



# Climate Action Plan

---

## PHASE ONE

*A plan to guide local government actions to reduce long-term contributions to climate change throughout the community*

- October 2020 -



# Table of Contents

Foreword by the Chair of the Board of Supervisors .....	1
The Community We Envision .....	3
Introduction .....	4
Rising to the Challenge and Opportunity .....	8
The Challenge: Impacts of Climate Change.....	8
Building on Our History of Local Stewardship .....	9
Seizing the Opportunity.....	10
Our Commitment to Climate Action .....	12
Greenhouse Gas Emission Reduction Targets.....	14
Phased Approach.....	16
Co-Benefits: Improving Prosperity, Health, and Quality of Life in Albemarle County .....	18
Commitment to Equity.....	20
Implementation in Action.....	22
Strategies and Actions.....	24
Transportation and Land Use .....	26
Buildings .....	32
Renewable Energy Sourcing .....	36
Sustainable Materials Management.....	39
Landscape, Natural Resources, and Agriculture.....	42
Glossary of Key Terms & Abbreviations.....	46
References.....	48
Acknowledgments .....	53

*Solar installation on Crozet Library rooftop.*



# Foreword

In the midst of the COVID-19 pandemic, the impact that human activity has on our climate became eminently clear—with school and commuter traffic absent from our roadways, within just a few short weeks, our skies became clearer, our views became grander, and our streams became cleaner. But we can't address climate change by staying home. Even the global lock-down—and its severe economic impact—didn't make a significant impact on our long-term climate trajectory. When we look at the data, we can see what is more difficult to discern on the ground—that we are experiencing here in Albemarle County increased intensity of rainfall and flooding events and more frequent heat waves. Climate change is here, now, on our doorstep. We must learn to live differently.

The Albemarle County Board of Supervisors understands that leadership at all levels of government is required in order to meet the global challenge for climate action. I am proud that Albemarle County is one of the leading localities in the United States by adopting an ambitious greenhouse gas emission reduction goal of 45% by 2030 (from 2008 levels) and zero net emissions by 2050. We cannot achieve these goals without the partnership of our residents, business community, and institutional partners.

This is the community's plan. The Albemarle County Climate Action Plan reflects the work of scores of community members attending outreach events, committing time to serving on sector work groups, and generating hundreds of comments about opportunities, ideas, and challenges that the plan must address.

This plan is just the beginning. The Albemarle County Climate Action Plan is the first phase of a multi-phase climate action planning process, and we will continue to update it, add details and new information, and work with the community to strengthen it to achieve our community vision. I hope everyone will read this plan and join us in the work ahead to forge a better future, together.

Ned L. Gallaway, Chair  
Albemarle County Board of Supervisors



# The Community We Envision

This Climate Action Plan is consistent with and supports Albemarle County's overall vision for the community.

The purpose of this Climate Action Plan is to reduce the community's contributions to global climate change while advancing the County's vision of a thriving, vibrant community for every resident.

In particular, the Climate Action Plan seeks to:

- *benefit the health of all residents;*
- *protect the local natural environment;*
- *stimulate the creation of green jobs to support a thriving local economy;*
- *promote education on climate action for youth and adults; and*
- *contribute to a more equitable community, with the benefits of climate action programs easily accessible and affordable for every resident regardless of socio-economic status*

*Albemarle County  
envisions a community  
with...*

Abundant natural, rural, historic, and scenic resources

Healthy ecosystems

Active and vibrant Development Areas

A physical environment that supports healthy lifestyles

A thriving economy, and

Exceptional educational opportunity

*...for present and future  
generations*

# Introduction

Climate change is profoundly affecting Virginia—from sea level rise and increased flooding in coastal regions to longer wildfire seasons in the Appalachian Mountains. In Virginia’s interior, extreme rainfall and extended heatwaves not only present public safety and health challenges, but also increase the likelihood of property damage, drought, and invasive species harming agriculture,<sup>1</sup> the state’s largest industry<sup>2</sup> and an important feature of Albemarle County.<sup>3</sup> This has the potential for direct impacts on Albemarle County’s economy and rural character.

The burning of fossil fuels, large-scale deforestation for commercial agriculture and development, and systemic degradation of forests, wetlands, and other ecosystems since the Industrial Revolution are spurring drastic changes in Earth’s climate and weather patterns. The American public is increasingly aware of and concerned about global climate change—73% recognize that global warming is happening and 62% understand that global warming is primarily caused by humans.<sup>4</sup> World leaders have collaborated to address climate change since the early 1990s—meeting most recently for the 25<sup>th</sup> United Nations Climate Change Conference—but have struggled to reach consensus on a collective response appropriate to the seriousness of the crisis.

Just as there is a critical role for nations and international bodies in addressing climate change, there is a similarly important role for local governments. Ultimately, global climate change results from the collective accumulation of local actions. Local governments are uniquely situated in their relationship to the communities they serve—their knowledge is more rooted in their locale and they will be the first to respond to community needs in the face of a changing climate. In this way, local governments have both a responsibility and an opportunity for leadership in reducing their communities’ contribution to climate change and charting a sustainable future. Albemarle County recognizes the importance of this role and embraces its responsibility to take bold steps to mitigate climate change as part of its policies, programs, and practices in service of a healthy, vibrant, just community.

As a local government, we recognize that taking steps locally to mitigate climate change can and must enhance the quality of life for everyone in the community, advance social equity for members of our community harmed by unjust practices, and benefit local health, ecosystems, and economic activity. Through climate action that builds on existing County programs, residents of Albemarle County should expect to see healthy, thriving natural areas with wildlife we know and love; an abundance of well-paying, green jobs; and educational opportunities for youth and adults. Community members should experience better health from improved infrastructure for biking and walking; greater access to affordable, locally grown food; and reduced pollution along streets and in neighborhoods. Policies and programs should contribute to an equitable and just community by narrowing disparities in outcomes for health, education, economic well-being, and the impacts of climate change on our community’s most disadvantaged members. By aiming for these outcomes, the County can advance its overall vision through climate action.

In embracing its responsibility for leadership on climate action, the Albemarle County Board of Supervisors has resolved to reduce community-wide greenhouse gas emissions by 45% from 2008 levels by 2030 and to achieve zero net emissions by 2050. This Climate Action Plan provides a framework for how Albemarle County will achieve its commitment to mitigate climate change. It will serve to guide staff initiatives and inform County programs, policies, capital investments, and partnerships with the community. While it is important for the County government to lead by example, County operations account for only about 5% of community-wide emissions. Therefore, it is also crucial for the County to inspire and facilitate action by organizations, businesses, and individuals throughout the community.

The County anticipates climate action planning to be a long-term endeavor—occurring in two initial phases, with continued iterative updating as we measure progress and adapt to changing conditions. This document represents the culmination of Phase 1; it aims to present a broad framework of goals, strategies, and actions. To not delay meaningful ac-



tion, this plan identifies actions that we can begin to implement promptly, as well as actions that require planning and further assessment. Phase 2 will build on this plan through a more robust evaluation of the strategies and actions, including a deeper consideration of equitable implementation and additional community benefits. Phase 2 will also include other efforts outside of planning: implementation of priority strategies and actions, the development of a greenhouse gas emission inventory, and an assessment of community resiliency to climate change.

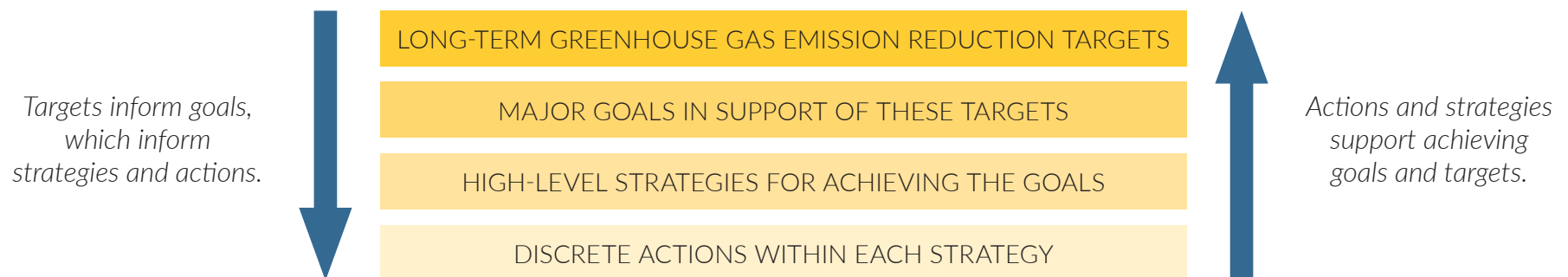
The strategies in this plan are categorized into the major sectors of the community by which greenhouse gas emissions can be reduced:

- TRANSPORTATION AND LAND USE**
- BUILDINGS**
- RENEWABLE ENERGY SOURCING**
- SUSTAINABLE MATERIALS MANAGEMENT**
- LANDSCAPE, NATURAL RESOURCES, AND AGRICULTURE**

While many of the actions described in this plan are unique to specific emission sectors, some types of actions are applicable to several—or even all—sectors. For example, community outreach and involvement will be essential in building capacity and achieving meaningful emission reductions in each of the sectors. Further, each sector contains actions that focus on Albemarle County’s ability to lead by example through changes to policies and procedures in County operations.

We can successfully mitigate our community’s contribution to climate change only if we adopt new practices throughout the County government and community. As such, this plan was developed through the collective effort of many County staff in collaboration with community partners, local experts, various stakeholder groups, and residents. In addition, the plan is linked to and complements numerous existing County and community plans. Finally, it supports Albemarle County’s overall guiding vision to contribute to a healthier, more prosperous, and more equitable community for all residents.

*Logical Framework of CAP Components*



## Relationship to Other County & Regional Plans

Albemarle County's Climate Action Plan echoes many of the same values and broad aspirations identified by other County plans, such as preserving our natural environment, supporting the local economy, and promoting healthy lifestyles. Most prominently, the 2015 Comprehensive Plan details numerous goals, objectives, and strategies that directly or indirectly support climate action.<sup>5</sup> For instance, protecting natural resources—including local watersheds, stream buffers, and wildlife habitat—contributes to three related benefits: supporting local environmental health, mitigating climate change, and enhancing resilience to climate change impacts already underway.

Similarly, all 12 principles of the Neighborhood Model, referenced throughout the Comprehensive Plan, have significant potential to support climate action along with local quality of life. For example, provision of quality, affordable housing in the Development Area “in close proximity to employment centers, community services, and transportation networks ... helps reduce automobile dependence.”<sup>6</sup> The Comprehensive Plan also makes clear that many climate-friendly policies whose primary purpose serves local livability and environmental health have a long history within local governance.

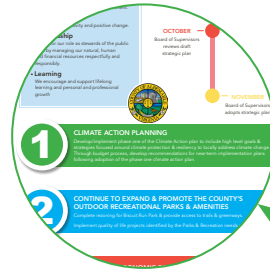
Other County plans expound in greater detail on objectives in the Comprehensive Plan, as well as related goals. For instance, the Bio-

diversity Action Plan details specific recommendations for maintaining quality, connected habitat to preserve and support the rich biodiversity in Albemarle County.

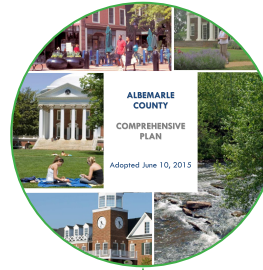
To address aspects of infrastructure that go beyond its borders, Albemarle County also participates in several key planning initiatives through the Thomas Jefferson Planning District Commission (TJPDC), a regional organization that spans the City of Charlottesville, Albemarle County, and several neighboring counties. Two plans produced by this commission—the Jefferson Area Bicycle and Pedestrian Plan<sup>7</sup> and the Charlottesville-Albemarle Metropolitan Planning Organization Long Range Transportation Plan<sup>8</sup>—have informed goals, strategies, and actions in the Transportation and Land Use section of the Climate Action Plan. Likewise, the regional Solid Waste Management Plan, also produced by the TJPDC, informed the Sustainable Materials Management section. In turn, we expect that Albemarle's Climate Action Plan will influence future planning of the TJPDC in these areas.

**Albemarle County Plans**

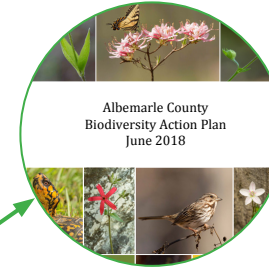
**Prioritized FY20-22 Strategic Plan**



**Comprehensive Plan**



**Biodiversity Action Plan**



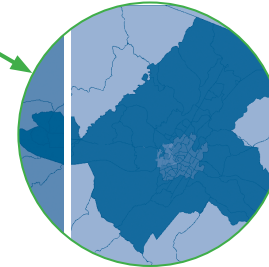
**Regional Plans**



**Thomas Jefferson Planning District Commission Solid Waste Management Plan**



**Jefferson Area Bicycle and Pedestrian Plan**



**Charlottesville/Albemarle Metropolitan Planning Organization 2045 Long Range Transportation Plan**

# Rising to the Challenge and Opportunity

Climate change presents a unique challenge and a unique opportunity. It is a challenge in its far-reaching impacts on planet and society, and in the extent of changes to “business-as-usual” activities that it will require. Yet it also provides opportunities: to preserve the natural resources and landscapes that enrich Albemarle County, building on the County’s history of local environmental stewardship; to strengthen our community by addressing historical practices and policies that have produced present disparities; and to promote good jobs, clean air, and clean water for the health and prosperity of all residents.

This Climate Action Plan seeks to respond to these challenges and opportunities by expanding beneficial policies and addressing policy gaps. Many elements of this plan—from broad goals to specific actions—are not new to the County; rather, they complement existing plans and programs, such as the Comprehensive Plan and decades-long environmental conservation and growth management priorities.

## THE CHALLENGE: IMPACTS OF CLIMATE CHANGE

The effects of climate change are already here. The U.S. National Aeronautics and Space Association (NASA) puts it straightforwardly:

*“Global climate change has already had observable effects on the environment. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted and trees are flowering sooner. Effects that scientists had predicted in the past would result from global climate change are now occurring: loss of sea ice, accelerated sea level rise and longer, more intense heat waves.”*<sup>9</sup>

Americans are experiencing these effects now—extreme heat waves in the summer,<sup>10</sup> increasingly intense inland flooding from heavy rainfall

and superstorms,<sup>11</sup> and wildfires at unprecedented frequency and scale.<sup>12</sup> Not only have wildfires in the states of California, Oregon, and Washington gripped national news, for example, but Virginia is also expected to see more fires in the Appalachian Mountains.<sup>13</sup> These trends point to a key feature of climate change: increasing weather extremes. For example, from 1948 to 2011, Virginia experienced a 33% increase in the frequency of extreme rainstorms and snowstorms and an 11% increase in precipitation during the largest annual storm.<sup>14</sup> From 1980 to 2014, we have seen a 20-day local increase in the length of the mosquito season.<sup>15</sup> Looking ahead, we can also expect the number of days per year over 95°F to grow significantly.<sup>16</sup> Just this summer, Charlottesville far surpassed its previous record for consecutive number of days in which the temperature hit or exceeded 90°F, setting a new record of 35 days in a row.<sup>17</sup>

Although various effects of climate change will be seen everywhere, the impacts and costs will not fall equally on all people. Reports from the Intergovernmental Panel on Climate Change (IPCC) predict that vulnerable populations and historically marginalized communities likely will be affected more severely by increased rainfall, flooding, heat waves, and more. Increasingly severe weather patterns resulting from climate change will exacerbate food insecurity, economic hardship, negative health outcomes, and lack of access to basic goods and services, among other challenges.<sup>18</sup>

For example, rural communities globally are likely to be among the most negatively impacted by climate change,<sup>19</sup> of local concern given the important rural character of Albemarle County. In the United States, people in poverty and people of color will experience harmful impacts of climate change most severely.<sup>20</sup> For instance, people in poverty are more vulnerable to heat islands during heat waves and housing burden from higher utility costs. Women, children, and the elderly will also experience comparatively greater harmful impacts to health and wellbeing.<sup>21</sup> For ex-

## Climate Science and Understanding

Scientists began laying the foundation for modern climate science as early as the nineteenth century, and by the mid-twentieth century had confidently linked rising average global temperatures to increasing concentrations of carbon dioxide (CO<sub>2</sub>) in the atmosphere due to human industrial activities.

