



Palmetto Air Quality Collaborative (PAQC)

DRAFT South Carolina Priority Climate Action Plan (PCAP)

January 2024

DRAFT Disclaimer: This is a DRAFT version of the Priority Climate Action Plan (PCAP), accessible through the PAQC webpage to allow stakeholders, state and regional agencies, local governments and municipalities, planners, decision makers, and others to provide comments and feedback on key elements of the document. These key elements follow requirements set by the Environmental Protection Agency (EPA) and include the greenhouse gas emissions inventory, priority emissions reduction measures, benefits analysis, and review of authority.

The revision process will be ongoing during the time the draft PCAP is publicly available to ensure the final draft is completed by the March 1, 2024, submission deadline to the EPA. This document is not final and is subject to change. All comments submitted to PAQC.Comments@scor.sc.gov by February 14, 2024, will be considered during final revisions of the PCAP.



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Authorship and Comments: SCOR is authoring and producing the South Carolina Priority Climate Action Plan (PCAP) in coordination with SC DHEC and other agencies, organizations, and individuals participating in the PAQC. Please direct feedback and comments regarding the PCAP to PAQC.Comments@scor.sc.gov.

Acknowledgements:

SC DHEC and SCOR thank all members of the Palmetto Air Quality Collaborative (PAQC) and Action Teams. Every member of these teams was integral to the development of this PCAP report.

Note: A list of participating organizations will be included the final PCAP.

Disclaimer:

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Acronyms

CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Economic Justice Screening Tool
COG	Council of Governments
CPRG	Climate Pollution Reduction Grant
EJ	Environmental Justice
EPA	Environmental Protection Agency
GHG	Greenhouse gas
HFC	Hydrofluorocarbons
IRA	Inflation Reduction Act
MSA	Metropolitan Statistical Area
ODS	Ozone depleting substances
PAQC	Palmetto Air Quality Collaborative
PCAP	Priority Climate Action Plan
PFC	Perfluorocarbons
SCOR	South Carolina Office of Resilience
SCPA	South Carolina Ports Authority
SC DHEC	South Carolina Department of Health and Environmental Control

Key Terms

Climate: Describes what the weather is like over a long period of time in a specific area. Climate discussions often focus on averages of temperature, precipitation, humidity, sunshine, wind, and other measures over a thirty-year period, and how those averages may be changing over time.¹

Climate and Economic Justice Screening Tool (CEJST): A tool to identify communities with a high percentage of residents that have low incomes and limited access to resources and who experience disproportionate environmental and socioeconomic burdens. EPA strongly recommends use of [CEJST](#) to assess community burdens associated with air quality, climate change, energy, environmental hazards, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

Climate Pollution Reduction Grant (CPRG) Program: A \$5 billion program authorized and funded by the Inflation Reduction Act in 2022. Administered by the U.S. Environmental Protection Agency, the [CPRG](#) program offers Phase I Planning Grants to support states, local governments, tribes, and territories to conduct climate planning. Competitive Phase II Implementation Grants will support the implementation of greenhouse gas reduction measures identified in Phase I Priority Climate Action Plans.

Co-benefits: The multiple benefits that result when a policy or action to reduce greenhouse gas emissions are enacted. These other benefits may be related to public health (improved air quality), economic development, cost savings for governments and businesses, workforce training opportunities, enhanced greenspaces, flood mitigation, and community engagement.

Comprehensive Climate Action Plan (CCAP): A narrative report that provides an overview of the grantees' significant GHG sources/sinks and sectors, establishes near-term and long-term GHG emission reduction goals, and provides strategies and identifies measures that address the highest priority sectors to help the grantees meet those goals. The CCAP must include a comprehensive inventory of emissions and sinks for the following sectors: industry, electricity generation/use, transportation, commercial and residential buildings, agriculture, natural and working lands, and waste and materials management.

