University of Virginia

Environmental Footprint Reduction Plan

Phase 1 - Greenhouse Gas

November 12, 2009 Draft

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Acknowledgments

A Report of the Presidential Committee on Sustainability

The Committee on Sustainability advises the President and Executive Vice President and Chief Operating Officer, through the Architect for the University, on all matters related to the overall quality, diligence, and progress of the University's commitment to sustainability in the broad sense of environmental, economic, and social impacts, and their relationship to the future of the University. In carrying out this charge, the Committee shall be engaged in the following:

- Recommend policies, procedures, and priorities that will promote the highest-standards of sustainable practice across the University including but not limited to business operations, energy production and utilization, and design and management of facilities.
- Provide guidance in the development of communication plans with the goal of increasing sustainable behavior among faculty, staff, and students.
- Recommend and encourage the development of new opportunities to educate the University community on sustainable thinking and practice.
- Review and comment on the University's progress toward measurable sustainability objectives.
- Review and comment on the University's responses to major national surveys and/or voluntary compliance with regard to an institutional plan toward the reduction in CO2 emissions and related environmental impacts.

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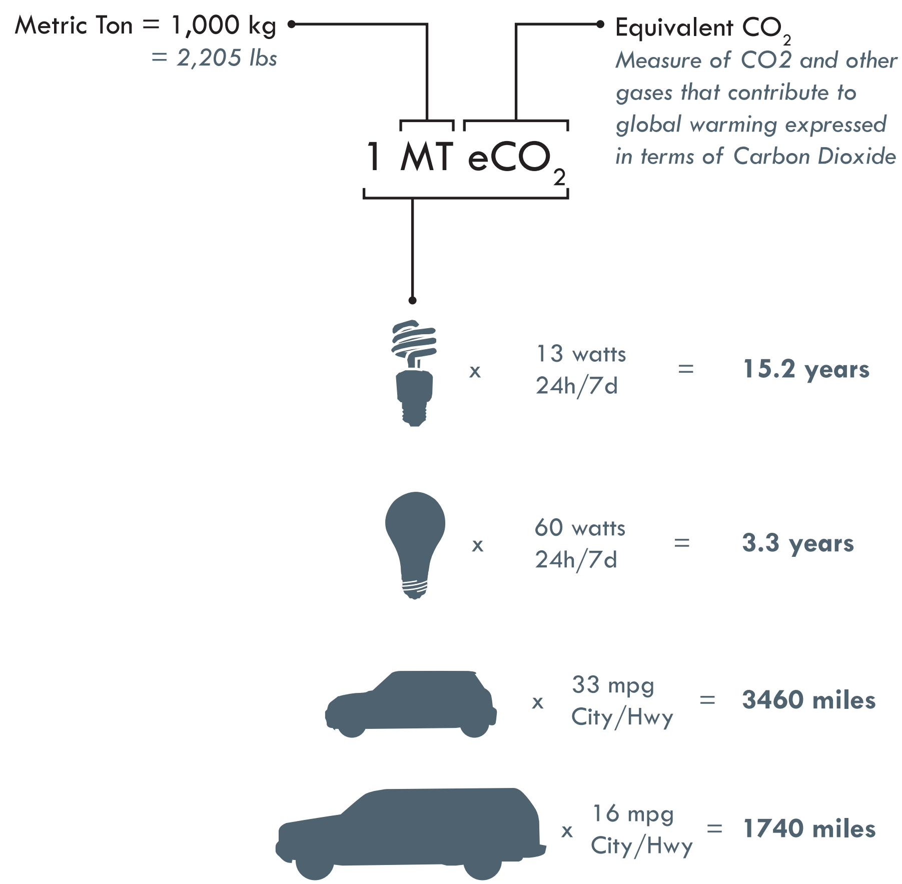
Primer

This plan makes frequent reference to the measurement of metric tons (MT) of equivalent carbon dioxide emissions (eCO2), or $MTeCO_2$ for short. The figure below provides a simple visualization of activities that generate 1 $MTeCO_2$.



Introduction

The Environmental Footprint Reduction Plan - Phase One (EFRP) is the first of several plans to be developed by the President's Committee on Sustainability. The goal of this and future plans is to enhance the sustainability of the University through specific environmental impact reductions. The Phase One plan develops a framework to reduce greenhouse gas (GHG) emissions and establishes a formal emissions reduction target for the University. Future phases of the EFRP will address additional environmental impacts, including water use, waste, and nitrogen. A review and update cycle of five years will ensure that all plans measure progress, include new reduction strategies, and establish new goals.

The overall objectives of this plan are **(1) To define a realistic goal for significant reductions in our institution's greenhouse gas emissions** and **(2) to detail specific strategies by which to achieve this goal.**

The above objectives were met through the following specific activities:

- A comprehensive inventory of our institutions current and projected greenhouse gas emissions was developed.
- A range of emission reduction goals recommended by the scientific community, ordered by the Governor, and implemented by peer institutions were evaluated.
- Strategies are identified by which to achieve this goal through (1) Minimizing the impact of new growth, (2) increasing efficiency and conservation, and (3) increasing the use of renewable energy.
- Based on the above, an aggressive but realistic emission reduction goal for our institution is recommended.
- A mechanism is proposed to monitor progress and to implement new, refined, and/or more cost-effective technologies as they becomes available in the future.

Section 1 - The Challenge

Climate change is one of the most significant and widespread challenges facing our generation and those soon to come. Stabilizing global warming will require the concerted, comprehensive, and sustained efforts of the entire world population. The United States ranks as the world's second largest emitter of CO_2 and calls to reduce greenhouse gas (GHG) emissions in the U.S. are now emerging from Congress, the White House, and State Capitols across the country. As an institution of higher education and research, the University of Virginia bears a unique responsibility to demonstrate real action in reducing our carbon footprint and ensure that all members of our community have knowledge of climate change, its effects, and its solutions. A commitment to these objectives are contained in major pan-university statements signed by the University, including both the *Talloires Declaration* (1991) and the *Universitas 21 Declaration on Sustainability* (2009).

The University of Virginia's commitment to sustainability is an indefinite pledge to conduct our mission in the most sustainable method possible. As part of this commitment, the University seeks to minimize its environmental impacts by all means feasible. Of particular importance are the greenhouse gas emissions generated by the inherent functions of the University. Heating and cooling our buildings, preparing food for our students and patients, powering our computers, operating our transit service, and providing critical health care are among the countless activities that create measurable greenhouse gas emissions. This plan establishes an outline of how the University may continue to provide all of these functions, but do so in both a more efficient and a less polluting manner.

The findings of the Intergovernmental Panel on Climate Change (IPCC), which has found that "warming of the climate system is unequivocal," and that "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations" compel the University to demonstrate leadership in reducing emissions.

