



Town of Blacksburg



CLIMATE ACTION PLAN 2016



**CLIMATE
ACTION
PLAN**

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MAYOR'S MESSAGE

CLIMATE ACTION PLAN



Across America, local governments are taking action to address climate change while making their communities healthier and more resilient. Blacksburg is proud to be among them. From the outset, the citizens of Blacksburg led the charge for our community's climate protection efforts. Seeing a lack of meaningful action on the national and international stage, Blacksburg citizens urged the town's leaders to join the Cool Cities Initiative, a nationwide effort to spur towns and cities to provide climate leadership at the local level. When we took that first small but important step, we demonstrated that Blacksburg recognized its fundamental responsibility to take stock of our share of global greenhouse gas emissions and work to ensure a stable climate for future generations. However, that commitment, which Blacksburg's Town Council approved by resolution in 2007, was only the beginning. In the years since, we have expanded that commitment by performing a community-wide greenhouse gas emissions inventory and engaging hundreds of citizens and stakeholders in order to develop this Climate Action Plan. We have seen a steadily growing number of Blacksburg's citizens become actively engaged in creating their own clean energy future, and our local actions have inspired other Virginia communities along the way.

We know that nearly every aspect of our lives is impacted by energy. It warms our homes, fuels our vehicles, runs our businesses, enables communication across distances, and plays a critical role in producing and transporting the food we eat. The Town of Blacksburg recognizes that our community and the world at large will be facing critical energy challenges in the coming years and decades, but with those challenges will also come opportunities. By taking action today, we can ensure a smooth transition to a clean energy future that will preserve our quality of life, improve economic resilience and foster an ethic of responsible stewardship of our shared natural resources and climate.

This plan represents both a short and long-term set of strategies for the Town to pursue to reach our community's energy and climate action goals. Looking back at what we've accomplished as a community since 2007, I feel proud, encouraged and optimistic. Our citizens have shown us they're enthusiastic about creating a clean energy future and we're ready to provide the kind of leadership that can translate that vision into reality.

A handwritten signature in black ink, appearing to read "Robert R. Ryan". The signature is fluid and cursive, written over a white background.

CLIMATE ACTION PLAN

TIMELINE OF PROCESS, 2007 - 2016

Climate Commitment;
Emissions Reduction
Target Set

Engage Citizens &
Key Stakeholders;
Form Working
Group

GHG Emissions Inventory;
Projections & Scenarios

Development of Goals,
Objectives, Strategies

Finalize
Technical
Report

Development of the Town of Blacksburg's Climate Action Plan was made possible by the hard work and dedication of many people over several years.

Citizens from Sustainable Blacksburg, particularly Dave Roper, Aaron Barr and Town Council Member Don Langrehr, first urged the Town's leadership to join the Cool Cities Initiative and make a commitment to reduce greenhouse gas emissions.

Much of the technical work on the greenhouse gas emissions inventory was accomplished in partnership with faculty and student researchers from the Urban Affairs and Planning Department at Virginia Tech, under the guidance of Professors John Randolph and Damian Pitt. Later, a Masters Student in Urban & Regional Planning, Joseph Gruss, performed an exhaustive update and verification of the Town's Community Wide Greenhouse Gas Inventory in 2012. Professor Scott Bailey with the Virginia Tech Center for Space Science and Engineering Research also provided invaluable guidance on the data that supports the science of climate change.

Additionally, an enormous debt of gratitude is owed to the more than two dozen community stakeholders who guided the planning process through two committees: The Mayors Task Force on Climate & Sustainability (2007—2011) and the Climate Action Plan Working Group (2013—2015).

Mayors Task Force on Climate Protection & Sustainability 2007– 2011

Mayor Ron Rordam
Pat Bixler
David Roper
Bill Claus
Joe Meredith

Todd Holt
Joyce Graham
Sean McGinnis
John Randolph
Denny Cochrane

Fran DeBellis
Kelly Mattingly
Susan Garrison

Climate Action Plan Working Group 2013—2015

Councilman John Bush
Andy Alden
Anne McClung
April DeMotts
Benjamin Knopp
Chase Counts
Todd Holt

Ed Tuchler
Emily Schosid
Bill Claus
Joe Gruss
John Randolph
Kelly Mattingly
Steve Semones

Kim Homer
Laureen Blakemore
Matt Hanratty
Michael Walker
Pat Bixler
Carol Davis

ACKNOWLEDGEMENTS & DEDICATION



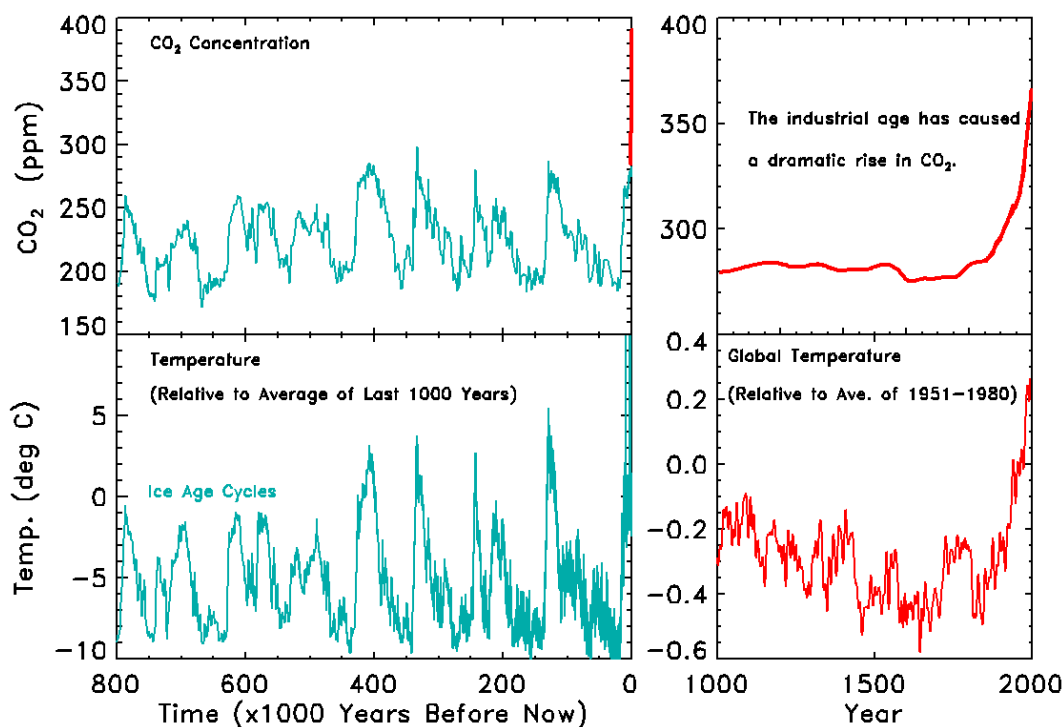
Susan Garrison was the Town of Blacksburg's Environmental Manager until her passing in 2013. She provided the heart and guiding hand behind the process of developing the Climate Action Plan.

Susan began her 25 years of service to Blacksburg as its first horticulturalist, and retired as the town's first Environmental Manager. Among her many other initiatives and accomplishments, Susan was a founding board member of Sustainable Blacksburg. She also helped establish Blacksburg's annual Sustainability Week in partnership with Virginia Tech and Sustainable Blacksburg. Her guiding vision was always to make Blacksburg a more beautiful, sustainable and joyful place to grow up and grow old.

A tireless environmental advocate, Susan remained dedicated to moving the Climate Action Plan forward, even in the midst of her two-year battle with cancer. This plan and the clean energy future that it will help ensure for Blacksburg's citizens are dedicated to her memory.

The Greenhouse Effect – A Good Thing, if Kept In Balance

Without an atmosphere, Earth would be frozen and lifeless. We know our planet is only habitable because of a natural greenhouse effect brought about mainly by water vapor (60%) and carbon dioxide (26%). However, humans are altering the relative composition of this atmosphere, mainly by burning fossil fuels. As a result carbon dioxide has gone up over 35% since pre-industrial times and over half of that has occurred since 1970. This additional carbon dioxide traps radiation that would otherwise escape to space, amplifying the natural greenhouse effect, producing warming. The warming is manifested in many ways, not just increasing surface temperatures, but also melting ice, and changing the hydrological cycle and thus rainfall patterns. Since 1970 the effects are large enough to be outside the bounds of natural variability for global mean temperatures. If greenhouse gas emissions continue as they have, the earth is on course to rise 4 degrees Celsius or more. With those trends, the oceans could be up to a meter higher by the end of this century. Ocean fisheries could collapse. Extreme weather events are all but guaranteed. Predictable agricultural conditions, and therefore our ability to produce food for a growing population, could be in serious jeopardy. Is that a big deal? Yes it is. It is by far the greatest issue facing our species in the modern era.



Carbon dioxide concentrations in the atmosphere over the preceding 800,000 and 1000 years as measured in ice cores and average global temperatures, respectively.

Prior to the modern era, atmospheric carbon dioxide varied between lows of 200 parts per million (ice ages) and 300 ppm (warmer interglacial periods).

In the last few years, CO2 levels have reached 400 ppm, which is unprecedented since modern humans first emerged as a species on Earth.

2 Degrees? 4 Degrees? How Can That Make A Difference?

It's logical to wonder how a seemingly small change in average global temperatures could be so damaging. After all, the temperature day-to-day in a given locality often varies by 20 degrees or more. The key is that the changes that are predicted will produce temperature increases that are both long-term and global in nature. Keep this in mind: the last time the earth averaged just a few degrees colder, most of North America was covered in a mile thick sheet of ice. That many degrees warmer? Common sense dictates it would bring unprecedented disruptions to the Earth's climate.

BACKGROUND: CLIMATE SCIENCE

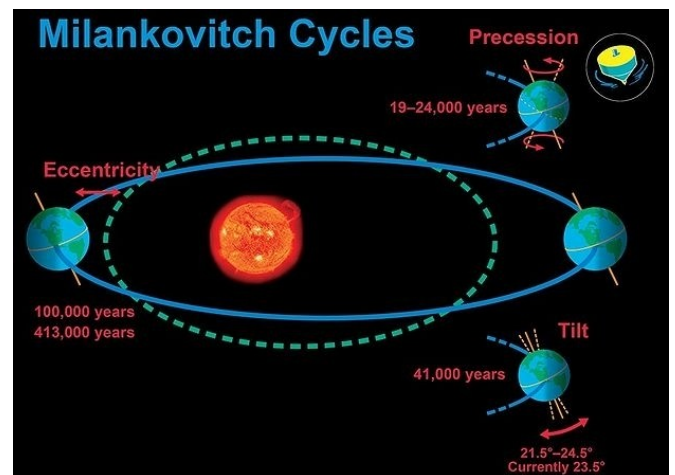
CLIMATE ACTION PLAN

97% of Climate Scientists Agree – Not Natural Climate Variability

Ninety-seven percent of climate scientists agree that man-made climate change is a reality and it is a problem. As early as 1859, the role of CO₂ as a greenhouse gas was firmly established. Later scientists demonstrated that CO₂ and climate moved in lock-step during prehistoric ice ages and warmer interglacial periods as shown in the chart on the previous page. These past climate cycles, had a distinct regularity and scientists sought an explanation for why these had occurred. Starting in the mid-1800s, a series of important scientific discoveries added to our understanding of natural climate cycles, and have largely been attributed to changes in Earth's orbit around the Sun. **Milutin Milankovitch** (1879-1958), a Serbian astrophysicist and geophysicist, gets most of the credit for connecting how these orbital cycles, in combination, related to past ice ages and for calculating much more thoroughly how they affect climate. These include:

Eccentricity of Orbit: The Earth's path around the Sun is almost a circle, but not quite. It is elliptical, with the Sun just off center as one 'foci' of the ellipse. Gravitational pull from other planets causes the path to become slightly more or slightly less elliptical in cycles that occur about every 100,000 years. Venus, because it is close to Earth, and Jupiter, because it is so massive, have the greatest effect on the eccentricity of Earth's orbit. These changes lead to varying levels of solar illumination and therefore changes in temperature.

Axial Tilt (also called Obliquity): The axis of the Earth's orbit is at an angle. This angle is responsible for the fact that one hemisphere receives more sunlight during summer. Over long time periods, the obliquity slowly changes. This change is caused by multiple factors including the following two: The Moon's orbital path is not precisely along Earth's orbital plane and so the gravitational attraction of the Moon varies in direction over time. Also, the gravitational pull of the Sun and Moon on Earth's equatorial bulge causes the poles to slowly wobble. These two effects lead to cycles of obliquity of 41,000 and 20,000 years, respectively. When the change in obliquity is so great as to point the Earth's Polar Regions closer to the sun, the polar caps begin to evaporate and greenhouse gases are released into the atmosphere, causing warmer periods. When the obliquity is smaller and the poles are less illuminated, the polar caps reform and freeze greenhouse gases into the ice, leading to ice ages.



It is important to remember, the pace of these past climate changes was very slow, taking tens to hundreds of thousands of years. In the last million years the biggest orbit-induced cycles occurred roughly every 100,000 years. It is natural and logical to wonder if evidence of these natural past changes to the climate explain what's happening today. To the contrary, **scientists know these orbital changes are not behind today's global warming**. In fact, the current state and trend of our orbit dictates we should be cooling now, not warming. We are adding greenhouse gases into the atmosphere at a rate far exceeding any of the natural processes. What

Executive Summary

Climate change will be the defining challenge of the 21st century. Evidence continues to mount that continued inaction on greenhouse gas emissions could lead to catastrophic changes, destabilizing the very systems that support and sustain human civilizations. Billions of people will experience these changes through threats to public health, disruption of national and local economies, and food and water insecurity. Buildings and infrastructure will be increasingly impacted by the severity and frequency of weather events. For certain coastal communities, these threats will be amplified by rising sea levels.

Some of Virginia's communities are among some of the most vulnerable. The Norfolk-Virginia Beach Metropolitan Areas ranks 10th in the world in the value of assets exposed to sea level rise; and a recent study by the Hampton Roads Planning District Commission indicates that "costs from three feet of sea-level rise in the Hampton Roads region are expected to range between \$14 billion and \$87 billion."

A business-as-usual pattern of carbon emissions is likely to create 4°C of warming, and could lock in enough sea level rise to submerge land currently home to 470 to 760 million people, with unstoppable rise unfolding over centuries. By contrast, significant carbon cuts limiting warming to 2°C could bring the number as low as 130 million people. Foreign policy experts increasingly warn that people internally displaced from sea level rise, droughts, and super storms are considered a risk to domestic stability within their own countries and international security more broadly.



Most of the world's largest cities are located in coastal regions.

While a worldwide policy response to climate change is required, a great deal of the action and implementation will have to take place at the local level. Blacksburg is proud to join the majority of U.S. cities that have made a formal commitment to reduce their community's greenhouse gas emissions. In fact, for nearly 10 years while this plan was still under development, Blacksburg was already making investments and setting new policies to reduce carbon emissions, starting with changes to the Comprehensive Plan that encourage more sustainable development practices, significant expansion of alternative transportation options, a municipal commitment to pursue LEED Silver Certification for new or substantially renovated municipal buildings, and more recently, by launching the Solarize Blacksburg program. This initiative was the first of its kind in Virginia, and resulted in a quadrupling of the amount of residential solar in less than a year and which garnered our community the U.S. Conference of Mayors Climate Protection Award for 2015. These carbon-reduction efforts have already brought numerous benefits to our community and have strengthened our community's long-term economic, social and environmental resilience. Clearly Blacksburg is already heading in the right direction.

The Commitment, The Target, The Plan

While Blacksburg’s early achievements have been notable, the latest science suggests that more ambitious actions are required to mitigate the most extreme impacts of a changing climate. Blacksburg’s Climate Action Plan sets out to do just that. The long-range goal, established by Town Council in 2007, is to reduce our community-wide greenhouse gas emissions by 80% below 1990 levels by 2050. This plan, once fully implemented, will enable us to reach that emissions reduction target. This will require being much more efficient with the energy we use in the buildings where we live, work and go to school; to rethink the ways we get around; to make wise development decisions as our population grows; to invest in clean energy sources, and to be more deliberate in our everyday consumption and disposal choices. Some of these changes will require significant investment, but it is increasingly clear that the costs of inaction would be far, far greater.