Greenhouse Gases (GHG): Gases that trap heat in the Earth's atmosphere. Earth would be uninhabitable without GHGs. Greenhouse gases are naturally present in the atmosphere as carbon circulates among the atmosphere, oceans, soil, plants, and animals. However, when GHGs in the atmosphere accumulate at very high levels, more heat is trapped in the atmosphere system and the Earth gets warmer. The principal greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases.²

Greenhouse Gas Inventory: A list of GHG emissions *sources* and *sinks* and the associated emissions quantified using standard methods. In the United States, sources of greenhouse gases include those from human activities, such as those coming from burning fossil fuels for electricity, heat, and transportation. A sink refers to any process, activity, or mechanism that prevents emissions or removes a GHG from the atmosphere. Managed forests, natural ecosystems, and other lands act as net sinks, sequestering and storing carbon, and serve to reduce overall emissions.

¹ National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental information, <https://www.ncei.noaa.gov/news/weather-vs-climate>

² EPA, Overview of Greenhouse Gases, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Greenhouse Gas Reduction Measure: Any policy, strategy, or action that reduces GHG emissions and/or enhances carbon sinks.

MSA: Metropolitan statistical areas as defined by the U.S. Census 2020 MSA population. A list of eligible MSAs can be found in Appendix 15.2 of in EPA's [CPRG: Formula Grants for Planning, Program Guidance for States, Municipalities, and Air Control Agencies](#).

Palmetto Air Quality Collaborative (PAQC): A four-year planning initiative (July 2023 to June 2027) to develop greenhouse gas inventories, as well as innovative strategies to reduce greenhouse gases (GHG) and air pollution, for South Carolina. The PAQC is co-led by the SC Office of Resilience (SCOR) and SC Department of Health and Environmental Control (SC DHEC) and prioritizes interagency coordination and community engagement. Funding comes from the U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) program.

Priority Climate Action Plan (PCAP): A narrative report that includes a GHG emissions inventory and a list of near-term, high-priority, and implementation-ready measures to reduce GHG pollution. This document, the *South Carolina Priority Climate Action Plan*, is the first deliverable required by the CPRG program.

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1 Executive Summary

Note: An Executive Summary will be included in the final PCAP.

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2 Introduction

The Palmetto Air Quality Collaborative (PAQC) is a four-year planning initiative (July 2023 to June 2027) to develop innovative strategies to reduce greenhouse gases (GHG) and air pollution in South Carolina. This initiative intends to lay the groundwork for lowering air emissions, engaging communities, and supporting workforce and economic development opportunities. The PAQC is co-led by the SC Office of Resilience (SCOR) and SC Department of Health and Environmental Control (SC DHEC)³ and is funded through the U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) program. This document, the **South Carolina Priority Climate Action Plan**, is the first deliverable required by the CPRG program.

2.1 EPA Climate Pollution Reduction Grant Program

On August 16, 2022, the Inflation Reduction Act (IRA) was signed into law and established funding for greenhouse gas planning and implementation efforts. The IRA authorized the EPA to establish the CPRG program.⁴ States, the most populous metropolitan statistical areas (MSAs), tribes, and U.S. territories were eligible to receive CPRG funding to develop strategies for reducing GHG emissions and other harmful co-pollutants. Phase I of the CPRG program provided participating states with \$3 million and MSAs with \$1 million develop GHG inventories and set priorities for reducing GHGs and achieving related community benefits. Phase II of the CPRG program will provide approximately \$4.3 billion nationwide in competitive Implementation Grants.

South Carolina is one of 45 states in the nation that accepted and received funds from the CPRG program. Three MSAs in, or encompassing areas within, South Carolina also accepted and received CPRG funding: Columbia, Greenville-Anderson, and Charlotte-Concord-Gastonia. The Central Midlands Council of Governments (COG), Appalachian COG, and Centralina Regional Council (NC) are the lead organizations for each of the respective MSA efforts (Figure 1). The Catawba Regional COG (SC) represents the South Carolina counties located in the Charlotte MSA region.

