents, and a tap water vs. bottled water survey to raise awareness about the negative environmental effects of plastic water bottles. Currently, Eco-Reps are coordinating with students from the Computer Science program to demonstrate the results from data collected from the real-time electricity meters in all buildings on campus. Eco-Reps will use this data for awareness campaigns about electricity usage and conservation. In spring 2011, the first residence halls competitions were held to determine which hall could reduce electricity usage the most. As well, students have also been instrumental in working with Aramark Corp. on trayless dining and food waste reduction. And the Student Government Association voted to allocate a percentage of student activity fees for annual sustainability projects. These have included the purchase of outdoor recycling bins, support for a commuter bus service, and the initial funding for real-time electricity meters in the residence halls.

Institutional policies and decision-making have also reflected the College's commitment to advancing sustainable practices. President Dave Wolk has been a strong advocate for sustainability, and he moved the College in this direction by signing the Talloires Declaration at the Earth Day Celebration on April 25, 2007. President Wolk subsequently ordered the creation of the Work Group on Sustainability (a.k.a. Sustainability Work Group (SWG)) – a group of students, faculty, administrators and staff to oversee sustainability efforts. At spring Convocation 2008, President Wolk signed the College onto the President's Climate Commitment. Recent institutional policies have also been adopted to advance sustainability. These include a policy to purchase products made from post-consumer goods, a College Book Store purchase policy of non-sweatshop products, and an Indoor Environmental Quality Policy that sets heating and cooling thresholds to save energy and reduce GHG emissions. The College has also gone to electronic billing and correspondence to reduce paper usage, as well as the purchase of hybrid and/or electric vehicles to replace vehicles in the campus fleet. Additionally, there have been multiple retrofittings and changes to the physical structures on campus, many in collaboration with Efficiency Vermont, to conserve energy and reduce waste. These included the replacement of incandescent lights with CFLs and other low energy lighting, adding of Energy-Miser systems to all vending machines, LED exit lighting, and motion-detecting sensor lighting in public spaces. Castleton has also adopted a green design policy for all new construction on campus. As a result, the three newest residence halls – North, South and Audette - were built to include multiple energy efficient components, and the newly completed Campus Center has earned the Gold LEED certification. Likewise, a soon-to-be constructed residence hall and Facilities buildings have been designed to LEED specifications.

Clearly, there has been a significant culture shift at Castleton to embrace sustainability. Castleton College sets itself as a positive model for its students, staff, and the surrounding communities for responsible environmental citizenry. Even with the many fine efforts by the College, many challenges remain as Castleton grows bigger and tries to be greener at the same time. Perhaps the largest challenge is the goal of achieving carbon neutrality.

The writing of this Climate Action Plan, thus, sets the path for College into the future to continue to advance sustainable living and learning at Castleton College and beyond.

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## **Greenhouse Gas Emissions at Castleton**

In spring 2007, students in the “Community in American Society” class conducted a Greenhouse Gas Inventory of Castleton State College as the service-learning component for their class. Students worked directly with staff from Clean Air - Cool Planet both in class and outside the classroom to collect and analyze data of the anthropogenic greenhouse gas emissions from the College for the years 1990 to 2006. The purposes of the inventory were to clarify the sources of greenhouse gas emissions and establish baseline levels of carbon dioxide, methane, nitrous oxide and other greenhouse gas producers and to act as a guide for short-term and long-term reduction policies for the College. Most of the data for this Climate Action Plan are based upon this GHG inventory. Modifications and updates made were possible from a partial Greenhouse Gas Inventory performed by a student intern in 2008 and updated information on electricity usage, building square footage, enrollments, and other recent changes to the campus.

### ***Important terms needed to understand a greenhouse gas emissions inventory***

1. **eCO<sub>2</sub>** stands for carbon dioxide equivalents, which is a universal standard of measurement for the impacts caused by releasing greenhouse gases. eCO<sub>2</sub> is calculated using the global warming potential (GWP) of each greenhouse gas. The GWP of CO<sub>2</sub> is arbitrarily set at 1. Because methane (CH<sub>4</sub>) traps 23 times more heat than CO<sub>2</sub>, its GWP is 23. Therefore, if Castleton State College releases 1 kg of CO<sub>2</sub> and 1kg of CH<sub>4</sub>, 24kg eCO<sub>2</sub> are released.
2. **One Metric Tonne** is 1000 kilograms or 2200 pounds. One metric tonne of CO<sub>2</sub> is enough CO<sub>2</sub> to fill 509 square meters or a cube approximately 8 meters on each side, with pure CO<sub>2</sub>.
3. **MTCDE** is an abbreviation for Metric Tonnage of Carbon Dioxide Equivalents.
4. **Btu** is an abbreviation for the British thermal unit. One Btu is the amount of heat needed to raise one pound of water one degree Fahrenheit. **MMBtu** = one million Btu.

### ***Greenhouse Gas [GHG] Emission Sources:***<sup>5</sup>

Greenhouse Gas emissions have been divided into three categories based on scope and emissions source. The three scopes represent varying levels of responsibility for emissions based

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<sup>5</sup> Information for this section is adapted from Clean Air-Cool Planet Campus Carbon Calculator User’s Guide, Version 6, August 2008, American College and University Presidents’ Climate Commitment, Implementation Guide, September 2007, and thanks to Dickinson College’s Climate Action Plan Working Group, September 15, 2009.

on how directly they can be controlled by the institution. Scope descriptions and how they relate to Castleton College are as follows:

**Scope One GHG Emissions** are owned or controlled by the College. At Castleton, scope one emissions include on-campus fossil fuel combustion; that is, burning of distillate oil and propane for heat. Note that this is described as “on-campus stationary” sources in the GHG inventory data. Scope One emissions also include GHG emissions from fleet vehicles and from refrigerants and fertilizers.