Here’s the good news: these changes will also bring significant benefits to Blacksburg’s citizens and the community as a whole. Communities that are designed for energy efficiency in buildings and transportation options enjoy the economic benefit of avoided energy costs – retaining those dollars in the local economy. Communities that make sure people can get where they need to go in more active ways enjoy better public health outcomes, improved air quality, reduced congestion and more thriving civic spaces. Communities that make deliberate and wise choices about development are better positioned to preserve rural landscapes, support robust local food systems, and maintain the health and integrity of local watersheds, forests, and wildlife habitats. Blacksburg aims to be this type of community.

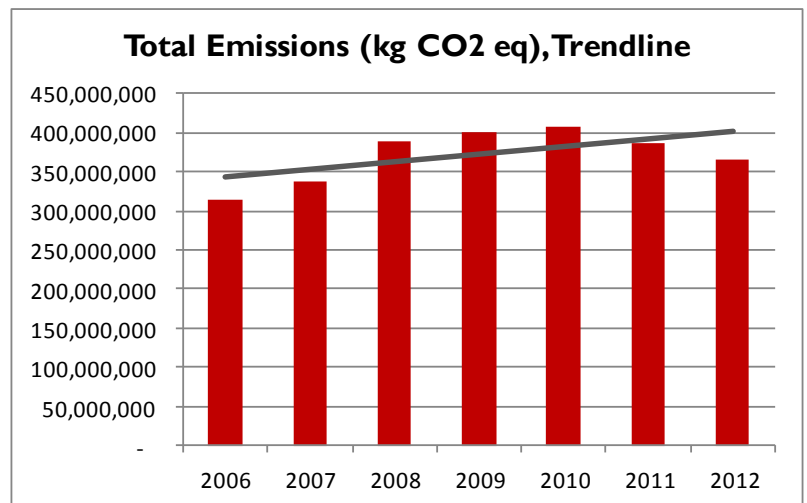
Blacksburg’s Climate Action Plan is divided into six chapters covering the major sectors of the community that substantially contribute to Blacksburg’s greenhouse gas emissions. These include: Residential, Transportation, Commercial/Industrial, Food, Waste & Recycling, Land Use, and Renewable Energy. The plan spells out goals, measurable objectives, and implementation strategies across each of these sectors. The format for each chapter is as follows: a listing of that sector’s goals, objectives and anticipated co-benefits, a snapshot of that sector’s share of community-wide greenhouse gas emissions as well as narrative describing existing conditions, challenges and opportunities; a list of individual actions that citizens can take as they relate to that sector; a set of shorter-term “Let’s Get Started” strategies with a 2 to 5 year implementation horizon, and an additional set of longer-term “Looking Ahead” strategies with a 5 to 15 year implementation horizon. Throughout each chapter, readers will also find additional “Key Concepts” and “Leading By Example” vignettes.

The following pages provide an overview of the community-wide greenhouse gas emissions inventory, including the share of emissions contributed by each key sector; projections of what our emissions are expected to be under a “business as usual” scenario and an explanation of how the goals, objectives and strategies included in this plan reflect the most realistic path forward to meet our emissions reduction targets by 2050. The **Climate Action Plan Technical Report** provides a far more detailed explanation of the methodology that went into the greenhouse gas emissions inventory, including complete data tables, and a more lengthy narrative that supports the goals, objectives and strategies found in this plan. This technical report can be viewed on the Town of Blacksburg website.

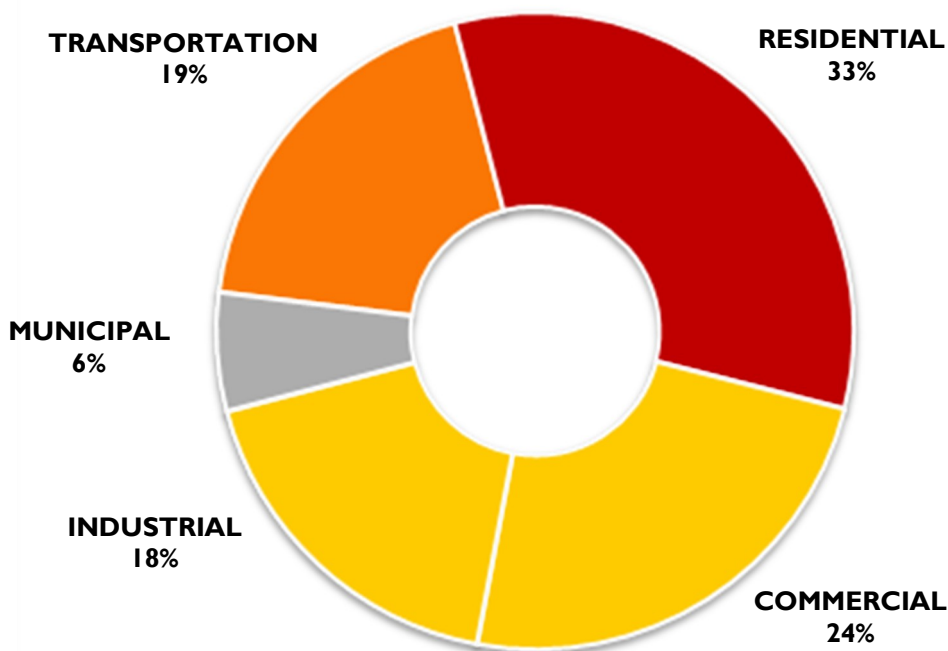
Any planning process is rooted in a handful of key questions:

- Where are we today?**
- Where are we heading?**
- Where do we want to end up?**

In the case of climate action planning, the first of those three questions indicated the need to undertake a comprehensive inventory of our community’s greenhouse gas emissions. Following the ICLEI (Local Governmental for Sustainability) Protocol, Blacksburg’s total greenhouse gas (GHG) emissions were calculated and broken down into the key contributing sectors: residential, commercial, transportation, industrial, and municipal. Energy use and emissions calculations were derived from the following data sources: transportation-related emissions were calculated based on Virginia Department of Transportation (VDOT) data on vehicles miles traveled (VMTs) in Blacksburg as well as census data that indicates Blacksburg’s breakdown of preferred transportation modes; detailed electricity consumption data by sector were provided by AEP and Virginia Tech Electric; and emissions related to natural gas consumption was derived from data provided from the local natural gas provider, Atmos Energy. These data enabled us to establish a full snapshot of community-wide data over a seven year span, as shown in the chart at right.



Blacksburg’s Emissions by Sector



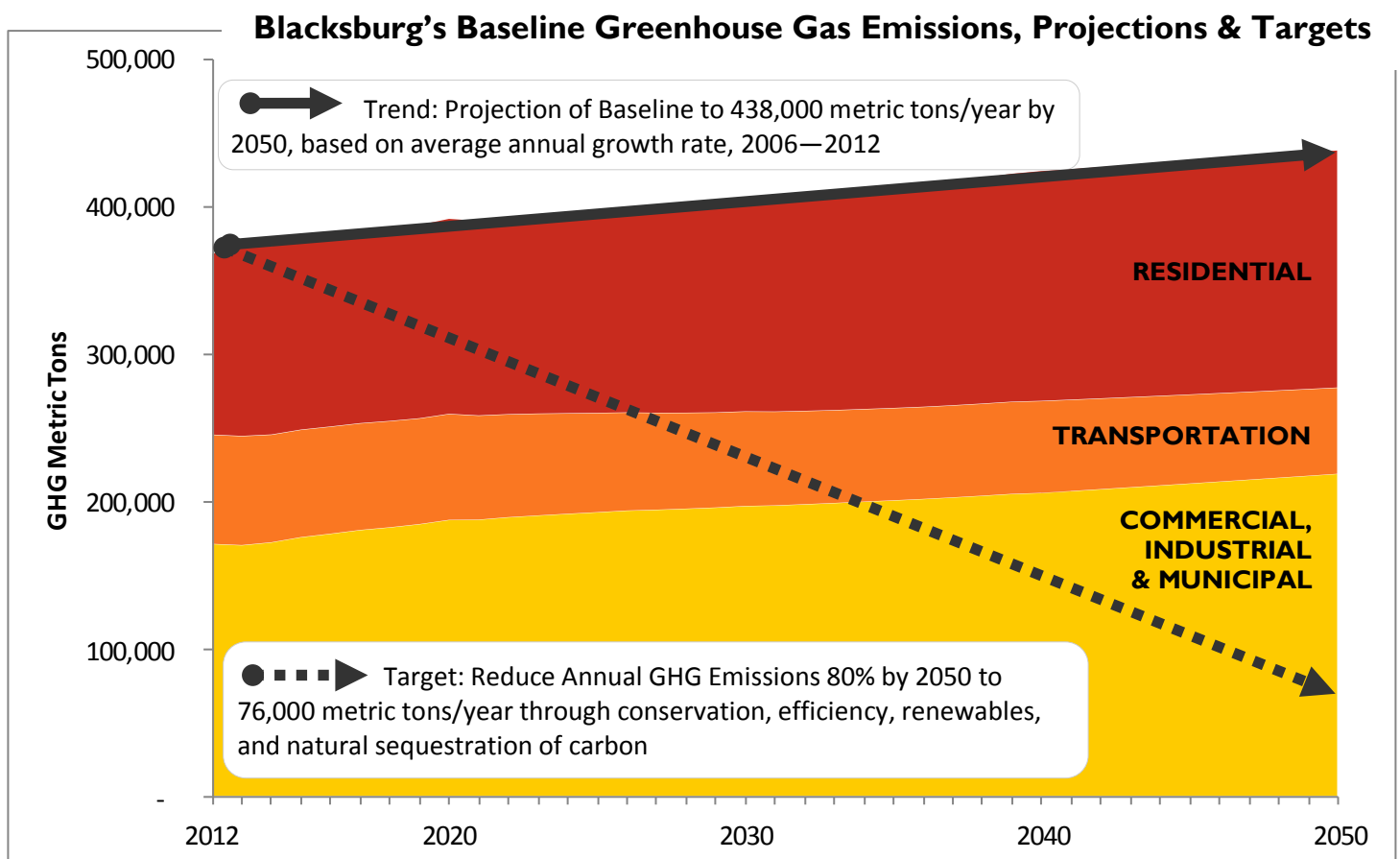
The diagram at left shows the relative share of each major contributing sector for which data was readily available. Other contributing sectors: food, waste, recycling, and changing land uses lack concrete local data sets and were therefore not included in this inventory of baseline conditions.

Nevertheless, these additional sectors were included in the planning process since it is clear from national data sets that food production and delivery, consumer choices, disposal decisions, the growth of renewable energy and community design all significantly contribute to greenhouse gas emissions and are therefore key factors in meaningful climate mitigation planning.

EMISSIONS PROJECTIONS

CLIMATE ACTION PLAN

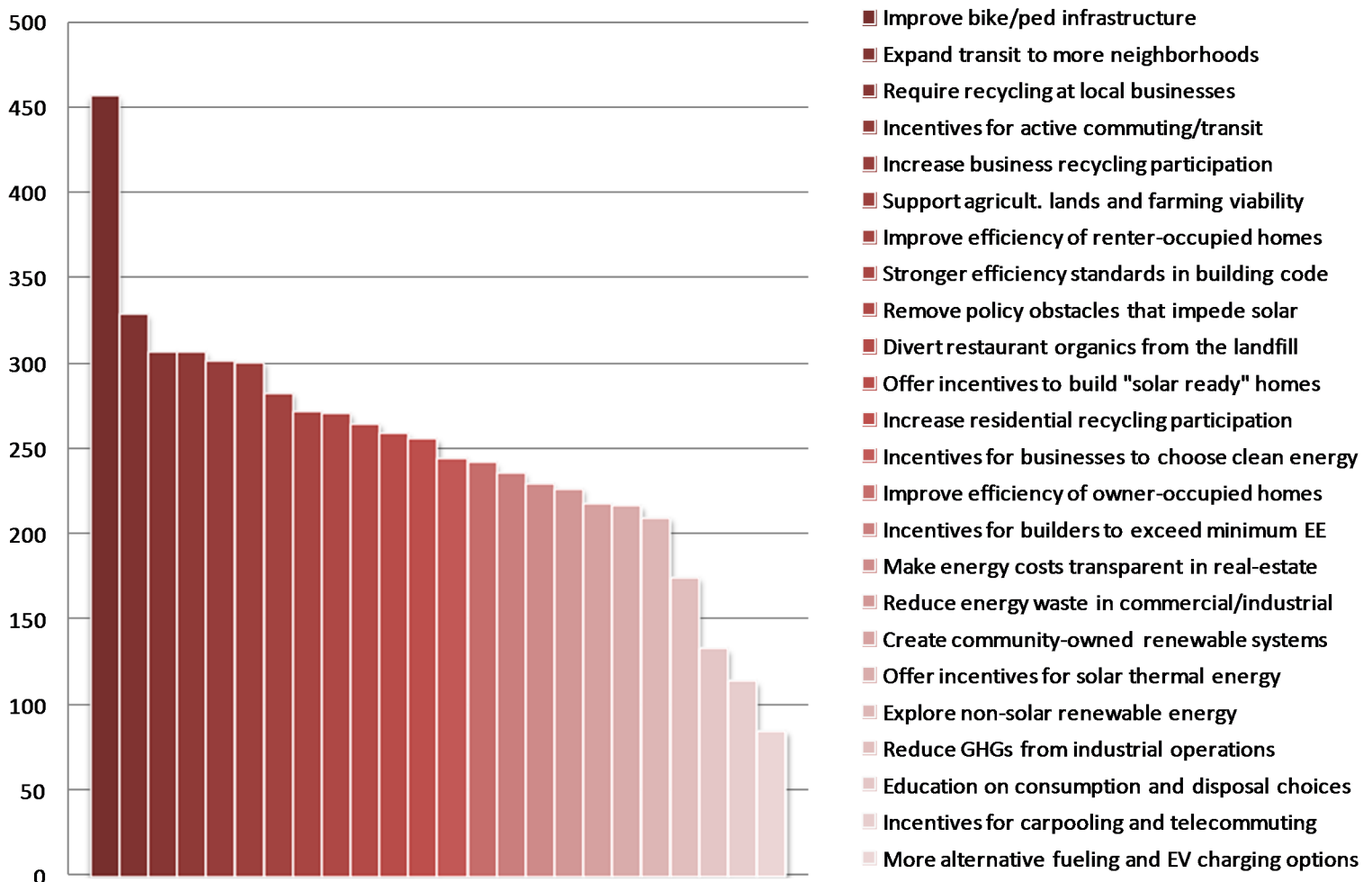
Calculating average annual growth rates (AAGRs) of emissions between 2006 and 2012 and applying these to each sector, provided a reasonable estimate for the second question, **“Where are we heading?”** Looking at the baseline conditions and this trendline, Blacksburg’s community-wide emissions are expected to increase by nearly 20% between 2012 and 2050 under a business-as-usual scenario, as shown in the chart below.



The third question, **“Where do we want to end up?”** has many answers, but broadly, we know we want a community that is healthy, resilient and thriving. A warming and increasingly unstable climate threatens that future vision: as extreme weather events increase in both severity and frequency, as the hydrological cycle becomes disrupted, as stable growing conditions for agriculture become more precarious, as displaced populations shift away from areas impacted by sea-level rise or extended droughts. Ultimately, the answer to this third question is driven by the scientific consensus that a stable climate will be seriously imperiled if the overall concentration of atmospheric CO₂ is not brought back down to 350 parts per million (ppm) before the century’s end, preferably sooner. To achieve that aim, it is believed that the world’s emissions need to be reduced 80% by 2050 over the levels that existed in 1990, as shown in the dotted line in the graph above. This target also matches the greenhouse gas emissions reduction commitment that Blacksburg’s Town Council adopted by resolution in November of 2007, and around which this resulting plan has been developed.

After tackling the first key questions in the planning process, “Where are we today?”, “Where are we heading?”, and “Where do we want to end up?”, the planning process focused in on the specifics of **how** to reach this very ambitious target. Looking at the best available information on the policies and technologies that have a reasonable likelihood of reducing emissions, a long set of potential strategies was generated, 407 in all. Prioritizing those strategies was the next step. A number of criteria were established that the Climate Action Plan Working Group used to weigh and prioritized this longer list. Among the criteria was the degree to which Blacksburg’s citizens supported them. Through a widely-publicized online survey, Blacksburg’s citizens were asked to weigh in on 5 potential approaches within each of the major emissions-contributing sector. They were invited to indicate whether they considered these approaches: "not a priority", a "low priority", a "medium priority", a "high priority", or an "essential priority". Next, they were asked to identify their top two approaches within each sector; these two scores were combined and the resulting citizen priority rankings are shown below.