Virtually all scientists agree that global warming since the Industrial Revolution has been caused by the increase of greenhouse gas emissions in the atmosphere associated with human activities, including burning fossil fuels, deforesting land, and other unsustainable resource extraction (e.g., mining, over-fishing) that degrades ecosystems.<sup>37</sup> While climate science has become increasingly sophisticated in recent years, a 2019 study determined that the projections from even the earliest climate models—from the 1970s—are indistinguishable from what has occurred.<sup>38</sup>

Concern over the negative consequences of global climate change is not new. President Lyndon B. Johnson received a report from his Science Advisory Committee in 1965, which described the increase of atmospheric carbon dioxide concentrations due to burning fossil fuels and warned of possible “deleterious” effects of resulting climatic changes.<sup>39</sup> For decades, the global community has attempted to address climate change through cooperative research and international agreements to reduce greenhouse gas emissions, such as the 1992 United Nations Framework Convention on Climate Change (UNFCCC), the 1997 Kyoto Protocol, and the 2015 Paris Agreement, which calls on countries to act to limit warming to 1.5° Celsius above pre-industrial levels.<sup>40</sup> Unfortunately, little progress has been achieved, with the long-term trend in emissions continuing to rise and countries either failing to meet targets or setting insufficient targets in the first place.<sup>41</sup>

In 1988, the United Nations created the Intergovernmental Panel on Climate Change (IPCC) to assess scientific research on global warming and climate change. The IPCC has produced five major assessment reports and numerous special reports on the impacts of a changing climate, as well as opportunities for mitigation and adaptation. In 2018, the IPCC published a widely circulated special report on the likely impacts to society of global warming of 1.5°C and 2°C, based on the Paris Agreement goals. The conclusions were clear: Global warming of 1.5°C will produce dire consequences to “health, livelihoods, food security, water supply, human security, and economic growth,” and the effects of a 2°C increase will likely be far worse.<sup>42</sup>

The 2018 IPCC special report also concluded that limiting global warming to 1.5°C above pre-industrial levels will require “far-reaching and unprecedented changes in all aspects of society,”<sup>43</sup> including “deep emissions reductions” and “rapid and far-reaching transitions in energy, land, urban and infrastructure... and industrial systems.”<sup>44</sup> Although this situation poses a daunting challenge, we also believe that it provides a potent opportunity to further many of Albemarle County’s existing priorities described herein and to pursue a prosperous, equitable, and just community.

ample, women and children are already being displaced at higher rates due to floods and droughts.<sup>22</sup>

Governments, businesses, universities, and other institutions around the world are coming to terms with the financial risks and costs of climate change. Economically, we can expect climate change “to increasingly disrupt and damage critical infrastructure and property, labor productivity, and the vitality of our communities.”<sup>23</sup> Scientists, economists, and policymakers agree: The costs of inaction in the face of climate change will dwarf the costs of taking climate action now.<sup>24</sup> CDP Global, a non-profit that discloses the environmental impacts of business and government operations, reported in 2019 that 215 of the world’s biggest companies have valued the near-term climate risks to their businesses at almost one trillion US dollars.<sup>25</sup> A 2019 US Defense Department report, for example, identified the vulnerabilities from climate change of 79 key military facilities and states that “the effects of a changing climate are a national security issue.”<sup>26</sup>

Climate change is further interconnected with multiple ecological crises. Extensive research has measured biodiversity loss and ecological degradation at staggering scales over the past 50 years, driven by many of the same land and sea use practices and industrial activities that cause climate change, and further exacerbated by climate change itself.<sup>27</sup> Close to home, this includes dramatic losses in North American bird populations since 1970<sup>28</sup> and projections of increased stress and habitat loss on North American birds, including many species that live in or migrate through Albemarle County, such as the Scar-

lett Tanager, White-throated Sparrow, and Yellow-throated Warbler.<sup>29</sup> Trees are also vulnerable to climate change. Species at the southern limits of their range here in Albemarle County—such as northern red oak and white pine—could all be gone within the next century, and species at the northern limits of their range could become increasingly common.<sup>30</sup>

## **BUILDING ON OUR HISTORY OF LOCAL STEWARDSHIP**

Responding to the challenge and opportunity of climate change does not occur in a vacuum. Albemarle County has a history of local environmental stewardship and conservation, through which we have preserved important natural and cultural resources. The County’s Growth Management Policy, instituted in the 1971 Comprehensive Plan and reflected in all subsequent updates to the Plan, has helped to protect the local watershed and other natural resources within the County by directing growth to the Development Areas and limiting subdivision in the Rural Area.<sup>31</sup>

The Neighborhood Model, created to support implementation of the Growth Management Policy, identifies twelve principles that contribute to livable, vibrant urban places.<sup>32</sup> In addition to benefiting quality of life and local environment, these principles in combination—and many of them individually—directly and indirectly advance climate action. The County’s 2015 Comprehensive Plan identifies numerous objectives that support clean air, clean water, healthy ecosystems, and high-quality local urban places, each of which also contribute to mitigating climate change.

Consider, for instance, that many objectives in the Comprehensive Plan’s Natural Resources chapter detail strategies for protecting or even improving local ecosystem health (e.g., clean air, clean water) while also contributing to reducing greenhouse gas emissions or sequestering carbon. Methods of land use and development that “work with natural processes to minimize impacts on streams and groundwater”<sup>33</sup> often preserve the land’s carbon sequestration capacity. Transportation planning that promotes “alternatives to single-occupancy vehicles, such as walking, bicycle use, ride-sharing, and public transit services,” contributes to clean air locally and lower greenhouse gas emissions.<sup>34</sup>

Consider also the Comprehensive Plan’s strategy to “use the waste hierarchy (reduce, reuse, recycle, dispose) to guide waste management poli-

cy,”<sup>35</sup> which provides support and context for the strategies and actions in the Climate Action Plan on managing materials sustainably. Objective 7 of the Comprehensive Plan’s Community Facilities chapter identifies interlocking outcomes of sustainable materials management: “reduce waste, conserve resources, protect human and environmental health, and decrease greenhouse gas emissions.”<sup>36</sup>

In these and other ways, many of the County’s existing priorities and policies for balancing development and resource preservation also advance the goals of this Climate Action Plan.

We also acknowledge that stewardship efforts in the County have not always succeeded, and services and programs associated with County priorities don’t always serve all residents equitably. In such cases, we find specific opportunities to bring the County into greater alignment with its vision, longstanding priorities of growth management and natural resource protection, goals for equity and inclusion, and climate action objectives.

## **SEIZING THE OPPORTUNITY**

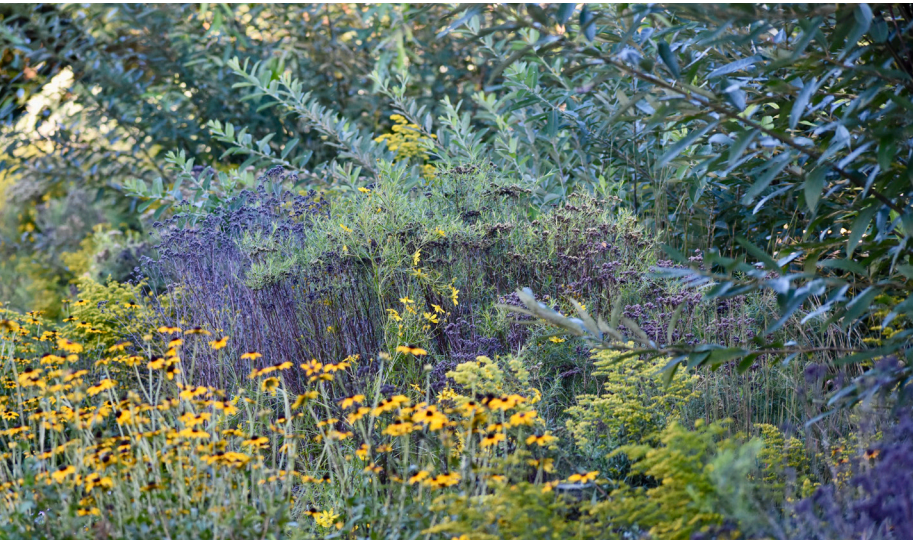
We envision this Climate Action Plan as benefiting our local community as much as it benefits the global climate. Fortunately, the two can work in tandem. Regenerative agriculture, local food production, reforestation, promoting native plants, protecting and improving our watershed, recycling and composting waste into a circular economy, improving connectivity and clean transportation modes, making our buildings more energy efficient and livable, and generating clean energy from renewable sources—all these benefit the climate and improve quality of life here in Albemarle County.

Consider the Climate Action Plan in the context of specific elements of the County’s vision: Climate action has the potential not only to protect but also to strengthen the County’s natural, rural, historic, and scenic resources by encouraging land management practices that regenerate soil, increase ecosystem health, and promote greater biodiversity. Land use, development, and transportation decisions that reduce the need for travel by car in urban spaces—in turn reducing greenhouse gas emissions—promote active and vibrant Development Areas and a general

physical environment that supports healthy lifestyles. Advancements in renewable energy generation, building energy efficiency, and local production and consumption of economic goods can all promote a thriving economy, in part by creating green jobs. Within each of these areas lie opportunities for education among adults and youth in our community.

In these ways, the Climate Action Plan is as much about the kind of place we want to live in here in Albemarle County as it is about reducing the community's contributions to global greenhouse gas emissions.

It's also an opportunity to collaborate with partners in the broader community, including key institutional partners; the City of Charlottesville and the University of Virginia are simultaneously developing their own plans to mitigate climate change as part of their respective sustainability programs. The County, City, and University have worked together by sharing information and providing mutual support, and the County will continue to work with these partners as it refines its Climate Action Plan and begins to implement strategies and actions.



## Striving for Holistic Climate Action

As Albemarle County works to address climate change among our local community, we want to stress the importance of maintaining as holistic a view as possible about the causes and effects of climate change, as well as interrelated ecological crises that manifest locally and globally (e.g., loss of biodiversity, species extinction, ecosystem degradation). In climate policymaking, there is a risk of what some ecologists and environmentalists have described as “climate fundamentalism” or “carbon reductionism”—seeing all ecological challenges through the lens of climate change and reducing climate change to purely a numbers game of carbon emissions devoid of local context.<sup>45</sup> As a 2012 article in the journal *Global Environmental Politics* put it, “there has been such a focus on carbon that it has become removed from its environmental and social (and even climate) context.”<sup>46</sup>

Within this view, for example, clearing forested land to build a new solar energy utility would make sense as long as the reduced carbon emissions from solar energy generation is greater than the carbon emissions of the lost forestland (from decomposing root systems, depleted soil, etc.).<sup>47</sup> This view is reductionist because it ignores the value of the forest habitat for biodiversity, local air quality, watershed quality, people's enjoyment, the rural character of Albemarle County, and numerous other seen and unseen benefits beyond carbon sequestration. Carbon reductionism also assumes that we can accurately calculate the sequestration capacity of the local forested area and compare it to the emission reductions of the solar utility. Recent research suggests that such calculations tend to grossly underestimate the total carbon sequestration capacity of healthy ecosystems.<sup>48</sup>

As the County pursues policies and programs to support reductions in greenhouse gas emissions, we will strive to plan and act holistically so that climate change mitigation actions support overall wellbeing in our local ecosystem, with particular attention paid to avoiding unintended negative consequences to local ecology and quality of life. In a similar way that the County will examine proposed strategies and actions in order to advance equity and mitigate unintended negative impacts on disparities in our community, the Climate Action Plan should support overall environmental health *within* the County and should avoid actions that compromise such health for the sake of greenhouse gas emissions reductions. One way that the County can enact this intention is to ensure that climate action planning reflects the priorities of other County planning documents that emphasize the importance of promoting and preserving local environmental health, such as the Biodiversity Action Plan (2018) and the Comprehensive Plan (2015).

# Our Commitment to Climate Action

Effectively addressing climate change requires action at all levels of society—by individuals, businesses, organizations, and all levels of government. As a local government, Albemarle County builds infrastructure, conducts local transportation planning, makes land use decisions in accord with its growth management policy, influences building zoning and construction, maintains sizeable parks and open space, and stewards natural resources. The County can also create policies and programs that incentivize individuals, organizations, and businesses to adopt sustainable and regenerative practices. Further, the County can serve as an example to others by adopting such practices in its own operations—such as investing in more sustainable buildings, a more efficient vehicle fleet, and on-site renewable energy projects.

Albemarle County has demonstrated a commitment to natural resource protection and environmental stewardship since the 1970s, with particular emphasis on maintaining the health of the Rivanna River watershed. Local awareness about the significance of climate change emerged in the Charlottesville-Albemarle community in the mid-2000s, prompting local government action. On December 5, 2007, the County Board of Supervisors approved the Sierra Club’s Cool Counties Resolution, pledging to a voluntary goal of reducing carbon dioxide emissions by 80 percent by 2050. (The Charlottesville City Council had passed a resolution the year before endorsing the U.S. Mayors Climate Protection Agreement.)

In May 2009, the County and City begin working with the University of Virginia and other local partners on an initiative that became known as the Local Climate Action Planning Process (LCAPP). The resulting LCAPP report—finalized in August 2011—articulates the motivation for taking climate action, summarizes the planning process, gives examples of existing efforts, and provides recommended actions from which the three major entities could then develop their own action plans. On September 7, 2011, the Board of Supervisors rescinded the Cool Counties Resolution but unanimously accepted the recommendations of the LCAPP Steering Committee.

On September 6, 2017, the Board of Supervisors passed a resolution to “Reaffirm Commitment to Support Local Action to Reduce Climate Pollution.” On September 5, 2018, the Board authorized signing the “We Are Still In” Declaration—an open letter from over 3,800 U.S. state, tribal, local, business, and organizational leaders committing “to support climate action to meet the Paris Agreement” goals.<sup>49</sup> During strategic planning sessions in the fall of 2018, the Board determined that climate action planning was one of their most important priorities. Through the Prioritized FY20-22 Strategic Plan,<sup>50</sup> the Board directed staff to develop and implement a community-wide climate action plan consisting of high-level goals and strategies, as well as recommendations for near-term actions. This document serves to achieve that directive.

## Acting at All Levels of Society

To mitigate climate change, all levels of society need to participate. Governments can plan, incentivize, and build low-carbon infrastructure, as well as enact laws and policies that will accelerate the transition to more sustainable practices by individuals and businesses. Businesses and organizations can reduce process inefficiencies, lower the amount of energy used by buildings and vehicle fleets, install solar panels, and invest in new technologies specific to their industry. For example, Walmart announced its intent to reduce 1 gigaton of greenhouse gas emissions from its supply chain by 2030—the equivalent of taking 211 million passenger cars off the road for a year (“Project Gigaton”). Finally, individuals can contribute to mitigating climate change in several ways: using more efficient forms of transportation; making sustainable food choices and reducing their food waste; and minimizing their consumption and purchasing sustainable products. The CAP is intended to provide guidance on how the actions of individuals, institutions, businesses and government entities fit together toward a collective goal.