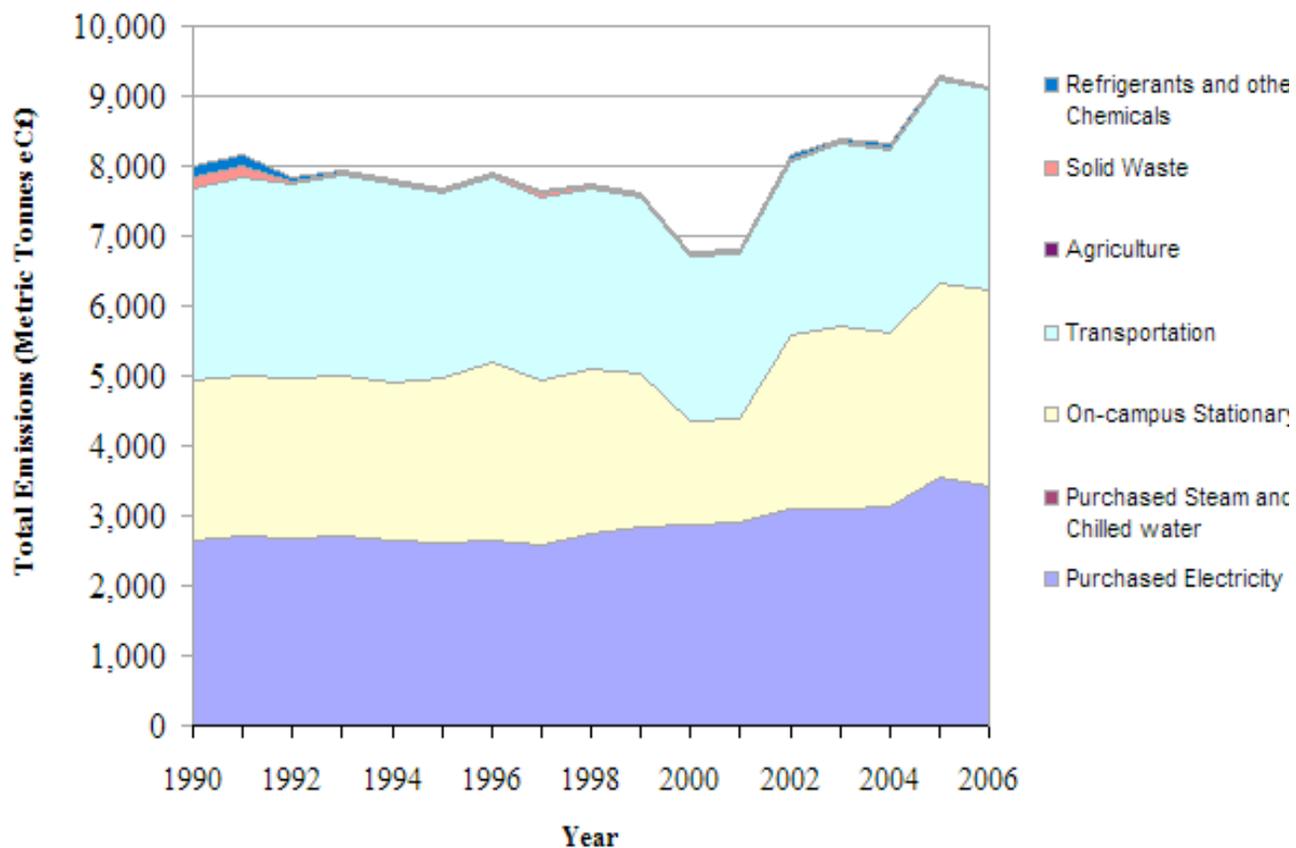
**Scope Two GHG Emissions** are neither owned nor operated by the college but are directly linked to the institution’s energy consumption. Scope Two GHG emissions at Castleton are its purchased electricity, all of which at this time comes from Central Vermont Power Service (CVPS).

**Scope Three GHG Emissions** are neither owned nor operated by the institution but are directly financed by the institution or the result of an encouraged or required behavior. At Castleton, Scope Three GHG emissions include the disposal of solid waste, air travel directly financed by the College, study abroad air travel, and commuting by students, faculty, and staff.

According to guidelines set forth by the ACUPCC, participating colleges and universities agree to report all Scope One and Two emissions, and to the best of their ability the GHG emissions from Scope Three. Below is a summary of GHG emissions per the 1990 to 2006 Castleton GHG Emissions Inventory.

### ***Summary of Castleton’s Greenhouse Gas Emissions***

The following graph shows Castleton College’s GHG emission in total Metric tonnes and by emission type from the years 1990 to 2006.



Total Greenhouse Gas Emissions<sup>6</sup> in Metric Tonnage of Carbon Dioxide Equivalents (MTCDE) for the years 1990 to 2006 were 134,397 MTCDE. This averages to 7905 MTCDE per year. Predictably, total greenhouse gas emissions fluctuated with student enrollment trends, with emissions per student remaining relatively consistent between 4.4 and 5.0 MTCDE per full-time equivalent student per year. There has, however, been a marked increase in GHG emissions since 2002 and especially in 2005 and 2006. The following chart shows percent increases since 2002 compared to the average:

Year	MTCDE	% compared to average 7905 MTCDE
2002	8116	+2.7
2003	8363	+5.8
2004	8275	+4.7
<b>2005</b>	<b>9265</b>	<b>+17.2</b>
<b>2006</b>	<b>9110</b>	<b>+15.2</b>

<sup>6</sup> Note that On-campus Stationary emissions are composed of heating fuel oil and propane (Scope One emissions). The College has no emissions from purchased steam and chilled water or from agriculture.

Increases in greenhouse gas emissions since 2002 can be attributed in part to a steady increase in student enrollments. The sharp increases in 2005 and 2006 are also attributable to increased square footage of campus buildings. There was a 16.6% increase in building square footage, from 508,020 sq ft to 592,368 sq ft, in 2005 and 2006 corresponding to the expansion of Castleton Hall and the completion of the North, South, and Audette residence halls. This matches the approximate 16% increase in MTCDE in those years. The slight drop off in 2006 is possibly due to decreased electrical usage from shutting down the Fine Arts Center in the summer for reconstruction (specifically, from shutting down the air conditioning system) and, hopefully, from energy efficiency measures taken throughout the College in 2006; for example, many old lighting sources were replaced with new energy efficient types that year.

The following chart shows the breakdown of total percentage to the MTCDE emissions by scope and source in the year 2005, which is used as the baseline for the Climate Action Plan:

Percentage of Total MTCDE by Scope and Source in 2005

Electricity – Scope Two	38%
Transportation – Scope One & Three	32%
Fuel Oil, Propane, Fleet – Scope One	30%
Solid Waste – Scope Three	>.5%
Refrigerants, Fertilizers – Scope One	>.5%

Percentages of total GHG emission sources have remained consistent over time, with the exception of emissions from solid waste, which diminished significantly when Casella Waste Management, a crucial community partner in Castleton’s Green Campus Initiative, went to a landfill cap and methane recovery facility in the mid-1990s. The data demonstrates that three source types account for virtually all of the GHG emissions associated with the College. Purchased electricity (scope two) is the primary source of GHG emissions. This is followed closely by emissions from transportation sources which includes faculty and student commuter travel, by far the largest percentage (scope three), and to a lesser degree emission from the campus fleet (scope one) and college-financed air travel (scope three). The third source for GHG emissions is the burning of distillate fuel oil and propane (scope two) to heat campus buildings.