Citizen Priorities - Climate Action Approaches



ESTABLISHING PRIORITY STRATEGIES



These citizen priority scores were weighed with a number of other key criteria including:

1. Greenhouse Gas Emission Impact
2. Co-Benefits to Community
3. Demographic/Geographic Scope of Impact
4. Local Capacity
5. Impact on Local Economy & Employment
6. Funding & Financing Options; Return On Investment (ROI)
7. Integration with Established Community Plans & Policies; State Policy Drivers/Obstacles

Utilizing this set of criteria, a set of priority strategies was identified and are reflected in each of the sector chapters in three ways: a set of **“Individual Actions”** that citizens can choose to adopt in their own lives, shorter time-horizon **“Let’s Get Started”** strategies, and longer-term **“Looking Ahead”** strategies. The precise timeline for implementation of the community strategies will depend on a number of critical factors: integration into existing community plans and policies; political will and local capacity, funding and financing opportunities, external technological and market forces, and in some cases, significant shifts in Federal or State energy, housing, and/or transportation policies. The pages below from the Commerce and Industry Chapter show an example of how the strategies are presented across all the sector chapters:

Individual Actions

Let’s Get Started

Looking Ahead

COMMERCE & INDUSTRY

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
Avoid disposables. Bring your own bags to the grocery, your own travel mug to the coffee shop, and even your own to-go container to the restaurant.	(Politely) ask your favorite restaurant to switch from Styrofoam cups and to-go containers to something recyclable, compostable, or better yet—reusable (for a small fee).	Make a six-month commitment to not use any disposable items and share your progress with friends and family on social media.
If you catch your favorite local businesses doing something green, be sure the tell them you notice and appreciate it!	Nudge: If you see ways that your favorite local businesses could “green” their practices, let them know you would welcome a change.	Vote with your dollars and reward the local businesses that are going the “extra green mile.”
If you work in an office, think about the spaces where “daylighting” might be possible—places where natural light is sufficient for a good portion of the day.	Point your employer toward local resources that can help Blacksburg businesses improve the energy efficiency of their buildings.	Form a “green team” at your workplace and look for other opportunities to save energy and resources across the organization.
If you are a local business owner, investigate the DQC’s Virginia Environmental Excellence Program (VEEP), or the Virginia Green Initiative.	Look into green certifications for your industry sector (such as the Green Restaurant Association, or the U.S. Green Retail Association).	Pursue and attain state and/or industry green certifications for your place of business. Display these proudly for all your customers and clients to see!

You have power as an individual and as a consumer, and you can “vote” with your dollars every day when you choose alternatives to energy-intensive products and services. Instead of buying food that has traveled 1,500 miles to the local grocery store, why not pick up some in-season produce at the farmers market? The table above lists actions you can take as an individual consumer, an employee, and a business owner. Simple things you can try today, next steps to start building new habits, and bigger changes you can take on when you’re ready to be a champion for greening our local economy.

COMMERCE & INDUSTRY

LEADING BY EXAMPLE: GILLIE’S RESTAURANT

GOALS
REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

PRIORITY STRATEGIES

Let’s Get Started:

Industrial Energy Efficiency Programs: Encourage industrial facilities to take advantage of existing and emerging federal and state programs such as the DOE’s Industrial Technology Program, which sponsors energy audits for manufacturing plants.

Education & Outreach for Businesses: Engage local business owners in low and no-cost energy savings measures, including behavioral campaigns for employees (anti-idling policies, water conservation, daylighting initiatives, etc.)

Commercial Solar Potential: Perform a community-wide analysis of commercial properties to determine solar capacity of existing commercial roof space.

Green Business Certification Program: Create a local green business certification program to recognize local businesses that have made energy efficiency improvements and adopted other sustainability actions.

LEED Buildings: Through the Town’s LEED building commitment, continue to lead by example for new construction or substantial rehab of commercial-grade buildings.

One of Blacksburg’s oldest and most-loved restaurants, Gillie’s offers vegetarian fare right in the heart of downtown. While most restaurants offer Styrofoam or plastic to-go containers, Gillie’s has offered compostable to-go containers for several years.

COMMERCE & INDUSTRY

KEY CONCEPT: GREEN LEASES

GOALS
REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

PRIORITY STRATEGIES

Looking Ahead:

Commercial Energy Coalition: Foster collaborations among area businesses to share information on energy efficiency improvements and pool resources to purchase energy-efficient materials or equipment.

Incentives for Commercial Energy Upgrades: Establish incentives, financing tools, and other resources that would enable local businesses to cost-effectively pursue energy efficiency upgrades in their buildings and operations.

Green Leases: Explore opportunities (such as Green Leases) for renter businesses to partner with commercial property owners on efficiency upgrades or solar PV installations.

Commercial Energy Evaluations: Offer free or reduced-cost analysis of local commercial buildings to demonstrate return on investment timeline and potential cost-saving of efficiency upgrades.

LEED Building Incentives: Establish incentives, financing tools, and other resources that would enable local businesses and industry to cost-effectively pursue LEED certification or some suitable equivalent.

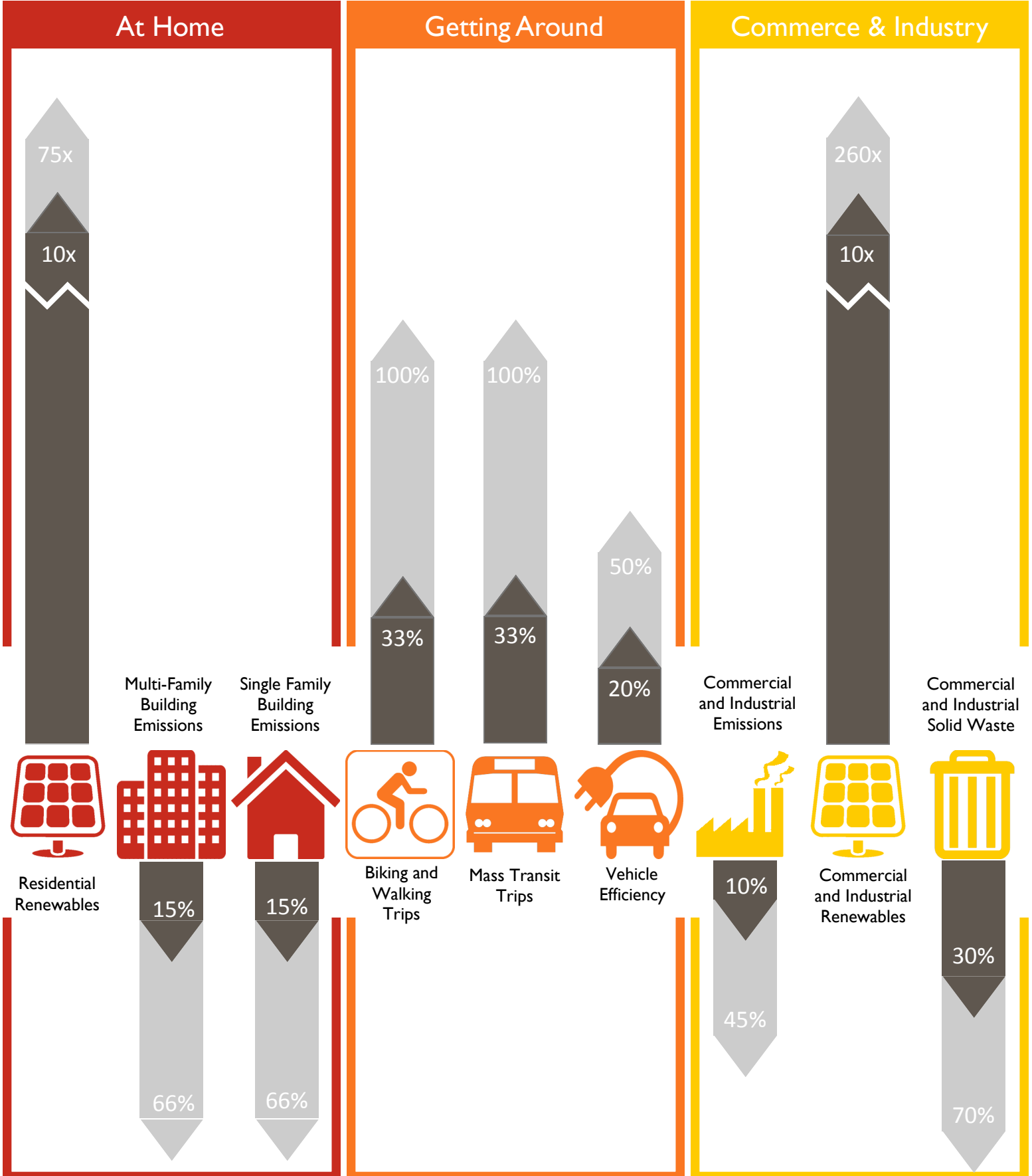
Innovative Financing for Commercial Efficiency: Identify collaborative financing options for large-scale commercial systems, such as privately owned and operated joint ventures.

The Natural Resources Defense Council, the Institute for Market Transformation, and the Department of Energy have teamed up to develop a free library of template green leases for all types of commercial settings.

The following page provides a snapshot of the goals translated into measurable objectives, and the extent of implementation that would enable Blacksburg to fully reach its emissions reductions goals, including 2020 and 2050 benchmarks.

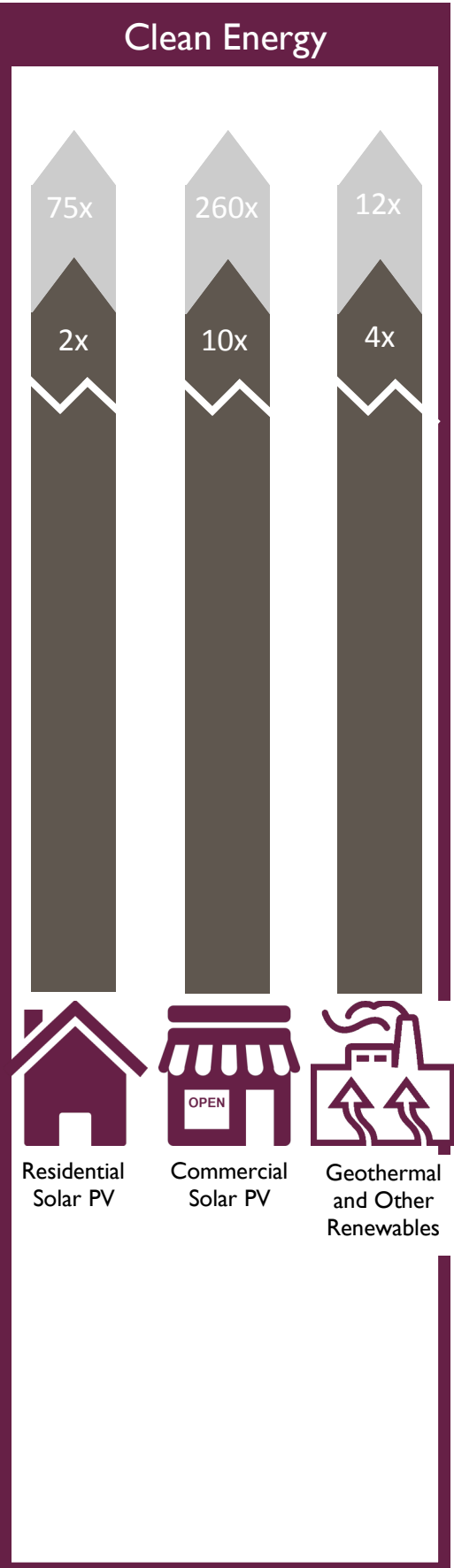
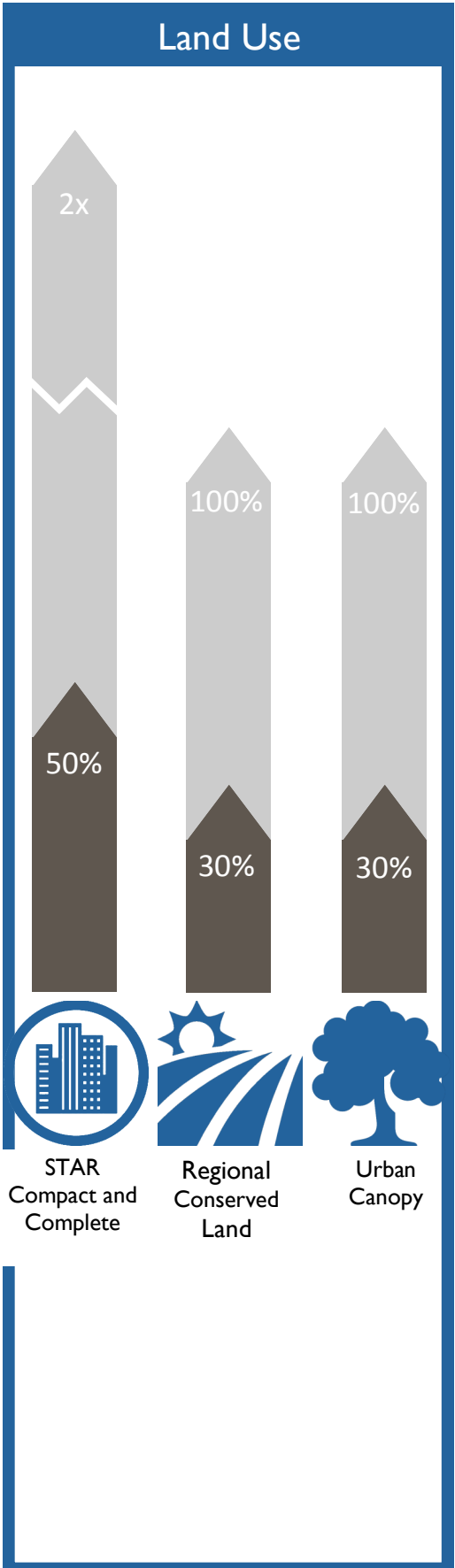
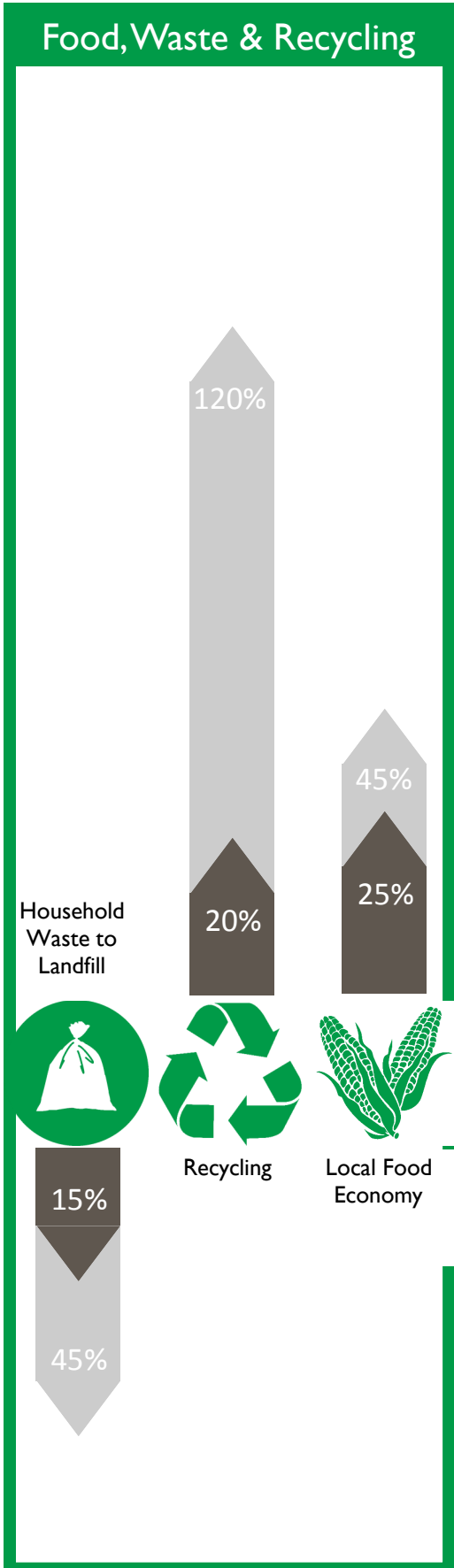
ON TARGET

■ 2050 Goals and Indicators
 ■ 2020 Goals and Indicators



**ON
TARGET**

■ 2050 Goals and Indicators
■ 2020 Goals and Indicators



AT HOME

GOALS

INCREASE RESIDENTIAL ENERGY CONSERVATION BEHAVIORS
IMPROVE ENERGY EFFICIENCY OF OWNER-OCCUPIED HOMES
IMPROVE ENERGY EFFICIENCY OF RENTAL PROPERTIES
EXPAND ADOPTION OF RESIDENTIAL RENEWABLE ENERGY

- CO-BENEFITS:**
- reduces household costs for heating and cooling
 - improves thermal comfort and indoor air quality
 - creates local jobs in the energy efficiency field
 - provides a hedge against utility price increases



AT HOME

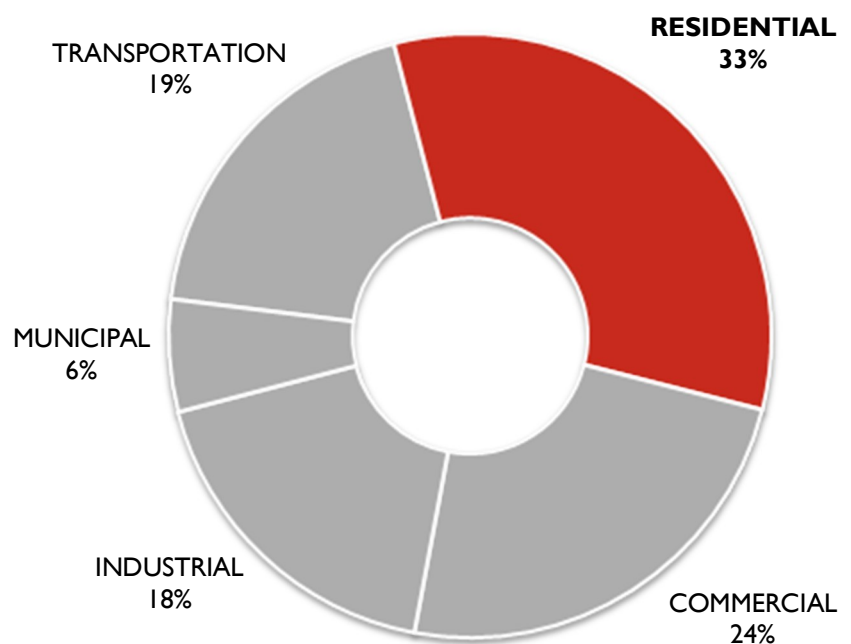
BASELINE CONDITIONS, CHALLENGES & OPPORTUNITIES

Residential buildings currently account for a full third of Blacksburg's greenhouse gas emissions, making it the largest source by sector. Upgrading these buildings to improve energy efficiency is arguably the most direct way to reduce overall energy consumption in our community.