Section 2 – UVa Greenhouse Gas Emissions

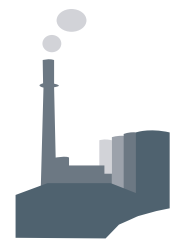
2.1 Emissions Sources

A thorough understanding of the sources of University greenhouse gas emissions is necessary before adopting a GHG reduction goal and plan. Emissions sources are organized into three categories, known as scopes, based on the ownership and control of each source. The three scopes are explained in Figure 1 (right).

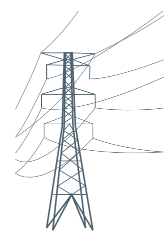
The University of Virginia, led by Environmental Health and Safety (EH&S) and the Environmental Sciences Organization (ESO) has completed a GHG Inventory for 2000-2008 using the Clean Air-Cool Planet (CACP) Campus Carbon Calculator. The UVa GHG Inventory includes owned and leased facilities in Charlottesville, but does not include field stations, UVa's College at Wise, or the UVa Foundation. The 2008 UVa inventory measures GHG emissions from fuel use in heating plants, purchased electricity, employee commuting, fleet fuel consumption, refrigerants, fertilizer, and waste. The UVa inventory does not include emissions generated from other University-sponsored travel (such as air travel), student commuting, or the purchase of paper for printing. Peer institutions that have captured emissions from sponsored travel typically report these emissions at approximately 10% of total emissions. For UVa this would amount to about 35,000 $MTeCO_2$ of additional emissions per year.

Though the CACP tool does not track emissions generated through the manufacture and transport of purchased products and construction materials (embodied energy), nor activities outsourced to contractors, the emissions from these additional Scope 3 sources are significant. For example, GHG emissions embodied in materials used for new construction are roughly estimated at .1 $MTeCO_2$ per square foot of new building space. In 2008, the University added over 1 million square feet of newly constructed space, accounting for these emissions would increase total emissions by an estimated 100,000 $MTeCO_2$ (a 32% increase). It is expected that future GHG inventories will account for additional Scope 3 emis-

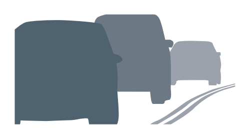
Figure 1 - Emissions Scopes



Scope 1 Emissions
Direct Emissions generated by University-owned equipment and activities. Includes: heating plants, fleet, University Transit Service, jet, fertilizer application, refrigerants



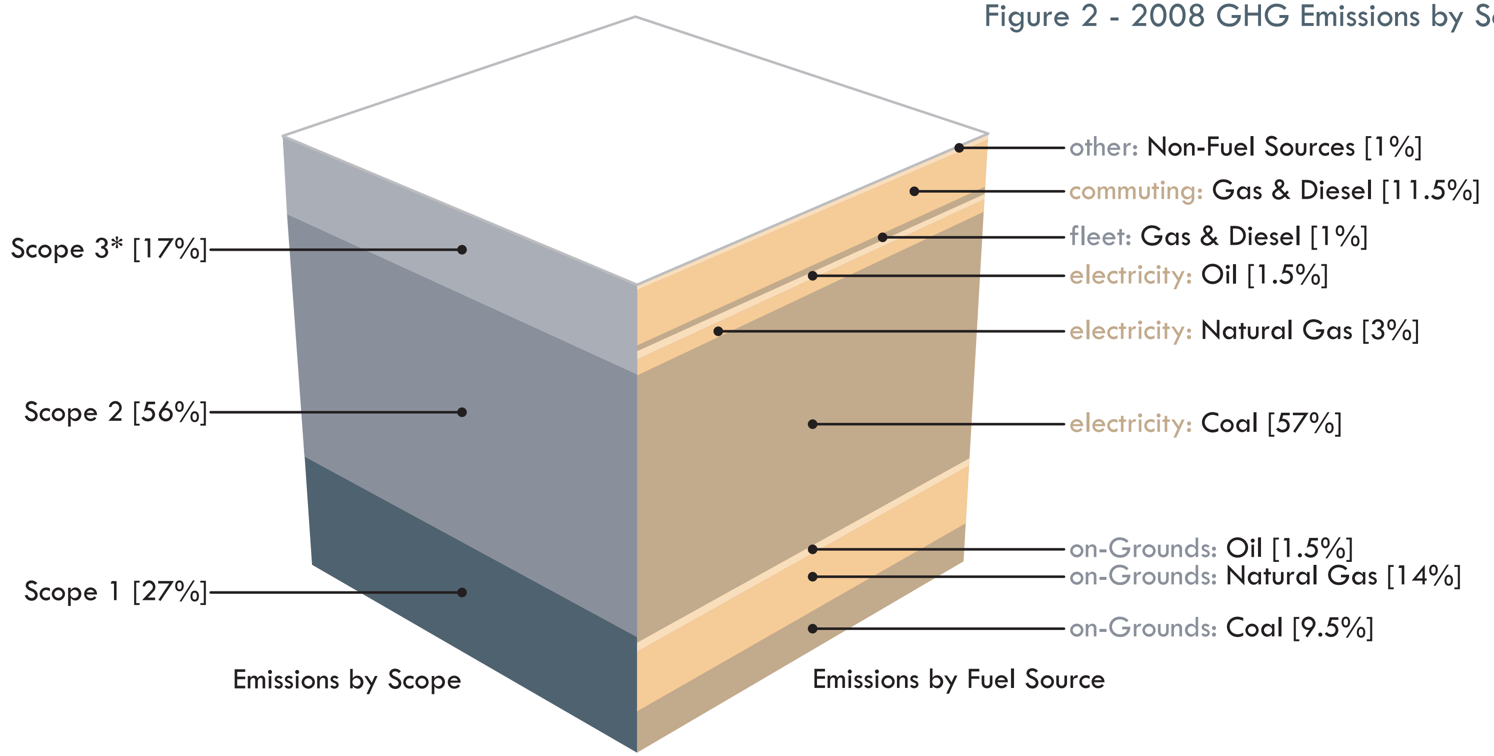
Scope 2 Emissions
Emissions generated through the production of electricity purchased by the University.



Scope 3 Emissions (Partially Known)
Emissions generated from indirect sources as a consequence of University operation. Includes: commuting, solid waste, wastewater, etc.

Unknown Scope 3 Emissions
Data not yet available for: University-sponsored air travel, procured goods and services, construction activities, etc.

Figure 2 - 2008 GHG Emissions by Scope and Origin



*Scope 3 emissions inventory not complete

sions sources; this document will address strategies to reduce emissions embodied in construction, sponsored travel, and purchased materials.