Electricity, which the college purchases from Central Vermont Public Service, is the primary source of greenhouse gas emissions (38% of total). The following graph shows updated information on total electricity usage through the year 2010:

YEAR	Total kWh
1990	3,871,970
1991	3,964,662
1992	3,913,336
1993	3,961,706
1994	3,828,628

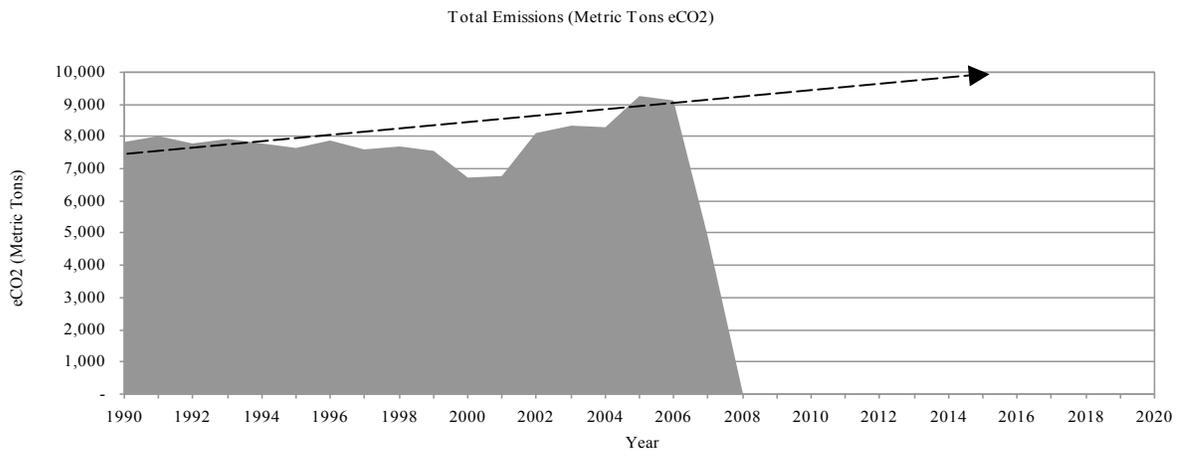
1995	3,788,654
1996	3,833,338
1997	3,760,006
1998	3,988,231
1999	4,120,766
2000	4,171,391
2001	4,218,471
2002	4,497,955
2003	4,505,890
2004	4,563,705
2005	5,142,849
2006	4,982,771
2007	4,965,764
2008	5,019,249
2009	5,272,896
2010	5,308,373

Note that although electricity usage has fluctuated with enrollment trends over the nineteen year period, there has been a general increase over time and a significant increase of greater than 10% to the mean since 2005. Further, it appears that slight reductions in 2006 and 2007, probably due to energy reduction measures taken by the College and building closures, have been offset by increasing electricity usage in 2008, 2009 and 2010.

GHG emission from electricity usage is followed by those attributable to transportation (32%). The major GHG emissions source from transportation, more than 90%, comes from students, faculty, and staff commuter travel (scope three), with most of that, about 80%, from student commuting. Mitigating this source will be a major challenge given that about one-half of the students live off campus and the fact that Castleton has a rural location. A 2007 survey of commuter travel showed that students drive an average of 11 miles one-way to campus. About 6% of GHG emissions from transportation are derived from the campus fleet (scope one) and about 3% from college-financed air travel (scope three). On-campus stationary source emissions account for the remaining 30% of total emissions. These include Scope One sources such as the burning of fossil fuels to heat campus buildings, which is the burning of distillate fuel oil in the College's steam plants, which accounts for the vast major of on-campus stationary source emissions at about 97%, and the limited use of propane that accounts for about 3%.

Although this pattern of GHG emissions has remained consistent over the study period, there have been general increases in all of the major sources of greenhouse gas emission producers on campus. Notably, since 2006 there have been significant changes to the campus that will further increase the College's carbon footprint. For example, a number of construction projects have taken place since 2006 including the construction of a sports stadium, the reconstruction of the gymnasium and other athletic facilities, the purchase of an indoor ice rink, the expansion of the science and communications

buildings, the renovation and enlargement of the Campus Center, and the construction of three new residence halls. As a result the physical footprint of the College has increased xxx percent to a total of xxx square feet as of 2010. [requested data from Rick Wareing]. As well, in 2011, the College broke ground for the construction of a new Facilities building and a new residence hall. It remains to be seen how the combination of growing larger and acting greener will effect GHG emissions. A necessary short-term action will be the necessity to perform an updated GHG emissions inventory that adequately reflects current conditions at the College. The following graph shows a business-as-usual projection of GHG emissions to the year 2020. At these rates, GHG emissions would eclipse 10,000 MTCDE per year by 2020.




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## **Goals and Mitigation Strategies to Carbon Neutrality at Castleton**

Castleton’s Climate Action Plan sets a three-phase timeline to achieve climate neutrality. Greenhouse gas mitigation measures used for the Plan are based upon the 1990 to 2006 Greenhouse Gas (GHG) Emissions Inventory as summarized above. For the purposes of this Climate Action Plan, year 2005 data figures for Metric Tonnage of Carbon Dioxide Equivalents (MTCDE) and Scope One, Two, and Three emissions sources are used as baseline data to measure and track reductions in GHG emissions over the three phases. 2005 data is used because it represents the highest GHG emission totals for that study period. It is important to note upfront that a new GHG Inventory needs to be performed

as soon as possible to gather up to date information in order to set more accurate measures and mitigation strategies.<sup>7</sup> This is particularly important because the College has undergone significant increases to its physical footprint since 2006 with the addition of sports facilities, enlargements to many existing structures, and the construction of new buildings. At the same time, the College has incorporated many energy reduction measures through student and institutional programs and the College's collaboration with Efficiency Vermont. As GHG emissions information is updated, the Climate Action Plan will be revised to provide more accurate numbers and mitigation strategies. The following chart from the Clean Air-Cool Planet Carbon Calculator shows details of total GHG emissions by source in 2005.