Blacksburg has some specific challenges overcome in this arena - a large percentage of older homes and apartment buildings which were built before minimum standards for energy efficiency were a part of the building code. Efficiency upgrades to these homes would improve indoor air quality and thermal comfort, while substantially reducing household energy costs. Furthermore, Blacksburg has a very high proportion of renter-occupied housing, which creates financial incentive barriers for landlords and renters alike. Blacksburg's biggest challenge for the residential sector will be to create tools and resources that will make residential retrofits of owner-occupied *and* rental properties attractive and cost-effective for homeowners and landlords alike.

Other residential energy opportunities include upgrading to more efficient water heaters, appliances and lighting, as well as energy conservation techniques that residents can employ such as passive cooling in summer or air-drying laundry. While appliance upgrades can involve substantial up-front costs, they have been demonstrated to pay for themselves over time and are considered very cost-effective investments. The biggest challenge in encouraging residential energy efficiency improvements is identifying creative ways to reduce up-front costs so more residents can take advantage of these long-term financial savings while helping the community reach its goals on reducing energy consumption and GHG emissions.

RESIDENTIAL SECTOR
Share of Greenhouse Gas Emissions



Meeting Our Residential and Building Efficiency Goals:

- Reduce average per-unit greenhouse gas emissions from single-family homes by 15% by 2020, and by 66% by 2050.
- Reduce average per-unit greenhouse gas emissions from existing multi-family housing units by 15% by 2020, and by 66% by 2050.
- Increase the installation of solar PV, solar water heating systems, and/or geothermal on residential buildings tenfold by 2020, and seventy-five fold by 2050.

AT HOME

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
<p>Visit the lighting display area of the hardware or lighting store and check out the much-improved light quality of newer LED bulbs.</p>	<p>Switch out one regular lightbulb for a compact fluorescent or LED and see how you like it.</p>	<p>Replace 10 of the highest-use bulbs in your home with CFLs or preferably, LEDs which are even more efficient and don't contain mercury.</p>
<p>Use cold water wash and rinse settings on your washing machine; 80% - 90% of the energy used to wash your clothes is used to heat the water.</p>	<p>Use the "No Heat Dry" option on your dishwasher and reduce its energy consumption by up to 40%.</p>	<p>Try air drying. Did you know that your clothes dryer is typically the second biggest electricity-using appliance in your home? (after the fridge)</p>
<p>Heating and cooling account for 50% of the energy consumed in Blacksburg's average home. If you typically keep your home at 70 year-round, try 68 in winter and 72 in summer.</p>	<p>Arrange to have one of Blacksburg's energy assessment firms perform a simple home energy evaluation or even a <u>complete home energy audit</u> to identify cost-effective efficiency upgrades for your home.</p>	<p>Do the upgrades! When you substantially improve the energy efficiency of your home you will experience big savings on your winter and summer utility bills, improved thermal comfort, and better indoor air quality!</p>
<p>Adjust water heater thermostats to 120 degrees, down from the 140 degrees that is typically pre-set in the factory.</p>	<p>Take stock of all your household appliances and estimate the expected replacement date. For those near the end of the expected life, research some <u>Energy Star options.</u></p>	<p>Take advantage of Energy Star tax holidays when you are ready to replace old home appliances—usually held in October each year.</p>

For more great ideas to save energy and money in your home try these useful websites: smarterhouse.org and energizeblacksburg.org



Did you know there are close to 90 million clothes dryers in the U.S.? If every American household air-dried their clothes for just half the year, it would save 3.3% of the country's total residential output of carbon dioxide, plus tons of money!

You can save a lot of energy and money by making changes to the way you do things in your home. The table above lists simple actions you can try out today, next steps to start building new habits, and bigger changes you can take on when you're ready to take a big bite out of your residential energy use.

GOALS

INCREASE RESIDENTIAL ENERGY CONSERVATION BEHAVIORS
IMPROVE ENERGY EFFICIENCY OF OWNER-OCCUPIED HOMES
IMPROVE ENERGY EFFICIENCY OF RENTAL PROPERTIES
EXPAND ADOPTION OF RESIDENTIAL RENEWABLE ENERGY

PRIORITY STRATEGIES



Let's Get Started:

State Policy: Work with other localities across Virginia to advance clean energy policies at the state level.

Community Energy Campaigns: Utilize community and neighborhood based campaigns to establish and support energy reduction initiatives that foster adoption of conservation and efficiency practices following a "continuum of actions approach".

DIY Efficiency Initiatives: Create low and no-cost resources that homeowners and renters can utilize to identify efficiency simple "DIY" upgrade opportunities and reduce energy waste.

Promote Efficient Rentals: Publicize the advantages of energy-efficient rental properties to renters and multifamily developers alike: resident comfort and health, dramatically reduced energy cost, and changing consumer expectations.

Passive Solar and Solar-Ready: Provide incentives for homebuilders and developers to maximize thermal efficiency and future solar PV potential when making site and home design decisions (i.e. building orientation, roof slope and geometry.)

Efficiency Incentives: Establish incentives, financing tools, and other resources that enable homeowners to afford energy efficiency upgrades on their homes.

Green Building Certifications: Provide incentives for homebuilders and developers to adopt energy-efficient and other green building practices (EarthCraft, LEED, Energy Star, etc.)

Energy Score for Homebuyers: Promote the advantages of an energy assessment as part of the home buying process.

AT HOME

LEADING BY EXAMPLE:

JASON & JUSTIN BOYLE

Justin and Jason Boyle, brothers and co-owners of **Green Valley Builders**, wanted to take their green building practices one step further and set out to



build an entirely green neighborhood.

Mount Tabor Meadows is the first subdivision of its kind in Blacksburg, where each home has been

designed and built to meet Energy Star and EarthCraft certifications, making them up to 30% more efficient than a typical new home.

In addition, all of the homes in the neighborhood were built solar-ready, making it much more cost-effective for

homeowners to add solar later on. When the **Solarize Blacksburg** initiative launched in the spring of 2014, Mount Tabor Meadows residents adopted solar at much higher rates than the community at large.



Top: Justin and Jason receiving the 2010 NRV Homebuilders Association Award for Design Excellence on the Mount Tabor Meadows project.

Above: One of many solar homes in Mount Tabor Meadows.

GOALS

- INCREASE RESIDENTIAL ENERGY CONSERVATION BEHAVIORS
- IMPROVE ENERGY EFFICIENCY OF OWNER-OCCUPIED HOMES
- IMPROVE ENERGY EFFICIENCY OF RENTAL PROPERTIES
- EXPAND ADOPTION OF RESIDENTIAL RENEWABLE ENERGY

PRIORITY STRATEGIES



KEY CONCEPT: PACE FINANCING



Looking Ahead:

Energy Score for Renters: Explore ways to make a rental property's energy rating score or typical energy usage available to prospective renters prior to lease signing.

Reetrofit Savings Calculator: Promote tools such as the online retrofit calculator that provide guidance on cost-effective energy upgrades as well as estimates for cost savings for both tenants and landlords of multifamily housing.

Green Leases: Promote and publicize the advantages of "green leases" to better align tenant and landlord interests over energy efficiency and consumption, while also providing a cost-sharing framework for efficiency upgrades in longer-term rentals that guarantee lower energy costs and greater thermal comfort for occupants.

PACE Financing: Consider establishing a low-interest public revolving loan fund, on-bill or PACE-model financing options, or establish a public "loan loss" reserve agreement with local lenders to help local residents and businesses finance energy efficiency upgrades and solar projects.

Energy Performance on MLS: Work to include energy performance information to prospective buyers through amendment of the MLS template.

Building Code for Efficiency: Advocate for changes in the uniform building code of Virginia that would substantially improve the energy efficiency of newly constructed residences, both single-family and multi-family.

Housing Professionals: Encourage housing industry professionals to adopt and promote energy efficiency as part of their core mission (realtors, homebuilders, developers, appraisers, inspectors, building officials)

Residential energy efficiency upgrades typically pay for themselves many times over in the long-term, but homeowners often struggle with the up-front cost. Enter **Property-Assessed Clean Energy (PACE)** programs, already enabled in Virginia.

Locality secures a bond or otherwise creates a lending pool of money that is available to local residents

Property owners voluntarily sign up for financing to do efficiency upgrades or to install solar on their home

Loan payments replenish pool; revenue-neutral for locality, immediate financial benefits for residents, supports local clean energy jobs

Loan repaid through property tax bill (monthly loan payment is often lower than monthly energy savings)

PACE programs use a lien/property tax assessment process to provide that up-front financing, and are a very promising path forward to: 1) address the up-front cost conundrum, 2) save consumers money on their monthly utility bills right away, 3) are tax neutral and 4) promote local jobs.

GOALS

INCREASE RESIDENTIAL ENERGY CONSERVATION BEHAVIORS
IMPROVE ENERGY EFFICIENCY OF OWNER-OCCUPIED HOMES
IMPROVE ENERGY EFFICIENCY OF RENTAL PROPERTIES
EXPAND ADOPTION OF RESIDENTIAL RENEWABLE ENERGY

AT HOME

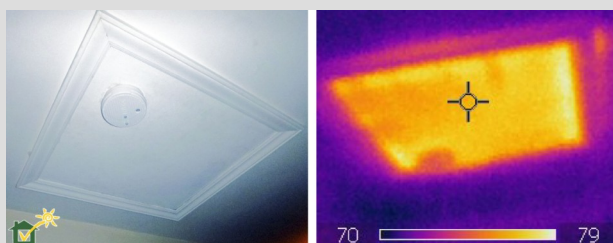
LEADING BY EXAMPLE:

DAWN JEFFERIES and MARK OWCZARSKI

Dawn and Mark were highly motivated to reduce the energy use in their home as much as possible. While the potential for cost savings and concern for the environment were factors in their decision, they were also trouble-shooting indoor allergen and comfort issues in their young son's room, which they noticed stayed significantly colder in the winter months. They knew that the comfort issue probably signaled a bigger problem that was costing them money and wasting valuable energy.



To get some expert help, Dawn and Mark reached out to **Energy Check**, a locally-owned company that offers home energy-efficiency testing and improvement services. Based on the results of their personalized home energy evaluation, they were able to tackle some specific challenges,



namely leaky HVAC ducts in non-conditioned spaces, lack of air sealing, and inadequate insulation levels in their attic, as shown in these images

"I was expecting to notice a difference at some point, I just wasn't expecting it to be so immediate. My parents came to visit and asked if we'd finally figured out how to adjust all the thermostats because the house was so much more comfortable...our gas bill showed remarkable reductions. Pretty amazing given that winter (2014) was so much colder than the previous year"
- Dawn Jefferies, Blacksburg resident

Top: Dawn & Mark, proud and happy energy efficiency retrofit clients

Above: Photograph vs. thermal image of their attic access, which helped pinpoint a source of excessive heat in summer and cold air infiltration in winter.

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GETTING AROUND

GOALS

REDUCE CAR DEPENDENCY
INCREASE BIKING, WALKING & TRANSIT FOR DAILY TRIPS
IMPROVE VEHICLE EFFICIENCY

CO-BENEFITS

- reduces fuel and and vehicle maintenance costs
- improves air quality
- reduces traffic and parking congestion
- spurs downtown revitalization
- improves health, well-being, and quality of life



GETTING AROUND

BASELINE CONDITIONS, CHALLENGES & OPPORTUNITIES

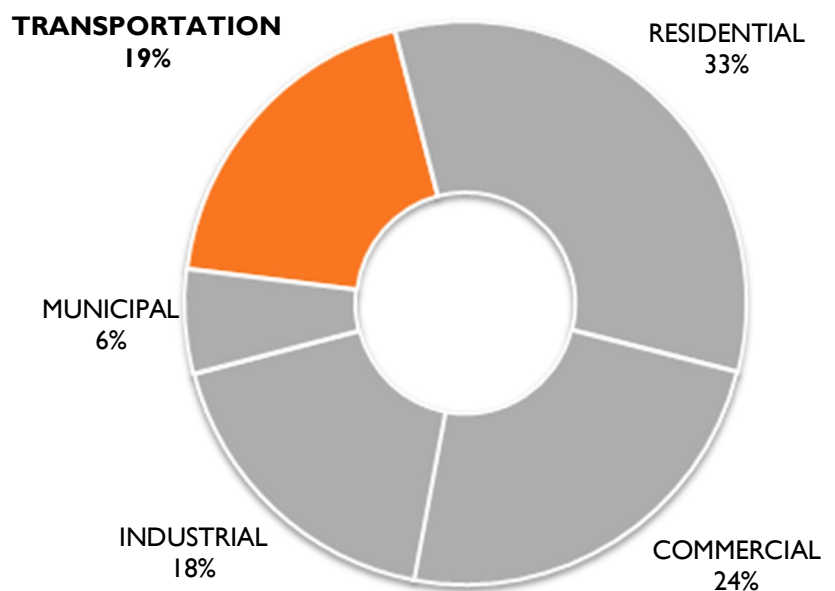
Transportation is one of the most promising areas for reducing overall energy use. Most of Blacksburg's citizens rely on a private vehicle to get around (78%), and two-thirds of drivers say they normally drive alone for their daily commute. At the same time, average vehicle miles traveled (VMTs) are close to 10 miles per person per day, which makes walking, biking, and riding the bus a realistic option for many of the Town's residents. This is especially true for work and school commutes as these trips typically follow a fixed daily route, tend to be solo trips (single-occupancy vehicles), and don't usually involve transporting goods such as groceries.

When surveyed on a host of potential strategies that were being considered for inclusion in this Climate Action Plan, Blacksburg's citizens by far expressed their strongest support for expanding the Town's bike and pedestrian infrastructure.

Fortuitously, Blacksburg has recently completed its Bike Master Plan so the framework is already in place to significantly advance that goal in the coming years. Furthermore, the Greenway/Bikeway/Sidewalk Committee has worked tirelessly over the years to advance the best options for planning and development of multi-use trails, bike lanes, and sidewalks. As a result of their efforts, Blacksburg has a robust system of biking and walking trails as depicted in the "Paths to the Future" map, which is included in the Town's Comprehensive Plan.

Blacksburg Transit is also one of the Town's greatest alternative transportation assets. Right now, BT routes are targeted toward the transportation needs of the student population. In the coming years, it will significantly help Blacksburg reach its Climate Action goals if the routes are expanded to better serve the non-student population. Given all these assets and the Town's relatively small geographic area, Blacksburg is very well-positioned to transition to a lower-carbon transportation future.