## GREENHOUSE GAS EMISSION REDUCTION TARGETS

The intent of the proposed strategies and actions in this Climate Action Plan is to reduce the amount of greenhouse gases emitted by human activities within Albemarle County and simultaneously to increase the sequestration of greenhouse gases by vegetation and soil. While any reduction of net greenhouse gas emissions within the County over time is a step in the right direction, a good plan requires quantitative targets by which to measure success.

**Albemarle County's target is to reduce greenhouse gas emissions in the community by 45% from 2008 levels by 2030 and to achieve net zero emissions by 2050.<sup>51</sup>**

Albemarle County has conducted several community-wide greenhouse gas inventories in the past to estimate the total amount of emissions produced within the boundaries of the County.<sup>52</sup> The County performed inventories for the years 2000, 2006, and 2008 using ICLEI-USA climate inventory software and various sources of information, including traffic data, energy usage, housing statistics, and information from solid waste haulers. 2008 was selected as Albemarle County's baseline year because it is the closest inventory year to 2010, the baseline year used by the IPCC for modeling responses to global warming of 1.5°C and 2°C.

Based on the 2008 inventory, greenhouse gas emissions in Albemarle totaled over 1.6 million tons of carbon dioxide equivalent (CO<sub>2</sub>e).

Through a formal resolution passed on September 18, 2019, the Board of Supervisors set its greenhouse gas reduction target of reducing emissions by 45% from 2008 levels by 2030 and ultimately achieving zero net emissions by 2050. This target is consistent with the Paris Agreement goal to limit global warming to well below 2.0°C (3.6°F).

As part of Phase 2 of the climate action planning process, the County will once again calculate community-wide greenhouse gas emissions based on the latest available data and updated ICLEI software. Beginning in 2020, this inventory will be repeated every two years to track progress towards reaching the County's targets.

## How Does a Community Measure Greenhouse Gas Emissions?

A community's impact on climate change can be represented by a greenhouse gas inventory. An inventory is an accounting of all greenhouse gases produced within the geographic boundaries of the community minus the amount of greenhouse gases sequestered within that community through deliberate actions. Because there are a variety of greenhouse gases and each has a different impact on the climate, the total of all gases is expressed as an equivalent amount of carbon dioxide.

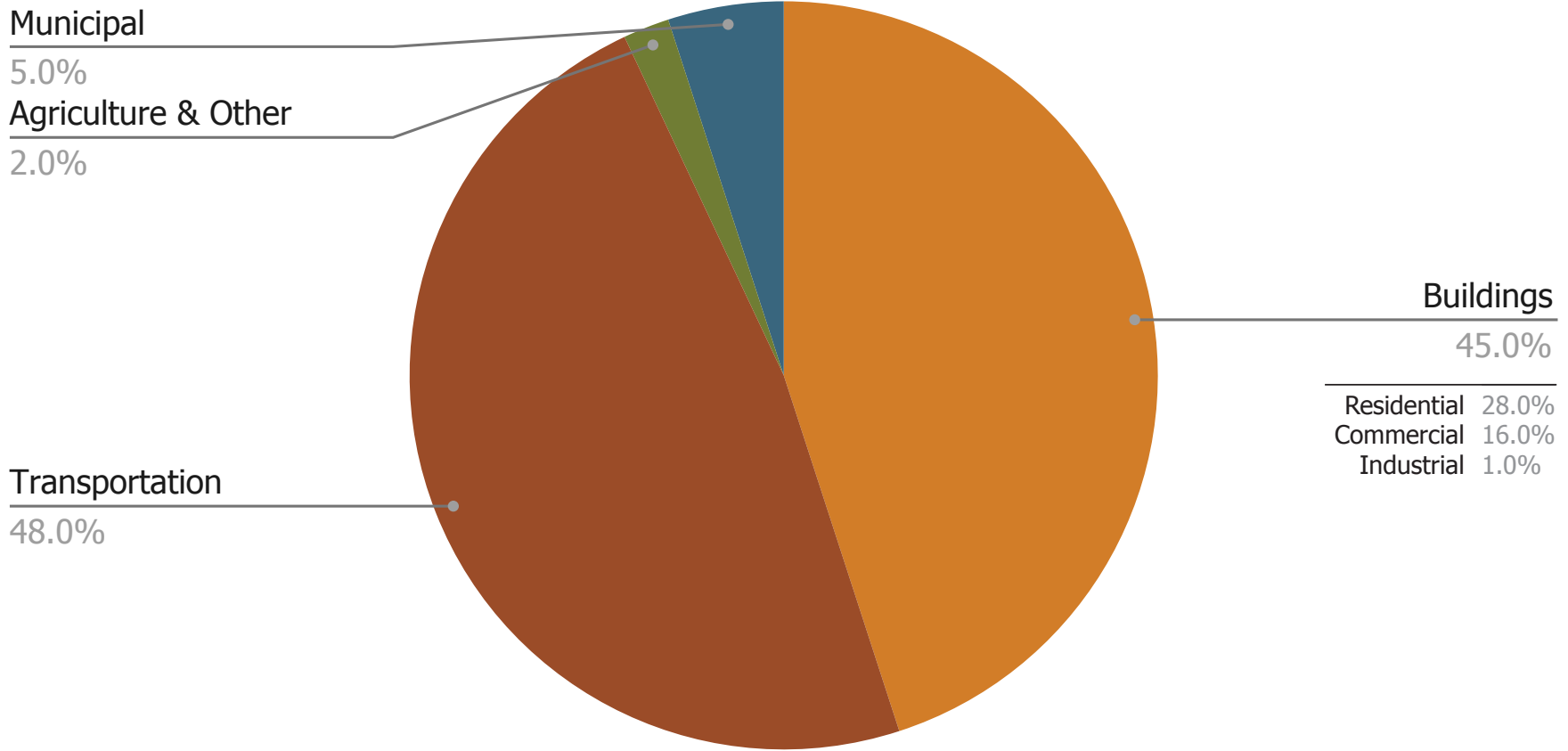
Emissions from the use of energy may be direct, such as by driving a gas vehicle, or indirect, such as by using electricity generated by a fossil-fuel power station.

Since carbon sequestration occurs naturally and continually, our greenhouse gas inventory will only consider new practices that remove carbon from the atmosphere, like planting new trees and agricultural practices that regenerate soil health.

Newly available software advances will allow an accounting of local carbon sequestration to be included in the upcoming emissions inventory. Specifically, future inventories will incorporate carbon sequestration achieved through significant improvements to land management practices and land cover, as well as carbon released due to major land development. Small-scale land use and land cover changes that are continually happening throughout the County cannot be realistically tracked and accounted for.

# GREENHOUSE GAS EMISSIONS SOURCES (CO<sub>2</sub>-e PERCENT)

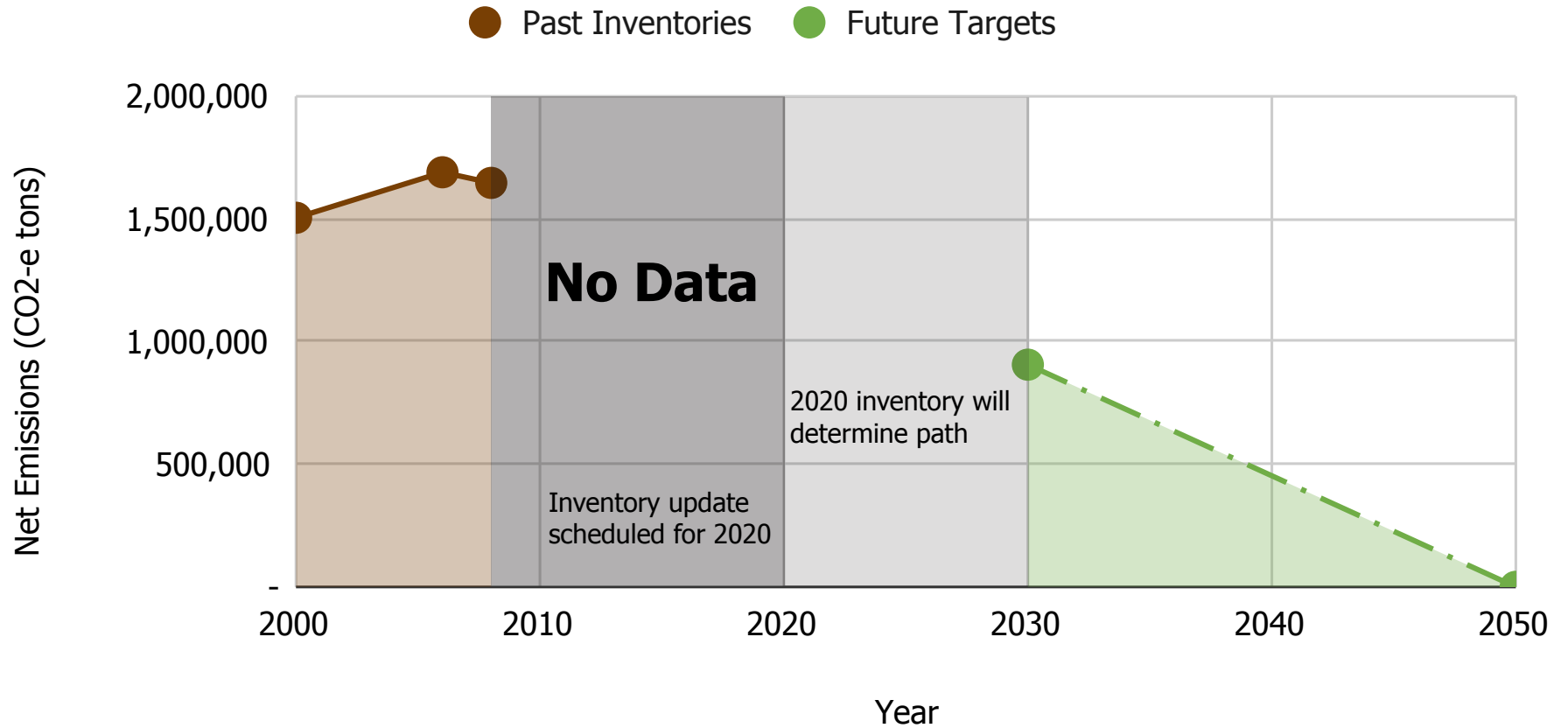
Albemarle County, 2008 Inventory



*This chart illustrates the major sources of greenhouse gas emissions in Albemarle County in 2008, grouped by standard emissions inventory categories. The Buildings sector represents residential, commercial, and industrial buildings combined. Waste is not shown due to its small percentage; nevertheless, it represents an important sector for climate action.*

# NET GREENHOUSE GAS EMISSIONS AND TARGETS

## Inventories and Targets



This chart depicts the County's net greenhouse gas emissions for the years 2000, 2006, and 2008 (in brown), along with a partial projected track for emissions reduction toward the County's targets in 2030 and 2050 (in green). The area in dark gray includes years for which the County does not have data; the 2020 inventory will allow a slope estimate for emissions from 2008 to 2020. After conducting the 2020 inventory, we will add a projected path for emissions reduction between 2020 and 2030.

## PHASED APPROACH

Albemarle County is conducting its climate action planning in multiple phases. In Phase 1, we engaged with community stakeholders to develop the goals, strategies, and actions presented in this plan. In Phase 2, we will begin implementation, update our greenhouse gas emissions inventory, refine the strategies and actions herein as needed with continued community input, and begin climate resiliency planning. Beyond Phase 2, we will engage in continual monitoring, evaluation and adaptation of climate-related programming.

### *Phase 1: Climate Action Plan Development*

This plan reflects the culmination of Phase 1 of the climate action planning process, which began in earnest in October 2018 with the formation of various working teams, consisted mostly of County staff but including key partner representatives. Teams focusing on each of the emission sectors, described in the introduction, included County staff and community stakeholders. These sector teams were responsible for developing the strategies and actions that comprise this plan based on their particular expertise and from reviewing other localities' climate action plans.

Community input was a key element of the Phase 1 process. All sector team meetings were publicized and open to the public. In March 2019, the County hosted an open house event to kick off the work by the sector teams. On almost every Monday evening during the months of May through July 2019, the County held meetings focused on discrete emission sector subjects in order to gather ideas directly from community members. We collected community feedback via verbal and written comments during public meetings, from emails sent to [climate@albemarle.org](mailto:climate@albemarle.org), and from an online form made available from August 14 – 25, 2019.

In addition, from April to May 2020, the County invited feedback on a publicly released draft of the Climate Action Plan. We received hundreds of comments from residents and local organizations through letters, email, and two online questionnaires on the platform Public Input. Early plans for public engagement included several in-person

events, all of which were canceled due to the novel coronavirus pandemic. On June 17, 2020, County staff presented the draft Climate Action Plan to the Board of Supervisors via video teleconference and received additional feedback from each individual supervisor.

From May to July 2020, County staff carefully reviewed all comments and feedback, integrating much of the feedback into this Phase 1 Plan and identifying suggestions for Phase 2. The core Climate Action Plan production team reviewed and sorted all feedback, and each sector team reviewed feedback specific to their respective sector, providing input on how best to integrate suggestions into the Plan.

At the time of publication, we have begun to implement some actions from this plan—for instance, revising County policies and practices that will reduce the carbon footprint of local government operations. In addition, we have provisioned funding to support climate-related investments in community programs and County facilities.

### *Phase 2: Implementation and Refinement*

In Phase 2, we will (1) implement the actions identified in this plan, (2) complete biennial greenhouse gas emissions inventories to track progress, (3) refine the County's Climate Action Plan with greater specificity and detail, (4) develop the County's first climate resiliency plan, and (5) improve community engagement.

1. IMPLEMENTATION: We will shift considerable energy towards implementing the actions in this plan, initially focusing on those that have clear benefit and relatively low effort and cost. Specifically, we will:
  - a. develop unambiguous and concrete targets for all actions in this plan, using SMART goals (**S**pecific, **M**easurable, **A**chievable, **R**ealistic, and **T**ime-bound);
  - b. quantify each action in terms of estimated costs (time, resources) and benefits (potential reduction in greenhouse gas emissions, anticipated co-benefits);
  - c. evaluate each action in terms of potential effects on social

equity with the support of an equity advisory group, create an inclusive process for engaging community stakeholders in this process, and amend actions to maximize potential benefit and minimize risk;

- d. prioritize actions with consideration of the costs, benefits, and effects on equity in order to best allocate limited staff, financial, and community resources to the most constructive actions; and
- e. monitor existing strategies and actions and consider new ones in order to ensure that the plan continues to be SMART amidst changing local and global circumstances, as well as to take advantage of opportunities that may arise due to new enabling legislation, emerging technologies, or partnership opportunities.