Chart of GHG Emissions by Source for Year 2005

Select Year -->	2005	Energy Consumption	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>	eCO <sub>2</sub>
		MMBtu	Kg	kg	kg	Short Tons	Metric Tonnes
<b>Purchased Electricity</b>		42,991	3,529,745	24	10	3,895	<b>3,533</b>
<b>Purchased Steam/Chilled Water</b>		-	-	-	-	-	-
<b>Stationary Sources</b>		38,156	2,755,269	495	24	3,058	<b>2,774</b>
<b>Non Co-Gen</b>		38,156	2,755,269	495	24	3,058	<b>2,774</b>
<b>Co-Gen Electric</b>		-	-	-	-	-	-
<b>Co-Gen Steam</b>		-	-	-	-	-	-
<b>Transport Total</b>		40,222	2,860,683	557	192	3,230	<b>2,930</b>
<b>University Fleet</b>		1,766	124,139	24	8	140	<b>127</b>
<b>Student Commuters</b>		33,325	2,340,130	465	160	2,644	<b>2,398</b>
<b>Faculty/Staff Commuters</b>		4,845	340,138	68	23	384	<b>349</b>
<b>Air Travel</b>		286	56,277	1	1	62	<b>56</b>
<b>Agriculture Total</b>		-	-	-	0	0	<b>0</b>
<b>Solid Waste</b>		-	-	1,035	-	26	<b>24</b>
<b>Refrigeration</b>						4	<b>4</b>
<b>Total</b>		<b>121,370</b>	<b>9,145,697</b>	<b>2,111</b>	<b>227</b>	<b>10,213</b>	<b>9,265</b>

***Castleton's Goal: Three Phases to Carbon Neutrality***

Phase I seeks to reduce greenhouse gas emissions by 25 percent in ten years, by 2021. Phase II will set the greatest reduction rate of 75 percent and is targeted to coincide with the 350<sup>th</sup> anniversary of Castleton College in 2037. Phase III seeks to reduce the

<sup>7</sup> An updated GHG inventory is scheduled in spring 2012 as a service-learning project.

remaining 25% to achieve carbon neutrality by 2057. The following chart shows reduction amounts in total MTCDE for each phase based upon the 2005 baseline data:

Total MTCDE Targeted Phase Reductions Timeline:

Baseline Year 2005 = 9,265 MTCDE

Phase I Year 2021 Goal at 25% reduction = 6,949 MTCDE

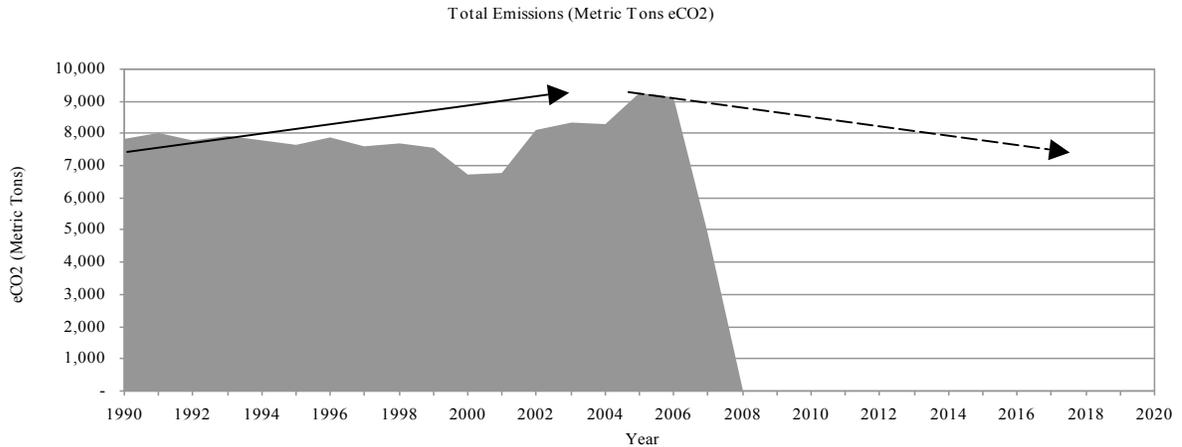
Phase II Year 2037 Goal at 75% reduction = 2,316 MTCDE

Phase III Year 2057 Goal at 100% reduction = 0 MTCDE

***Phase I Mitigation Strategies: 25% by 2021 through Energy Conservation with Reductions to Scope One and Two Emissions and Composting***

Phase I mitigation seeks to reduce total GHG emissions by 25% by 2021. This modest reduction is recommended given current economic conditions, anticipation of challenging demographic population trends in Vermont in upcoming years, and the current condition of campus facilities and in-place efficiency measures. The 25% reduction will be achieved by additional energy efficiency measures, beyond that which are already in place, to campus facilities to reduce GHG emissions primarily from purchased electricity and the burning of fossil fuels to heat campus buildings. To achieve an overall 25% reduction by 2021, Phase I sets a goal to reduce Scope One emissions from the burning of fossil fuels by 25%. In metric tonnes of carbon equivalents, Scope One emission would be reduced by 726 MTCDE from 2905 MTCDE in year 2005 to 2179 MTCDE in year 2021. Scope Two emissions from purchased electricity are to be reduced by 45%. Scope Two emissions would be reduced by the more aggressive amount of 1590 MTCDE from 3533 MTCDE in year 2005 to 1943 MTCDE in year 2021. In addition, minimal reductions in carbon emissions will be achieved from the creation of an on-campus composting system to reduce the solid waste stream (Scope Three emissions). Phase I mitigation strategies described below are generally qualitative because additional data is needed from an updated Greenhouse Gas Emissions Inventory and a Comprehensive Thermal Efficiency and Energy Use Audit. Once these are performed, more precise quantitative mitigation measures can be applied. After the initial revisions, biennial GHG inventories should be used to assess and revise as needed.

The following graph shows projected reductions to the year 2020.



**Scope One Emissions** at Castleton College include on-campus fossil fuel combustion; that is, GHG emissions from the burning of distillate oil and propane, gasoline and diesel fuels used in fleet vehicles, and emissions from refrigerants and fertilizers.