TRANSPORTATION SECTOR Share of Greenhouse Gas Emissions



Meeting Our Transportation Goals:

- Increase the percentage of trips taken by bicycle and walking by 33% percent by 2020 and 100% percent by 2050.
- Increase the percentage of trips taken by bus or other mass transit by 33% percent by 2020 and 100% percent by 2050.
- Support improvements in vehicle efficiency (the ratio of GHG emissions to VMT) by 20 percent by 2020 and 50 percent by 2050.

GETTING AROUND

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
Check your tire pressure once a month. Your car loses 0.3% of fuel economy for every one-pound drop in air pressure below the optimal level.	Drive friendly! Quick acceleration and aggressive driving can decrease fuel efficiency by as much as 33%.	Use your car's air-conditioning sparingly. Running your car's air conditioning on max can increase fuel consumption by 5—20%.
Combine errands. Try to group short trips together and save fuel.	Visit the Ride Solutions website and find a carpool buddy	Sign your up for Ride Solutions' Annual Clean Commute Challenge , and encourage your co-workers to compete as well.
Investigate some walking or biking routes to your frequent destinations.	Try biking one day to work, school., or just for fun. Borrow a friend's bike if you need to!	Make a commitment to bike or walk a certain number of days a month.
Visit the BT4U website to find the bus stops closest to the start and end points of your daily commute.	Next time you have to fly, try the Smart Way bus to get to and from the Roanoke Airport.	Try Transit. If you've never been on Blacksburg Transit , make a commitment to try it at least once this month.
Test drive a hybrid or all electric car, or visit greencars.org to explore makes, models, and prices	Look into leasing an all-electric vehicle if your daily commute is less than 30 miles.	Sign up for ZipCar —a community car-sharing membership that lets you go car-free when you're ready!



RIDESolutions
Connecting the Region's Commuters

You can make a positive difference by making simple changes to the way you get around Town. The table above lists simple actions you can try out today, next steps to start building new habits, and bigger changes you can take on when you're ready to become a champion for clean commuting. Along the way you can save a lot of money, inspire your friends and neighbors, and maybe even get in your daily exercise!



blacksburg daily photo

GOALS

REDUCE CAR DEPENDENCY
INCREASE BIKING, WALKING & TRANSIT FOR DAILY TRIPS
IMPROVE VEHICLE EFFICIENCY

PRIORITY STRATEGIES

GETTING AROUND

LEADING BY EXAMPLE:

BETH LOHMAN and JERRY FORD



Let's Get Started:

Bike Master Plan: K cf_ hck UFX'Z ""]bHY[fUjcb'cZ h.Y'Hck b'cZ6'UWgVi f[fji 6]MWW' A UghYf' D'Ub']bhc' ch.Yf'Hck b'dc']MhXcW'a Ybrj'

Active Commute Incentives: Offer incentives or otherwise encourage residents to bicycle or walk to daily destinations.

Education & Outreach: Increase awareness of the individual benefits of alternative and active commuting and the variety of options available in the community

Bicycle Friendly Community Status: Partner with the American League of Cyclists and work toward recognition as a "Bicycle Friendly Community of America"

Planning for Alternative Transportation: Continue to coordinate land use decisions with alternative transportation services.

Ride and Car Share Opportunities: Promote and expand adoption of existing ride-share and car-pool matching programs with local employers and employees.



Enthusiastic cyclists and committed-bike commuters, husband and wife team **Jerry Ford** and **Beth Lohman** co-founded the **NRV Bike Kitchen** in 2012. The Bike Kitchen is committed to providing disadvantaged people with affordable, quality transportation bicycles, and utilizes volunteers to recycle and repair donated bicycles.



The **Habitat for Humanity ReStore** in Christiansburg hosts the Bike Kitchen, providing space for the workshop where bikes are repaired and stored until matched with a community member in need.

Top: Original artwork created for the Bike Kitchen by local artist, Jackie Harder.

Above: Beth posing next to some newly repaired bikes at the Bike Kitchen HQ.

GOALS

REDUCE CAR DEPENDENCY
INCREASE BIKING, WALKING & TRANSIT FOR DAILY TRIPS
IMPROVE VEHICLE EFFICIENCY

PRIORITY STRATEGIES

GETTING AROUND

KEY CONCEPT: CAR DEPENDENCY



Looking Ahead:

Bike Master Plan Implementation: Work toward full implementation of Bike Master Plan to ensure walking and biking are a safe and convenient means of daily travel for all Blacksburg residents.

Bike Share: Pursue a bike-share program to connect key destination points around Town and alleviate parking congestion.

Low Emission Vehicle Incentives: Offer incentives for residents to switch to lower-emission vehicles.

Regional Trail Infrastructure: Continue to expand trails and other cycling and walking infrastructure between Blacksburg and adjacent communities in the New River Valley.

Zip Car Expansion: Increase the convenience of biking, walking, and riding the bus by expanding the Zip-Car car share program at Virginia Tech to other parts of Blacksburg.

BT Routes to Neighborhoods: Increase Blacksburg Transit route coverage and frequency to residential neighborhoods, especially during work commuting hours.

Alternative Fueling Infrastructure: Provide incentives or help identify resources to expand alternative fueling/charging stations around Town.

Most communities in America are relatively car dependent – meaning it is highly impractical or unsafe for people to get where they need to go without driving. Car dependency results from transportation investments and land use patterns that favor automobile access while offering limited and fragmented alternatives to other modes of transportation.



Car dependency is also impacted by regional housing options and job opportunities. The map on the following page shows the proportion of workers who commute from outside Blacksburg, those whose commute falls within Town limits, and those who drive out of the community each day to get to work.

Reducing car dependency has many benefits for citizens and whole communities:

- Opens up options for non-drivers
- Improves public health
- Reduces road and parking congestion
- Lowers household transportation costs
- Improves local air quality
- Increases foot traffic in downtown areas

GOALS

REDUCE CAR DEPENDENCY
INCREASE BIKING, WALKING & TRANSIT FOR DAILY TRIPS
IMPROVE VEHICLE EFFICIENCY

GETTING AROUND

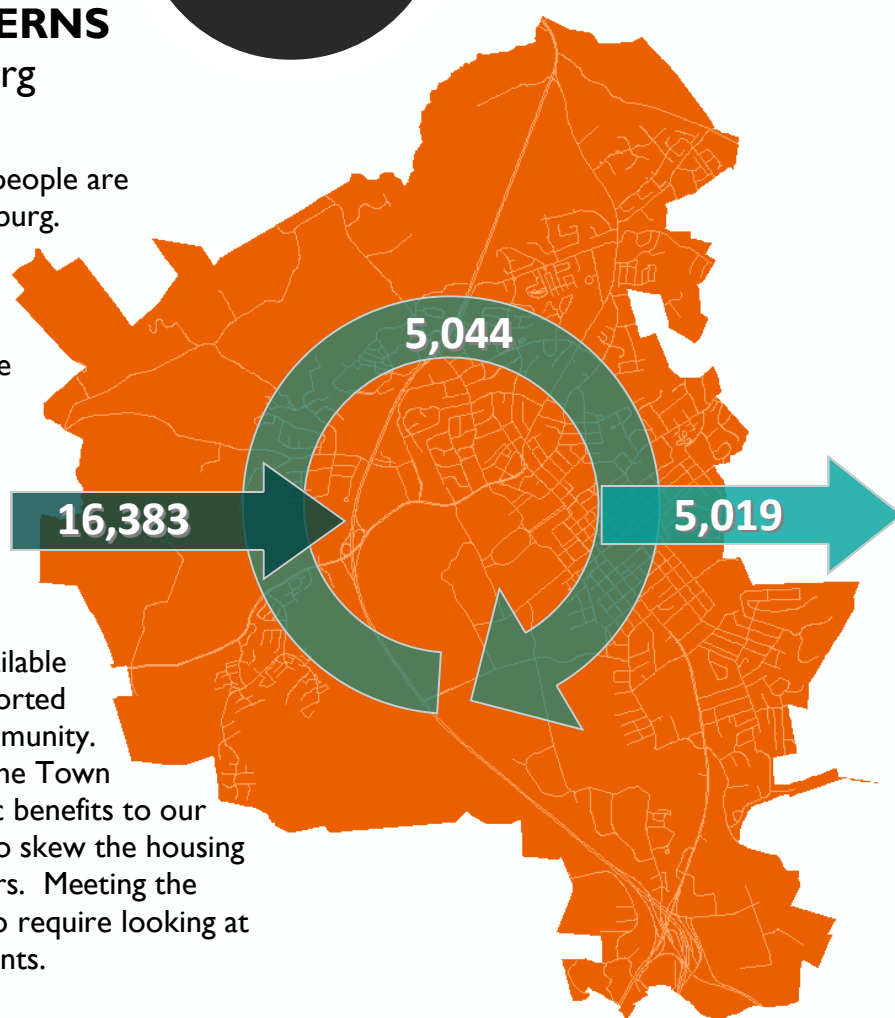
DAILY COMMUTING PATTERNS

In, Around, and Out of Blacksburg

On a normal business day, around 26,000 people are commuting into, around, and out of Blacksburg.

The arrows show the relative commuting patterns and indicate that around half the people who live in Blacksburg are commuting outside of Town for work, while around 75% of the people who work in Town are commuting in from adjacent communities or other parts of the region.

A high proportion of in-commuting is often an indicator of a housing affordability imbalance, in which the housing options available tend to fall in a price range that is not supported by the median wages found within that community. The presence of a major university within the Town of Blacksburg provides enormous economic benefits to our community and the region, but also tends to skew the housing market to meet the needs of student renters. Meeting the Town's emissions reduction targets will also require looking at issues of housing affordability for non-students.



Sources:

Garrison, S., J. Randolph, D. Pitt, C. Davis, and J. Gruss. *Blacksburg Climate Action Plan Technical Report. 2008 - 2013. Transportation Chapter, pg. 21*

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COMMERCE AND INDUSTRY

GOALS

REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

CO-BENEFITS

- reduced energy costs for local businesses and industry
- customer appreciation & other reputational benefits
- job creation in the clean energy/energy efficiency field
- improved local air quality

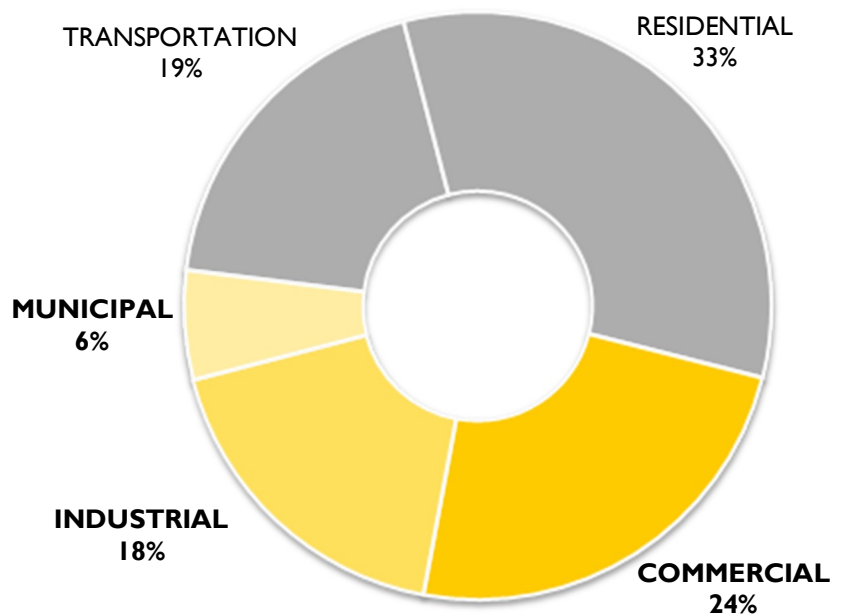


Taken together, the commercial and industrial sectors comprise **42%** of the community’s greenhouse gas emissions. From a functional standpoint, municipal buildings and operations have many similarities with the commercial sector, and represent an additional **6%** of the community’s emissions. Improvements to **building efficiency and lighting upgrades have the greatest potential** to reduce commercial and industrial energy waste and emissions since heating/cooling and lighting drive the majority of the energy consumed by local businesses— **49%** and **18%** respectively.

Blacksburg’s residents interact with the community’s commercial and industrial sectors in three ways - as consumers, as employees, and in the case of local businesses, as owners. As a result, citizens have more than one avenue to influence the business sector to move toward cleaner energy choices—as business leaders, as advocates within the workplace, and as consumers who make deliberate choices in how to spend their dollars on household goods, entertainment, dining, and recreation. Rewarding businesses who adopt and expand sustainability practices sends a clear message and gives other businesses an incentive to make similar changes.

The Town is already leading by example in this regard, ensuring that municipal buildings serve as models for sustainability through its commitment to pursue at minimum a **LEED Silver** rating for new construction or substantial renovation of municipal buildings, pursuing high-efficiency upgrades on existing buildings, and exploring the potential for on-site renewable energy generation on public properties. Primary strategies for the commercial and industrial sector center on developing small business incentive programs that promote **energy-efficient retrofits** and on-site **renewable energy** systems, and adoption of **green business practices/certifications** that reduce waste, conserve energy, and protect natural resources, all while saving businesses substantial money in the long run.

COMMERCIAL & INDUSTRIAL SECTORS
Share of Greenhouse Gas Emissions



Meeting Our Commercial & Industrial Energy Goals:

- Reduce greenhouse gas emissions from commercial and industrial buildings by 10% by 2020 and 45% by 2050.
- Increase the amount of commercial energy demand met with on-site renewables tenfold by 2020 and two-hundred sixty fold by 2050.
- By reducing use of disposable goods, increasing recycling, and diverting organics from the landfill, reduce commercial and industrial solid waste by 30% by 2020 and 70% by 2050.

COMMERCE & INDUSTRY

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
Avoid disposables. Bring your own bags to the grocery, your own travel mug to the coffee shop, and even your own to-go container to the restaurant.	(Politely) ask your favorite restaurant to switch from Styrofoam cups and to-go containers to something recyclable, compostable, or better yet—reusable (for a small fee).	Make a six-month commitment to not use any disposable items and share your progress with friends and family on social media.
If you catch your favorite local businesses doing something green, be sure the tell them you notice and appreciate it!	Nudge. If you see ways that your favorite local businesses could “green” their practices, let them know you would welcome a change.	Vote with your dollars and reward the local businesses that are going the “extra green mile” .
If you work in an office, think about the spaces where “ daylighting ” might be possible—places where natural light is sufficient for a good portion of the day.	Point your employer toward local resources that can help Blacksburg businesses improve the energy efficiency of their buildings.	Form a “ green team ” at your workplace and look for other opportunities to save energy and resources across the organization.
If you are a local business owner, investigate the DEQ’s Virginia Environmental Excellence Program (VEEP), or the Virginia Green initiative.	Look into green certifications for your industry sector (such as the Green Restaurant Association , or the U.S. Green Retail Association)	Pursue and attain state and/or industry green certifications for your place of business. Display these proudly for all your customers and clients to see!



You have power as an individual and as a consumer, and you can “vote” with your dollars every day when you choose alternatives to energy-intensive products and services. Instead of buying food that has traveled 1,500 miles to the local grocery store, why not pick up some in-season produce at the farmers market?

The table above lists actions you can take as an individual consumer, an employee, and a business owner. Simple things you can try today, next steps to start building new habits, and bigger changes you can take on when you’re ready to be a champion for greening our local economy.



GOALS

REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

PRIORITY STRATEGIES

COMMERCE & INDUSTRY

LEADING BY EXAMPLE: GILLIE'S RESTAURANT



Let's Get Started:

Industrial Energy Efficiency Programs:

Encourage industrial facilities to take advantage of existing and emerging federal and state programs such as the DOE's Industrial Technology Program, which sponsors energy audits for manufacturing plants.

Education & Outreach for Businesses: Engage local business owners in low and no-cost energy savings measures, including behavioral campaigns for employees (anti-idling policies, water conservation, daylighting initiatives, etc.)

Commercial Solar Potential: Perform a community-wide analysis of commercial properties to determine solar capacity of existing commercial roof space.

Green Business Certification Program: Create a local green business certification program to recognize local businesses that have made energy efficiency improvements and adopted other sustainability actions.

LEED Buildings: Through the Town's LEED building commitment, continue to lead by example for new construction or substantial rehab of commercial-grade buildings.