³ Pursuant to 2023 Act No. 60, as of July 1, 2024, the authoritative functions, powers, and duties of the Department of Health and Environmental Control related to the protection, regulation, and enforcement of all environmental matters, unless otherwise reassigned, shall transfer to Department of Environmental Services, by operation of law.

⁴ <https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants>

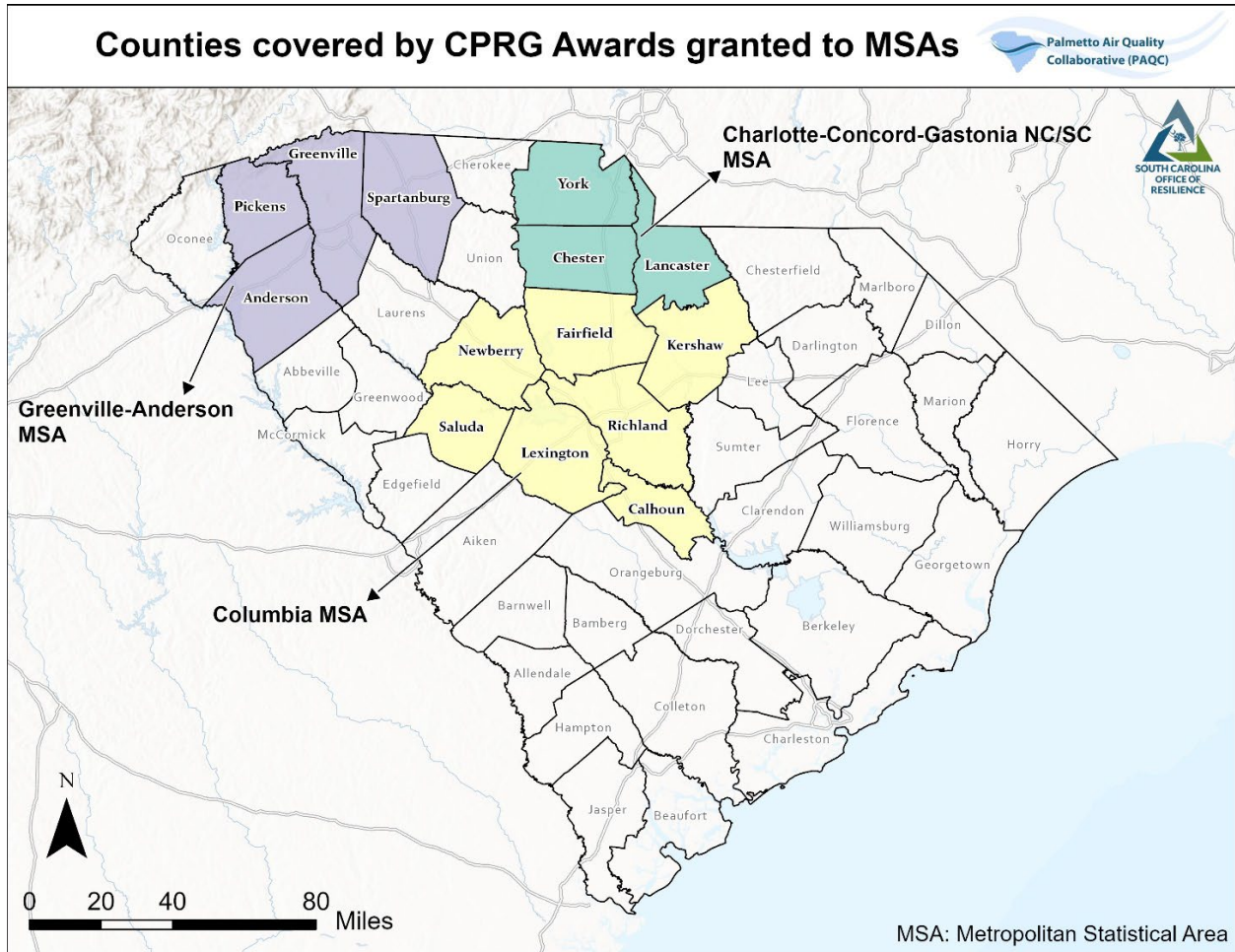


Figure 1. CPRG Map for South Carolina

2.1.1 CPRG Phase I Requirements

During the four-year planning grant, recipients are required to submit several deliverables to the EPA. These include the Priority Climate Action Plan (due March 1, 2024), the Comprehensive Climate Action Plan (CCAP; due mid-2025), and a Status Report at the end of the grant period (mid-2027).

This document comprises the Priority Climate Action Plan (PCAP) and includes the required elements: greenhouse gas (GHG) inventory; identification of near-term, priority measures to reduce greenhouse gases; assessment of benefits from reduction measures for low income and disproportionately burdened communities; and a review of agency or organization authority to implement specific measures.

The Comprehensive Climate Action Plan (CCAP) will build on the PCAP and include additional, required elements: more comprehensive assessments of GHG reduction measures and benefits, GHG emissions projections, GHG reduction targets, workforce planning analysis, and identification of funding opportunities.

The final Status Report will include information about the implementation status of GHG reduction measures included in the PCAP and CCAP, relevant updates to CCAP analyses and projections, and any next steps or future needs for funding or staffing.

The development of the PCAP, CCAP, and final Status Report also require interagency and intergovernmental coordination, as well as stakeholder and community engagement. Section 3, “Developing the Priority Climate Action Plan”, describes the PAQC’s approach to coordination and engagement for the development of the PCAP.

2.1.2 CPRG Phase II Implementation Grants

Phase II of the CPRG program entails a competitive funding process for states, municipalities⁵, Councils of Governments, municipal planning organizations, tribes, and territories to implement measures identified in an applicable PCAP.