As data and reporting methodologies improve in coming years, it is likely that total emissions figures will vary as a result of better data (as opposed to actual changes in emissions). The numbers cited in this report are based on best available methodology, but should not be compared with future results without first accounting for variations caused by inventory methodology. Future UVa documents will evaluate differences in methodology and provide the relevant context for cross-referencing information and reports over time.

2.2 Trends and Forecasted Growth

The University of Virginia is enrolling more than 150 new students each year, employing associated faculty and staff, and expanding its science, research, and clinical capabilities. This growth has often been accommodated through construction of new facilities. Since nearly 90% of GHG emissions at UVa are generated through the conditioning and use of buildings, new facilities contribute directly to additional GHG emissions.

From 2000 to 2008, UVa GHG emissions have increased by 62,000 MTeCO$_2$, an average rate of 2.9% annually. This increase can be tied directly to new building construction completed during this time. Over the same period, the total square footage of the University increased at an identical rate of 2.9% per year (excluding parking garages).

The rapid growth the University has seen over the past eight years is expected to continue, and will include energy intensive facilities such as the Carter Harrison Medical Research Building, Emily Couric Clinical Cancer Center, ITC Data Center, College of Arts and Sciences Research Building, Hospital Bed Expansion, and Rice Hall (ITE Building). All but the Carter Harrison Building will achieve LEED certification or higher and will use less energy than a conventional facility of the same use. Despite these energy savings, the GHG emissions of these energy intensive buildings are expected to be noticeably higher than the University average. This increase in intensity is reflected in the disparity of emissions and space growth projected for the next few years. The average growth rate through 2012 is projected at 2.8% for emissions, outpacing the projected 2.0% growth rate in new building space. Efforts to lower GHG emissions will continue to be hindered by the rate and type of growth in people and new construction.

Shifts in GHG emissions may occur due to fluctuations and long-term trends in the types of fuel used to generate energy. While the fuel mix used to generate electricity has remained roughly constant, the fuel mix of the Main Heating Plant has shifted considerably from coal to natural gas in recent years due to construction occurring at the plant. In 2003, the Main Heating Plant generated 540,000 MMBTU from the combustion of coal; in 2007, coal-based production dropped to 165,600 MMBTU. Since natural gas produces 44% less greenhouse gas emissions per MMBTU than coal, recent reductions have been recorded in Scope 1 emissions. As the Heating Plant returns to primarily coal combustion, emissions are projected to increase by approximately 17,500 MTeCO$_2$. UVa could continue to burn large amounts of natural gas, but the higher price of natural gas over coal suggests that funds are more effectively spent, from an emissions reduction perspective, on energy efficiency improvements. If the cost differential between natural gas and coal narrows in the future, increased consumption of natural gas may become a cost-effective strategy to reduce emissions.

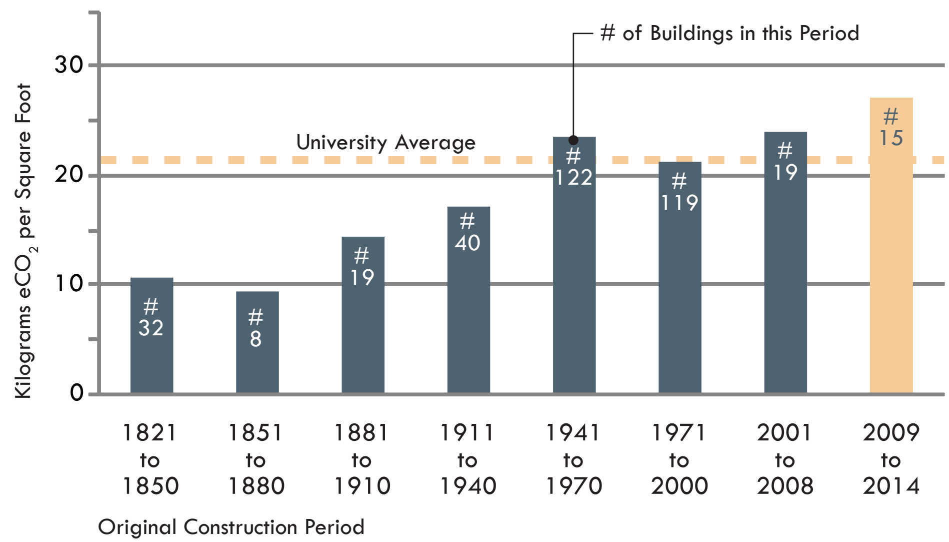


Figure 3 - Building GHG Emissions by Year Built

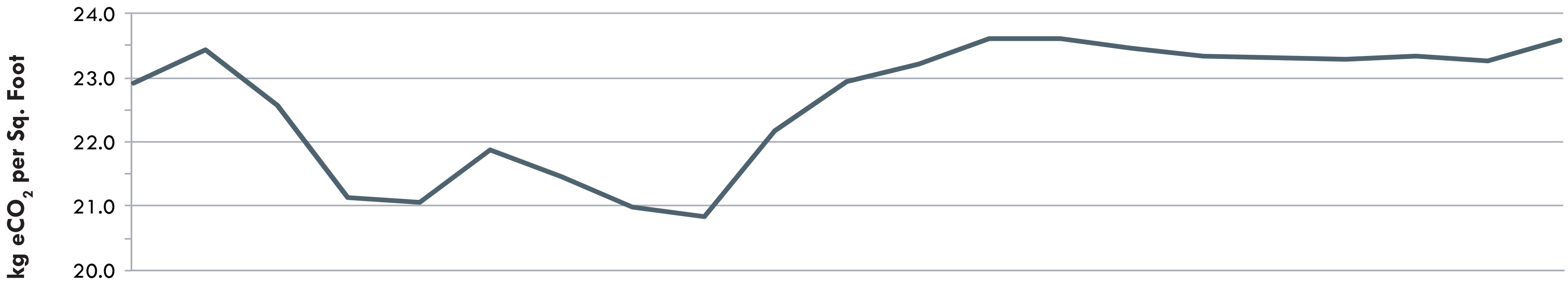


Figure 4.1 - Actual (2000-2008) and Projected (2009-2020) GHG Emissions Normalized by Square Feet

Figure 4.2 - Actual (2000-2008) and Projected (2009-2020) GHG Emissions in Absolute Figures