2. GREENHOUSE GAS EMISSIONS INVENTORIES: We will complete a greenhouse gas emissions inventory in 2020 and every two years following that. Each inventory will reflect a time period for which the majority of the required data can be obtained, likely from two years earlier. To the extent possible, we will make the data associated with the inventories readily available to the public.
3. CLIMATE ACTION PLAN REFINEMENT: This Phase 1 Climate Action Plan lists a broad suite of actions that the County should take over many years to meet our 2030 and 2050 emissions reduction targets. As we undertake the necessary steps to implement this plan effectively and equitably, greater detail and nuance will be added to the County's strategies and actions, along with lessons learned from implementation. We will ultimately record these refinements in a revised and updated Climate Action Plan document that can guide County action in the years and decades to come.
4. CLIMATE RESILIENCY PLANNING: We will assess how a changing climate will affect our community and how we can adapt as to reduce harmful impacts, producing a companion plan to guide County action.
5. COMMUNITY ENGAGEMENT: Throughout, we will continue to seek ways to create opportunities for community members to be involved in climate action planning, to obtain representative input, to keep the community informed of our plans and progress, and to empower individuals to take action. We will strive to engage with all

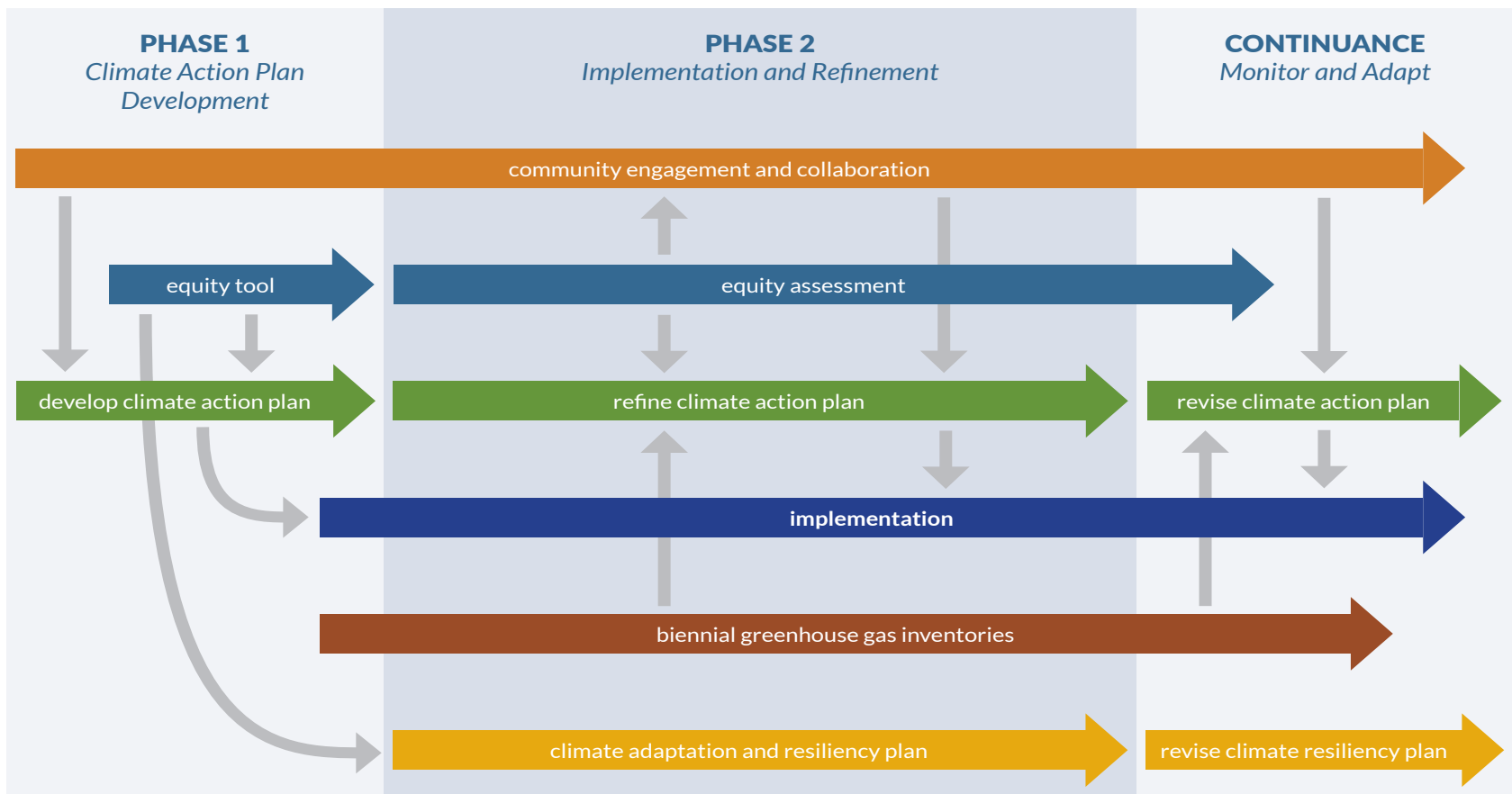
sectors of the community, particularly those that have been historically underrepresented.

### *Continuance: Monitor and Adapt*

Due to the changing nature of global issues, the scale of addressing climate change, and a greenhouse gas emission reduction target in the year 2050, climate action will almost certainly be a permanent County program. As with any complex and wide-ranging effort, the climate action plan will be updated periodically to reflect changing conditions, recent greenhouse gas emissions inventories, and refined climate action priorities.



*Moorman's River, just downstream from Sugar Hollow reservoir.*



Above: Visual depiction of the County's phased approach to climate action planning. Arrows in color depict major program elements across the phases. Gray arrows indicate how individual elements inform other elements.

## Adaptation and Resilience

Many communities, including Albemarle County, have begun to consider how they will adapt to a changing climate—for instance, whether their infrastructure and public safety services will be prepared to respond adequately to extreme storms. Climate resilience is both the ability to absorb stresses related to climate change and to adapt community systems to be more sustainable over time. While this Climate Action Plan focuses on climate change mitigation, Albemarle County recognizes the importance of adaptation and resilience. In its Comprehensive Plan, the County has committed to studying in greater detail the local impacts of climate change and to developing a Community Resilience Plan “to prevent harm to human and biologic health.”<sup>54</sup>

## CO-BENEFITS: IMPROVING PROSPERITY, HEALTH, AND QUALITY OF LIFE IN ALBEMARLE COUNTY

The primary focus of this Climate Action Plan is to reduce greenhouse gas emissions in Albemarle County, helping to mitigate the adverse effects of climate change. However, climate action planning is not just about reducing emissions. In fact, taking smart action to mitigate the effects of climate change brings a host of other benefits that will support Albemarle County's vision for a thriving, vibrant community. The strategies and actions in this Climate Action Plan will specifically support economic prosperity, community health, and the local natural environment.

### *Economic Prosperity*

Smart climate action planning presents numerous benefits to the local economy in Albemarle County. Job creation will be central: Projects to increase the energy efficiency of buildings, install on-site renewable energy generation, and build local renewable energy utilities will create well-paying, sustainable jobs in the growing clean energy industry. Production and consumption of locally made products—like food, furniture, and other goods—reduces greenhouse gas emissions and supports local job creation. Further, when we reduce wasteful costs from inefficient buildings or congested commutes by improving efficiency, we free up time and disposable income for more productive activities. On a broader scale, more efficient buildings and transportation infrastructure can make a community more attractive to businesses. Managing our community's waste more sustainably—through repairing goods, recycling, and composting—can also support the local economy by creating jobs, spurring innovation, and enhancing efficient resource use.<sup>53</sup> For example, composting can provide affordable, natural fertilizer for local farmers and gardeners to use in their operations while reducing landfill waste. Actions that protect and restore the local natural environment make Albemarle County a more attractive place to visit, supporting the local economy through tourism.

### *Community Health*

Climate action planning will also improve the health of people who live and work in Albemarle County. Local air quality will benefit from reduced vehicle and building emissions and from planting trees in areas with less canopy, which in turn can reduce rates of asthma and other chronic dis-

eases. Planting trees and other vegetation also reduces noise, lowers summer temperatures, increases access to natural areas, and contributes to greater biodiversity, which can improve the physical and mental health of residents. Expanding access to active modes of transportation and to fresh, locally grown food promotes healthier lifestyles.

### *Local Natural Environment*

Actions to mitigate climate change will produce local benefits to environmental health, supporting broader ecosystem resilience. For example, preserving existing forest and planting new trees in strategic areas supports wildlife habitat, maintains a healthy watershed, improves stormwater management, reduces flood risk, and improves air and water quality. Preserving and restoring biodiversity in turn makes Albemarle County a more enjoyable place to live, work, and visit. Increasing the health of the local natural environment also helps to preserve the character of rural and wild places in the county for generations to come.

*Throughout this document, additional benefits that accrue as a result of actions to mitigate climate change will be referred to as **co-benefits**. Specific co-benefits are named within each sector description in the Strategies and Actions section—identifying broader improvements to prosperity, health, and quality of life stemming from climate actions.*

## COMMITMENT TO EQUITY

Albemarle County understands that the effects of climate change will not impact all community members in the same way or to the same degree. We are committed to creating a process of climate action planning now and in the future that will serve all residents while also addressing disparities created by historic and present policy. As an objective, equity in climate action planning means pursuing outcomes that benefit everyone in the community without leaving anyone behind or worsening disparities that already exist, as well as addressing disparities where possible.

Accounting for differences in the harmful impacts of climate change is crucial for climate action planning and for realizing the kind of community that Albemarle County envisions. Further, the need to plan for climate change presents a valuable opportunity to address existing inequity in the county and to foster a stronger, healthier community for everyone. Conversely, poor climate action planning can worsen existing inequity by, for example, failing to consider current disparities in household energy burden or in access to clean energy.

Three aspects of equity pertinent to climate action planning are:

1. *structural inequality* in terms of who provides input on new programs,
2. who has *access to the benefits* of implementation, and
3. on whom *financial burden* of implementation falls.<sup>55</sup>

A climate action plan that does not address these dimensions of equity will neither be sustainable nor just.

Forthrightly addressing equity in climate action planning benefits everyone. “Equity aims to equip everyone, especially those who have been left behind, with the resources that allow them to contribute and prosper,” observes the organization PolicyLink. “When smart, sustainable strategies are tailored to the needs of the most vulnerable communities, op-

portunities improve for all.”<sup>56</sup> Put another way, “equity can mean looking at a system through the lens of its most disadvantaged members. Whatever is not working for them may well be impacting others in the system—just not as severely. The changes that improve their experience of the system will very likely feed up to others.”<sup>57</sup> In other words, if Albemarle County’s Climate Action Plan strategies and actions ensure that underserved members of the community have input on and benefit from new programs and services, the quality of such services will be higher for everyone.

In order to incorporate equity robustly into the County’s Climate Action Plan, the Office of Equity and Inclusion commissioned the creation of an assessment rubric to aid addressing equity in the Phase 1 document, to guide integrating it into Phase 2 strategies and actions, and to assess progress throughout development and implementation. The equity assessment rubric, *Creating an Equitable Climate Action Plan in Albemarle County*, will be employed along with other relevant equity tools to examine existing strategies and actions through the three dimensions of equity described above (structural inequality, accessibility to benefits, and financial burden).<sup>58</sup> Where necessary, updates and modifications will be made to specific strategies and actions in order to maximize potential benefits to equity and minimize risks of worsening existing inequity.

Each of the following sections that discusses a specific mitigation sector includes a brief discussion of potential benefits and risks to equity associated with that sector’s strategies and actions. The equity assessment rubric (available on the County website) serves as a reference for more specific questions and considerations.<sup>59</sup> As the County adds greater detail to strategies and actions in Phase 2 of the Climate Action Plan, more specificity will also be included about how equity can be addressed.





*With all work in Phase 2 of the Climate Action Plan, it will be especially important to include the voices of marginalized and underserved communities in Albemarle County in the process of designing more detailed strategies that will serve the community as a whole. Stakeholder representation should be equitable and inclusive so that the benefits or programs and services designed to mitigate climate change are accessible and affordable. In some cases, this may require outreach and engagement to build the capacity of communities to engage meaningfully on technical issues that relate to climate action planning, as well as communications that overcome the digital divide, language barriers, and other obstacles.*

*Orange coneflower growing in the native plant garden at the County Office Building on McIntire Road.*

## IMPLEMENTATION IN ACTION

While Phase 1 of climate action planning has focused on developing the strategies and actions in this Plan, Albemarle County has already engaged actively in climate action. Building on our history of environmental stewardship and community investment, we have undertaken numerous projects that are helping to mitigate climate change, save money, protect the local environment, and increase quality of life for residents.

In this section, we highlight a few recent examples of County projects that reflect actions identified in this Plan.

### Creating Walkable Urban Connections

The County recently completed two sidewalk projects that allow people to travel more easily on foot from where they live to stores and restaurants. The Barracks Road sidewalk project created a new connection from Barracks West Apartments to the existing sidewalk beginning at Georgetown Road—providing a continuous pedestrian route to the Barracks Road shopping center and other commercial destinations. Another project lies along Hydraulic Road from Georgetown Road to Commonwealth Drive. Both projects provide new connectivity between high-density residential units, commercial developments, and transit.



*Red Box: Newly constructed sidewalk along Hydraulic Road between Georgetown Road and Commonwealth Drive.*

*Orange Box: Local Energy Alliance Program (LEAP) technicians adding insulation as part of a low-income home weatherization project in Southwood Mobile Home Park.*

### Reducing Energy Use by Homeowners

For several years, the County has supported the Local Energy Alliance Program's (LEAP) innovative work to improve the affordability, energy efficiency, and comfort of homes throughout the county. As part of a pilot program completed in October 2019, LEAP made upgrades to ten homes in Southwood Mobile Home Park—at no cost to the homeowners.

The program aims to reduce the high energy bills that many residents face due to poor insulation and inefficient HVAC systems in their homes. LEAP developed this pilot program in partnership with Habitat for Humanity of Greater Charlottesville and with financial support from Albemarle County. The County's \$40,000 donation helped to support start-up and crew-training costs for what promises to be a lasting community benefit.



## Solar Energy at County Buildings

In recent years, the County has completed several solar panel installation projects on local government and public school buildings, beginning a transition toward powering County facilities with clean energy.

In 2016, six of our public schools were the first in Virginia to install solar arrays under a Power Purchase Agreement (PPA). The system's 3,000 panels generate 1.1 megawatts of energy—enough to power 125 average U.S. homes—and meet over 20% of the participating schools' annual electricity requirements. Under the PPA, the \$2 million investment required no up-front capital expenditure. In 2019, the County also installed a 60-panel, 21.6-kilowatt solar array on the roof of the Crozet Library. This system cost approximately \$45,000 and has a return on investment period of about 13 years.

The County has also invested in several projects to reduce energy use at its local government and public school buildings, based on the findings of an energy audit and through ongoing internal energy management efforts. At the 5<sup>th</sup> Street office building, we replaced outdated heating and air conditioning systems and sealed gaps in the building envelope. At the Northside Library, we achieved significant energy use reductions through no-cost improvements to the facility's building systems controls. At a total cost of \$347,000 and annual savings starting at \$46,000 (which will increase over time), these projects have a return on investment period of about 7.5 years.



*Gold Box: Crozet Library rooftop solar, seen in winter. While snow remains on parts of the roof, it melts quickly on solar panels, enabling continued energy generation.*

*Green Box: One of ten conservation easements recently donated to the Albemarle Conservation Easement Authority to help preserve the County's rural character.*

## Protecting Land

During the fiscal year ending June 30, 2020, landowners donated ten conservation easements totaling 6,955 acres to the Albemarle Conservation Easement Authority—keeping this land in the Rural Area and available for agriculture, forestry, and carbon-sequestering vegetation. These easements also eliminated the potential for 658 rural dwellings that would increase automobile traffic and emissions.



# Strategies and Actions

The principal content of this Climate Action Plan are the strategies and actions that Albemarle County aims to implement over time in order to reduce net greenhouse gas emissions from the community. These strategies are organized by sectors, which represent major sources of emissions that can be reduced, opportunities to sequester carbon dioxide from the atmosphere, or a combination of both. The five sectors detailed in this Climate Action Plan are:

**TRANSPORTATION AND LAND USE**  
**BUILDINGS**  
**RENEWABLE ENERGY SOURCING**  
**SUSTAINABLE MATERIALS MANAGEMENT**  
**LANDSCAPE, NATURAL RESOURCES, AND AGRICULTURE**

Each sector section begins with several overarching goals and an overview of how taking action in that sector can reduce greenhouse gas emissions or sequester carbon dioxide.

We identify as co-benefits broader improvements to prosperity, community health, environmental wellbeing, and overall quality of life that the sector's actions will also support. These co-benefits reflect enhancements to individual wellbeing and local community life beyond greenhouse gas emissions reduction.