One of Blacksburg's oldest and most-loved restaurants, **Gillie's** offers vegetarian fare right in the heart of downtown. While most restaurants offer Styrofoam or plastic to-go containers, Gillie's has offered **compostable to-go containers** for several years.



GOALS

REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

PRIORITY STRATEGIES

COMMERCE & INDUSTRY

KEY CONCEPT: GREEN LEASES



Looking Ahead:

Commercial Energy Coalition: Foster collaborations among area businesses to share information on energy efficiency improvements and pool resources to purchase energy-efficient materials or equipment.

Incentives for Commercial Energy Upgrades: Establish incentives, financing tools, and other resources that would enable local businesses to cost-effectively pursue energy efficiency upgrades in their buildings and operations.

Green Leases: Explore opportunities (such as Green Leases) for renter businesses to partner with commercial property owners on efficiency upgrades or solar PV installations.

Commercial Energy Evaluations: Offer free or reduced-cost analysis of local commercial buildings to demonstrate return on investment timeline and potential cost-saving of efficiency upgrades.

LEED Building Incentives: Establish incentives, financing tools, and other resources that would enable local businesses and industry to cost-effectively pursue LEED certification or some suitable equivalent.

Innovative Financing for Commercial Efficiency: Identify collaborative financing options for large-scale commercial systems, such as privately owned and operated joint ventures.

Green leases, also known as “**aligned leases**”, work by aligning the financial and energy motivations of building owners and tenants so they can work together to save money and conserve energy resources. In a typical commercial lease, the energy costs are either entirely borne by the tenant (property owner has little motivation to invest in efficiency) or entirely borne by the owner (tenant has little motivation to conserve energy day-to-day). The situation is often referred to as a “split incentive” problem. Although green leases are available for residential properties, they work especially well for **commercial rentals**, where tenants may be in one location for years or even decades.



The **Natural Resources Defense Council**, the **Institute for Market Transformation**, and the **Department of Energy** have teamed up to develop a free library of template green leases for all types of commercial settings.

GOALS

REDUCE ENERGY WASTE IN THE COMMERCIAL & INDUSTRIAL SECTORS
INCREASE THE USE OF RENEWABLE ENERGY IN THE BUSINESS SECTOR
INCREASE CONSUMER DEMAND FOR GREEN BUSINESS PRACTICES

COMMERCE & INDUSTRY

LEADING BY EXAMPLE: SHELTER ALTERNATIVES

For more than 25 years, **Shelter Alternatives** has been a leader in the community and across the state in green business practices, receiving numerous awards along the way, including the most recent, the **2014 Montgomery County Chamber of Commerce's NRV Green Company of the Year**. Shelter (as it is colloquially known in Town) was nominated by their Chamber peers for this award, which is given annually to recognize a business that "values and practices sustainability in their office, business operations, and outreach."



Sustainability governs all decisions made in the daily operations of the company. "Product choice, energy management and reduce/reuse/recycling protocols are just some of the ways that we make it a priority" says office manager Gregg Moneyhun. That same

philosophy is echoed as part of the company's core values, directing employees to take responsibility for their actions and impacts on the environment.

Top: the staff of Shelter Alternatives posing in front of their Blacksburg office for a 25th anniversary photo in 2013.

Bottom: The 2014 Montgomery County Chamber of Commerce Green Company of the Year Award

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FOOD, WASTE & RECYCLING

GOALS

REDUCE THE AMOUNT OF WASTE SENT TO LANDFILLS
REDUCE GHG EMISSIONS ASSOCIATED WITH FOOD CHOICES
EXPAND GREEN BUSINESS PRACTICES IN TOWN
REDUCE EMISSIONS ASSOCIATED WITH CONSUMER CHOICES

CO-BENEFITS

- supports local farmers and food system resiliency
- conserves regional landfill space
- improves personal and public health
- saves money for individuals and households
- reduces habitat destruction from material extraction



FOOD, WASTE & RECYCLING

BASELINE CONDITIONS, CHALLENGES & OPPORTUNITIES

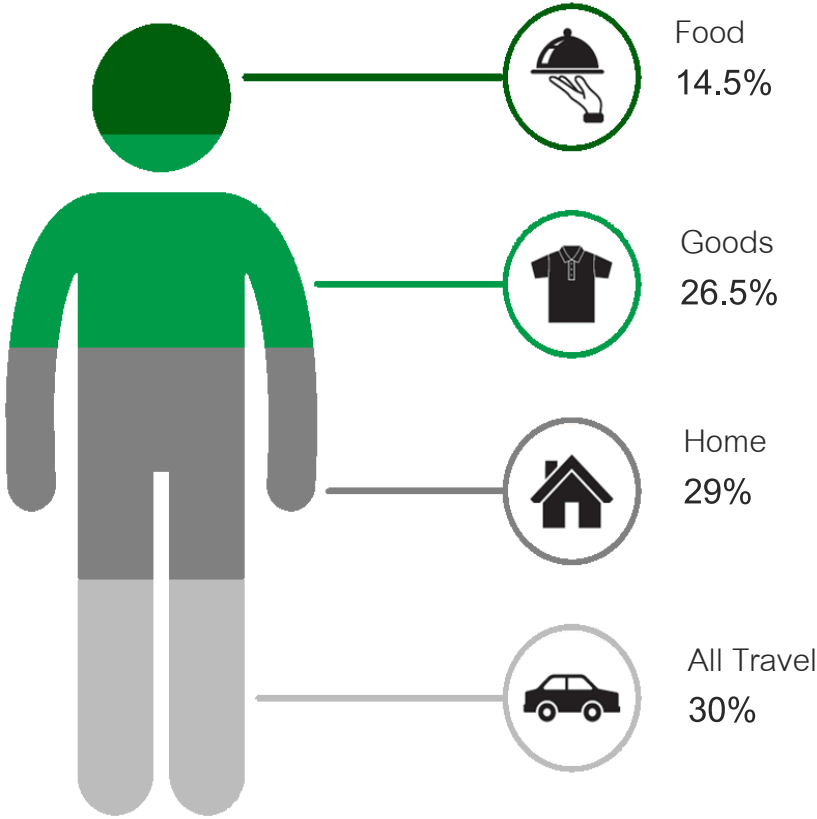
Everyday we make dozens of choices about what we eat, what we buy, how we use or consume these items, and how we dispose of them at the end of their useful life. These decisions make a big difference both in the amount of waste we produce and in the amount of greenhouse gas emissions we are responsible for as individuals. Each stage in the **lifecycle of consumer goods and food**, from the procurement of raw materials, to production, to distribution, to everyday use and ultimately, disposal, requires energy. For the average American, food, consumer goods, and services make up around 40% of annual energy consumption and associated emissions. Therefore, at every stage of the consumption life cycle, individuals have opportunities to reduce their environmental impact.

One example: an aluminum can produced from raw bauxite ore requires **twenty times** the energy needed to produce a can from recycled aluminum. Similarly, choosing durable goods, repairing and reusing things whenever possible, recycling, and making food choices that take are mindful of associated greenhouse gas emissions, can go a long way in reducing the environmental impacts of everyday choices.

Blacksburg is a great place to live if you want to lighten your consumer footprint. With a robust local food economy, multiple thrift stores, many locally-owned businesses that offer “green” and/or durable goods, ample opportunities to trade and barter, and convenient recycling available for both residents and businesses, Blacksburg’s citizens can take big strides in whittling down the emissions associated with their food and consumer choices.

EMISSIONS BY CONSUMPTION SECTORS

Average Share of Greenhouse Gas Emissions



Meeting Our Food, Waste, and Recycling Goals:

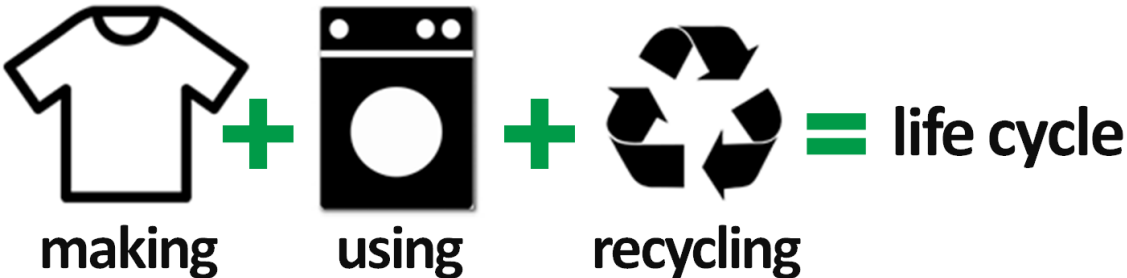
- Decrease the average amount of household refuse sent to the landfill from the current average, 1,400 lbs./household/year to 1,200 lbs./household/year by 2020 and 800 lbs./household/year by 2050.
- Increase the proportion of recycling as a percentage of total refuse by 20% by 2020 and by 120% by 2050.
- Strengthen and expand the local food economy (as measured by annual per-capita expenditures at local farmers markets) by 24% by 2020 and by 45% by 2050.

FOOD, WASTE & RECYCLING

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
Next time you are wrapping a gift, try newspaper comics or reusable gift bags or boxes! Paper gift wrap consumes about 250,000 trees each year in the U.S.	Most of us have too much “stuff” already. What about spending the same amount of money on a donation to the recipient’s favorite charity?	What about the holidays? Many families have shifted their approach: focusing present-giving on the little ones, and keeping things small, simple (and green) for the grownups.
Try Meatless Mondays . A mere 1% reduction in world meat consumption would have the same effect as \$3 trillion in solar energy investments.	Investigate the carbon intensity of different food types.	Make a 6-month commitment to eat a lower-carbon diet.
Switch to a reusable water bottle. Americans used about 50 billion plastic water bottles last year. However, less one-quarter of these are recycled on average.	Try to go a whole day without using anything disposable. Take stock of all the little things you encounter that are made for single-use. Share your experience on social media!	Make a commitment to stop using five common disposable items for 6 months, replacing them with reusable options. (paper towels, coffee mugs, grocery bags, styrofoam to-go containers, batteries, to name a few)
Recycle (Good): When something is at the end of its useful life, be sure to recycle it properly.	Reuse (Better): Chances are you can borrow something or find it second-hand. Or, if you need to make a purchase, think about quality and durability, so the item can be used for a long time and passed on when you no longer need it.	Reduce (Best): Buying something new has the largest energy impacts, from extraction of raw materials, to manufacturing, to packaging and distribution. Before buying new, think about alternatives like borrowing or buying second-hand.

You can make a positive difference by examining and adjusting your everyday choices as a consumer. Borrowing, buying for durability (rather than disposability), repairing,



re-using, re-purposing, and recycling are all ways that you can make energy-wise consumer choices. The table above lists simple actions you can try out today, next steps to start building new habits, and bigger changes you can take on when you’re ready to become a champion for a truly green economy.

GOALS

REDUCE THE AMOUNT OF WASTE SENT TO LANDFILLS
REDUCE GHG EMISSIONS ASSOCIATED WITH FOOD CHOICES
EXPAND GREEN BUSINESS PRACTICES IN TOWN
REDUCE EMISSIONS ASSOCIATED WITH CONSUMER CHOICES

PRIORITY STRATEGIES

FOOD, WASTE & RECYCLING



Let's Get Started:

Food Education & Outreach: Collaborate with community groups to raise awareness of the energy and environmental impacts of different types of food production, processing, and transport.

Residential Recycling & Safe Disposal: Encourage increased household recycling as well as proper disposal of non-recyclable or hazardous items through informational campaigns and community outreach events

Promote Local/Sustainable Food: Work with local farmers to incorporate and highlight local and sustainable food choices at local events where food is provided or sold; work to identify and address barriers to the viability of small farming in the region.

Green Purchasing Policy: Develop an Environmental Preferable Purchasing Policy for government operations, and encourage its adoption more widely in the commercial/ industrial sector of the Town

Residential Composting: Establish regular home composting workshop programs and continue to provide residents with access to affordable containers for home composting.

Apartment Recycling: Periodically assess apartment residents' satisfaction with recycling options; enforce and/or strengthen the Recycling Ordinance as needed to ensure Blacksburg apartment residents have convenient access to recycling.

Community & Neighborhood Gardens: Expand public and neighborhood-based community garden programs to enable more people to grow a portion of their own food

LEADING BY EXAMPLE: CARLTON SCOTT & STONEGATE APARTMENTS

In the late fall of 2014, the Town of Blacksburg's Sustainability Division decided to put out a survey to gauge overall levels of recycling satisfaction and pinpoint areas for improvement.

When the results came in, one set of apartment complexes stood head and shoulders above the rest in terms of resident satisfaction. In fact, these two complexes, **Stonegate & Carlton Scott Apartments**, which are jointly managed by the same staff, garnered 100% satisfaction amongst their residents for the recycling facilities available to them.

April DeMotts, is the property manager for both apartment complexes, and the current president of **Sustainable Blacksburg**. She is also largely responsible for this high level of resident satisfaction. Ms. DeMotts commented, "sustainability and recycling are priorities for me. I take a lot of pride in our recycling options, and I make sure each new resident knows where and how to recycle properly."



Above: April DeMotts, Michael Mitchell, and Donald Akers, staff with Stonegate and Carlton Scott Apartments, decked out in their Hokie gear.

GOALS

- REDUCE THE AMOUNT OF WASTE SENT TO LANDFILLS
- REDUCE GHG EMISSIONS ASSOCIATED WITH FOOD CHOICES
- EXPAND GREEN BUSINESS PRACTICES IN TOWN
- REDUCE EMISSIONS ASSOCIATED WITH CONSUMER CHOICES

PRIORITY STRATEGIES

FOOD, WASTE & RECYCLING



Looking Ahead:

Commercial Recycling & Diversion of Organics:

Establish a coalition of businesses and nonprofit leaders to explore creative ways to reduce waste and encourage recycling and diversion of organics in the commercial sector.

Conservation of Working Lands: Work with community land trusts, property owners, local government to develop a conservation strategy for agricultural lands and forests.

Expand Commercial Recycling: Expand upon the successes of the Downtown Recycling Program to include commercial recycling clusters outside the downtown area.

Urban Agriculture: Explore opportunities to pilot "urban agriculture" and "agri-burbia" projects.

Pay As You Throw: Investigate the feasibility a volume-based "pay as you throw" refuse program whereby fees are based upon the amount of non-recyclable waste generated.

Local Food Production: Where practical and desirable to the community, address policy barriers that hinder local production of food including neighborhood restrictions on gardening, food processing, and keeping small livestock such as chickens.

Farm To School: Work with the Montgomery County School District, private schools or childcare facilities, and local food advocates to pilot a "Farm to School" program, incorporating locally-produced foods in student meals.

Curbside Composting: Investigate the feasibility of a curbside composting program that could serve the needs of single family residences; explore opportunities to expand such a program to multi-family residences or those with limited yard space.

KEY CONCEPT:

EMBODIED ENERGY

Cost is often the first thing American consumers consider when making a purchase, but **embodied energy** is another important value to explore, particularly if one is serious about reducing their share of global emissions. In short, embodied energy is the sum of all the energy required to produce something.



From exacting and processing raw materials, to manufacturing, to transporting that item to your local store (or doorstep).

Consider this armchair and all the energy embodied in its constituent parts

and assembly process. Now imagine this armchair has gotten a little threadbare over the years.

Although it might cost exactly the same amount of money to buy a new armchair vs. having the old one re-upholstered and re-stuffed would require far, far less energy—all while supporting a local craftsman and contributing to the local economy.