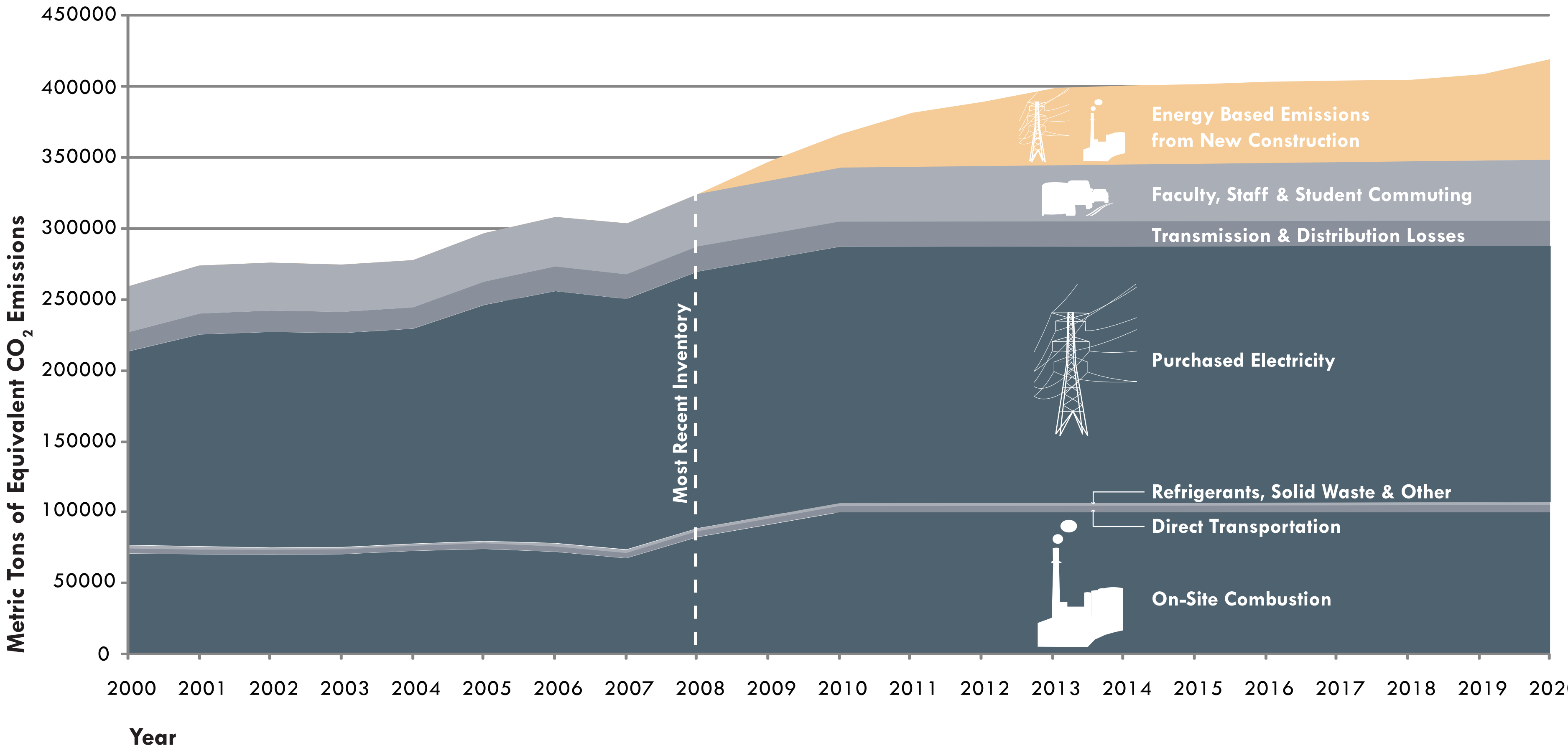
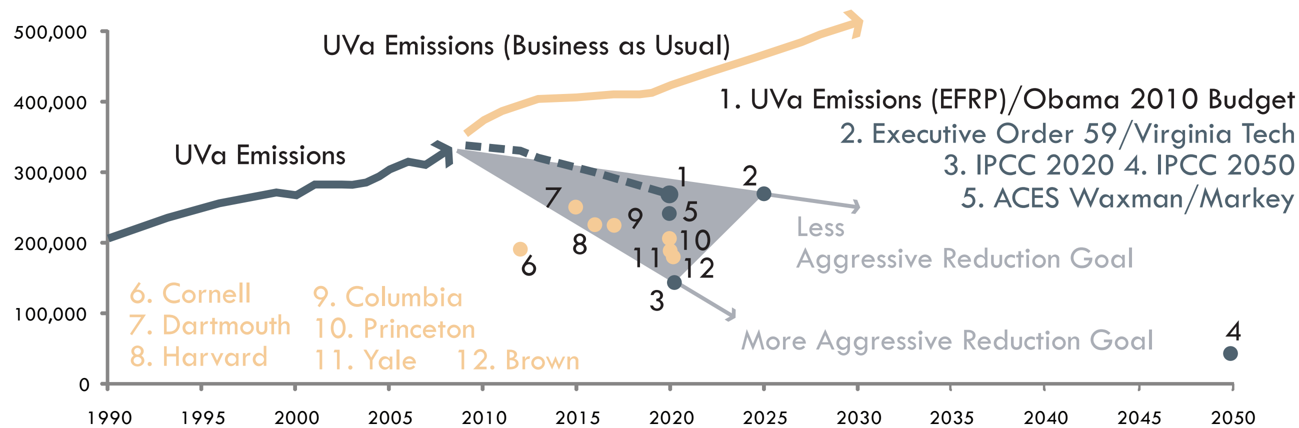


Figure 5 - Selected GHG Reduction Goals Expressed Relative to UVa Emissions

Section 3 – Reduction Targets for GHG Emissions



3.1 Survey of Other Reduction Targets

Multiple greenhouse gas emissions reduction targets exist at the local, state, regional, national, and international level. Typical targets include an emissions base year, target year(s) for reduction, and reduction amount. Targets particularly relevant to UVa include those identified by Governor Kaine via Executive Order, President Obama in the 2010 Budget, and Congress in the American Clean Energy and Security (ACES) Act.

Issued by Governor Kaine in December, 2007, Executive Order 59 establishes a goal to reduce statewide emissions to year 2000 levels by 2025. E.O. 59 also created the Governor's Commission on Climate Change. The Commission's final report, released December 2008, suggests that the target set by E.O. 59 may not be sufficient and cites science-based targets identified by the IPCC of 25% below 1990 levels by 2020 and 80% below 1990 levels by 2050.

In the President's 2010 Budget, President Obama states that his administration will work expeditiously to, "develop an economy-wide emissions reduction program to reduce greenhouse gas emissions approximately 14 percent below 2005 levels by 2020, and approximately 83 percent below 2005 levels by 2050." The ACES Act, passed by the House in June 2009, sets a target of 17% below 2005 levels in 2020, along with additional targets for 2012, 2030, and 2050.