Approximately \$4.3 billion will be available. EPA anticipates awarding approximately 30 to 115 grants, spread across five different funding tiers. Awards may range from \$2 million to \$500 million. Final selections will depend on the quality and quantity of applications and funding availability.

Implementation Grant applications are due to the EPA by April 1, 2024. Awards are expected to cover a five-year period, with an estimated start date of October 1, 2024.

⁵ As defined by the Clean Air Act section 302(f): "The term "municipality" means a city, town, borough, county, parish, district, or other public body created by or pursuant to State law."

2.2 The Palmetto Air Quality Collaborative

SCOR and SC DHEC are partnering as co-leads for the South Carolina CPRG program, and together formed the Palmetto Air Quality Collaborative (PAQC) after funding was awarded in July 2023. SC DHEC is the prime recipient of the grant, and SCOR is a sub-awardee. The South Carolina Ports Authority (SCPA) also received a sub-award to assess strategies and opportunities to reduce greenhouse gas emissions in its operations. The South Carolina Energy Office is also a key partner in this effort. Through the PAQC, SCOR and SC DHEC will complete the three EPA key deliverables and other program requirements.

The PAQC is intended to help decision makers and the communities of South Carolina understand our statewide GHG emissions and how GHG emission reductions can provide a wide range of co-benefits such as economic growth, improved public health, and enhanced community resilience. The PAQC seeks to reduce GHG emissions in South Carolina by identifying and pursuing strategic, collaborative, and voluntary actions that can be taken by all levels of government, the private sector, communities, other stakeholder groups, and private citizens. GHG reduction measures recommended in the PACP are intended to be voluntary and incentive-based and achieve a wide range of benefits for the state.

The remainder of this section describes the various missions, interests, and roles of the lead agencies and key partners.

2.2.1 SC Department of Health and Environmental Control

SC DHEC is charged with improving the quality of life for all South Carolinians by protecting and promoting public and environmental health. SC DHEC Environmental Affairs encompasses five bureaus which have regulatory and permitting authority. These bureaus offer a wide range of applied science and technical expertise. They also provide technical assistance and education/awareness programs to local governments, schools, businesses, and the public.