A discussion of equity addresses how strategies in each sector can contribute to equitable outcomes for the whole community, as well as potential risks to equity that may arise from poor planning or implementation.

The strategies and actions are presented in tables. Strategies identify initiatives that support one or more of the goals associated with a given sector, and actions identify specific activities that support a particular

strategy. For each action, we identify the time frame of the action with three labels:

**IMMEDIATELY ACTIONABLE:** These actions can be implemented immediately or are already underway, will require more modest investments in time and money, and are expected to produce clear benefits in a relatively short period. These will generally be the first steps the County will take to implement the Climate Action Plan.

**INITIATE PLANNING:** These actions represent activities whose planning can begin now but whose implementation may take more time and may require greater financial investments. Complete implementation will occur in the medium term.

**ASSESS OPPORTUNITIES:** These actions, and in some cases the strategies they support, require further research in order to plan and implement. They may become possible only as opportunities arise. Conducting this research will form a central component of Phase 2 of climate action planning, and these actions will exhibit greater detail and specificity in Phase 2 documentation.

*Butterfly weed growing in the native plant garden at the County Office Building on McIntire Road.*





*Solar panels on the roof of a resident's home in the Rural Area.*

*Native plant garden in front of the County Office Building on McIntire Road. Plants pictured here include prairie willow, northern bush honeysuckle, threadleaf coreopsis, and bushy St. John's wort. In addition to providing habitat and food for pollinators and other animals, the root systems of many native plants grow deeper into the soil than lawn grass, helping rebuild the health of soil and its ability to sequester carbon.*

# Transportation and Land Use

---

## GOALS:

*Reduce overall vehicle miles traveled.*

*Shift towards lower-emissions and zero-emissions vehicles.*

*Reduce use of single-occupancy vehicles.*

*Increase use of alternative modes of travel such as biking, walking and public transit.*

---

Greenhouse gases from the transportation sector comprise the largest contribution from Albemarle County to global climate change, accounting for 48% of all emissions during the 2008 baseline year. This sector includes all trips by all people for all reasons that occur within the geographic boundaries of the county. Examples include commutes by individuals from home to work, portions of local bus routes within the county, trips by local commercial fleets, and travelers passing through on Interstate 64 and other highways.

The purpose of the strategies in this sector is to enable people to move in healthier, more efficient, less carbon-intensive ways—in effect, reducing the amount of emissions produced while maintaining (or even enhancing) mobility. As reflected in the goals listed above, this can be achieved in three primary ways: by employing healthier, less energy intensive transportation modes, such as walking or bicycling instead of driving a car; by reducing the number of single-occupancy vehicle trips, through practices such as carpooling or using public transit; and by reducing overall miles traveled through planning smarter trips and telecommuting.

Land use is integral to reducing transporta-

tion-related emissions because it significantly affects people's travel options. Smart land use planning is crucial for empowering people who live and work in Albemarle County to choose less carbon-intensive modes of transportation. For instance, a denser land use pattern with a broader variety of uses reduces the need for people to travel long distances for their needs. Providing opportunities for multi-modal travel within developments gives people greater choice in how they move around.

## CO-BENEFITS

Improving transportation infrastructure and land use patterns in order to reduce greenhouse gas emissions also supports a healthy community. For example, reducing vehicle emissions and increasing access to active modes of transportation like biking and walking can improve local air quality and the health of residents. Cleaner air from fewer cars on the road can reduce rates of asthma, and improved cycling and pedestrian infrastructure can reduce rates of diabetes. In addition, improvements in public transit and infrastructure for active modes of transportation can reduce the costs of commuting and running errands for more people, while increasing travel options. Further, fewer

single-occupancy vehicles on the road contributes to less traffic congestion and shorter commutes. Together, these improvements to transportation and land use can contribute to a more active, vibrant community.

## EQUITY

If well-designed with awareness of historical inequities, transportation and land use initiatives have significant potential to advance equity in Albemarle County. Improved transportation infrastructure and smarter development can make employment, recreation, and basic goods and services more accessible to everyone, reducing commute times and the need to own a private vehicle. With intention, Albemarle County residents can experience positive health outcomes from increased opportunities to use active modes of transportation; residents in areas with poorer health outcomes due to historical inequities in the built environment's design have the potential to benefit in particular. Further, the semi-permanent transition to remote work among many industries due to the coronavirus pandemic highlights the importance (and potential benefits) of expanding broadband internet access equitably to everyone in the county.



*Crozet Avenue, Downtown Crozet (Crozet Library on the left). Example of a complete street, with bicycle lanes, sidewalks, and greenery on both sides.*

The risk of worsening existing inequities increases if careful attention is not given to how past transportation and land use decisions facilitate certain kinds of movement for some while inhibiting it for others. For instance, if housing affordability is not considered when planning new developments with mixed-use zoning, these areas may be affordable only to affluent families. Or, if removal of infrastructure for polluting modes of transportation (e.g., parking lots) is not paired with expansion of pollution-free modes that serve the same

commuter routes, it may become more difficult for lower income people to access places of employment. How increases in public transit service are financed should also be considered so as not to burden low income people unduly with ridership rate increases.

# TRANSPORTATION & LAND USE: STRATEGIES AND ACTIONS

STRATEGIES	ID	ACTIONS	TIME FRAME
Increase opportunities for bicycling, walking, and other alternative forms of personal transportation for daily travel.	T.1.1	Improve data collection and reporting on bicycle and pedestrian facilities, usage, and deficiencies for setting concrete improvement targets.	immediately actionable
	T.1.2	Increase the extent of sidewalks, bike lanes, and shared-use paths in the County’s Development Areas, focusing on strategic, high-impact connections and filling gaps in existing networks.	immediately actionable
	T.1.3	Improve the quality of bicycle and pedestrian infrastructure in the Development Areas to make it safer and more comfortable for users.	immediately actionable
	T.1.4	Increase public information about bicycle and pedestrian safety.	immediately actionable
Through land use planning, provide an urban land-use pattern more conducive to sustainable local and regional travel, and to protecting carbon sequestration in the Rural Area.	T.2.1	Reduce amount of land dedicated to parking by prioritizing alternative transportation modes over single-occupancy vehicles in commercial and residential developments. Review and update parking requirements in the zoning ordinance to support this goal.	initiate planning
	T.2.2	Improve coordination between land use and public transit systems.	assess opportunities
	T.2.3	Incentivize denser and more mixed-use development patterns within the Development Areas, including infill development within existing low-density areas and redevelopment of existing underutilized commercial sites.	initiate planning
	T.2.4	Increase affordable housing options in areas served by a variety of transportation options.	assess opportunities
	T.2.5	Incentivize and support land conservation in the Rural Area to provide opportunities for carbon sequestration and protection of existing carbon stores.	assess opportunities
	T.2.6	Continue and expand policies and actions to direct development into the Development Areas and to reduce development in the Rural Area, such as a Transfer of Development Rights (TDR) program, in order to protect existing carbon sequestration, maintain opportunities for future increases in carbon sequestration, and to reduce carbon emissions related to transportation in a lower-density development pattern.	immediately actionable



## STRATEGIES

## ID ACTIONS

## TIME FRAME

Increase electric vehicle charging infrastructure available to the public.

T.3.1 Develop local ordinances and policies that encourage or require new developments to provide electric vehicle charging stations, as appropriate.

initiate planning

T.3.2 Pursue public/private partnerships and/or state and federal grants to support an increase in the availability of electric vehicle charging infrastructure.

immediately actionable

Incentivize the purchase of lower and zero-emissions vehicles by County residents.

T.4.1 Assess a reduction of the personal property tax rate for electric vehicles.

assess opportunities

T.4.2 Support and promote utility demand response programs to facilitate electric vehicle charging.

assess opportunities



An autonomous electric micro transit shuttle developed by Peronne Robotics in Crozet as part of a collaboration with Albemarle County and JAUNT.



Albemarle County's first electric vehicle, a Nissan Leaf. Action T.7.2 commits the County to defining a plan and timeline for replacing as much of its fleet as possible with electric and hybrid vehicles.

## TRANSPORTATION & LAND USE: STRATEGIES AND ACTIONS (CONTINUED)

STRATEGIES	ID	ACTIONS	TIME FRAME
Through regional partnerships and initiatives, such as the Regional Transportation Partnership (RTP) and the Charlottesville/ Albemarle Metropolitan Planning Organization (MPO), increase the use of public transit or other transportation demand management programs to provide alternatives to single-occupancy vehicles.	T.5.1	Continue to improve coordination between public transit providers (e.g., JAUNT, CAT, UTS) to better serve Development and Rural Areas.	immediately actionable
	T.5.2	Continue planning efforts to assess increasing the frequency, quality, and reliability of transit service along key routes in the Development and Rural Areas.	immediately actionable
	T.5.3	Continue planning efforts to increase local and regional transit network coverage area for fixed route and flexible bus service in both the Development and Rural Areas.	immediately actionable
	T.5.4	Increase the usage of the TJPCD Rideshare program through improved marketing and by setting use targets.	initiate planning
	T.5.5	Build on past work to collect and analyze feedback from regional residents and employees on what factors they consider in choosing to use single-occupancy vehicles, public transit, or other alternatives.	immediately actionable
	T.5.6	Develop a more robust incentive program, perhaps as part of the Charlottesville Better Business Challenge.	initiate planning
	T.5.7	Partner with regional employers to encourage and incentivize reductions in single-occupancy vehicle commuting.	initiate planning
	T.5.8	Call for a Transportation Demand Management (TDM) plan that will be conducted jointly with the City of Charlottesville and coordinated by the Thomas Jefferson Planning District Commission (TJPDC) and the Charlottesville-Albemarle Metropolitan Planning Organization (MPO).	immediately actionable
	T.5.9	Work with the City of Charlottesville and other regional partners to incentivize increased use of public transit with discounts, load-based scheduling, and usage tracking.	initiate planning

**STRATEGIES****ID ACTIONS****TIME FRAME**

Increase the overall fuel efficiency of the County vehicle fleet.

T.6.1 Modify vehicle replacement criteria to strongly weight vehicle efficiency.

immediately actionable

T.6.2 Define a plan and timeline for replacing as much of the County fleet as possible with electric and hybrid vehicles.

immediately actionable

T.6.3 Update the process to justify the need for new vehicles, as well as type of vehicle, in order to maintain the “right-sized” fleet.

immediately actionable

T.6.4 Increase availability of EV infrastructure (chargers) on government properties.

initiate planning

T.6.5 Assess the viability of acquiring electric school buses to replace diesel school buses.

assess opportunities

Improve County Government policies and procedures pertaining to employee work travel and commuting.

T.7.1 Develop a non-idling policy for vehicles having internal combustion engines.

immediately actionable

T.7.2 Provide access to charging stations for employees using personal electric vehicles.

initiate planning

T.7.3 Provide opportunities and incentives to employees to telecommute and to more efficiently commute to work (e.g., carpool, bike, transit passes for all County employees, etc.).

immediately actionable

T.7.4 Encourage and support teleconferencing and carpooling to meetings.

immediately actionable

With support of partnering organizations, increase community awareness about alternative, clean modes of transportation and infrastructure projects in the county designed to facilitate ease of clean transport for residents.

T.8.1 Increase informational programs on transportation, land use, and climate change for local government and public school staff.

immediately actionable

T.8.2 Increase access to information and resources on transportation, land use, and climate change for teachers and students in public schools.

assess opportunities

# Buildings

---

## GOALS:

*Reduce overall energy use in buildings.  
Increase on-site renewable energy production.*

---

From heating and cooling to cooking and lighting, our buildings perform many energy intensive tasks. It is no surprise, then, that the energy used by the buildings within Albemarle County accounted for approximately 45% of total greenhouse gas emissions in the baseline year of 2008. Emissions associated with this sector include the greenhouse gases resulting from the production of electricity consumed by buildings and from the combustion of fossil fuels—like natural gas and heating oil—to power furnaces and water heaters.

The contribution to climate change from the county's building infrastructure can be decreased by reducing the amount of energy that buildings use and by generating renewable energy at the building site. Reducing building energy use can be achieved through simple measures, such as sealing air leaks and using more efficient light bulbs and appliances, or through more complex measures, such as upgrading a building's insulation and mechanical systems. Renewable energy produced on-site—such as through a solar energy system—will reduce the amount of energy drawn from the local electric grid, which still gets most of its energy from the combustion of coal and natural gas.<sup>60</sup>

Albemarle County can help spur private investments in energy efficiency and renewable energy generation in existing and new buildings by increasing community awareness, offering incentives such as rebates and financing, working with local partners to escalate assistance and services, and establishing per-

formance measures. These actions can help building owners and tenants to make informed decisions regarding cost-effective energy upgrades, offsetting the upfront and total cost of those investments.

The County will also make direct economic investments in its local government and school buildings to reduce greenhouse gas emissions and to showcase innovations and technologies that can serve as models for the community.

## CO-BENEFITS

Increasing the energy efficiency of residential and commercial buildings, as well as installing on-site renewable energy generation like solar panels, bring numerous co-benefits beyond reducing greenhouse gas emissions. Principally, updating buildings for energy efficiency and renewable energy generation creates well-paying, green jobs for people who live locally, creating employment opportunities and strengthening the local economy. Upgrading building energy efficiency also lowers utility bills while increasing building comfort level, which can benefit residents and small businesses in particular. Reductions in utility bills mean reduced energy costs in the long-term, thereby reducing the cost of living and doing business. When property owners install solar panels on homes or commercial buildings they own, they become less dependent on the regional electric utility and even contribute to the electricity generation capacity of the local electric grid. This can in turn help maintain power at times

of peak energy demand and, in some cases, in the aftermath of storms that down power lines. Finally, energy efficiency and renewable energy upgrades are investments in the quality and value of buildings.

## EQUITY

Improving building energy efficiency and supporting on-site renewable energy generation with equity in mind can provide important benefits for lower income populations. Studies show that households in the United States with lower income pay significantly more per square foot in home utility costs than median and higher income households, as do heads of household of color compared with white heads of household.<sup>61</sup> Energy efficiency and weatherization upgrades that target lower income households and support up-front investment costs have the potential to reduce home energy costs significantly for these families. Increasing affordable access to on-site renewable energy generation on residential properties, as well as energy efficiency upgrades, can help reduce household energy burden for more people and contribute to fewer emissions. Further, such projects have the potential to create green job opportunities that employ people in these communities.

However, the potential equity benefits from energy efficiency and on-site renewable energy projects require intentional design and are not an inevitable outcome. Risks of worsening inequities need to be taken into account.

For example, energy efficiency and on-site renewable energy initiatives may contribute to unchecked increases in property value and rental rate increases, in turn leading to gentrification and displacement of lower income families. Alternatively, programs may not equitably target landlords, leaving renters unable to

benefit from advances in energy efficiency and renewable energy that require property work. Outreach and education about such programs are also crucial and may fail to reach historically marginalized communities due to the digital divide, language barriers, or other communication obstacles. Efforts to advance building en-

ergy efficiency and on-site renewable energy generation throughout the community will be most successful and equitable if they account for these risks in the design phase, consulting both experts and community members.