Many higher education institutions have also announced greenhouse gas reduction targets. The most common higher education target is the American College and University Presidents' Climate Commitment (ACUPCC), which currently includes 659 signatory institutions (UVa has not signed the ACUPCC). While the ACUPCC implies a minimum goal of 80% reduction by 2050 and urges climate neutrality as quickly as possible, short and long-term reduction goals are developed individually by each signatory institutions within two years of signing the commitment. Many institutions that are not ACUPCC signatories have nonetheless adopted greenhouse gas reductions. For example, only 2 of the 8 Ivy League institutions have signed ACUPPC (Cornell University and University of Pennsylvania), but all 8 institutions have announced reduction goals.

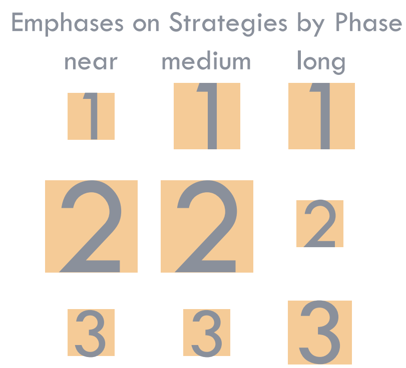
3.2 Reduction Target for UVa

The University has made reducing GHG emissions an institutional priority and will work to lower emissions as fast as possible within the realm of financial and technological constraints. **This plan establishes the goal of reducing UVa's GHG emissions to 20% below 2008 level by 2020, which meets President Obama's target of 14% below 2005 levels by 2020 and reaches Governor Kaine's target five years sooner.** The goal will be realized though a framework of three strategies detailed in the following section.

Section 4 - Reduction Strategies and Tactics

Emissions will be reduced through a set of three strategies:

Strategy 1: Minimize and/or mitigate GHG emissions resulting from all new projects.
Strategy 2: Prioritize and substantially increase efficiency and conservation efforts in existing buildings, fleet operations, and employee commuting and travel behavior.
Strategy 3: Increase the amount of renewable energy generated and consumed at UVa.



4.1 Strategy 1: Minimize Impact of New Growth

Increases in the size of the University, including construction of new building space and expansion of student, faculty, staff, and patient populations, will lead to increases in GHG emissions. While the amount of increase will vary based on building or population type, without mitigation, all new University growth will lead to GHG emissions growth.

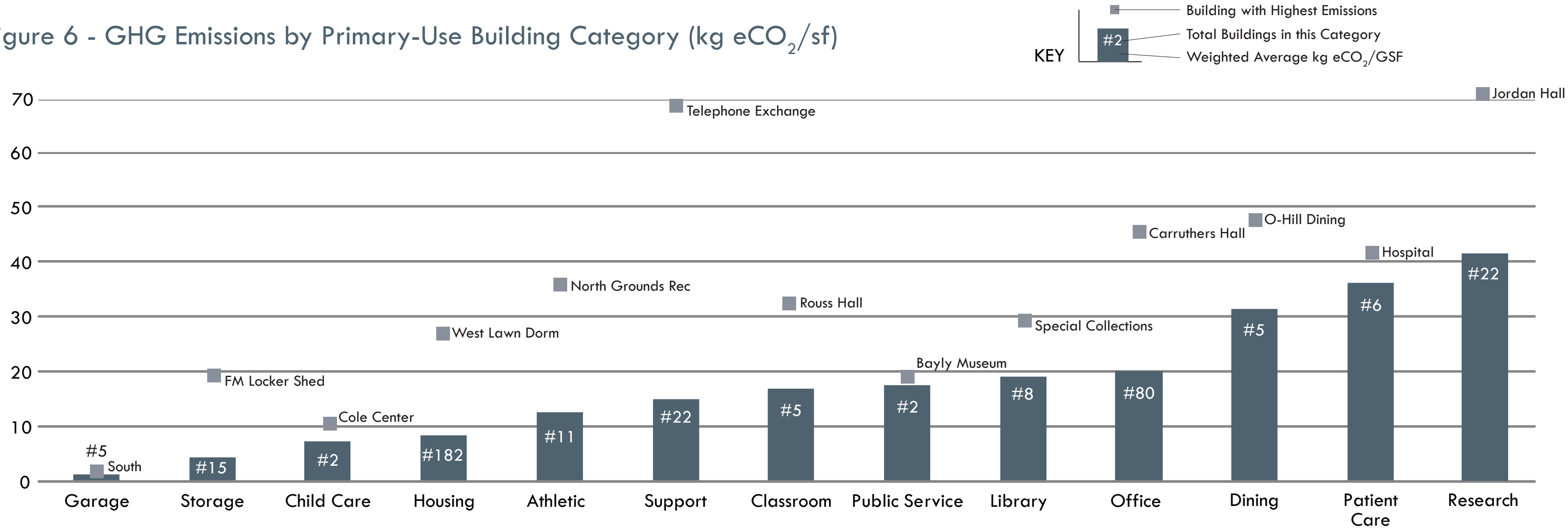
Projected increases in GHG emissions associated with new projects will be mitigated entirely through fourteen specific tactics grouped into three interrelated substrategies: (1a) Minimize the need for new construction, (1b) minimize emissions resulting from new construction, and (1c) mitigate the remaining impact of new construction. Due to the multi-year lead time between initial approval and subsequent occupation of a new building, the results of efforts to mitigate GHG emissions will not be fully realized until at least four years after policy adoption.

Substrategy 1a: The need for new construction will be minimized through aggressive management, utilization, and renovation of existing space. The four tactics outlined below will result in significant GHG reductions as well as significant cost savings when compared to new construction.

- S1.1: Conduct a detailed assessment to quantify current space utilization and efficiency to provide the necessary benchmarks with which to evaluate proposals for new space.
- S1.2: Extend operation of University facilities from a 5-day to a 6-day per week schedule and from an 8-hour to a 12-hour per day schedule. By serving more people, existing facilities will be able to absorb population growth without the need to construct new facilities and address associated GHG emissions.
- S1.3: Wherever possible, renovate and rehabilitate existing buildings to meet programmatic requirements without the need to construct new facilities and address associated embodied GHG emissions.
- S1.4: Identify under-utilized spaces that can be shared across departments and schools to thereby avoid repetitive and unnecessary facilities. GHG reductions and cost savings will be realized through avoidance of construction and operation of new facilities.