Scope One Emission Sources by percentages of Scope One total

Distillate Oil	Propane	Gas Fleet	Diesel Fleet	Fertilizer/Refrigerants
93%	2%	5%	1%	>1%

The burning of distillate fuel oil to heat campus buildings accounts for the vast majority of Scope One emissions (93%). Thus, reducing this source will need to account for much of the 25% reduction targeted to Scope One sources in Phase One. Scope One emissions are solely owned and operated by the institution, and thus are said to be the least problematic to control. However, the current steam generated heating system is not scheduled or intended to be altered, converted or replaced by a new system over the next ten years. Therefore, efficiency and conservation measures will need to be used. The College has already set this course in the correct direction in a number of ways. For example, the College has adopted a green design policy for new construction. The result of this is already visible with the many energy efficiency mechanisms incorporated in the construction of the three most recent residence halls – North, South, and Audette Houses. In addition to having multiple electricity saving measures such as low energy lighting and motion lighting in public areas, these buildings also are heated by an on-site propane system, which is much more efficient than the oil heated steam system that services most of the rest of the campus. As well, the new Campus Center was completed in 2009 and engineered under LEED certification specifications. The goal for the new Campus Center was to achieve a Silver LEED certification; the actual result was the earning of Gold LEED certification as of 2010. In 2011, construction of a new residence hall and Facilities building will begin; these buildings will also incorporate green design measures. Thus, as the College’s buildings and facilities change, they will become more efficient, which should reduce the College’s overall carbon footprint, as well as save money. The College has taken another step to reduce emissions from heating by adopting an Indoor Environmental Quality Requirements Policy in spring of 2011. This policy sets heating and cooling limits. The heating threshold maximum is 68 degrees

Fahrenheit for all campus buildings during the winter heating months from October through April in Vermont. Previously, the College had no official policy for heating and cooling, but the *de facto* temperature was set at 70 degrees Fahrenheit. According to Professor George Hooker, there is a 4% savings in energy use for every one degree lowered. Thus, this policy should show an 8% savings in energy and associated costs for heating. Regarding emissions from fleet vehicles, the College has a policy to replace travel vehicles with hybrid vehicles to greatly reduce gas usage. To date, the College has replaced four vehicles with hybrid cars. In addition, President Wolk and the Sustainability Work Group are pushing to replace suitable utility vehicles with solar-powered vehicles. Historically, the College has used very minimal fertilizers on campus grounds. Even so, the staff has agreed to use no fertilizers in the future. It is also recommended that the College carefully consider when air conditioning is necessary for future needs and consider alternatives where appropriate. The results of these changes to the campus GHG emissions have yet to be measured, but they do set the College in the right direction.

It is certain that greater mitigation strategies will be needed to improve energy efficiency in all campus buildings. In order to accomplish this, the College needs to commission a Comprehensive Thermal Efficiency and Energy Use Audit for all buildings. It is recommended that the College undertake such an audit within the next two years. Results from the audit can then be used to retrofit heating, cooling, ventilation or other energy-use systems in existing buildings to become more efficient.

**Scope Two Emissions** come from purchased electricity. Currently, Castleton College purchases all of its electricity from Central Vermont Public Service, with the exception of one, small solar station that is used to power only the College's small observatory. As noted in the GHG inventory summary above, purchased electricity is the largest source of GHG emissions at 38%. As well, there has been an overall trend of increased electricity use since 1990 and especially since 2005 with the growth in student enrollments and campus building square footage. After slight reductions in electricity usage in 2006 and 2007, there were sharp increases from 2008 to 2010 (see chart above page 13). This is somewhat surprising given the multiple programs and measures the College has undertaken in the last five years to reduce electricity usage. Castleton has worked closely with Efficiency Vermont, a non-profit organization that provides technical assistance and financial incentives to help Vermont homeowners and businesses with energy-efficiency measures and to reduce energy costs.<sup>8</sup> According to Efficiency Vermont's Castleton Customer History Report dated January 16, 2011, the College has participated in twenty-three different energy efficiency programs in collaboration with Efficiency Vermont. From these programs, the College has a cumulative energy savings of 3,297,200 kWh,

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<sup>8</sup> Efficiency Vermont provides technical assistance, rebates, and other financial incentives to help Vermont households and businesses reduce their energy costs with energy-efficient equipment, lighting, and approaches to construction and major renovation. Additionally, we partner extensively with contractors, suppliers, and retailers of efficient products and services throughout the state. Efficiency Vermont is operated by a private nonprofit organization, the Vermont Energy Investment Corporation, under an appointment issued by the Vermont Public Service Board (from "About Us" at [www.encyvermont.com](http://www.encyvermont.com)).

representing a 19.1% savings as a percent from baseline usage, and \$362,700 in cost savings. According to the projected electricity usage without these measures, Castleton would be consuming nearly 6.3 million kWh in 2010 rather than the 5,308,373 million kWh actually consumed. While the declared savings from these programs are certainly significant and crucial to reducing GHG emissions, there continue to be nearly annual increases in electricity usage. It will be challenging to reverse this trend in this age of electronics, but it is a critical key to achieving the goals of the Presidents' Climate Commitment. The College, again, appears to be headed in the right direction. In addition to the many programs mentioned, there are several other reduction measures in place or in process. One of these as mentioned above is the newly adopted Indoor Environmental Quality Requirements policy which has sets winter heating and the summer cooling thresholds. Since air conditioning systems are powered by electricity, the summer cooling limit at 74 degrees Fahrenheit will regulate and hopefully lessen that emissions source. There are also a number of student-led energy savings projects. For example, Residence Life staff has organized three light bulb exchange programs to replace older incandescent bulbs with energy efficient CFLs, and energy conservation awareness campaigns are routinely held for students living on campus. Another important program with the potential for significant energy and cost savings is the real-time electric metering program. In fall of 2007, students of Community Action Seminar as their service-learning project, researched and wrote a multiple year plan for the College to install sub-meters, also known as real-time electricity meters or smart meters, in all buildings on campus.<sup>9</sup> The President's Cabinet accepted the student proposal, and in spring 2008 the Student Government Association voted to expend \$8,000 from student activity funds to purchase the first sub-meters to be installed in designated residence halls. Since then the program has grown, and in spring 2010 the College was awarded an \$84,000 grant to install electric sub-meters for all buildings on campus. Students, administrators, and Facilities staff worked with Johnson Controls Inc. to install meters and integrate the data.<sup>10</sup> Andrew Hicks ('11), a recent Computer Science graduate, worked closely with Facilities staff and Johnson Controls to develop software to make the data accessible to the campus community. Now that this data is in a usable format, it will be analyzed to set policies and procedures to significantly reduce electricity usage and save costs by discovering peak usage patterns and to educate the campus community about their use behaviors. A major goal for this project is to provide hands-on education to change the culture of energy use on campus. This year, the Eco-Reps are working with students from the Computer Science program to show results of the real-time electricity meters in all buildings on campus, and in spring 2011 during Earth Week, Eco-Reps held the first residence halls competitions to determine which hall could reduce electricity usage the most. The real-time metering program is to become a lynchpin to raise awareness, change behaviors, and provide significant reductions in electricity use at the College. It is hoped that by adding efficiency measures and changing the culture of unconscious electricity usage to a culture of awareness and conservation, the College will be able to achieve the very optimistic goal of a 45% reduction in electricity usage in ten