The Bureau of Air Quality's (BAQ) primary role in the PAQC is to provide technical assistance and review for the greenhouse gas inventories. The Bureau of Land & Waste Management (BLWM) leads and coordinates engagement efforts with waste management stakeholders, as well as oversees and manages South Carolina's adherence to EPA reporting requirements. SC DHEC's Collaborative Partnerships, Community Engagement, and EJ teams have, over many years, built strong relationships, developed cross-cutting initiatives, and increased capacity among communities across South Carolina. Their leadership and existing relationships with communities across the state will ensure meaningful engagement with a diverse group of stakeholders and the public.

2.2.2 South Carolina Office of Resilience

SCOR was established in 2020 by the Disaster Relief and Resilience Act (SC Code §48-62-10) and serves the state by coordinating post-disaster housing recovery, administering flood risk mitigation programs, implementing flood reduction projects, and leading statewide resilience planning efforts. SCOR developed the Strategic Statewide Resilience and Risk Reduction Plan (2023), a framework to guide state investment in programs and policies to protect South Carolina from extreme weather events. In developing the Plan, SCOR adopted this definition of resilience to guide the agency's work: "The ability of communities, economies, and ecosystems within South Carolina to anticipate, absorb, recover, and

thrive when presented with environmental change and natural hazards.”⁶ The Plan includes a series of recommendations aimed at decreasing the vulnerabilities and adverse impacts related to environmental changes and natural hazards. Many of SCOR’s activities have synergies and co-benefits with GHG reduction efforts. For example, land conservation provides an opportunity to enhance South Carolina’s carbon storage capacity and mitigate flood impacts. SCOR’s housing recovery program assists low-to-moderate income residents and communities by rebuilding or repairing storm-damaged homes, addressing critical safety needs and making energy efficient improvements, and providing individualized case management services to eligible households.

2.2.3 South Carolina Energy Office

The South Carolina Energy Office, housed within the South Carolina Office of Regulatory Staff, serves as the state’s principal energy planning entity, with a portfolio that encompasses energy efficiency, renewable energy, and clean transportation initiatives (S.C. Code §48-52-410 et seq.). The Energy Office develops the State Energy Plan and provides technical assistance, financial assistance, and education and outreach to local communities and stakeholder groups. They are an important partner for engaging the public, local governments, and utilities and for identifying and implementing measures related to energy conservation and efficiency for the residential, commercial, electric generation, and transportation sectors.

2.2.4 South Carolina Ports Authority

SCPA (created by SC Code §54-3-10) is an important asset for South Carolina, efficiently moving goods and connecting the state’s economy to global markets with maritime terminals in the Charleston Harbor and Port of Georgetown, as well as inland ports in Dillon and Greer. In 2021 SCPA was awarded an EPA Diesel Emissions Reduction Act (DERA) grant to update their equipment, reduce diesel emissions, and monitor air quality. They are an important partner for identifying and implementing measures through studies on zero (tailpipe) emission equipment, conducting inventories of air emissions from mobile sources, and developing and promoting incentive programs to reduce GHG emissions.

⁶ SCOR, Strategic Statewide Resilience and Risk Reduction Plan, <https://scor.sc.gov/resilience>

2.3 Purpose and Organization of the South Carolina Priority Climate Action Plan

The purpose of the PCAP is to identify and recommend voluntary, incentive-based reduction measures that will result in a wide variety of co-benefits for South Carolina. The scope of the PCAP is the entire state of South Carolina, including areas covered by the MSA recipients of CPRG funds (i.e., Columbia, Greenville-Anderson, and Charlotte-Concord-Gastonia). The South Carolina PCAP follows the requirements and guidance provided by EPA for CPRG recipients.⁷

The South Carolina PCAP is designed to be broad-based and address diverse needs and interests. This approach will optimize community support and guide efforts across the state to reduce greenhouse gas emissions and other harmful air pollutants. Completing the South Carolina PCAP enables other state, regional, and local government agencies to apply for the CPRG Phase II Implementation Grant competition. In addition, SCOR and SC DHEC expect the PCAP to serve as a reference document for other agencies, communities, and organizations pursuing future funding opportunities.