Substrategy 1b: When new construction cannot be avoided, decisions regarding program, siting, design, and construction must be evaluated explicitly based on the corresponding GHG emissions with the objective of minimizing emissions to the maximum extent possible. For instance, new labs should be designed with an air exchange rate that is appropriate to the corresponding research program as opposed to a higher, one-size fits all rate. Design and construction teams should also evaluate the embodied emissions in construction materials, construction activities, and, where appropriate, demolition, seeking to reduce emissions through design choices and product selection. Specific tactics include:

Figure 6 - GHG Emissions by Primary-Use Building Category (kg eCO_2/sf)



- S1.5: All new buildings and major renovations should be required to achieve LEED ratings of Gold or higher. LEED certification from the US Green Building Council ensures that projects follow a whole building approach to reduce environmental impacts building design and construction is followed. Note that the requirement to meet the base LEED certification is already in place.
- S1.6: Measure payback on realistic lifecycle of building components. The average age of major University facilities (10,000 GSF+) is 45 years. Many original design elements remain in these buildings 45 years or more later. As such, payback determinations for energy efficient design options should be evaluated based on realistic lifecycles, rather than the 10 and 20 year lifecycle assumptions typically used at present. Projected increases in the future cost of energy should be incorporated into the payback accounting for building components.
- S1.7: All new construction should achieve at minimum a 30% reduction in energy use relative to a similar building designed to applicable code. This requirement will also allow projects to achieve at least 10 points in LEED 2009 EA Credit 1 by reducing energy costs by 30%, rather than the 10% reduction required by LEED prerequisite.
- S1.8: Utilize passive solar design elements in all new construction to reduce the power demands for heating and lighting. Passive solar design is a highly efficient and, because it is largely cost neutral, very cost-effective source of renewable energy relative to alternatives.
- S1.9: Generate other forms of renewable energy on site. In addition to decreasing costs for associated hardware, financing strategies including tax credits, incentives, and grants can further offset the initial costs of these systems. When lifecycle payback is cost neutral or negative after accounting for all available incentives and for future increases in the projected cost of purchased energy, new projects should install on-site renewable energy generation either in the amount needed to eliminate GHG increases or to the maximum extent of space available.

Substrategy 1c: After realizing all feasible opportunities to minimize GHG emissions on site, new projects should fully mitigate any remaining increases in GHG emissions by funding conservation and efficiency improvements off site. Specific tactics include:

- S1.10: Project resources can be allocated to the existing Parking and Transportation Demand Fund to mitigate GHG emissions resulting from the associated transportation infrastructure through, for example, expanded transit service, and bicycle and pedestrian amenities. The Department of Parking and Transportation will develop a list of projected GHG emission reductions associated with each transportation-related project as part of a Transportation Demand Management program.
- S1.11: The Facilities Management Department will establish an on-Grounds Emissions Reduction Program that includes a priority list of conservation and energy efficiency activities together with the corresponding projected GHG reductions and capital costs. New projects may fund and implement these activities as required to completely mitigate impacts of the new project, beginning with the lowest price/per ton projects. A percentage of operational cost savings will be returned to the project sponsor.
- S1.12: On-Grounds conservation and efficiency improvements (tactic 1.11 above) should be considered the highest priority in mitigating remaining impacts of new projects, but where infeasible, projects may consider purchase of Renewable Energy Certificates (REC) or approved alternatives.
- S1.13: Projects may also be allowed to mitigate impacts by supporting, from philanthropic gifts, efficiency and conservation projects in the Central Virginia region. Examples of projects may include community education to enhance energy-efficient behavior, purchase of efficient equipment, support for energy audits, etc. All projects must demonstrate quantifiable projections for GHG emissions and be approved to ensure proper accounting and results.

4.2 Strategy 2 - Increase Efficiency and Conservation

While increases in emissions can ultimately be halted through Strategy 1 tactics, reductions below current levels can only be realized through improvements in the efficiency of existing operations (Strategy 2) and through conversion of existing energy use to renewable sources (Strategy 3). Energy conservation is one of the largest and most cost-effective means of reducing GHG emissions. The investment in many conservation efforts are rapidly repaid (within months to years) thereby producing significant savings that can help fund additional conservation and GHG reduction efforts.

Strategy 2 focuses on substantially reducing emissions through thirteen specific tactics organized under two related substrategies: (2a) Increase energy efficiency and conservation associated with buildings and (2b) increase the efficiency of transportation.

Substrategy 2a: Emissions resulting from energy used to heat, cool, and power buildings account for approximately 86% of UVa emissions and, consequently, the initial focus of any GHG reduction effort is to improve the efficiency of existing facilities. The University has improved building efficiency over the past decade through lighting retrofits, central plant upgrades, steam leak detection, motion sensors, and many other initiatives. Still, the most immediate and cost-effective reductions in GHG emissions will continue to be realized through improvements in building energy efficiency via a broad range of existing and new efforts. Initiatives listed in this section are designed specifically to reduce GHG emissions associated with current operations. These reductions should be accounted separately from reductions under the on-Grounds Emissions Reduction Program (Tactic S1.11), which focuses on mitigating GHG emissions associated with future growth.

- S2.1: Post highly visible energy consumption Information across grounds. Awareness of energy consumption is a necessary prerequisite to behavior change-based conservation strategies and data indicates that simply providing consumption information can lead to energy savings. However, at present, most building occupants have little or no information on how much energy they are consuming. Potential outreach methods include building energy displays (currently in development for Newcomb Hall, South Lawn, and Alderman Road Residence Halls), web monitoring, email newsletters, posters, and more.

- S2.2: Foster awareness and responsibility for energy use among schools, departments, and units through energy conservation outreach, education, shared savings, competitions, and awards.
- S2.3: Retro-commission existing facilities (underway). This activity involves analysis of existing buildings to identify systems that may not be functioning as originally designed and to implement minor changes, as opposed to major mechanical system overhauls, to improve efficiency, to enhance occupant comfort, and to reduce operating costs. Retro-commissioning of MR-4 is nearing completion and significant energy savings have already been realized.
- S2.4: Retrofit and/or remove fume hoods. Over 1,000 fume hoods are located in laboratory buildings on Grounds some of which are over 40 years old. On average, each hood consumes 3.0-3.5 times more energy than a typical house. Improvements in design and technology have created low-flow hoods that are safer than existing hoods and use 50-70% less energy. Whenever possible, hoods and associated air handling systems should be designed such that hood can be turned off completely when not in use.
- S2.5: Replace existing light bulbs with more efficient and longer lived fixtures, which yields savings in both energy and maintenance (underway).
- S2.6: Insulate steam fittings and eliminate leaks to minimize associated energy losses (underway).
- S2.7: Install software to engage sleep settings on University computers when not in use. This software allows for nightly updates and is available free from the EPA. This software has been implemented in UVa libraries.
- S2.8: Evaluate lighting to determine if levels in existing buildings exceed code requirements; remove fixtures or reduce fixture wattage to meet code. Also, install motion sensors in hallways and other shared spaces.
- S2.9: Weatherize existing facilities through improved insulation, reconfigured entrances, window repairs, and roof conversions to minimize losses.
- S2.10: Develop marketing and outreach efforts such as energy competitions, high-profile events, spot awards, and other marketing strategies to raise awareness of personal actions to improve energy efficiency and reduce GHG emissions.