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<sup>9</sup> See *Smart Meters: Education for a Greener Tomorrow at Castleton State College, Vermont*, prepared by Community Action Seminar, December 18, 2007

<sup>10</sup> Johnson Controls Inc. has a portion of its website devoted to their sustainability efforts. See <http://www.johnsoncontrols.com/publish/us/en/sustainability.html>.

years. If this cannot be achieved by behavior change and efficiency measures alone, this report recommends the purchasing of renewable electricity sources from its electricity provider and/or the installation of on-campus renewable energy sources. In Vermont, the Cow Power ® program is being established in partnership with CVPS to provide affordable renewable energy to customers and greatly reduce methane emissions from dairy farming.<sup>11</sup> Other institutions such as nearby Green Mountain College, have agreed to purchase a portion of electricity from Cow Power. One idea raised by students would be to purchase renewable electricity such as Cow Power by having students vote to add a modest charge to their tuition and fees. Another alternative would be for the College to add on-campus renewable energy sources such as solar or wind power. The College currently has one small solar station that has only been used to power the astronomical observatory. Use of that station could be expanded to charge electric-powered vehicles. It is recommended that Castleton undertake a cost-benefit analysis of adding solar and perhaps wind energy producers on campus.

**Scope Three Emissions** at the College include the disposal of solid waste, air travel directly financed by the College, study abroad air travel, and commuting by students, faculty, and staff. Phase I mitigation calls for the creation of an on-campus composting system for food waste to reduce the solid waste stream. Overall, emissions from solid waste represents a very small percentage of GHG emissions – in 2005 Solid Waste produced 24 metric tonnes of CO<sub>2</sub>, which is less than one-half a percent of carbon emissions. Solid waste is a small percentage because Casella Waste Management Inc., a major community partner with Castleton College in sustainability endeavors, went to a methane recovery and burn landfill system in 1992 and upgraded to a recovery and electricity generation landfill system in 2004. Nevertheless, waste from food services is a significant portion of the solid waste stream at the College. For example, the main dining hall alone produces approximately 40 pounds of waste scraps per day and much more in prepared food waste. Rather than collecting and transporting this waste via fossil fueled vehicles (a source of GHG emissions that is not considered in Castleton’s inventory), an on-campus composting program could be created, the end product of which could be used by the College or given to local farmers who have expressed great interest in getting this composted material for their farms.

Because Phase I goals are dependent upon the data needed from an updated Greenhouse Gas Emissions Inventory and a Comprehensive Thermal Efficiency and Energy Use Audit, mitigation strategies will need to be revised accordingly. After the initial revisions, biennial GHG inventories should be used to assess and revise the Climate Action Plan.

### ***Phase II Mitigation Strategies: 75% by the 250<sup>Th</sup> - Cutting the Addiction to Fossil Fuels and Anticipating Advances in Green Technologies***

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<sup>11</sup> Methane gas is 23 times more effective at trapping heat in the atmosphere than carbon dioxide. Thus, the transformation of animal waste from dairy farming to a carbon-based power source greatly reduces associated GHG emissions. CVPS has an excellent website explaining the process and benefits of Cow Power at <http://www.cvps.com/cowpower.html>.

Phase II projects the greatest GHG emission reductions of 75% from the 2005 baseline year. This ambitious goal set for the year 2037 will coincide with the 250<sup>th</sup> anniversary of Castleton State College, the 18<sup>th</sup> oldest college in the United States, founded in 1787. Phase II carbon reduction measures will be achieved through a radical diminished use of fossil fuels, specifically from the installation of a new heating system that will be powered by a renewable energy source. Phase Two also prescribes increased renewable electric energy sources and a significant decrease in emissions from commuter transportation. As well, it is assumed that advances in green technologies will be help meet the Phase II goal.

Phase II will reduce GHG emissions to 2,316 Metric Tonnage of Carbon Dioxide Equivalents (MTCDE), or a 75% reduction to the baseline year, by 2037. Prescribed mitigation strategies are to reduce Stationary On-campus Scope One emissions – i.e. emissions from on-campus heating sources – from a current rate of 30% of total carbon emissions to 0. Scope Two emissions from purchased electricity, already cut substantially by 45% in Phase I, will be reduced an additional 15% to 1487 MTCDE in the year 2037. The remaining reductions are to come from significant decreased GHG emissions produced from commuter transportation. Metric tonnes of carbon equivalents from transportation will drop from 2930 to 1527 MTCDE. Of course, mitigation strategies projected this far into the future are speculative and will very likely need to be assessed and revised to achieve the Phase II goal.

***Scope One On-campus Stationary emissions*** at Castleton are to be reduced to 0 by the year 2037. This ambitious goal is to be achieved through the instillation of a new heating system that will be powered by a renewable energy source. To date, the College has undertaken no discussions of this drastic shift in heating systems for the campus. Nevertheless, the current steam-heat system powered by distillate oil is very inefficient and already antiquated. It is the hope that this Climate Action Plan will pursued the College to move to a renewable, on-site heating system at the time the current system will need to be replaced, which should be well prior to the target year of 2037. No specific system of renewable energy will be offered at this time. As green technologies advance over the next few decades there should be several alternatives that would not be cost-prohibitive. As examples of possible alternatives, one need only look a few miles to the south and north of Castleton to colleges that have already committed to renewable heating and power systems. These are Green Mountain College, which has converted to a biomass heat and power facility burning wood pellets<sup>12</sup> and Middlebury College, which has converted to a biomass gasification system powered by sustainable vegetation grown on site.<sup>13</sup> A similar system of renewable heating and power could be installed at Castleton College which, hopefully, would be less dependent upon products harvested from already stressed forests and agricultural lands.

***Scope Two Purchased Electricity Emissions*** were already to be reduced by 45% in Phase I. Phase II recommends an additional 15% reduction for a total of a 60% reduction

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<sup>12</sup> See *Green Mountain College Climate Action Plan*, Sept 9, 2009, update on ACUPCC Reports August 12, 2010.

<sup>13</sup> See *Climate Action Implementation Plan*, Middlebury College, August 28, 2008.

in GHG emissions from the 2005 baseline year. This would result in carbon equivalents of 1,413 MTCDE. The primary means to accomplish this goal is to use electricity produced from the new on-site heating and power facility. This is again similar to the methods currently operating at Green Mountain and Middlebury. If this degree on on-site electric power cannot be achieved, it is recommended that the College purchase renewable energies from its electricity provider as described above.