## BUILDINGS: STRATEGIES & ACTIONS

### STRATEGIES

### ID ACTIONS

### TIME FRAME

Enable and incentivize private energy efficiency and renewable energy projects in the County Code and during the community development regulatory process.	B.1.1	Establish a County policy clarifying this strategy.	initiate planning
	B.1.2	Review the building, zoning, subdivision, land use, and tax sections of the County Code for opportunities to facilitate and incentivize the construction of more energy efficient buildings and on-site renewable energy installations like geothermal, rooftop, and parking lot solar.	initiate planning
	B.1.3	Develop regulatory processes that would incentivize “better-than-code” design and renewable investing.	assess opportunities
	B.1.4	Develop regulatory processes that would incentivize greater housing density and connectivity.	assess opportunities
	B.1.5	Support the adaptive reuse of existing buildings through flexible approaches to County Code compliance and identify additional ways to facilitate building reuse, where appropriate.	assess opportunities
Expand upon and develop partnerships with local companies and non-profit agencies to improve energy efficiency in existing homes and businesses.	B.2.1	Support organizations/programs like the Local Energy Alliance Program (LEAP) that educate, provide technical assistance, and facilitate third-party energy efficiency and renewable energy incentives.	immediately actionable
	B.2.2	Promote and support organizations like the Albemarle Housing Improvement Program and the Piedmont Housing Alliance that make energy efficiency and weatherization improvements in affordable housing stock.	immediately actionable
	B.2.3	Research opportunities to support programs that improve workforce training in fields related to clean energy and energy efficiency.	assess opportunities

## BUILDINGS: STRATEGIES & ACTIONS (CONTINUED)

STRATEGIES	ID ACTIONS	TIME FRAME
Promote private energy efficiency and renewable energy investments by the private sector.	B.3.1 Develop energy efficiency and renewable energy standards for developer-constructed affordable housing units.	assess opportunities
	B.3.2 Consider a property tax exemption or partial rebate to encourage owners of existing commercial and residential buildings to make energy efficiency investments.	assess opportunities
	B.3.3 Assess financing mechanisms such as the Property Assessed Clean Energy (C-PACE) program and a Clean Energy Loan Fund program and implement, if appropriate.	initiate planning
Increase community awareness about energy conservation and renewable energy.	B.4.1 Develop a multi-media informational campaign; as appropriate, partner with other local government agencies, educational institutions, non-profits, and utilities. Promote community-based programs like the Community Climate Collaborative (C3) Better Business and Residential Challenges.	initiate planning
	B.4.2 Promote and encourage building design, construction, and performance rating and certification systems.	initiate planning
	B.4.3 Support community efforts to share information about conservation, energy efficiency, and renewable energy topics. Prioritize conservation, then efficiency of energy devices, then energy sourcing.	initiate planning
	B.4.4 Develop agreements with utility companies and other stakeholders to more effectively collect and share energy use data.	assess opportunities
	B.4.5 Increase informational programs on building energy efficiency, renewable energy generation, and climate change for local government and public school staff.	initiate planning
	B.4.6 Increase access to information and resources on building energy efficiency, renewable energy generation, and climate change for teachers and students in public schools.	initiate planning
Partner with utility companies to expand energy efficiency, renewable energy, and energy storage options for property owners and tenants.	B.5.1 Support and promote utility demand response programs, which enables customers to use less energy during peak hours, thereby offsetting the need for utilities to satisfy peak energy demand using fossil fuels.	assess opportunities

## STRATEGIES

## ID ACTIONS

## TIME FRAME

	B.5.2 Support the provision of “on-bill” financing whereby customers can pay for efficiency and renewable energy investments over time as part of their monthly bills.	assess opportunities
	B.5.3 Support and promote programs within the 2020 Virginia Clean Economy Act and Governor’s Executive Order #43; including Regional Greenhouse Gas Initiative (RGGI), Renewable Energy Portfolio Standards, Power Purchase Agreements, net metering, and shared/multi-family solar.	initiate planning
Establish formal policies to further GHG emissions reduction efforts at local government and school buildings.	B.6.1 Establish formal goals for GHG emissions reductions for local government and school buildings.	immediately actionable
	B.6.2 Establish a Green Buildings Policy to include operations, new construction, and renovations.	immediately actionable
Make targeted investments in energy efficiency, renewable energy, and energy storage projects at existing local government and school buildings.	B.7.1 When replacing roofs or constructing new buildings, include any penetrations necessary to accommodate solar arrays if analysis indicates the roof is appropriate for solar installation (south-facing, load analysis, no light obstructions, etc.)	initiate planning
	B.7.2 Analyze the existing portfolio of buildings for opportunities to add on-site renewable energy, and define a plan and timeline for installing on-site renewable energy in feasible locations.	immediately actionable
	B.7.3 Adopt a policy whereby operational savings associated with energy efficiency project are reinvested into future renewable energy projects.	immediately actionable
	B.7.4 Assess energy efficiency opportunities and invest in those projects with the best fiscal/GHG return on investment (ROI).	initiate planning
	B.7.5 Replace equipment at/beyond its expected useful life with high efficiency equipment, such as geothermal systems.	initiate planning
	B.7.6 Develop a plan for routinely performing “tune-ups” of building mechanical systems (known as retro-commissioning).	assess opportunities
	B.7.7 Partner with utility companies to research energy storage systems and make recommendations for County facilities, including vehicle-to-grid and battery storage options for demand control, emergency back-up power, and grid resiliency.	assess opportunities
Advocate for Virginia legislative actions to support energy efficiency.	B.8.1 Align County Board of Supervisor’s legislative priorities with those of other agencies influencing the state legislature, e.g. Virginia Association of Counties and Virginia Municipal League.	initiate planning

# Renewable Energy Sourcing

---

## GOAL:

*Increase renewable energy generation capacity to the electrical grid system.*

---

The electrical grid is an interconnected network for delivering electricity from producers to consumers across a region. The portion of the regional grid within Albemarle County is regulated by the Virginia State Corporation Commission and operated by two investor-owned companies—Dominion Power and Appalachian Power Company—and two member-owned cooperatives—Central Virginia Electric Cooperative and Rappahannock Electric Cooperative. While over half the energy produced in Virginia is derived from burning natural gas, less than 1% currently comes from solar and wind.<sup>62</sup>

There are presently no utility-scale renewable energy systems located in Albemarle County. However, the Albemarle County Board of Supervisors has provided a path forward for utility-scale solar projects in the county via a Special Use Permit and has approved its first project.

The County will support the development of local renewable energy by improving local land use policies and practices, supporting Virginia legislation that facilitates expansion in the renewable energy sector, pursuing utility-scale investments to provide energy for County operations, and supporting the programs and initiatives of local utilities and renewable energy developers when there are public benefits. In supporting renewable energy projects at the utility scale, the County will also strive to maintain a holistic perspective that accounts for potential climate benefits and the health of our

local ecosystem. In doing so, we will prioritize roof tops, parking lots, brownfields, landfills, and post-industrial or other open lands over forested or ecologically valuable lands for siting utility-scale renewable energy installations.

## CO-BENEFITS

Renewable energy sourcing on a utility scale brings a number of benefits, some of which are shared with the installation of on-site renewable energy generation (see Buildings). Renewable energy utility construction and maintenance creates jobs in the clean energy sector that are inherently based locally or regionally. Local community renewable generation (e.g., solar gardens) can increase the electricity-generation capacity of the regional grid and bolster the resilience of the electric grid when demand is high or when storms damage transmission lines. In some cases, renewable energy generation can provide a supplemental income source for large landowners who lease part of their property to a local utility to build and operate renewable energy systems.

## EQUITY

Potential benefits to equity from utility-scale renewable energy generation can include the creation of green jobs and, in the case of community solar, energy independence. As power generation transitions from polluting and emissions-producing fossil fuels to clean, renewable energy, many good jobs will be created. Policies

can encourage and incentivize equity in project bids so that businesses owned by women and people of color are equitably represented. Where local communities can start community-scale renewable energy generation, they may be able to gain greater energy independence and resilience in the face of power outages from weather events and demand spikes due to climate change.

Access to renewable energy among historically marginalized communities is key to realizing the benefits equitably. “Decisions regarding where renewable energy is built, who has access to it, and who is hired to construct it, affect whether the energy system is equitable.”<sup>63</sup> If support for renewable energy projects focuses on areas where affluent populations are likely to benefit first, existing inequities will be worsened. Consulting historically marginalized communities will be crucial to an equitable renewable energy transition, given a long history of siting pollution-heavy utilities close to lower income communities and communities of color, adversely affecting health and quality of life.<sup>64</sup>



# RENEWABLE ENERGY SOURCING: STRATEGIES & ACTIONS

STRATEGIES	ID	ACTIONS	TIME FRAME
Enable and incentivize utility-scale renewable energy projects in the County Code and during the community development regulatory process.	R.1.1	Establish a County policy clarifying this strategy to enable and incentivize utility-scale renewable energy projects, incorporating holistic analysis of local impacts on equity and environment.	immediately actionable
	R.1.2	Review the building, zoning, subdivision, land use, and tax sections of the County Code for opportunities to better facilitate and incentivize renewable energy projects. Encourage and prioritize the use of roof tops, parking lots, brownfields, landfills, and post-industrial or other open lands over forested or ecologically valuable lands.	assess opportunities
Partner with utilities and renewable energy companies to increase local renewable energy and energy storage initiatives.	R.2.1	Develop a policy to support utility-scale renewable energy projects.	initiate planning
	R.2.2	Support and promote programs within the 2020 Virginia Clean Economy Act and Governor’s Executive Order #43; including Regional Greenhouse Gas Initiative (RGGI), Renewable Energy Portfolio Standards, Power Purchase Agreements, net-metering, and shared/multi-family solar.	initiate planning
	R.2.3	Conduct a study in cooperation with renewable energy companies to identify locations for utility scale projects in Albemarle County. Prioritize the use of roof tops, parking lots, brownfields, landfills, and post-industrial or other open lands over forested or ecologically valuable lands.	assess opportunities
	R.2.4	Provide financial incentives to promote private renewable energy investments.	assess opportunities
Invest in utility-scale renewable energy and energy storage to meet energy needs of local government operations as allowed under Virginia code.	R.3.1	Assess issuing a Request for Proposal (RFP) for a renewable Power Purchase Agreement (PPA).	initiate planning
	R.3.2	Partner with utility companies to research energy storage systems and make recommendation for County-owned facilities including vehicle-to-grid and battery storage options.	assess opportunities

## RENEWABLE ENERGY SOURCING: STRATEGIES & ACTIONS (CONTINUED)

STRATEGIES	ID	ACTIONS	TIME FRAME
Promote and facilitate investment in utility-scale renewable energy by the private sector.	R.4.1	Assess financing mechanisms applicable to utility-scale renewable energy.	assess opportunities
	R.4.2	Assess funding opportunities to support a Clean Energy Loan Fund program applicable to utility-scale renewable energy.	assess opportunities
Increase community awareness about utility-scale renewable energy.	R.5.1	Develop a multi-media informational campaign; as appropriate, partner with other local government agencies, educational institutions, non-profits, and utilities.	initiate planning
	R.5.2	Support community efforts to share information about utility-scale renewable energy.	initiate planning
	R.5.3	Increase informational programs on renewable energy generation and climate change for local government and public school staff.	initiate planning
	R.5.4	Increase access to information and resources on renewable energy generation and climate change for teachers and students in public schools.	initiate planning
Advocate for Virginia legislative actions to support utility-scale renewable energy.	R.6.1	Align County Board of Supervisor's legislative priorities with those of other agencies influencing the state legislature, e.g. Virginia Association of Counties and Virginia Municipal League.	initiate planning



Rooftop solar installation at Baker-Butler Elementary School in Albemarle County.



Rooftop solar installation at Mary Carr Greer Elementary School in Albemarle County.



Rooftop solar installation at Brownsville Elementary School in Albemarle County.

# Sustainable Materials Management

---

## GOALS:

*Increase the percentage of recyclable materials put to positive use and diverted from landfills.*

*Increase the percentage of organic materials diverted from landfills and composted.*

---

Sending “waste” to landfills or incinerators provides few benefits and much harm, and it wastes potentially valuable resources. In contrast, recycling, composting, and other forms of circular economy create value for people and markets, as well as reducing pollution and waste. Recyclable materials that people send to landfills take up valuable space, produce pollution, and go unused when they might otherwise contribute to value in new products. Similarly, composting organic waste—food scraps, yard clippings—creates new life as organic fertilizer, rather than decomposing in a landfill and producing methane gas—a greenhouse gas whose global warming potential is 84 times that of carbon dioxide over a 20-year period.<sup>65</sup>

Landfill gas—about half methane and half carbon dioxide—is a byproduct of the anaerobic decomposition of organic material in landfills—an entirely avoidable source of emissions.<sup>66</sup> In 2018, landfill gas contributed about 15% of “human-related methane emissions” in the United States.<sup>67</sup> Albemarle County’s greenhouse gas emissions related to solid waste include those generated by its two decommissioned landfills, as well as various solid waste management operations. In addition, the accounting of greenhouse gas emissions includes those associated with the trash generated by all county homes and businesses—even though this trash is transferred outside the county.

The strategies in this sector generally involve reducing the amount of emissions-generating materials going into landfills, particularly or-

ganic materials such as food and yard waste. With 30%-40% of all food wasted in the United States,<sup>68</sup> reducing food waste offers big opportunities.

## CO-BENEFITS

Enhancing the quantity and quality of recycling and composting provides important local benefits to community health and cleanliness, local ecosystem health, and the local economy. Recycling and composting are economies of scale, which means that they become more viable as more people participate. Growing participation supports local businesses and increases the scale and quality of their operations, thereby contributing to a virtuous cycle. Diverting recyclable and compostable “waste” from landfills has the straightforward benefit of reducing landfill growth, as well as limiting dumping and litter. Properly managing landfill gas can also reduce smog, which contributes to health problems like asthma.

Encouraging a culture of reducing, reusing, and recycling in the local community can have the added benefit of boosting local thrift, repair, and reuse of household items, contributing to growth in the so-called “circular economy” and spurring innovation in the process.

Composting encourages local food production by facilitating home gardening and by providing affordable, organic fertilizer to small farmers. As a fertilizer, composting can also support local ecosystem health by reducing the use of

chemical fertilizers that contribute to toxic runoff.

## EQUITY

Albemarle County can advance equity in materials management by improving the reach and quality of recyclables, compost, and landfill collection services, specifically targeting residents who currently lack convenient access to any such service. Secondary benefits of improved recycling, composting, and trash collection infrastructure are improved environmental health and cleanliness in neighborhoods, commercial areas, and recreational areas. Prioritizing locations where these services are most lacking is important for benefiting equity.

Risks of worsening current inequities primarily involve accessibility and financial burden. Expanded composting and recycling services should be easily accessible to all residents, and program design must account for the risk of inaccessibility to residents of multi-family buildings. In addition, the County recognizes the importance of financing composting and recycling programs in ways that do not add undue financial burden on residents and businesses, particularly lower-income residents and small businesses.

## SUSTAINABLE MATERIALS MANAGEMENT: STRATEGIES & ACTIONS (CONTINUED)

STRATEGIES	ID ACTIONS	TIME FRAME
Increase the availability, convenience, and efficiency of trash and recycling collection.	S.1.1 Establish a model trash and recycling center at the Ivy Material Utilization Center.	immediately actionable
	S.1.2 Study the feasibility of curbside recycling by the County.	immediately actionable
	S.1.3 Identify if there is a need to locate additional paper/cardboard balers in Albemarle County.	immediately actionable
	S.1.4 Establish a pilot residential recycling center in Scottsville.	assess opportunities
	S.1.5 Work with RSWA to explore improving the customer experience through operational changes. Provide comprehensive recycling and disposal services to reduce the potential for mishandling or dumping.	assess opportunities
	S.1.6 Study the feasibility of locating residential trash, recycling, and composting centers within a particular distance or time limit to population centers. Ensure equitable access for underserved communities to future sites is considered.	assess opportunities
Research economic and regulatory tools to improve waste metrics reporting and motivate residents to recycle.	S.2.1 Amend Chapter 13 of the County ordinance to require large trash haulers to report the weight or volume of trash and recycling and their vehicle-miles-traveled.	initiate planning
	S.2.2 Assess a pay-as-you-throw model of trash pricing, in which fees are based on the amount of trash.	assess opportunities
	S.2.3 Assess requiring recycling at particular land uses—such as large multifamily developments and commercial/industrial properties.	assess opportunities
	S.2.4 Assess requiring recycling collection areas at new developments meeting particular criteria.	assess opportunities
	S.2.5 Explore Government Green Purchasing Policy for local government and public schools.	initiate planning
	S.2.6 Research and make recommendations on co-generation waste-to-energy options and impacts.	assess opportunities

## STRATEGIES

## ID ACTIONS

## TIME FRAME

Increase the availability and convenience of organic material collection and composting.