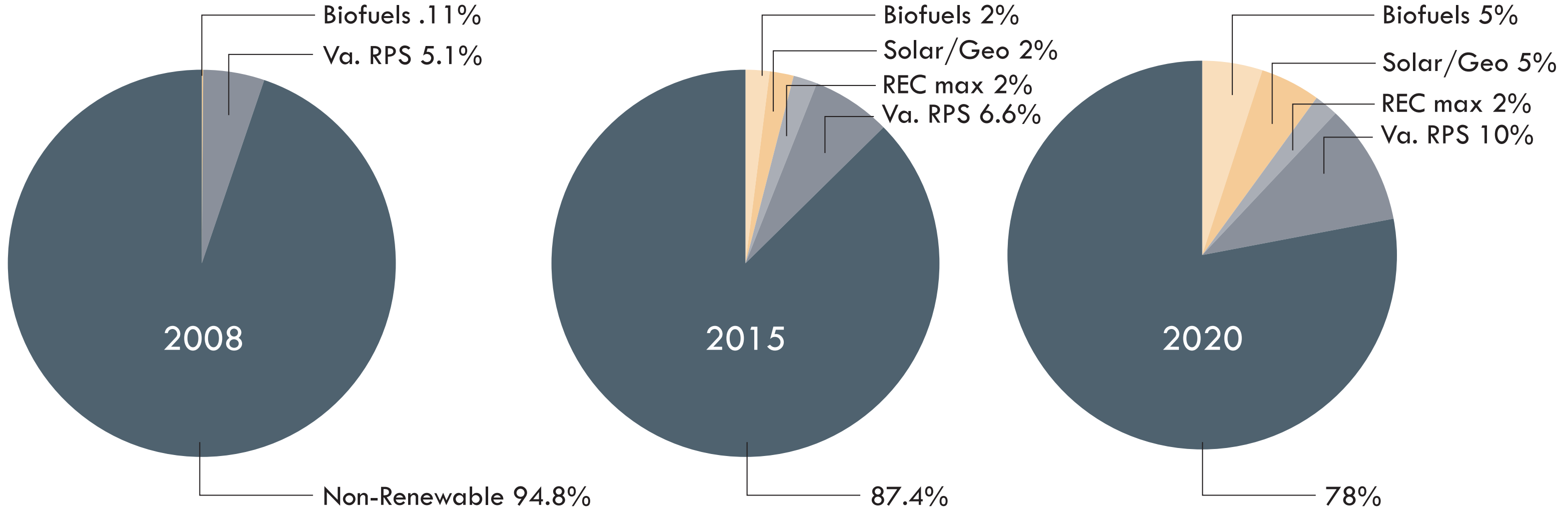
Substrategy 2b. Improvements in transportation efficiency will be realized in both University fleet operations and personal travel of students, staff, and faculty. Through implementation of Transportation Demand Management (TDM), the University will reduce the GHG emissions associated with commuting in single-occupancy vehicles (SOV) by creating incentives to shift to carpool, transit, or non-motorized options. In addition, under recent Executive Order 82 and by the Code of Virginia, State agencies are mandated to pursue a goal of not less than 20% of its eligible workforce telecommuting by January 1, 2010. Previously implemented TDM programs have resulted in an estimated savings of ~700 MT eCO_2 annually. Specific tactics include:

S2.11: Employ TDM to reduce the rate of single occupancy vehicle use and vehicle miles traveled among staff, faculty, and students (underway). Focus priority on pedestrian and bicycle travel for on-Grounds trips, bicycle and transit travel for Charlottesville trips, and car/vanpool and transit travel for longer trips.

S2.12: Transition fleet vehicles to more carbon efficient vehicles through use of smaller vehicles, hybrids, natural gas, and electric vehicles. Prohibit use of fleet vehicles for on-Grounds people moving and replace with bicycles or transit. Reserve on-Grounds vehicle use for equipment delivery only.

S2.13: Offer parking discounts or preferred parking to commuters driving high-efficiency or low emissions vehicles.

Figure 7 - Renewable Energy Targets for 2015 & 2020



4.3 Strategy 3 - Increase Renewable Energy

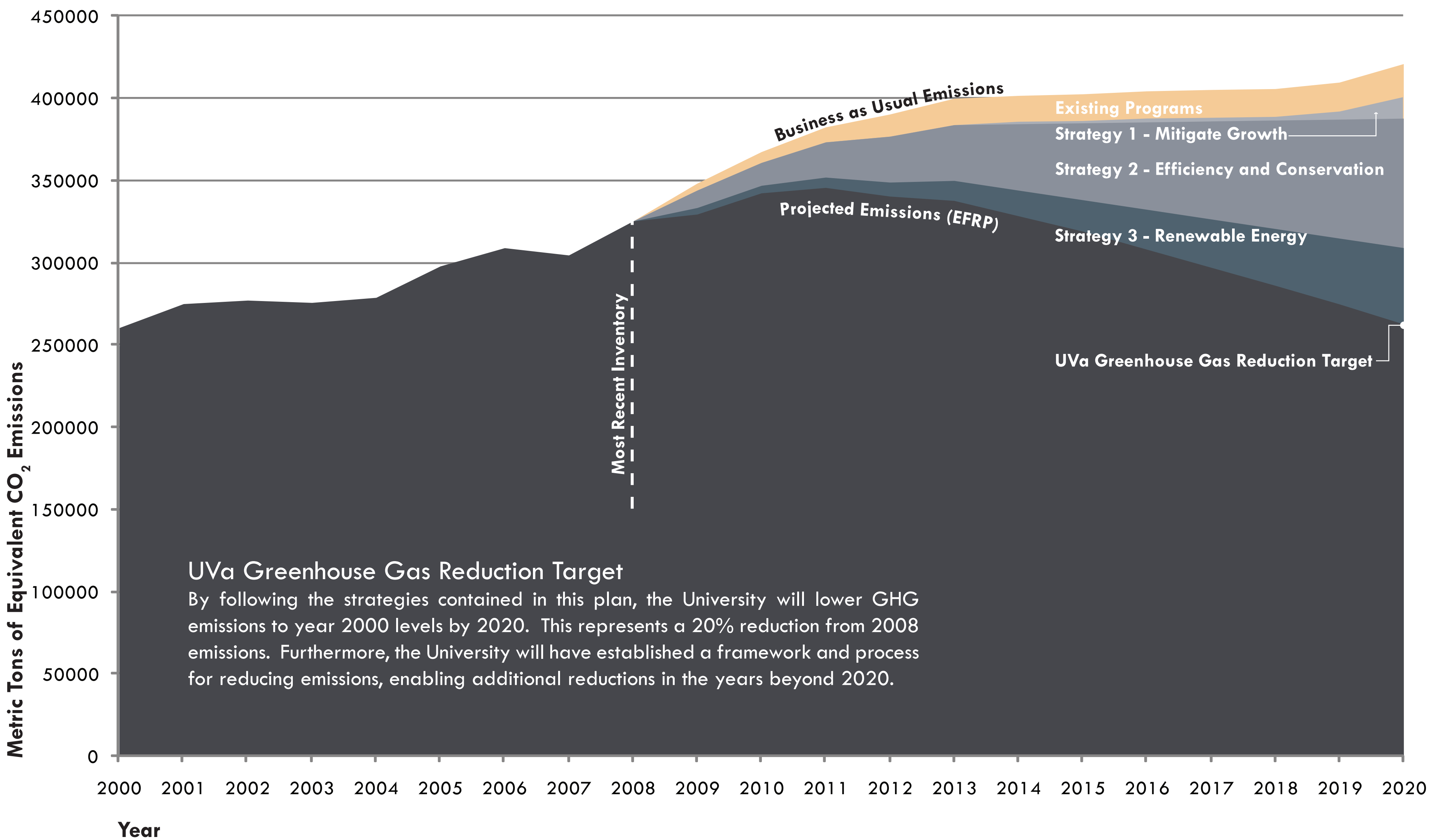
While efficiency and conservation improvements are the immediate priority for reducing GHG emissions, significant reductions in emissions will not be realized without an increase in the use of renewable energy. Currently, large-scale implementation of renewable energy generation is not feasible due to higher costs as compared to conventional sources, but consistent trends of decreasing costs for renewable energy and increasing costs for fossil-fuel based energy sources indicate that this price differential will continue to narrow. The third strategy of this plan creates a renewable portfolio standard (RPS) for the University that supplements the voluntary RPS currently in place in Virginia. A RPS sets forth percentage goals for the amount of energy generated from renewable sources. Twenty eight states and the District of Columbia currently have RPS requirements, and five additional states, including Virginia, have voluntary RPS goals.