**Scope One and Three Transportation emissions** at Castleton are significant contributors to GHG emissions. In 2005, transportation contributed to 30% of all GHG emissions produced totaling 2,930 MTCDE. To achieve the Phase II overall goal of 75%, it is calculated that GHG emissions from transportations will need to be reduced by 48%. In this Climate Action Plan, all reductions are calculated from vehicular commuter travel. Transportation types are categorized into different Scope emissions sources. GHG emissions from the College’s fleet vehicles and school-sponsored air travel are considered Scope One emissions. Commuter travel by students, faculty, and staff are designated under Scope Three emissions; the most difficult to control. The following chart shows carbon emission equivalents produced from transportation in total and broken down by transportation type for the 2005 baseline year:

<b>Transport Total</b>	<b>YEAR 2005</b>	<b><u>MTCDE</u></b>
	<b>University Fleet</b>	<b>127</b>
	<b>Student Commuters</b>	<b>2,398</b>
	<b>Faculty/Staff Commuters</b>	<b>349</b>
	<b>Air Travel</b>	<b>56</b>

Clearly, emissions from student commuting produce the greatest percentage of GHG emissions related to transportation. From a 2006 survey of commuter travel at the College, it was determined that about one-half of the students at Castleton are commuters. Of those students who commute, 95% travel alone and 90% said they travel to and from campus 5 days per week during the fall and spring semesters and travel 11 miles to get to campus. From this data, it was estimated that commuter students traveled more than 5 million miles to and from the campus in 2006. Based upon 2005 enrollment figures, commuter students traveled 5,540,535 miles and consumed 250,703 gallons of gasoline. According to the Carbon Calculator provided by Clean Air-Cool Planet, the average car in 2005 traveled 22.10 miles per gallon. MTCDE figures are derived by a formula from this data; thus, in 2005 student commuters at Castleton produced 2,398 MTCDE.

It is anticipated herein that nearly all of targeted reductions to GHG emissions from commuter travel by the year 2037 will be achieved through better energy efficiency technologies. For example, if the average mpg rates go from 22.10 in 2005 to 40 mpg in

2037, a figure that seems reasonable, emissions from students, faculty and staff commuting (Scope Three) and from the College's fleet vehicles (Scope One) would, in fact, reduce GHG emissions due to transportation by 48% and carbon equivalents would be reduced by 1,403 MTCDE.<sup>14</sup>

### ***Phase III Mitigation Strategies: Becoming Carbon Neutral by 2057***

Phase III seeks to achieve carbon neutrality by 2057 by eliminating the remaining 25 percent of GHG emissions through advances in green technologies and, if necessary, the purchase of carbon offsets. At this distance into the future, it is difficult to predict let alone imagine how the College and the world will have dealt with global climate change. If predictions by most scientists are accurate and anthropogenic GHG emissions are not greatly reduced by this time, Castleton's efforts may well be too little. Nevertheless, this Climate Action Plan will chart a course based in optimism. It predicts that green technologies and the human society will meet the challenge to counteract our negative impacts on this shared environment.

Phase III carbon reductions seek to eliminate the remaining 25%, or 2,316 MTCDE, of GHG emissions. To do so, the College would need to eliminate or offset the remaining sources of GHG emissions, which would be almost entirely from emissions from purchased electricity (Scope Two) and transportation (Scopes One and Three). The remaining carbon emissions from purchased electricity will be 1,413 MTCDE. These will be eliminated by a combination of on-site energy production from a sustainable heat and power system installed in Phase Two, by the addition of more on-site renewable energy production measures such as solar or wind power or some other green technology, or from the purchase of carbon offsets; this would be the least desirable mitigation method. Similarly, the remaining 1,527 MTCDE produced by transportation will need to be eliminated. It is hoped that well before this time petroleum-based fuels will have been depleted or displaced by non-GHG producing transportation. If technologies have not reached this level, the College would need to purchase carbon offsets to cancel emissions from commuter and college-based transportation. Other sources of GHG emissions from solid waste and fertilizers are very minor at Castleton. With proper decision-making and sufficient technologies, these should not become a problem. The only potential area of concern relates to emissions from refrigerants. As an American Culture for a Necessity of Complete Comfort has grown, there has been an increasing demand for air conditioning.<sup>15</sup> This Plan recommends careful consideration by the College in choosing the appropriate and necessary places for air conditioning. Again, it is hoped that

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<sup>14</sup> This is calculated as follows: (1) year 2005 miles traveled students, faculty, staff, and fleet totaled 6,235,585 miles; (2) gallons of for commuters and fleet = total gallons 282,035. At 40 mpg, gallons of gas are reduced to 155,890. At a factor of .009 MTCDE per gallon of gasoline, the total MTCDE produced by transportation in the year 2037 would be reduced by 1,403 MTCDE, or 48%.

<sup>15</sup> Air condition is now the largest consumption item for electricity in the United States. According to the US Department of Energy, "The most significant end uses were central air-conditioning and refrigerators, each of which accounted for about 14 percent of the U.S. total" (from U.S. Household Electricity Report, July 14, 2005 at [www.eia.doe.gov](http://www.eia.doe.gov). Retrieved July 22, 2011).

advances in green technologies will meet the needs of people without a cost to our shared environment.

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### **Tracking the President's Climate Commitment at Castleton**

Greenhouse Gas Emissions produced or generated from the operations of Castleton College will be tracked by biennial GHG Inventories beginning in 2012 and continuing throughout the Commitment period. It is recommended that GHG Inventories be done as service-learning projects embedded in appropriate classes or other student-led

programming, and it is also recommended that the College provide a reasonable budget for biennial GHG Inventories through the Sustainability Work Group. As GHG emissions change, the Climate Action Plan will need to be revised accordingly. It is further recommended that the Sustainability Work Group oversee the revisions and implementations of the Climate Action Plan.