Section 3 of this document, “Developing the Priority Climate Action Plan,” describes the PAQC approach to engagement and coordination during the PCAP phase of the grant. Due to the rapid timeline provided by EPA for CPRG recipients to develop PCAPs, SCOR and SC DHEC acknowledge that it was unable to engage directly with all communities and potential stakeholders. SCOR, SC DHEC, and the South Carolina Energy Office will review and update coordination and engagement strategies after submission of the PCAP.

Section 4, “The Planning Context,” provides an overview of relevant population, demographic, and climate conditions and trends to consider. This section also includes background information about greenhouse gases, discusses benefits associated with reducing GHG emissions, and describes examples of existing efforts happening in South Carolina to reduce climate and air pollution.

Section 5 provides the statewide greenhouse gas inventory for South Carolina. SCOR and SC DHEC used the EPA State Inventory Tool (SIT) to develop the inventory.⁸ The tool provides a series of interactive spreadsheets, pre-populated with default data from federal agencies and other sources covering fossil fuels, electricity consumption, agriculture, forestry, waste management, and industry. SIT provides a streamlined, standardized process for states to calculate GHG emissions, establish a baseline understanding of emission sources and amounts, and identify where to focus efforts to reduce emission with available resources.

Section 6 presents recommendations for priority GHG reduction measures for South Carolina. These recommendations follow EPA guidance for the PCAP, which requires that the lead organization(s) and other collaborating entities identify near-term, high-priority, implementation-ready measures that could be enacted directly by the lead organization(s) or by other governmental agencies within the state. Each priority measure also includes an assessment of the benefits of that measure for low-income and disproportionately burdened communities, discussion of other co-benefits associated with that measure, and a review of agency authority to implement the measure.

⁷ Information about the PCAP elements can be found in EPA’s [Climate Pollution Reduction Grants Program: Formula Grants for Planning, Program Guidance for States, Municipalities, and Air Control Agencies](#).

⁸ <https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool>

Section 7 presents additional, recommended measures for reducing GHG emissions in South Carolina.

Note: The Draft PCAP has placeholders for three additional required elements of the PCAP, Community Benefits and Engagement (Section 8), Review of Authority (Section 9), and Conclusions and Next Steps (Section 10). These sections will be included in the final PCAP.

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3 Developing the Priority Climate Action Plan

SCOR is the lead agency for drafting and producing the Priority Climate Action Plan. SCOR staff, funded through South Carolina's CPRG award, produced the Greenhouse Gas Inventory (Section 5), compiled the list of recommended and priority GHG reduction measures (Section 6), and developed other required PCAP elements, such as the community benefits analysis and review of authority.

SCOR and SC DHEC recognize that interagency/intergovernmental coordination and stakeholder engagement are essential for any successful planning process and subsequent implementation. As the PAQC was established, initial efforts focused on communicating the CPRG program and process to key partners and obtaining feedback on the most effective mechanisms to connect with different communities and stakeholder groups.

Throughout the PCAP development phase, SCOR, SC DHEC, and the South Carolina Energy Office participated in weekly meetings to plan and implement coordination and engagement strategies. This coordinating group then tapped existing networks and associations, asking them to disseminate information about the PAQC to regional and local governments, community organizations, and other stakeholder groups and to invite their engagement in the PCAP process.

This section describes the PAQC's coordination and engagement approach. A primary mechanism to obtain agency and stakeholder input on the PCAP was through Action Teams (Section 3.4).

3.1 Interagency and Intergovernmental Coordination and Collaboration

The purpose of the PAQC's interagency and intergovernmental coordination and collaboration efforts is to involve state, regional, and local governments and agencies in the planning process and ensure that the efforts undertaken through South Carolina's CPRG program connect and align with relevant activities occurring in the state.