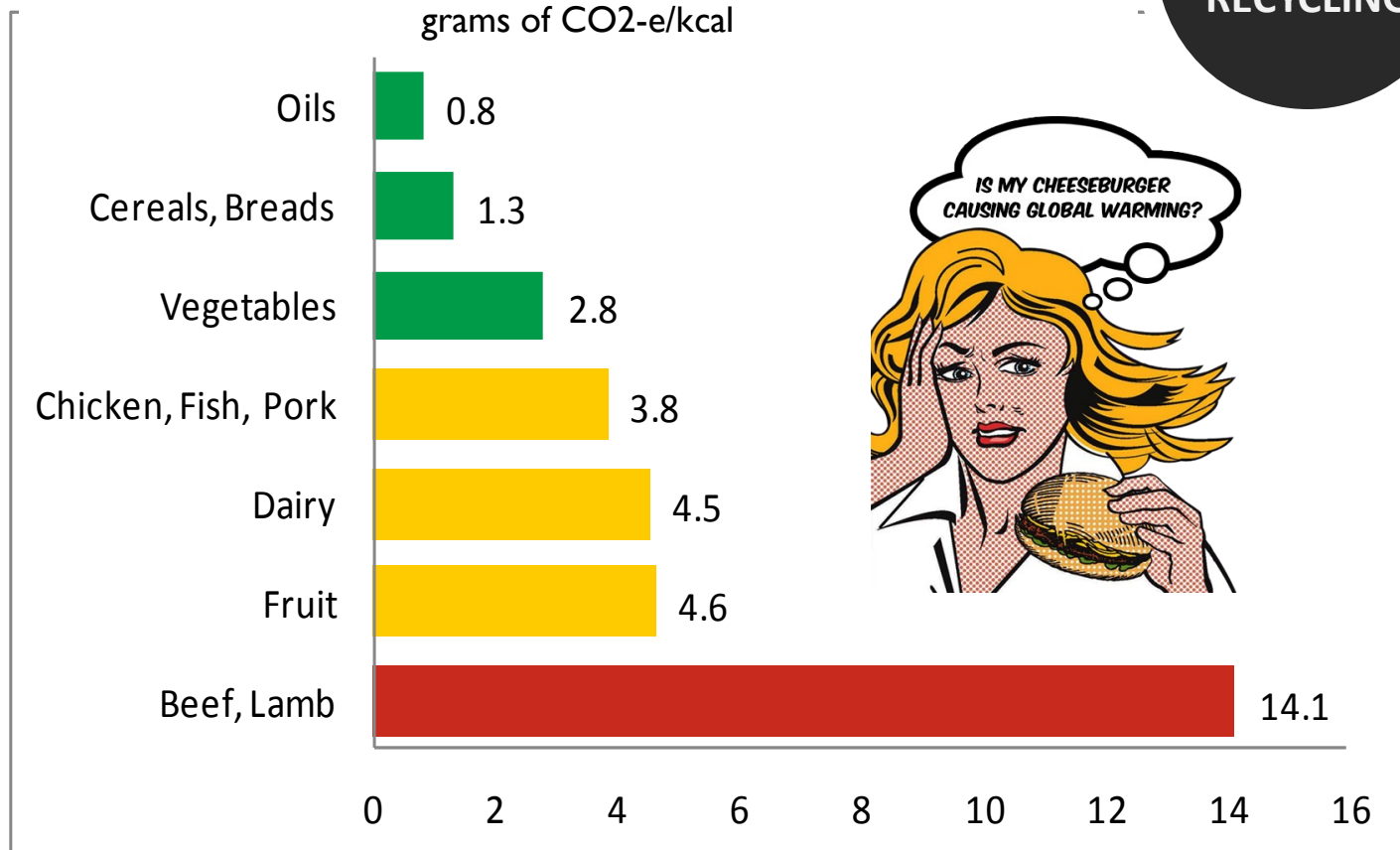
GOALS

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FOOD, WASTE & RECYCLING

CARBON INTENSITY OF DIFFERENT FOOD CHOICES

grams of CO₂-e/kcal



Note: Figures are grams of carbon dioxide equivalents per 1000 calories by food type. Estimates are emissions from cradle to point of sale, but do not include emissions from personal transport, home storage or cooking, or any land use changes (i.e. converting forests to farmland).
Sources: ERS/USDA, LCA data, 10-LCA data, Weber & Matthews 2011

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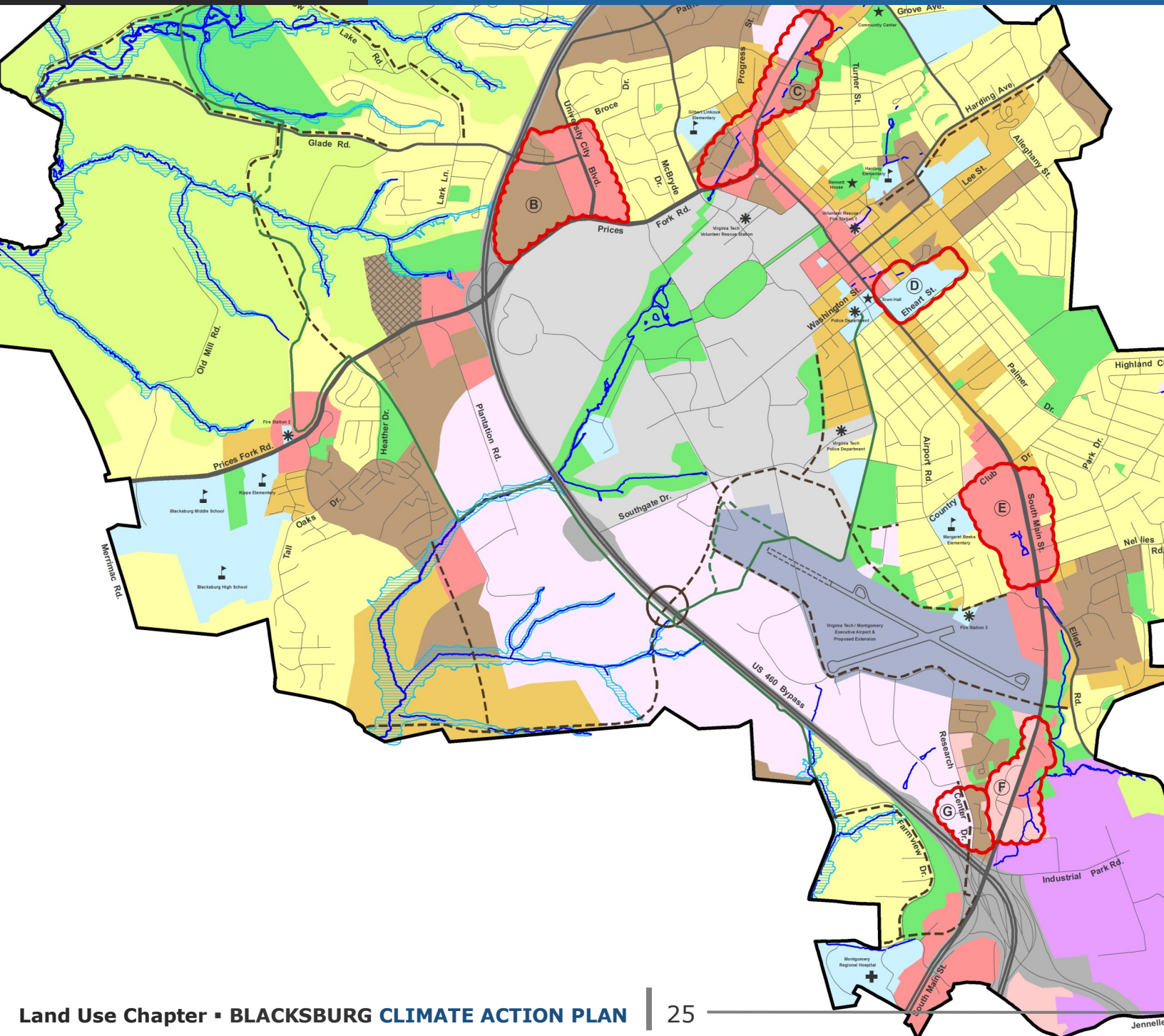
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LAND USE

GOALS

PROMOTE LAND USE THAT REDUCES GHG EMISSIONS
STRATEGICALLY CONSERVE AND RESTORE NATURAL AREAS
INCREASE CARBON SEQUESTRATION CAPACITY OF LAND

- CO-BENEFITS:**
- reduces public infrastructure and service costs
 - improves watershed integrity
 - reduces car dependency and transportation costs
 - supports wildlife habitat and ecosystem health
 - supports local farmers and food system resiliency
 - preserves rural and scenic landscapes



LAND USE

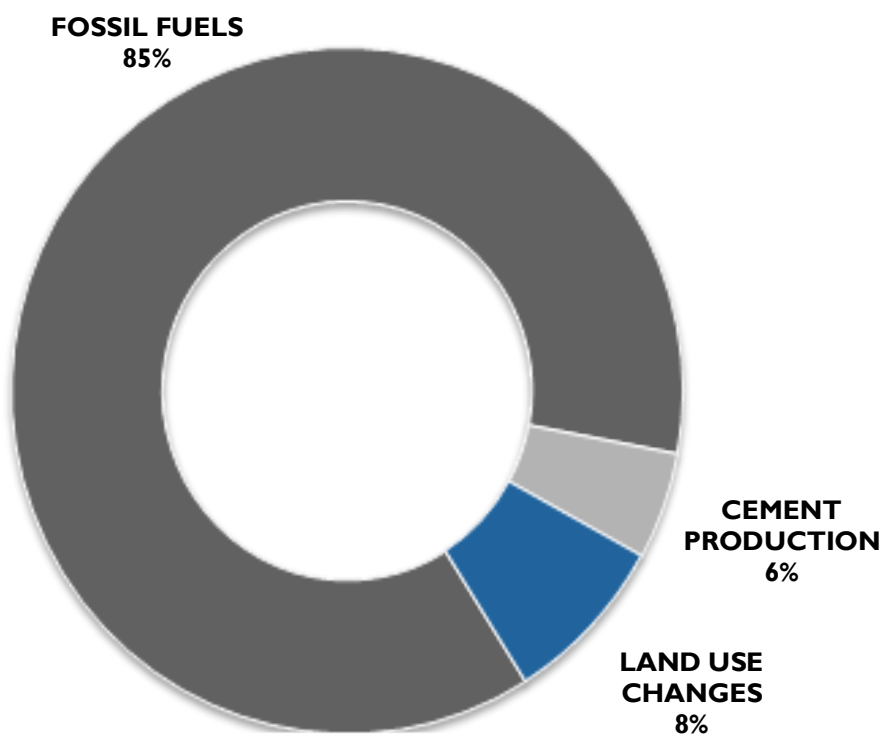
BASELINE CONDITIONS, CHALLENGES & OPPORTUNITIES

Land use changes are the second leading direct contributor of carbon emissions worldwide after the burning of fossil fuels. These **direct emissions** come large from converting forests and natural grasslands to agricultural uses or human settlements. Land use changes can also have significant **indirect** impacts on a community's greenhouse gas emissions—by shaping transportation choices and the relative energy efficiency of buildings.

In this way, land use decisions can and do shape the biggest piece of the emissions pie, **fossil fuel consumption**. A comprehensive land use approach is needed to address both the direct and indirect greenhouse gas emissions associated with land use.

One approach can be for Blacksburg to actively encourage the creation of **Compact & Complete Centers (CCCs)** throughout the Town. These are walkable, 1/2-mile areas around a central point that contain a strong mix of uses, transit availability, appropriately-scaled density, and walkability while maintaining demographic and economic diversity. Blacksburg has already laid much of the groundwork for the creation of CCCs and will continue to support high-quality development initiatives that will further accelerate this trend. Blacksburg can also mitigate the GHG emissions associated with land use by: encouraging practices that increase the carbon sequestration potential of land within the town, offering incentives to preserve or restore forested areas, increasing community-wide tree canopy on both public and private lands, and encouraging new housing options that use less energy per occupant.

WHERE HUMANITY'S CO₂ COMES FROM Global share of Greenhouse Gas Emissions



Meeting Our Land Use Goals:

- Increase the percentage of land area that qualifies for the “Compact and Complete Centers” designation by 50% by 2020, and 200% by 2050.
- Foster regional collaboration on land conservation efforts to increase the percentage of conserved lands by 30% by 2020, and 100% by 2050.
- Increase the percentage of land area that has protected vegetated surfaces or green roofs by 30% by 2020, and 100% by 2050.

LAND USE

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
<p>Plant a tree. Consider placement and species selection to avoid future shading problems for solar panels or clotheslines</p>	<p>Update your lawnmower. Until 1995, lawnmower emissions were unregulated. Older, less efficient, two-cycle lawnmowers release 25-30% of their oil and gas unburned into the air. Consider a newer (or electric) model, or better yet—a push-style mower!</p>	<p>Re-design your yard! Work with a permaculture landscape designer to significantly reduce the water and energy intensity of your yard or property.</p>
<p>Learn more about regional land conservation organizations such as the New River Land Trust or the Virginia Outdoors Foundation.</p>	<p>Advocate for development of a regional strategic plan on land conservation; advocate for adoption of local policies that would support implementation of such a plan.</p>	<p>If you are a landowner with 50 or more acres, investigate the benefits of a conservation easement. If not, look into buying Land Conservation Tax Credits to offset your state taxes.</p>
<p>Attend a public meeting on a local land use decision and lend your support for development decisions that advance climate action goals.</p>	<p>Attend Blacksburg’s Citizens Institute. Learn how development decisions are made and the role you can play in advocating for lower impact development .</p>	<p>Vote with your housing dollars. Look for homes and neighborhoods that are designed and built to reduce environmental impacts and greenhouse gas emissions.</p>
<p>Research and avoid wood products and food ingredients that are associated with the illegal clearing and conversion of rainforests.</p>	<p>Look for third-party certification label such as “Rainforest Alliance Certified”, found on many food products, or the Forest Stewardship Council logo, which distinguishes wood products that were legally and sustainably harvested.</p>	<p>You don't have to cut down a tree to build that deck! Using reclaimed or salvaged woods is a great option. If you can't find used wood, give recycled plastic lumber or composites a try.</p>

Residential lawns are a fixture of American towns and neighborhoods, and represent about 20 million acres of the country’s total land area. But did you know that about 30-60% of urban fresh water is used for watering laws, while annually, lawn mowers consume about **580 million gallons** of gasoline? In fact, an hour of gas-powered lawn mowing produces as much pollution as four hours of driving a car! The table above lists simple actions you can try out today (such as greening your lawn), next steps to start building new habits, and bigger changes you can take on when you’re ready to become a champion for greener land use. Along the way you can save a lot of money, inspire your friends and neighbors, and maybe even get in some exercise, perhaps with this cutting-edge **Pollution Avoiding Exercise Machine!** >>>



GOALS

PROMOTE LAND USE THAT REDUCES GHG EMISSIONS
STRATEGICALLY CONSERVE AND RESTORE NATURAL AREAS
INCREASE CARBON SEQUESTRATION POTENTIAL OF LAND

PRIORITY STRATEGIES



Let's Get Started:

Incentivize Low-Impact Development: Offer incentives to developers who pursue development projects and building methods that advance the Town's climate action plan goals.

Encourage Forest Preservation & Restoration: Expand opportunities and incentives for private landowners, developers, businesses, neighborhoods, and community groups to preserve forests and expand tree-planting initiatives

Track Car Dependency: Establish indicators of car-dependency and connectivity that can be used as a performance measure between residential areas and key destinations around Town.

Expand Blacksburg's Municipal Tree Canopy: Continue and expand the Town's urban forestry initiatives

Expand Housing Options: Regularly review and amend land use policies to foster development that provides an array of housing options that meet the needs and preferences of existing and emerging demographics/income levels.

Conserve Open Space and Natural Areas: Pursue strategic land conservation on both a long-term and regional scale to advance local/regional carbon sequestration efforts.

Support High-Quality Density Increases: Review and amend permissible development options and land-use policies that increase multi-family and attached housing options without negatively impacting adjacent neighborhood character.

LAND USE

LEADING BY EXAMPLE:

PAT BIXLER and GLADE ROAD GROWING

A classic partnership formed recently on the outskirts of Blacksburg. Back in 2010 **Pat Bixler** and his family, owners of Baseline Solar and long time residents of the NRV, purchased a large farm property directly across from Blacksburg's Heritage Park. Although the parcel had great residential development potential, the new owners quickly realized that it could be the perfect site to establish a new urban farm. Only one problem - farming is hard work, especially when you have no experience.



Enter **Sally Walker** and **Jason Pall (JP)**, a pair of young local farmers looking for land to pursue their dream of creating a natural, bio-dynamic farm to serve the burgeoning local foods market. What has emerged is **Glade Road Growing** - an arrangement which provides these farmers with a long-term affordable lease in exchange for them returning the land

to a more sustainable and productive agricultural use. Now in its fifth growing season, the operation has expanded to include vegetables, poultry and pork production, eggs and a small apple orchard.

In 2014, additional steps were taken to protect the property by placing it under a conservation easement through the **New River Land Trust**.



Above: Pilon the farm dog "helping" Sally with the chickens.

Top: JP posing proudly with the week's harvest

GOALS

PROMOTE LAND USE THAT REDUCES GHG EMISSIONS
STRATEGICALLY CONSERVE AND RESTORE NATURAL AREAS
INCREASE CARBON SEQUESTRATION POTENTIAL OF LAND

PRIORITY STRATEGIES



Looking Ahead:

Factor In Hidden Costs of Development: Longer commute distances, traffic congestion, expansion of municipal services and infrastructure, watershed impacts of impervious surfaces, etc. come with both public and private costs that should be factored into future development decisions and land-use policies.

