

## Update and Notes:

*The Climate Action Plan Technical Report was developed between 2008 and 2011 in partnership with the VT Urban Affairs and Planning Department. The final Climate Action Plan was developed from the findings found in this report, but a number of noteworthy changes were made, particularly to the approach of dividing goals, objectives and strategies into “Community Strategies” and “Government Strategies”. With guidance from the Climate Action Plan Working Group, the goals, objectives and strategies were re-organized into three different segments: “Individual Actions”, “Let’s Get Started” strategies which are intended for a shorter-term implementation horizon, and “Looking Ahead” strategies, which are planned for implementation farther in the future, perhaps over a 5-15 year period.*

## Chapter 1. Introduction

Climate change is one of the most pressing challenges of the 21<sup>st</sup> century. The world’s foremost scientists have been predicting and documenting the environmental changes driven by carbon emissions of human-generated greenhouse gases (GHGs) for more than five decades. In response to this accumulating evidence, and recognizing that climate change impacts span political boundaries, world leaders have sought to establish, with limited success, multiple national and international agreements to address GHG emissions. Observing the limitations of national governments to meaningfully address the root causes of climate change, local governments around the country began to take action on their own, primarily through the U.S. Conference of Mayors Climate Protection Agreement. This agreement was established in February 2005 by Seattle Mayor, Greg Nickels, with the intention of supporting and encouraging local governments in their efforts to address this global challenge at the local level. By the U.S. Conference of Mayor’s annual meeting, held four months later in June of 2005, an additional 141 mayors had signed on to participate.

### **Under the Agreement, participating towns and cities commit to take following three actions:**

- Strive to meet or beat the Kyoto Protocol targets in their own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
- Urge their state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol -- 7% reduction from 1990 levels by 2012; and
- Urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system

In November of 2006, The Town of Blacksburg, joined many other American municipalities, and signed onto the Mayors’ Agreement as well, committing to reduce greenhouse gas (GHG) emissions. To those ends, Blacksburg Town Council has set a target of reducing GHGs by 80% below 1990 levels by 2050. To meet this target will require municipal policy initiatives, as well

as collaboration and partnerships between citizens, businesses, and institutions to reduce energy waste . and reduce the overall carbon footprint of the Town.

This Climate Action Plan (CAP) describes the Town of Blacksburg's desire to reduce energy use and greenhouse gas (GHG) emissions in Blacksburg. The opportunities for achieving these reductions are primarily through energy efficiency and conservation, renewable energy use, alternative transportation, and community design. This Climate Action plan details those primary avenues for reducing overall energy use as well as the Town's goals, objectives, and strategies for pursuing those opportunities.

Blacksburg is an attractive and thriving community located in the mountains of Southwest Virginia. Known as being a "Special Place", Blacksburg is renowned for its quality of life, natural beauty, civic pride, and educational leadership. Its population of more than 43,000 residents in 2006 includes a diverse mix of students, professionals, retirees, and workers in local industries and commercial establishments. The Town of Blacksburg is a "whole life community" with varied housing opportunities and neighborhoods; emphasizes economic development within its historical downtown area; and promotes environmental stewardship that includes protecting its natural surroundings, open space, and watersheds. The Town of Blacksburg is also noted for its open government, strong citizen involvement, and commitment to regional collaboration with the surrounding counties and towns of the New River Valley and beyond.

Blacksburg is home to Virginia Tech Polytechnic Institute and State University (Virginia Tech), the state's largest research university, with 6,900 faculty and staff members and just over 28,800 students as of 2013. These students, faculty, and staff come from across the world to study and work and they contribute immeasurably to the Town's lively intellectual quality. Their presence offers a unique set of opportunities, as students often use Blacksburg as a "living laboratory", engaging their particular area of scholarship to explore real-world challenges the Town is facing, and in return receive practical, hands-on experience in their respective fields. Also, since Virginia Tech uses the most electricity, and generates the most GHGs in the area, it is essential that the university and the Town work together to investigate their energy policies and reduce their respective carbon footprints. The composition of the Mayor's Task Force on Climate Protection and Sustainability reflects the collaborative nature of this effort: Town staff and officials, VT faculty, students and administrators, citizens, businesses, and non-governmental organizations are working together to lead Blacksburg toward a sustainable energy future. The CAP focuses its recommendations on clean and renewable energy sources, energy efficiency, community design and transportation options to reduce vehicle emissions, and informed citizens practicing energy conservation in their homes and businesses.