S.3.1 Study the feasibility of residential curbside yard waste and food scraps composting.

immediately actionable

S.3.2 Make composting available in all public schools and County office buildings.

initiate planning

S.3.3 Make food scrap and yard waste composting available at residential trash and recycling centers.

initiate planning

S.3.4 Develop food waste reduction goals and incentivize compost at restaurants, grocery stores, and other large generators.

assess opportunities

Use media outreach, public information campaigns, and school programs to encourage behavioral changes towards consumption and waste.

S.4.1 Provide information about waste streams, recycling processes, and the benefits of reducing, reusing, recycling and composting. Encourage and promote waste hierarchy, circular economy, and reducing material waste.

initiate planning

S.4.2 Survey the public to gauge support for waste management initiatives or service changes. Ensure equity considerations are part of public survey.

assess opportunities

S.4.3 Encourage the donation or reuse of unneeded clothing; provide information on alternatives to sending fabric to landfill.

assess opportunities

S.4.4 Increase informational programs on sustainable materials management and climate change for the community, residents, and businesses.

initiate planning

S.4.5 Increase access to information and resources on sustainable materials management and climate change for local government, public school staff, and students.

initiate planning

Left: Compost drop-off at McIntire Recycling Center, which serves both County and City residents.

Right: Assorted recycle bins at McIntire Recycling Center.



# Landscape, Natural Resources, and Agriculture

---

## GOALS:

*Protect and restore natural carbon sinks.*

*Promote practices on managed land that trap carbon and minimize carbon emissions.*

---

While the other sections of this Climate Action Plan focus on reducing future greenhouse gas emissions, this section explores the potential to remove carbon from the atmosphere by changing the way we manage land throughout Albemarle County. *Carbon sequestration* is the term for capturing and storing carbon from the atmosphere—carbon that would otherwise be trapping heat in the atmosphere as carbon dioxide. Carbon sequestration can supplement the reduction of new greenhouse gas emissions to reduce the overall level of greenhouse gases in the atmosphere.

The County's role in sequestering carbon is to change its own land management practices and to work with partners to encourage, enable, and incentivize individuals and businesses throughout the community to change their practices.

All plants—from agricultural crops to urban trees—grow by pulling carbon dioxide out of the atmosphere using photosynthesis. The carbon that is integrated into the plant matter may ultimately be consumed (crops or feed), bound up in long-lived tree or forestry products, or assimilated into the soil as organic matter. Different land management practices—including farming, forestry, and landscaping—can result in very different amounts of on-property carbon capture and storage. Historic practices have resulted in a net reduction of carbon stored in the soil and landscape. However, changing farming, forestry, and backyard practices can lead to a net capture of carbon.

In order to assess accurately our progress in sequestering carbon, we will create—as part of greenhouse gas inventories—a model approximating how carbon is currently stored in various elements of the landscape. We will also track various sequestration programs and changes to the landscape in order to understand how sequestration changes over time. This will require a long-term commitment to maintaining and continually updating a large array of geographical data.

## CO-BENEFITS

Sustainable land management and agricultural practices bring a host of benefits beyond sequestering carbon and preventing the unnecessary release of carbon dioxide and other greenhouse gases into the atmosphere. In Albemarle County, protecting local ecosystems will preserve the landscape and character of the Rural Area. Further, practices like replanting deforested areas (reforestation) and restoring native grasslands can increase wildlife habitat and biodiversity, a crucial benefit as many species' habitats are shrinking as a result of climate change and the human activities causing it. Community gardening can contribute to local food production and consumption, encouraging healthy lifestyles and strengthening local communities. Regenerative agricultural practices on farms increase soil health and protect water quality from chemical fertilizers, which in turn promotes the long-term sustainability of agriculture in the area, as well as a rural tourism economy. Finally, planting trees in

urban areas can improve local air quality, lower summer temperatures, and improve the health of residents, in addition to sequestering carbon from the atmosphere.

## EQUITY

Smart landscape management, protection of natural resources, and sustainable agricultural practices have the potential to allow all residents to enjoy a healthier environment and to have access to areas with local biodiversity. Equitable forest protection and reforestation throughout the county, for example, can improve local air, water, and environmental quality for all residents, especially for people living in places with higher pollution. In addition to benefiting the natural environment, encouraging and supporting neighborhood community gardens can contribute to increased food security, lower food costs, and healthier diets in areas far from grocery stores.

For local environmental stewardship to advance equity, the location and prioritization of projects like reforestation and tree planting are paramount. Urban tree canopies tend to be highly unequal, with tree canopy and income positively correlated. If improvements to local environmental health—including conservation and tree canopy increases—occur in more affluent areas but not in areas with lower income and historically marginalized populations, these inequities will persist. Attention to the effect on housing affordability of environmental improvements should also be monitored.

# LANDSCAPE, NATURAL RESOURCES, AND AGRICULTURE: STRATEGIES AND ACTIONS

## STRATEGIES

Incentivize the protection and restoration of natural areas on private land, focusing on retaining existing forest cover on the landscape.



*A view of one of the native plant gardens in front of the entrance to the County Office Building on McIntire Road. Pictured here: scaly blazing star, purple lovegrass, butterfly weed, gray goldenrod, wild bergamot, orange coneflower, and whorled milkweed.*

## ID ACTIONS

ID	ACTIONS	TIME FRAME
L.1.1	Maintain and increase the County’s land-conservation programs and related efforts, with a focus on keeping large forested properties intact and in forested land cover, to protect and increase carbon sequestration, as well as to protect water quality and habitat.	immediately actionable
L.1.2	Increase parkland acquisition on forested land, to maintain and increase carbon sequestration while providing recreational and educational opportunities.	initiate planning
L.1.3	Connect landowners with existing funding sources, conservation assistance programs, and succession planning resources to minimize parcelization and fragmentation of farms and forested properties.	immediately actionable
L.1.4	Use (and modify as necessary) tax programs—such as the County’s land use real estate tax deferral program—as incentives to maintain and expand forested land cover and natural areas for carbon sequestration and associated values such as water quality and habitat.	initiate planning
L.1.5	Include the carbon trapping potential of land as part of the ranking methodology for the County’s Acquisition of Conservation Easements (ACE) program, and offer additional points for landowners willing to commit to carbon-informed land management.	initiate planning
L.1.6	Provide general educational resources for landowners regarding the benefits of protecting, restoring, and appropriately managing natural areas.	immediately actionable
L.1.7	Assess the feasibility of new programs or ordinances to further incentivize natural resource protection, restoration, and management.	assess opportunities
L.1.8	Study ways to incentivize the establishment of wetland mitigation banks and nutrient credit banks in the County.	assess opportunities
L.1.9	Provide County staff to consistently track and monitor carbon sequestration and land cover/land use patterns in the County to assess progress.	assess opportunities
L.1.10	Work with partners and property owners to manage invasive species on private properties. Ensure equitable access for property owners of a full range of incomes and property sizes.	assess opportunities
L.1.11	Promote small forests (“Victory Forests”) instead of lawns on large lot subdivision parcels and other large rural residential parcels. Ensure equitable access for property owners of a full range of incomes and property sizes.	immediately actionable
L.1.12	Join national and international campaigns for planting trees.	immediately actionable
L.1.13	Incentivize and support the protection, enhancement, and restoration of vegetated riparian buffers and wildlife habitat corridors for multiple benefits, including carbon sequestration.	immediately actionable

## LANDSCAPE, NATURAL RESOURCES, AND AGRICULTURE: STRATEGIES AND ACTIONS (CONTINUED)

STRATEGIES	ID ACTIONS	TIME FRAME
Increase tree cover and native vegetation in urban areas, particularly adjacent to streets and parking areas.	L.2.1 Promote the use of trees, shrubs, rain gardens, and native meadows in lieu of turf grass in landscape design and property management; encourage native species for additional benefits.	assess opportunities
	L.2.2 Evaluate a requirement that overall tree canopy is not reduced by development in the Development Areas. Pursue increases in tree canopy in new and existing developed areas.	assess opportunities
	L.2.3 Provide education, resources, and assistance to landowners.	assess opportunities
	L.2.4 Promote greater use of green roofs.	assess opportunities
	L.2.5 Encourage native Virginia Piedmont plantings along highway corridors and in solar energy generation facilities.	assess opportunities
	L.2.6 Reduce paved/impervious surfaces to mitigate heat islands.	assess opportunities
	L.2.7 Use Master Plans and Small Area Planning process to evaluate existing tree canopy, set future tree canopy targets, and to identify County-owned properties, potential public spaces, and other areas for increased urban-forest area in the Development Areas.	initiate planning
Promote carbon best management practices on agricultural and silvicultural land.	L.3.1 Provide education, resources, assistance, and incentives to property owners and agricultural producers regarding rotational grazing methods, cropland management, agroforestry, and other best management practices that both improve soil health and increase carbon sequestration.	initiate planning
	L.3.2 Encourage and incentivize retention of forest cover and carbon-informed management of managed forestland.	initiate planning
	L.3.3 Encourage a transition towards clean-energy farming and landscaping equipment.	assess opportunities



**STRATEGIES****ID ACTIONS****TIME FRAME**

Promote best carbon management practices on County-owned properties and as part of County projects and initiatives.

- L.4.1 Locate priority sites for evaluating the carbon trapping potential of the landscape on County properties.

---

- L.4.2 Evaluate the carbon trapping potential of the landscape when planning and managing County properties and projects.

---

- L.4.3 On priority sites on County-owned land, engage in native forest and grassland plantings for combined sequestration and habitat demonstration projects.

---

- L.4.4 Reduce carbon emissions associated with maintaining County parks, building grounds, and other properties.

---

- L.4.5 Manage invasive species on County properties.

---

- L.4.6 Protect, restore, and appropriately manage natural areas on County-owned land.

immediately actionable

---

initiate planning

---

initiate planning

---

assess opportunities

---

assess opportunities

---

initiate planning

Create opportunities for all residents to participate in initiatives that would contribute towards local carbon sequestration.

- L.5.1 Partner with local organizations to sponsor volunteer activities such as tree plantings and control of invasive species.

---

- L.5.2 Enable and promote community gardens, and promote local food production and distribution networks for carbon sequestration, energy-conservation benefits, and equitable access to local, fresh food.

---

- L.5.3 Increase informational programs on sustainable land management, native Virginia Piedmont species and habitats, and regenerative agriculture for local government and public school staff.

---

- L.5.4 Increase access to information and resources on sustainable land management, native Virginia Piedmont species and habitats, and regenerative agriculture for teachers and students in public schools.

---

- L.5.5 Continue to fund the Albemarle Conservation Assistance Program to provide support to residents for carbon-sequestration projects and other environmental improvement projects on residential land.

---

- L.5.6 Provide information resources for County residents on land-management techniques and tree-species selection for successful carbon sequestration.

assess opportunities

---

assess opportunities

---

initiate planning

---

assess opportunities

---

immediately actionable

---

immediately actionable

# Glossary of Key Terms & Abbreviations

Board of Supervisors (Board) The elected governing body of Albemarle County

carbon dioxide (CO<sub>2</sub>) A greenhouse gas having the most influence on global climate change

climate action plan (CAP) A plan describing how a local government, or any other body, will reduce their contribution to global climate change

carbon dioxide equivalent (CO<sub>2</sub>(e)) The amount or concentration of carbon dioxide that would cause the same level of global warming as that from an amount of all types of greenhouse gases

greenhouse effect The trapping of the sun's energy in the atmosphere

greenhouse gas (GHG) A gas that contribute to the greenhouse effect by absorbing infrared radiation (e.g., carbon dioxide, methane, and nitrous oxide)

ICLEI – Local Governments for Sustainability A global network of local governments dedicated to sustainability, resilience, and climate action

ICLEI-USA US chapter of ICLEI; national network of local governments dedicated to sustainability, resilience, and climate action

Intergovernmental Panel on Climate Change (IPCC) A United Nations body that assesses the science related to climate change

Local Climate Action Planning Process (LCAPP) A previous community-wide climate planning process among Albemarle County, Charlottesville City, and University of Virginia, culminating in a 2011 report

mitigation	Lessening the contribution to climate change by reducing the amount of greenhouse gas emissions
net emissions	The balance of greenhouse gas emissions considering both the generation and sequestration of greenhouse gases
net zero	The amount of greenhouse gases emitted is balanced by an equivalent amount of greenhouse gases sequestered
Paris Climate Agreement	An international agreement by which participating countries endeavor to limit global warming to well below 2°C, ideally to 1.5°C
reforestation	Natural or intentional replenishing of forests or tree coverage in places depleted by deforestation
resiliency	
sequestration	The ability to cope with impacts and to change in order to be better prepared in the future
vehicle miles traveled (VMT)	The capture and long-term storage of greenhouse gases, for instance by vegetation and soils  A term used in transportation planning as a measure of the amount of all travel for all vehicles in a given area over a given time period.

# References

1. "Understanding Virginia's Vulnerability to Climate Change," Georgetown Climate Center, accessed February 11, 2020, <https://www.georgetownclimate.org/files/report/understanding-virginias-vulnerability-to-climate-change.pdf>.
2. "Agriculture Facts & Figures," Virginia Department of Agriculture and Consumer Services, accessed February 11, 2020, <https://www.vdacs.virginia.gov/markets-and-finance-agriculture-facts-and-figures.shtml>.
3. "Albemarle County Virginia," 2017 Census of Agriculture: County Profile, National Agriculture Statistics Service, United States Department of Agriculture, accessed February 11, 2020, [https://www.nass.usda.gov/Publications/AgCensus/2017/Online\\_Resources/County\\_Profiles/Virginia/cp51003.pdf](https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Virginia/cp51003.pdf).
4. Anthony Leiserowitz et al., *Climate Change in the American Mind: April 2020* (New Haven, CT: Yale Program on Climate Change Communication, 2020), <https://climatecommunication.yale.edu/wp-content/uploads/2020/05/climate-change-american-mind-april-2020b.pdf>.
5. *Albemarle County Comprehensive Plan*, June 10, 2015, <https://www.albemarle.org/home/show-document?id=2947>.
6. *Ibid.*, 9.3. See page 8.14 for a list of the twelve Neighborhood Model principles.
7. *Jefferson Area Bike and Pedestrian Plan* (2019), Thomas Jefferson Planning District Commission (TJPDC), accessed August 5, 2020, <http://tjpd.org/transportation/jefferson-area-bike-and-pedestrian-plan/>.
8. *2045 Long Range Transportation Plan*, Charlottesville Albemarle Metropolitan Planning Organization, accessed August 5, 2020, <http://campo.tjpd.org/process-documents/lrtp/>.
9. "The Effects of Climate Change," NASA.gov, accessed February 13, 2020, <https://climate.nasa.gov/effects/>.
10. Kendra Pierre-Louise, "Heat Waves in the Age of Climate Change: Longer, More Frequent and More Dangerous," *The New York Times*, July 18, 2019, <https://www.nytimes.com/2019/07/18/climate/heatwave-climate-change.html>.
11. "Inland Flooding," US Climate Resilience Toolkit, Climate.gov, <https://toolkit.climate.gov/topics/coastal-flood-risk/inland-flooding>.
12. Bruce Lieberman, "Wildfires and climate change: What's the connection?" Yale Climate Connections, July 2, 2019, <https://www.yaleclimateconnections.org/2019/07/wildfires-and-climate-change-whats-the-connection/>.
13. John Boyer, "Floods, fires and rising seas: New Report Details How Virginia Will Feel Climate Change," *Richmond Times-Dispatch*, Nov 28, 2018, [https://www.richmond.com/weather/floods-fires-and-rising-seas-new-report-details-how-virginia/article\\_90a70d07-e988-5bde-837f-97053be61aae.html](https://www.richmond.com/weather/floods-fires-and-rising-seas-new-report-details-how-virginia/article_90a70d07-e988-5bde-837f-97053be61aae.html).
14. Travis Madsen and Nathan Willcox, *When It Rains, It Pours: Global Warming and the Increase in Extreme Precipitation from 1948 to 2011* (Environment America Research & Policy Center, 2012), 35-37, <https://environmentamerica.org/sites/environment/files/reports/When%20It%20Rains,%20It%20Pours%20vUS.pdf>. (See also: <https://environmentamerica.org/reports/ame/when-it-rains-it-pours>).
15. "Mosquito Season Getting Longer," Climate Central, July 29, 2015, accessed August 6, 2020, <https://www.climatecentral.org/gallery/graphics/mosquito-season-getting-longer>.
16. "What Climate Change Means for Virginia," United States Environmental Protection Agency, August 2016, EPA 430-F-16-048, accessed August 6, 2020, <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-va.pdf>.
17. "Number of Consecutive Days Max Temperature >= 90 for CHARLOTTESVILLE ALBEMARLE AIRPORT, VA" and "Number of Consecutive Days Max Temperature >= 90 for Charlottesville Area, VA (ThreadEx)," xMACIS2, ACIS: NOAA Regional Climate Centers, accessed September 18, 2020, <http://xmacis.rcc-acis.org/>.
18. IPCC, 2018: Summary for Policymakers, in: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse*

- gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)], In Press, p. 15.
19. Elspeth Dehnert, "Global Warming Hurts Rural Communities Most," *Scientific American*, March 28, 2014, <https://www.scientificamerican.com/article/global-warming-hurts-rural-communities-most/>.
  20. See, for example: Seth Shonkoff, Rachel Morello-Frosch, Manuel Pastor, and James Sadd, "The climate gap: Environmental Health and Equity Implications of Climate Change and Mitigation Policies in California—A Review of the Literature," *Climatic Change* 109, no. 1 (2012): 485-503; and Douglas Fischer, "Climate Change Hits Poor Hardest in U.S.," *Scientific American*, May 29, 2009, <https://www.scientificamerican.com/article/climate-change-hits-poor-hardest/>.
  21. See, for example: Bruce A. Carnes, David Stats, and Bradley J. Willcox, "Impact of Climate Change on Elder Health," *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences* 69, no. 9 (2014): 1087-1091, doi:10.1093/gerona/glt159; and "How Is Climate Change Affecting Women?" The Climate Reality Project, March 14, 2018, <https://www.climate-realityproject.org/blog/how-climate-change-affecting-women>.
  22. See, for example: Mary Halton "Climate Change 'Impacts Women More than Men'," *BBC News*, March 8, 2018, <https://www.bbc.com/news/science-environment-43294221>.
  23. U.S. Global Change Research Program, *Fourth National Climate Assessment*, accessed July 31, 2020, <https://nca2018.globalchange.gov/>.
  24. See, for example: Benjamin M. Sanderson and Brian C. O'Neill, "Assessing the Costs of Historical Inaction on Climate Change," *Scientific Reports* 10, no. 9173 (2020), <https://www.nature.com/articles/s41598-020-66275-4>; Katharine Ricke, Laurent Drouet, Ken Caldeira and Massimo Tavoni, "Country-Level Social Cost of Carbon," *Nature Climate Change* 8 (2018): 895-900, <https://www.nature.com/articles/s41558-018-0282-y>.
  25. "World's biggest companies face \$1 trillion in climate change risks," CDP, June 4, 2019, <https://www.cdp.net/en/articles/media/worlds-biggest-companies-face-1-trillion-in-climate-change-risks>.
  26. John Conger, "New Pentagon Report: 'The effects of a changing climate are a national security issue,'" The Center for Climate and Security, ClimateandSecurity.org, January 18, 2019, <https://climateandsecurity.org/2019/01/18/new-pentagon-report-the-effects-of-a-changing-climate-are-a-national-security-issue/>.
  27. "UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating,'" May 6, 2019, accessed July 31, 2020, <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>.
  28. Kenneth V. Rosenberg et al., "Decline of the North American Avifauna," *Science* 366, no. 6461 (2019): 120-124, <https://science.sciencemag.org/content/366/6461/120>. See also: The Cornell Lab of Ornithology, <https://www.birds.cornell.edu/home/bring-birds-back/>.
  29. "Survival by Degrees: 389 Bird Species on the Brink," Audubon, accessed July 31, 2020, <https://www.audubon.org/climate/survival-bydegrees>.
  30. "Virginia's Climate Modeling and Species Vulnerability Assessment", National Wildlife Federation, accessed August 6, 2020, <http://bewildvirginia.org/climate-change/virginias-climate-vulnerability-assessment.pdf>.
  31. *Albemarle County Comprehensive Plan*, 3.3-3.4.
  32. *Ibid*, 8.14.
  33. *Ibid*, 4.17.
  34. *Ibid*, 4.18.
  35. *Ibid*, 12.23.
  36. *Ibid*.
  37. See Zeke Hausfather, "Analysis: Why scientists

- think 100% of global warming is due to humans,” Carbon Brief, December 13, 2017; and IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535.
38. Zeke Hausfather, Henri F. Drake, Tristan Abbott, and Gavin A. Schmidt, “Evaluating the Performance of Past Climate Model Projections,” *Geophysical Research Letters* 47, no. 1 (2019): 1-10, <https://doi.org/10.1029/2019GL085378>.
  39. Dana Nuccitelli, “Scientists Warned the US President about Global Warming 50 Years Ago Today,” *The Guardian*, November 5, 2015, <https://www.theguardian.com/environment/climate-consensus-97-per-cent/2015/nov/05/scientists-warned-the-president-about-global-warming-50-years-ago-today>.
  40. The Paris Agreement, United Nations Climate Change, accessed September 1, 2020, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.
  41. Fiona Harvey and Jennifer Rankin, “Paris climate deal: world not on track to meet goal amid continuous emissions,” *The Guardian*, December 3, 2019, <https://www.theguardian.com/environment/2019/dec/04/paris-climate-deal-world-not-on-track-to-meet-goal-amid-continuous-emissions>.
  42. IPCC, 2018: Summary for Policymakers, in: *Global Warming of 1.5°C*, p. 9.
  43. “Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments,” Press Release, IPCC, October 8, 2018, <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>.
  44. IPCC, 2018: Summary for Policymakers, in: *Global Warming of 1.5°C*, p. 15.
  45. See, for example: Adam Moolna, “Making Sense of CO<sub>2</sub>: Putting Carbon in Context,” *Global Environmental Politics* 12, no. 1 (2012): 1-7, <https://muse.jhu.edu/article/464691>; Charles Eisenstein, *Climate: A New Story* (Berkeley, CA: North Atlantic Books, 2018); Richard Heinberg, “Climate Holism vs. Climate Reductionism,” Post Carbon Institute, January 14, 2016, <https://www.postcarbon.org/climate-holism-vs-climate-reductionism/>; and William Boyd, “In Defense of Live Carbon,” *Legal Planet*, May 15, 2019, <https://legal-planet.org/2019/05/15/in-defense-of-live-carbon/>.
  46. Moolna, 1. The author continues that carbon reductionism “has been favored by politicians perhaps because it replaces the irreducible complexity of global climate dynamics with a digestible concept, and by business because it allows the commodification essential to making climate tradable. Carbon reductionism, however, means that climate action threatens to create a myriad of environmental and socioeconomic problems that the dominant political discourse is failing to consider.”
  47. It further assumes that the energy produced from the new solar farm replaces an equivalent amount of fossil fuel generated energy, which only occurs if overall energy demand remains constant.
  48. Healthy ecosystems are complex systems with trophic cascades and dynamic feedback loops; linear causality in one direction is rare. This makes the isolation of variables required for quantitative measurement challenging, if not impossible. For example, trophic cascades are influential interactions that affect whole ecosystems in ways that are not perfectly linear. Albemarle County’s *Biodiversity Action Plan* (2018) offers a simple example of a local trophic cascade with implications for local ecosystem health and carbon sequestration: Large numbers of white-tailed deer threaten local forests by overconsuming young trees. Historically, wolves limited deer populations, which in turn maintained one aspect of forest equilibrium. Human hunting and removal of wolf populations contributed to unchecked deer populations, which now inhibits tree growth (and forest carbon sequestration capacity) in some areas of the County. (See *Biodiversity Action Plan*, Albemarle County, June 2018, 39, <https://www.albemarle.org/home/showdocument?id=950>.) For a discussion of this phenomenon in the context of climate change and climate policy, see Charles Eisenstein, *Climate: A New Story* (Berkeley, CA: North Atlantic Books, 2018), 29-36.
  49. “We Are Still In” Declaration, We Are Still In, <https://www.wearestillin.com/we-are-still-declaration>.
  50. Prioritized FY20-22 Strategic Plan, County of Albemarle, <https://www.albemarle.org/home/showdocument?id=3184>.
  51. Such targets are typically expressed as a percent reduction of net greenhouse gases by a certain year, as measured against a given *baseline*—or starting point. Targets often include interim milestones in addition to an ultimate reduction target.

52. *County of Albemarle, VA Emissions Baseline Report*, Department of General Services, County of Albemarle, February 2009, <https://www.albemarle.org/home/showdocument?id=3178>.
53. City of Fort Collins, *Road to Zero Waste Plan* (2013), 3, [https://www.fcgov.com/recycling/pdf/RoadtoZeroWasteReport\\_FINAL.pdf](https://www.fcgov.com/recycling/pdf/RoadtoZeroWasteReport_FINAL.pdf). See also “How Communities Have Defined Zero Waste,” *Managing and Transforming Waste Streams – A Tool for Communities*, United States Environmental Protection Agency, accessed September 18, 2020, <https://www.epa.gov/transforming-waste-tool/how-communities-have-defined-zero-waste>.
54. *Albemarle County Comprehensive Plan*, 4.45.
55. Department of Energy and Environment, Government of the District of Columbia, *Clean Energy DC: The District of Columbia Climate and Energy Action Plan*, August 2018, 47, [https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page\\_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report\\_0.pdf](https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf).
56. Mission Statement, PolicyLink, <https://www.policylink.org/about-us/mission-statement>.
57. Kelly Jones, “Why Focusing On Equity Is Good for Everyone,” *Eastside Pathways*, <http://eastsidepathways.org/why-focusing-on-equity-is-good-for-everyone/>.
58. Gabriel Dayley, *Creating an Equitable Climate Action Plan in Albemarle County*, Office of Equity and Inclusion, County of Albemarle, February 2020, <https://www.albemarle.org/home/showdocument?id=4479>.
59. *Ibid*, 15-37.
60. eGRID Summary Table 2018, USEPA, accessed on February 20, 2020 at [https://www.epa.gov/sites/production/files/2020-01/documents/egrid2018\\_summary\\_tables.pdf](https://www.epa.gov/sites/production/files/2020-01/documents/egrid2018_summary_tables.pdf).
61. Khalil Shahyd, “Study Highlights Energy Burden for Households and How Energy Efficiency Can Help,” *NRDC Expert Blog*, April 20, 2016, <https://www.nrdc.org/experts/khalil-shahyd/study-highlights-energy-burden-households-and-how-energy-efficiency-can-help>; Diana Hernández and Stephen Bird, “Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy,” *Poverty & Public Policy* 2, no. 4 (2010): 5-25. doi:10.2202/1944-2858.1095.
62. “eGRID Summary Tables 2018,” US Environmental Protection Agency, March 9, 2020, [https://www.epa.gov/sites/production/files/2020-01/documents/egrid2018\\_summary\\_tables.pdf](https://www.epa.gov/sites/production/files/2020-01/documents/egrid2018_summary_tables.pdf).
63. Maria McCoy, “Community Solar With an Equity Lens: Generating Electricity and Jobs in North Minneapolis,” *Local Energy Rules Podcast*, Institute for Local Self-Reliance, <https://ilsr.org/community-solar-equity-ler-episode-57/>.
64. Adrian Wilson et al., “Coal Blooded: Putting Profits Before People,” NAACP / Indigenous Environmental Network / Little Village Environmental Justice Association, <https://www.naacp.org/wp-content/uploads/2016/04/CoalBlooded.pdf>.
65. Gunnar Myhre et al., “Anthropogenic and Natural Radiative Forcing,” in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F.; Qin, D.; Plattner, G.-K.; Tignor, M.; Allen, S.K.; Boschung, J.; Nauels, A.; Xia, Y.; Bex, V.; Midgley, P.M. (eds.)] (Cambridge, United Kingdom and New York, USA: Cambridge University Press, 2013), [http://www.climatechange2013.org/images/report/WG1AR5\\_Chapter08\\_FINAL.pdf](http://www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf). See Table 8.7, page 714.
66. “Basic Information about Landfill Gas,” *Landfill Methane Outreach Program (LMOP)*, United States Environmental Protection Agency, accessed September 18, 2020, <https://www.epa.gov/lmop/basic-information-about-landfill-gas>.
67. *Ibid*.
68. “Food Loss and Waste,” U.S. Food and Drug Administration, accessed September 18, 2020, <https://www.fda.gov/food/consumers/food-loss-and-waste>.



# CLIMATE ACTION TOGETHER

ADVANCING CLIMATE ACTION IN CHARLOTTESVILLE, A REMAINABLE JOB

[ClimateActionTogether.org](http://ClimateActionTogether.org)



Community members gather to discuss climate action in the County, City, and UVA. Fall 2019.



# Acknowledgments

## *Board of Supervisors*

Ned Galloway  
Bea LaPisto-Kirtley  
Ann Mallek  
Diantha McKeel  
Liz Palmer  
Donna Price  
Norman Dill (former)  
Rick Randolph (former)

## *Albemarle County Staff*

Brian Becker  
Montie Breeden  
Kim Biasioli  
Dan Butch  
Scott Clark  
Brooke Conover  
Gabriel Dayley  
James Foley  
Dan Fowley  
Michael Freitas  
Bill Fritz  
Mark Graham  
Serena Gruia  
Greg Harper  
Trevor Henry  
Emily Kilroy  
Andy Lowe  
Kevin McDermott  
John Murphy  
Johnathan Newberry  
Rosalyn Schmitt  
Matt Smith  
Lindsay Snoddy  
Lance Stewart  
Narissa Turner

## *Community Contributors*

Laura Allen  
Rich Allevi  
Chip Bayles  
Trey Biasioli  
Kirk Bowers  
Morgan Butler  
Ann Coates  
Keith Crawford  
Caetano de Campos Lopes  
James Eaton  
Sean Farber  
Helen Flamini  
Chris Fuller  
Stuart Gardner  
Teddy Hamilton  
Paul Haney  
John Haydock  
Tim Heltzel  
Thomas Hickman  
Jennifer Jacobs  
Michael Johnson  
Teri Kent  
Susan Kruse  
Matthew Lawless  
Grace Leonard  
Dan Lysy  
Sunshine Mathon  
Phil McKalips  
Grey McLean  
Chris Meyer  
Tom Olivier  
Annette Osso  
Kristina Parker  
Andrew Pettitt  
Travis Pietila  
Kathy Rash  
Wilson Ratliff  
Dave Redding  
David Robinson  
Greg Slater  
Sarah Smith  
Edward Strickler  
Tish Tablan  
Andrea Trimble  
Sean Tubbs  
Katie VanLangen  
Jesse Warren  
Diane Weber