Virginia's statewide voluntary RPS sets out four target years, goal one is to generate 4% of 2007 base year energy sales in renewable energy by 2010. Goals increase steadily to reach the long-term goal of 15% by 2025. Renewable sources include biomass, hydroelectric, solar, wind, and geothermal. Although the Energy Information Administration currently cites 5.2% of Virginia's energy generation coming from renewable sources, already in excess of the 2010 goal, progress towards Virginia's voluntary RPS goals in 2016 and beyond may benefit the University's emissions total by reducing the amount of fossil fuels used in generating purchased electricity.

Through on-Grounds generation, use of bio-derived fuels, purchase of Renewable Energy Credits, or other means available, the University should increase the share of renewable energy consumed and/or generated at UVa to the levels indicated for 2015 and 2020 (see Figure 7 above).

The lack of a near-term target reflects both the lead time required to design and implement renewable energy systems as well as time allowed for installation costs to decrease. Even as single-digit percentages, these targeted levels are significant given the large amount of energy consumed by the University. At 2008 energy consumption levels, reaching a 5% target would require 171,000 million BTU of renewable energy. This amount corresponds to the total energy demands of nearly 2,250 homes annually. Still, these targets are achievable with technology already in place at higher education institutions today. For example, the $12 million biomass gasification plant at Middlebury College produces approximately 172,000 million BTU annually and a recently completed biomass gasification plant at the University of South Carolina boasts greater than twice this capacity.

Figure 8 - Projected GHG Reductions Through 2020



Section 5 – Plan Development and Updates

5.1 GHG Inventory Reporting

Ongoing inventory of greenhouse gas emissions will be necessary to track performance towards the goals set out in this report. In addition, the Environmental Protection Agency (EPA) Proposed Mandatory Greenhouse Gas Reporting Rule released for public comment on April 10, 2009, indicates that the University will be required to report emissions annually from combustion of coal, natural gas, and oil in heating plants and boilers. For these reasons, the University, led by the Office of Environmental Health and Safety, will update the greenhouse gas emissions inventory annually. Successive inventories will also expand and improve on the extent and accuracy of emissions, particularly Scope 3 emissions. For 2010, the University GHG inventory may include emissions from sponsored travel, procured materials, procured services, and construction and activities, as well as full accounting of other sources and sinks for GHG emissions (e.g. net changes in forest biomass). Support from various University departments will be necessary to ensure that the required data is available, particularly for University-sponsored travel records, student and employee commuting data, procured materials and services records, construction activities, and activities at satellite UVa facilities.

5.2 Further EFRP Development

The EFRP will also expand to include measurement of relevant environmental impacts. **Before the 2011 update release, the EFRP will include reduction goals for water use, nitrogen footprint, and waste generation.** All reduction goals will be measured on the same target schedule, and strategies should seek to reinforce multiple reduction targets wherever possible. Additional significant impacts may be added to the EFRP through review and approval of the President's Committee on Sustainability.

Strategy 1 requires the development of an on-Grounds Emissions Reduction program, which provides new construction projects with listing of applicable efficiency improvements: with improvement location, costs and GHG reduction impacts. The on-Grounds efficiency improvements listing should be updated annually, with adopted improvements removed upon implementation. Facilities Management will lead the development of the on-Grounds efficiency improvement list and the President's Committee on Sustainability will review and comment on the list annually. Strategy 1 also requires an accurate estimate of the environmental impacts of a project prior to its construction. This impact will be based on energy models, now in standard use to meet LEED certification requirements, as well as design documents, program requirements, and population trends. Environmental Health and Safety, Office of the Architect, and Facilities Management, will jointly develop a standardized method to accurately predict environmental impacts of new construction projects, reviewing the method every two years to incorporate new information and measurements.

5.3 Plan Review Schedule

The Environmental Footprint Reduction Plan sets initial target years of 2010, 2015, and 2020. In order to track progress, incorporate new strategies, and adjust target metrics, EFRP updates should be issued in fall 2011, 2016, and 2021. The fall date will allow for the release and analysis previous year's GHG inventory. The Office of the Architect will lead the development of each update and President's Committee on Sustainability will review and release each update. Updates will report on progress towards the identified goals; report any reasons or conditions that prevent full realization of goals; review existing strategies to determine any changes to their feasibility, cost, and impact; research and propose new strategies; and analyze if reduction goals need to be adjusted; and propose a new set of reduction goals for the long-term target.