## **1.1. Sustainability and Climate Action Planning in Blacksburg**

### ***1.1.1. Town's Work to Date on Environmental Sustainability***

One of the goals of Blacksburg's Comprehensive Plan, *Blacksburg 2046*, is to retain the beauty and functions of the natural and rural environments that characterize Blacksburg. The Town works with numerous local partners and local non-governmental organizations (NGO) to

collaborate on initiatives that promote sustainability in the area. As a result of these and other efforts, the Town is designated an Exemplary Environmental Enterprise (E3) by the Virginia Department of Environmental Quality. After the Town became a signatory to the Mayor's Climate Protection agreement in 2006, it established the Mayor's Task Force on Climate Protection and Sustainability to assist staff with implementation of the agreement. The Town joined ICLEI Local Governments for Sustainability in 2007. In addition to steps the Town of Blacksburg has taken on Climate Action Planning, the Town has also implemented numerous other sustainability initiatives in recent years, including:

- Adopted a policy that requires the US Green Building Council (USGBC) LEED Silver designation for all new building construction or renovation over 5,000 sq. ft.
- Adopted a Green Fleet Policy that encourages the purchase of low emitting, fuel efficient vehicles.
- Adopted a Green Commuting Policy and provides free transit service for Town employees.
- Has provided curbside recycling to Town residents since 1992.
- Has hosted Household Hazardous Waste collection days for over ten years.
- Partnered with the YMCA at Virginia Tech to provide electronics recycling to residents free of charge.
- Installed recycling services in all Town facilities including collection of batteries, cell phones, and other electronics.
- Has been designated a Tree City USA recipient for over ten years and established a Municipal Tree Nursery in 2007 to provide a minimum two-to-one replacement for trees removed on Town property.
- Implemented a biodiesel (B20) conversion program in 2007, which has converted all diesel fuel vehicles in the Public Works and Parks and Recreation departments to B20 along with some Blacksburg Transit vehicles.
- Hosts Sustainability Week each year in conjunction with in partnership with Virginia Tech and Sustainable Blacksburg. This sustainability awareness and education event is scheduled to continue in the future.

### ***1.1.2. Climate Action Planning Process***

On November 28, 2006 the Blacksburg Town Council passed Resolution 11-E-06 endorsing the U.S. Mayors' Climate Protection Agreement (USMCPA) and authorized Mayor Ron Rordam to sign the agreement. The Resolution directed the Town of Blacksburg to work in conjunction with appropriate supporting organizations such as ICLEI - Local Governments for Sustainability to track progress and access technical resources that would support implementation of the USMCPA.

In January 2007, Blacksburg established the Mayor's Task Force on Climate Protection and Sustainability to implement the USMCPA and steer the Town's climate action planning process. The fourteen members of the Mayor's Task Force represent a cross-section of the community, including representatives from the Town, the University, citizens, businesses, and non-governmental organizations. The immediate goals of the Mayor's Task Force were to prepare a community greenhouse gas inventory and emissions forecast, adopt emission reduction targets, and work with University and community partners to draft the Blacksburg Energy Conservation and Climate Action Plan (CAP). Table 1 lists the current members of the Mayor's Task Force on Climate Protection and Sustainability and identifies their respective affiliations.

**Table 1-1. Mayor's Task Force – Fall 2009**

<b>Name</b>	<b>Affiliation</b>
Mayor Ron Rordam	Mayor of Blacksburg
Pat Bixler	Executive Director of Sustainable Blacksburg
David Roper	Community Representative
Bill Claus	Community Representative
Joe Meredith	Industry Representative
Todd Holt	Industry Representative
Joyce Graham	Industry Representative
Sean McGinnis	University Representative
John Randolph	University Representative
Denny Cochrane	University Representative
Fran DeBellis	Electric Company Representative
Kelly Mattingly	Town of Blacksburg
Susan Garrison	Town of Blacksburg

Under direction and ongoing guidance from the Mayors' Task Force, students and faculty in the Urban Affairs and Planning (UAP) program at Virginia Tech gathered data on local energy consumption trends and completed the initial Town of Blacksburg Energy Use and Greenhouse Gas Emissions Inventory in the spring of 2008, followed by an investigation of greenhouse gas reduction and climate mitigation options, and developed a framework for the eventual CAP. A public forum was held during Sustainability Week, in October 2008, during which the public asked questions, voiced ideas, and raised concerns about CAP-related issues. UAP prepared a preliminary draft of the CAP at that time, which suggested a number of initiatives to reduce GHG emissions and evaluated their approximate costs, benefits, and feasibility. This draft report was submitted to the Mayor's Task Force for review.

In November 2008, the Mayor's Task Force sub-committee on climate change recommended a target for the Town of Blacksburg to reduce communitywide GHG emissions to 80% below 1990 levels by 2050, a number which reflects the consensus understanding from the scientific community as to the global emissions reductions that must be achieved to reduce the likelihood of catastrophic, long-term climate change. This local target applies to Town operations and communitywide emissions from transportation and the residential, commercial, and industrial sectors, but does not include Virginia Tech. Virginia Tech adopted a separate Climate Action Commitment and Sustainability Plan in June, 2009.