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## **Sustainability Curriculum and Community Outreach at Castleton**

In 2007, President Wolk signed the Talloires Declaration which committed Castleton College to integrating sustainability into its curriculum and outreach programs. According to the University Leaders for a Sustainable Future, the Talloires Declaration, composed in 1990, "...is the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The Talloires Declaration is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has been signed by over 350 university presidents and chancellors in over 40 countries."<sup>16</sup>

As described in the section "About Castleton and Sustainability," virtually every student at the College since 2005 has been actively engaged in some aspect of Castleton's Green Campus Initiative through their first-year seminars, service-learning projects, student-run programs, or extracurricular clubs and activities. Castleton College is proud to boast that it has one of the highest levels nationally of student engagement in its Green Campus Initiative. As well, the College's inclusion in its Mission of the need to teach and practice environmental sustainability demonstrates an institutional commitment. There has not, however, been the same degree of enthusiasm in infusing sustainability into the curriculum or to taking the message into the larger community. Although a few courses related to environmental sustainability have been added and there have been a number of service-learning projects to advance sustainable policies and programs, sustainability as a unifying theme or organizing principle has not occurred across the campus. Faculty, staff, and students who are interested and motivated have been supported, and this is a good thing. But the necessary culture shift has not happened across the campus and there have been no significant efforts to bring sustainability outreach programs to local schools or nearby communities. It is hoped that with the acceptance of this Climate Action Plan that teaching and living sustainability will become more central at the College. That being said, this generation of students understands the importance. It is now up to the faculty and administration to provide them with all the tools and the knowledge to go out

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<sup>16</sup> From "What is the Talloires Declaration" at [http://www.ulsf.org/programs\\_talloires.html](http://www.ulsf.org/programs_talloires.html). Retrieved July 25, 2011.

and change the world. It is recommended here that the College invest the necessary resources to hire a full-time Sustainability Coordinator who can develop outreach programs, provide help for faculty interested in infusing sustainability into their classes, and oversee the day-to-day projects and programs that will advance the living and learning of sustainability at Castleton College.

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## **Conclusion**

As green technologies advance and social conditions change, the Climate Action Plan will evolve accordingly. The hope is that Castleton State College of Vermont will achieve carbon neutrality sooner than 2057, and that the global community will respond in kind. The Climate Action Plan set out above is to be broad outline for Castleton College, a guide to the larger community, and a positive learning and living tool for the students and staff of the College, the surrounding communities, and the world. Perhaps no greater challenge confronts humanity at this time, and it is this generation that must first understand and then make wise choices in order to sustain a healthy global ecosystem for their children and their children's children and for all life in our shared community. It is with tremendous gratification that Castleton State College of Vermont submits this Climate Action Plan and commits to becoming carbon neutral.

Respectfully submitted,

Paul Derby  
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Castleton State College, Vermont

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## **Acknowledgements and Thanks**

It is a wonderful thing that so many are willing to commit their time and energies to this crucial social change movement. But with so many to thank, I am sure some will be forgotten. I apologize in advance for not including everyone. Please call, email or write to scold me so I can do better in future revision.

There is no particular order or ranking of thanks here. Every person is equally important in this global change movement.

I thank President Dave Wolk who has been a champion of sustainability efforts at Castleton, and whose enthusiasm and vision have brought profoundly positive changes at Castleton College. I thank Bill Allen, recently retired Dean of Administration, with whom I co-chaired the Sustainability Work Group. Bill also worked tirelessly with Efficiency Vermont on the many energy savings projects. Thanks to Academic Dean Joe Mark for also serving on the Sustainability Work Group and for his continued support for engaged learning. Thanks to Scott Dikeman, the new Dean of Administration, for support on this project and participation on the Sustainability Work Group. Thank you to Victoria Angis, Assistant Dean of Campus Life, for her personal commitment to sustainability and for her advisory role in the Student Government Association, Leadership program, and First Year programming. Thanks also to retired Dean of Students Greg Stone and current Dean Dennis Proulx. Thanks to the dedicated Residence Life staff such as Dan Gardner who recently moved to a bigger job and current staff member and Eco-Rep coordinator Maria Marinucci. Thanks also need to go to the entire Facilities staff for first tolerating intrusions, second cooperating with our meandering changes, and third advising our actions in areas we did not know. Special appreciation needs to go out to Rick Wareing, Chuck LaVoie, and the entire custodial staff. Thanks to the Aramark staff, Michael Williams and Rebecca Kerr, for advancing sustainability efforts at our dining services. Thank you to the faculty who have supported sustainability at Castleton and beyond, and especially to Professor Ann Honan who is a participant on the Sustainability Work Group, organizes annual K-12 Outdoor Classroom workshops, and who oversees the miserable chore of the bureaucratic aspects as the annual Earth Day and Week celebrations. Thanks also to Professor George Hooker for being on the Sustainability Work Group, for teaching classes on the Science of Sustainability, and for being a living example of how to think and live in an environmentally sustainable way. I wish to acknowledge Professor Phil Lamy for his service-learning projects that created the Campus Bicycle Program, a Campus Rain Garden, and the Brough Pond Cleanup Project, and to Professor Bill Kuehn for his annual first-year seminar watershed cleanup program with The Nature Conservancy.

Casella Waste Management Inc. has been an indispensable community partner for sustainability at Castleton from the very beginning. Special thanks go to John Casella, an innovator and advocate for advancing sustainability, and to Brett Patterson of Casella's who worked with Castleton's Green Team to institute the recycling program. Thanks to Clean Air-Cool Planet for all of the help on greenhouse gas emissions inventories and sustainability education, and for all of the great work you do with AASHE and the ACUPCC. In particular, I need to thank Jenn (Schroeder) Andrews of Clean Air-Cool Planet for co-teaching my students and for inviting them to co-present with her at a Smart and Sustainable Campus Conference in 2008. Thanks to the marvelous staffs at AASHE and Second Nature who have inspired me to think and act with a mind on sustainability. Thanks to the staff of Common Ground and the International Journal of Environmental,

Cultural, Economic, and Social Sustainability, and for your inspiring conferences and wonderful friendships.

Most of all, it is the students past and present who must be acknowledged and thanked, for not only are they the prime movers of sustainability but they must be the positive models of change in a current world of unsustainability; a world that we have thrust upon them. There are so many students over the last six years that have actively engaged in sustainability efforts at Castleton that I would run out of space to name them all, so in part I will do this by groups and shortcuts. I must, though, give thanks to a few critical individuals. Thank you Stacia Bucknell, Sarah O'Neill, and Cynthia Renninger for getting all of this started and for dedicating much of your time at Castleton on advancing sustainability. Thank you to Natalie Brassill, the first student sustainability coordinator and co-founder of the Sustainability Club. Thank you Andrew Hicks for the great work of the real-time metering software, and welcome David Nelson into that role. Thank you to dozens of the green crews, green interns, and recycling workers since the beginning - thanks Jessica, Mike, Leigha, Brian, Meghan, Shannon, Martin, Wyatt, Linna, Caleb, Robert, Bryanna, Justin, Matt, Heather, Candice, Dave, and the many, many others. Thanks to students who presented at and attended sustainability conferences. And thanks to the students of the following classes - Anthropology and the Environment, Community in American Society, and Community Action Seminar - for your service work to advance sustainability at Castleton State College of Vermont. Well done.