Foster Regional Planning: Work with adjacent localities to plan for regional transportation, housing, and infrastructure patterns that will minimize car-dependency and the conversion of green space, farms and forested areas.

Expand On Campus Housing: Encourage Virginia Tech to expand on-campus housing options to reduce student-rental pressure on traditional neighborhoods

"Right Size" Parking: Regularly review and amend the Zoning Ordinance to "right size" parking requirements in residential and commercial areas that have good proximity to alternative transportation infrastructure and/or key destinations.

Encourage Location Efficient Mortgages: Work with lenders on innovative lending practices to make Locational Efficient Mortgages (LEMs) available to people who meet an established standard of low car-dependency.

Explore Funding Mechanisms for Land Conservation: Pursue options for funding land conservation aspects of the climate action plan, such as funds for conservation easement monitoring, purchasing of development rights, etc.

Expand Lower-Impact Housing for Non-Students: Investigate options to create multi-family and attached housing options for non-students (young professionals/families/older adults), that are near transit routes and key destinations.

LAND USE

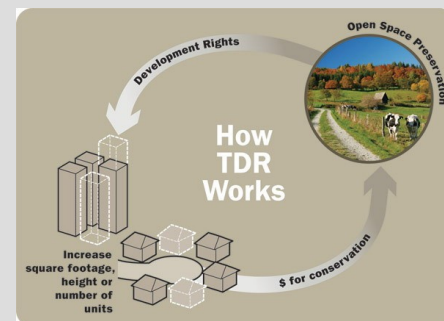
KEY CONCEPT: (TDR) TRANSFER OF DEVELOPMENT RIGHTS

Land ownership is commonly described as a bundle of different rights. They can include timber rights, mineral rights, access rights, rights to rent or sell, and of course, development rights. When someone purchases a parcel they also purchase the entire bundle of rights that are associated with that land. Development rights mean that you own the right to build structures on the parcel. In some places, development rights may be voluntarily separated and sold off from the land by a mechanism call **Transfer of Development Rights, or TDR.**

TDR is a market-based approach that encourages the voluntary transfer of growth from places where a community would like to see less development (called sending areas) to places where a community

would like to see more development (called receiving areas).

The sending areas can be environmentally-sensitive



properties, open space, agricultural land, wildlife habitat, historic landmarks or any other places that are important to a community. The receiving areas should be places that the general public has agreed are appropriate for extra development because they are close to jobs, shopping, schools, transportation and other urban services.

GOALS

PROMOTE LAND USE THAT REDUCES GHG EMISSIONS
STRATEGICALLY CONSERVE AND RESTORE NATURAL AREAS
INCREASE CARBON SEQUESTRATION POTENTIAL OF LAND

LAND USE

LEADING BY EXAMPLE:

LISA BELDEN and
IGNACIO MOORE

Over the years, Lisa and Ignacio have taken a number of big steps to reduce their household's environmental footprint. They made the switch to solar energy years ago and have long been dedicated bike-commuters.

Although they had taken some preliminary steps to “green their yard”, they decided a **permaculture** approach would really help them take that intention to the next level. That, and neither of them had much enthusiasm for spending their Saturdays mowing the lawn anymore. As biologists, they were drawn to something a bit more natural-looking than the standard manicured lawn, but also wanted to come up with a design that wasn't out of character with the surrounding neighborhood.

To get some expert advice, Lisa and Ignacio contacted **NatureScapes**—a local permaculture landscape design firm, and worked with them to come up with a beautiful, low-maintenance design, slowly converting their yard in phases - adding stone walkways; arbors, trellises and raised beds made from natural materials; wildlife-friendly native plants; and human-friendly edible landscape elements along the way.



“.....our kids love our new front yard too. They pick out and plant all the annual flowers each spring, and often snack on raspberries and blueberries on their way in after school, as well as hunting for cucumbers and beans for dinner.” - Lisa Belden

Sources and Additional Resources:

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CLEAN ENERGY

GOALS

INCREASE THE USE OF SOLAR RENEWABLE ENERGY SYSTEMS
INCREASE THE USE OF SOLAR THERMAL & PASSIVE SOLAR HEATING
ADVOCATE FOR CLEAN ENERGY POLICIES

CO-BENEFITS:

- hedge against utility price increases
- increase energy resilience and independence
- job creation in the clean energy sector
- fewer energy dollars leaving the local economy
- improved air quality and public health



CLEAN ENERGY

BASELINE CONDITIONS, CHALLENGES & OPPORTUNITIES

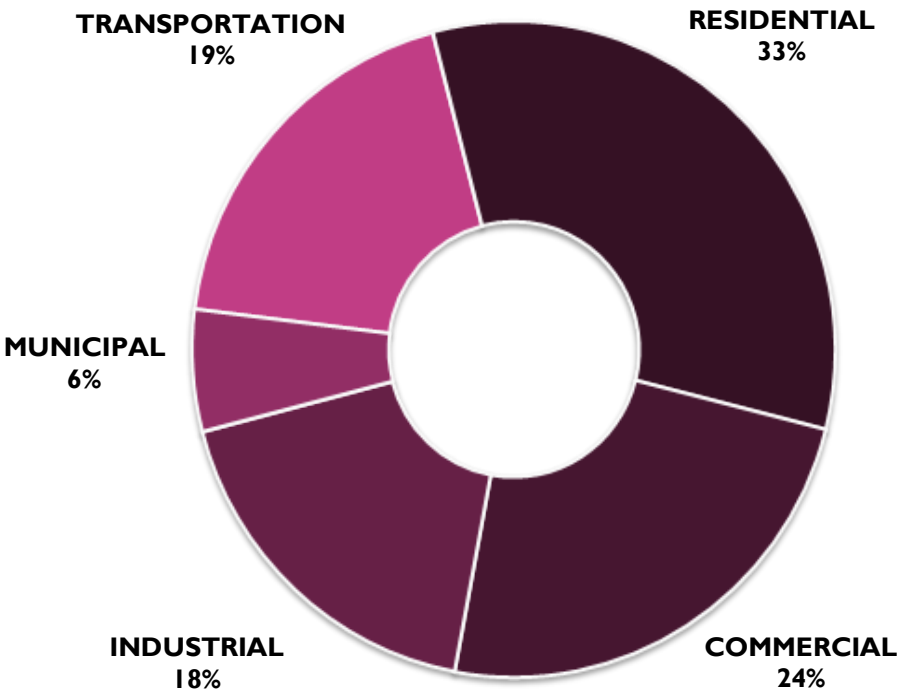
Fossil fuels still dominate our energy landscape, although that reality is poised to shift dramatically in the coming decades. Just since 2011, the cost of solar energy has fallen more than 60%. In many parts of the country, solar is already cost-competitive with electricity produced from fossil fuels.

Every sector of Blacksburg energy landscape - transportation, residential, commercial, industrial and municipal - has the potential to be transformed by renewable energy sources. Plug-in electric vehicles coupled with on-site renewables could dramatically shift the emissions of personal vehicles. Solar energy could serve a large proportion of the energy demand for residential, commercial, and municipal buildings. Combined with energy efficiency, “net zero energy” buildings, those that produce as much energy as they consume, are already a reality here in Blacksburg.

Grissom Lane Apartments, designed and constructed by Community Housing Partners, are a set of cottages built to EarthCraft Net Zero Standards to serve the needs of lower-income older adults. CHP and the Town of Blacksburg were recently recognized by the Interstate Renewable Energy Council (IREC) for that project, garnering the “Best of 2015 in Renewable Energy and Energy Efficiency” award for closing the divide between efficiency and renewables. That same year, Blacksburg was awarded the U.S. Conference of Mayors Climate Projection Award for the Solarize Blacksburg initiative, the first program of its kind in Virginia that more than quadrupled the amount of residential solar in the community and which inspired more than 25 other Virginia communities to launch similar programs by the close of the following year.

While we are proud of progress we have made, an array of technical, economic and policy obstacles still need to be addressed to foster a larger-scale transition to renewables. Because Blacksburg has proven itself to be a leader in this arena, both across the Commonwealth and on the national stage, we feel confident our community is well-positioned to secure a resilient, sustainable and affordable clean energy future going forward.

GREENHOUSE GAS EMISSIONS BY SECTOR Sectors with Renewable Energy Potential



Meeting Our Renewable Energy Goals:

- Meet 5% of residential energy demand with on-site photovoltaics (PV) systems by 2020 and 25% by 2050.
- Meet 2.5% of commercial, industrial, and municipal energy demand with on-site renewable by 2020 and 10% by 2050.
- Increase the use of solar-thermal (ST) energy systems, geothermal technologies, and passive solar space heating.

CLEAN ENERGY

INDIVIDUAL ACTIONS

TAKE ACTION TODAY!	NEXT STEPS....	BIGGER CHANGES
<p>Talk to a friend or neighbor who has solar, or one of the many people who went solar during the Solarize Blacksburg campaign, and learn about their experience.</p>	<p>Contact a local solar installer and find out if solar would work well on your property.</p>	<p>Solicit a proposal (or two), take the plunge and start making your own clean power!</p>
<p>Investigate the differences between solar PV, solar water heating, geothermal heating, and passive solar construction.</p>	<p>Build Solar Ready! If you are in the market for a new home, but don't think you can afford solar now, look for ways to include these technologies and design concepts, particularly for new construction.</p>	<p>Work with a local design/build firm with experience in Passive House, LEED, or Earth Craft standards, and get started building the clean energy home of your dreams.</p>
<p>Learn more about Virginia's energy policy landscape with respect to renewables and efficiency relative to the rest of the country and neighboring states.</p>	<p>Contact your state representatives and let them know you're ready for Virginia to catch up with its neighbors (Maryland, D.C. and North Carolina)</p>	<p>Contact your U.S. congressional representatives and let them know you're ready for national leadership on clean energy.</p>



The Doyle Family, Blacksburg's First Solarize Blacksburg customers proudly showing off their newly completed array installed by **Solar Connexion**

You have enormous power as a consumer and as a citizen, and you can let local, state, and national policy makers know that you want alternatives to pollution and climate destabilization. We all have the power to “vote” with our energy dollars by investing in efficiency and renewables as individuals and as whole communities. The table above lists simple actions you can try out today, next steps to start building new habits, and bigger changes you can take on when you're ready to be a champion for Blacksburg's clean energy future.

GOALS

INCREASE THE USE OF SOLAR RENEWABLE ENERGY SYSTEMS
INCREASE THE USE OF SOLAR THERMAL AND PASSIVE SOLAR HEATING
ADVOCATE FOR CLEAN ENERGY POLICIES

PRIORITY STRATEGIES

CLEAN ENERGY

LEADING BY EXAMPLE:

BLACKSBURG !



Let's Get Started:

State Energy Policy: Work with other localities across Virginia to advocate for more favorable clean energy policies to be expanded at the state level.

Local Solar Policy: Create a local policy environment and promote existing (and emerging) resources that will foster the expansion of solar PV and solar water heating.

Public Engagement on Renewables: Raise the profile of all types of renewable energy in Blacksburg by offering information (online resources, tours, workshops, community discussions) regarding renewable energy potential and opportunities in Blacksburg.

Municipal Solar Potential: Perform a community-wide analysis of municipal buildings and public properties to determine sites that might be suitable for a municipal solar array or solar water heating system.

Green Power Purchasing Consider a Town policy requiring purchasing of green power or installation of solar PV systems on municipal buildings, wherever possible and practical.

Favorable Financing: Consider establishing a low-interest public revolving loan fund, on-bill or PACE model financing options, or establish a public "loan loss" reserve agreement with local lenders to help local residents and businesses finance solar projects.



Solarize Blacksburg

In March of 2014, Blacksburg became the first community in

Virginia to launch a Solarize Initiative, which resulted in more than quadrupling the amount of residential solar in 6 short months and over one million dollars in local clean energy investment. Before the close of 2015 **twenty-five other Virginia communities** had followed Blacksburg's lead and launched Solarize initiatives of their own, creating real momentum and demonstrating the enormous amount of untapped consumer demand for clean energy in Virginia.



The Solarize Blacksburg Team and Local Solar Installers
Baseline Solar & Solar Connexion
Community Kick-Off Event - March 2014

GOALS

INCREASE THE USE OF SOLAR RENEWABLE ENERGY SYSTEMS
INCREASE THE USE OF SOLAR THERMAL AND PASSIVE SOLAR HEATING
ADVOCATE FOR CLEAN ENERGY POLICIES

PRIORITY STRATEGIES

CLEAN ENERGY

KEY CONCEPT: RPS AND SRECS



Looking Ahead:

Solar Gardens/Coops: Establish cooperatives or joint ventures (such as solar gardens) within the community that accelerate the adoption of residential and commercial solar.

Financing Municipal Solar: Investigate the array of options (and degree of public support) for funding or financing to subsidize municipal solar projects.

Non-Solar Renewable Potential: Explore opportunities for non-solar renewable energy development in Blacksburg, particularly wind, geothermal, and biomass energy generation.

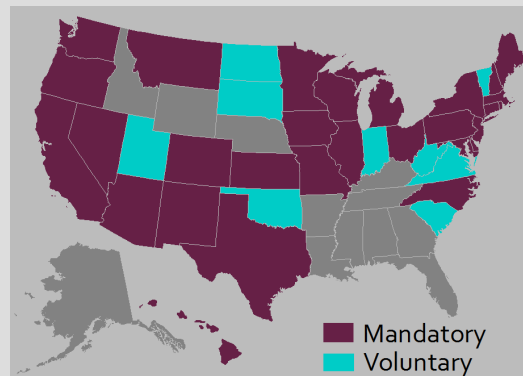
Solar Schools: Facilitate the creation of community-owned PV systems on large municipal buildings or schools, such as through a solar co-operative.

Non-Solar Renewable Policies: Create a local policy environment and promote existing (and emerging) resources that will foster the expansion of non-solar renewable energy, (wind, geothermal, biomass energy, methane capture) where practical and desirable to the community.

Renewable energy policy is an alphabet soup of acronyms, however two of these are key to understanding why Virginia is so far behind neighboring states when it comes to renewables - **RPS** and **SRECS**.

RPS stands for **Renewable Portfolio Standard**. An RPS is a state policy dictating how much of the utilities' overall energy portfolio will come from renewable sources. Most other states (shown in purple below) have established a mandatory RPS, which has driven significant growth in renewables in those states. By contrast, Virginia only has a renewable energy "goal" which is unenforceable and has left Virginia behind when it comes to renewables.

SRECS (Solar Renewable Energy Certificates) are earned for every 1000 kilowatts hours of electricity produced. A mandatory RPS creates a market for SRECS.



The owner of the system can sell these on the open market, which reduces the payback period for a solar array, sometimes by many years. SRECS are quite valuable in states with an RPS —as

high as \$400 in Washington D.C. In a typical example, a home with an average sized solar array, say 5kW could sell its SRECS for anywhere \$500—\$2,400 annually, depending on market demand.

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LEADING BY EXAMPLE:

DAVE ROPER

Back in 1979, Virginia Tech physics professor and local clean energy advocate Dave Roper purchased a small apartment building on Broce Drive as an investment property. The building, containing 12 apartments, was constructed in 1968, prior to establishment of minimum building code standards for energy efficiency. Wanting to set an example for other rental property owners, Dave worked with local building efficiency and solar firms, **Energy Check** and **Baseline Solar**, to improve the building's energy efficiency and install a large solar hot water array in 2008. This project was the first of its kind in Blacksburg and was featured in the **2009 NRV Green Buildings Tour**.



Above: The Solar Hot Water System installed by Dave Roper at his apartment building on Broce Drive. A wealth of other details on Dave's Solar Water Heating array (and pretty much any other energy topic) can be found at his blog:

<http://www.roperld.com/science/SolarHotWaterApartmentHouse.htm>

In Dave's Own Words:

"Some calculations have shown that investing in solar energy gives as good or better returns as investing in the stock market did over the past twenty years.

However, that is not at the top of my list of reasons for doing this project. My main concern is to reduce the amount of carbon dioxide that I am responsible for putting into the atmosphere, the consequences of which my descendants, along with all other people, will have to deal with in the future.

My second reason for doing this project is to be a test case that other apartment-house owners might follow to reduce their carbon emissions.

My third reason is that the science of doing it is very interesting and educational. Having been a physics educator for thirty-one years at Virginia Tech until 1998, this projects continues my devotion to teaching physics to the general public.

- excerpted from Dave's handout on the Solar-Hot-Water Apartment House