By addressing GHGs and energy use, Blacksburg aims to sustain and enhance the quality of life its residents already enjoy. Fewer GHG emissions mean improved physical health for everyone from newborns to grandparents; increased building efficiencies decrease families' monthly utility bills; and a focus on greener development and retrofitting older buildings for increased energy efficiency creates jobs.

# Chapter 2. Baseline and Projected Energy Sources and Uses

## 2.1. Baseline GHG Emissions Inventory

The Town of Blacksburg's GHG Emissions Inventory was completed in early 2008, based on data from 2000-2006. This baseline inventory was subsequently updated in early 2010\*, and again in 2013.

In 2012, the Blacksburg community, not including Virginia Tech, consumed a total of 3.0 trillion British thermal units (Btu) of end use energy and emitted a total of 363,411 metric tons of CO<sub>2</sub>-equivalent GHG emissions (hereafter referred to as tons CO<sub>2</sub>-e). This includes all electricity, natural gas, and other fuels consumed by the Town's residents, businesses, and institutions other than Virginia Tech.

Figure 2-1 illustrates the total end-use energy consumption and resulting GHG emissions by energy source for 2012. Electricity represents the largest source of energy use (39 percent), followed by transportation fuels (32 percent), and natural gas (28 percent). Other fuels – fuel oil, propane, and wood – combine for approximately 1 percent. When converted to GHG emissions, electricity accounts for a far greater portion (68 percent) than any other fuel source, because over 88 percent of the electricity Blacksburg receives from the grid comes from coal-fired power plants. Burning coal generates greater GHG emissions per unit of usable energy than natural gas or transportation fuels. Furthermore, GHG emissions are measured in terms of the fuel consumed at the point of generation, and the massive conversion and transmission losses associated with coal-fired power plants mean that each unit of end-use energy consumption represents about three units of energy consumed at the power plant (i.e., only about 1/3 of the energy consumed at the power plant makes it to the consumer as end-use electricity consumption).

\* Baseline inventory updates:

- Revised natural gas consumption figures to adjust for the fact that the local natural gas provider, Atmos Energy, had reported natural gas consumption in apartment buildings as part of the commercial sector. Shifted approximately 1/3 of the reported commercial sector consumption to the residential sector (details in Appendix A).
- Used data on natural gas consumption in TOB facilities for the years 2003-2005 and 2008 to estimate the TOB's yearly natural gas consumption for the years 2000-2009.
- Removed VT water consumption percentages from water/wastewater energy use calculations.

estimated for water and wastewater processing and distribution and Town of Blacksburg government operations. These combined for less than 6 percent of total GHG emissions.

## **2.2. GHG Emission Projections**

Estimates of future energy use and GHG emissions in Blacksburg are based on projections from the The U.S. Energy Information Administration (EIA) Annual Energy Outlook 2013. Nationwide projections from that report were compared to US population projections from the 2010 census to determine current and projected per capita energy use and GHG emission estimates for 2013 – 2050. Current US per capita estimates were compared to current Blacksburg per capita energy use and GHG emissions data to determine the proportion by which the EIA projections needed to be scaled down for each sector. Finally the resulting per capita projections for Blacksburg were multiplied by Blacksburg population projections from the Weldon Cooper Center to arrive at estimates for total energy use and GHG emissions for the town from 2013 - 2050. [Table 2-1](#) summarizes the resulting GHG emissions projections from this analysis.

**[Table 2-1. Growth Rates and Projections by Sector / Source \\*](#)**

Fuel Type	Sector	2012 - 2050 AAGR	GHG Emissions (metric tons)		
			2012	2030	2050
Natural Gas	Residential	-0.26%	14,361	14,942	13,022
Natural Gas	Commercial	0.69%	9,589	11,706	12,445
Natural Gas	Industrial	0.37%	16,989	18,056	19,585
Natural Gas	Public Authority	0.45%	2,232	2,635	2,650
	<b>Total</b>	<b>0.26%</b>	<b>43,170</b>	<b>47,339</b>	<b>47,701</b>
Bottled, tank, or LP gas	Residential	0.00%	93	96	93
Fuel Oil, Kerosene, etc.	Residential	-2.08%	2,569	1,785	1,155
	<b>Total</b>	<b>-1.97%</b>	<b>2,662</b>	<b>1,881</b>	<b>1,248</b>
Electricity	Residential	0.86%	106,036	126,040	147,082
Electricity	Commercial	0.81%	79,943	93,266	108,542
Electricity	Industrial	0.43%	49,748	56,362	58,572
Electricity	Public Authority	0.83%	10,751	13,006	14,718
	<b>Total</b>	<b>0.76%</b>	<b>246,479</b>	<b>288,674</b>	<b>328,914</b>