For example, many state agencies currently receive, expect to receive, or are applying for grants and funds available through the federal Bipartisan Infrastructure Law and Inflation Reduction Act (Section 4.5). Many of these funding opportunities have goals specific to GHG reductions or support other priorities (such as energy efficiency measures, clean energy technology development, electric vehicle infrastructure deployment) but that also have potential to reduce greenhouse gases. Interagency coordination can help to maximize funding opportunities, reduce duplication of efforts, and optimize benefits for South Carolina.

On the regional and local levels, government agencies are typically involved in land use planning and development decisions, transportation planning, air quality monitoring, water and wastewater management, zoning decisions and enforcement, and workforce development. All of these activities can have a role in managing and reducing greenhouse gas emissions (Section 6). As Councils of Governments serve as a coordinating body for local governments with their regions, they can serve as a liaison between the statewide CPRG effort and local communities, encourage local government feedback on GHG reduction measures identified in the PCAP and CCAP, and help build awareness and support for PAQC planning process.

Interagency and intergovernmental coordination measures taken by the PAQC thus far include:

- PAQC kickoff meeting on October 23, 2023, for state agencies, COGs, Municipal Association of South Carolina, and South Carolina Association of Counties
- Coordinating calls with the Appalachian, Central Midlands, and Catawba Regional COGs to discuss other CPRG efforts in South Carolina
- Ongoing communications through a monthly newsletter
- Invitations to participate in Action Teams (Section 3.4)

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3.2 Stakeholder and Community Engagement

SCOR, SC DHEC, and the Energy Office use a variety of tools to publicize the PAQC and ensure that stakeholders have access to the program, information about the process, and means to provide input and feedback.

- The PAQC website (<https://scor.sc.gov/paqc>) provides other agencies, stakeholders, and the public with information and other resources pertinent to South Carolina’s CPRG program and development of the PCAP.
- SCOR maintains a PAQC listserv and communicates progress and upcoming opportunities through a monthly newsletter.
- SCOR participated in and presented at several events in fall 2023 to publicize the PAQC and learn of relevant efforts and networks occurring within the state. Examples include events sponsored by the South Department of Commerce (meetings of Allied Partners, SC NEXUS), Sustain SC, South Carolina Energy Justice Coalition, South Carolina Electric Transportation Network, Southeast Sustainability Directors Network, and the City of Columbia Climate Protection Action Campaign.
- Two “Open House” webinars will take place on January 30 and January 31, 2024. These webinars are open to the public and being offered at evening and lunch time hours to reach audiences who may not be able to attend events scheduled for regular work hours. The webinars will introduce the PAQC and PCAP to attendees and will provide ample time for questions and discussion.
- SCOR developed an online survey to collect input from government agencies and stakeholders about emissions reduction priorities, current actions, and concerns. Specific reduction measure projects or ideas submitted through the survey were considered for inclusion in the PCAP and in the list of recommended and priority GHG reduction measures. The survey link is posted on the PAQC website and, beginning on November 27, 2023, was disseminated to the PAQC listserv, Action Teams, and other networks. As of December 28, 2023, PAQC had received survey responses from 145 individuals. Respondents represented 31 different counties and primarily local government (56 responses) and non-profit organizations (35 responses). The survey will be open and accessible throughout South Carolina’s CPRG planning grant.

3.3 Environmental Justice Hub

SC DHEC is conducting an Environmental Justice (EJ) Hub hybrid meeting on February 1, 2024, to initiate discussions with that network about the PAQC and the CPRG planning process and requirements. In addition to providing feedback on the PCAP draft, the group will also discuss strategies to engage with and involve EJ or low-income communities throughout South Carolina’s CPRG Phase I planning grant and in the Phase II implementation Grant process.

3.4 Action Teams

SCOR and SC DHEC formed Action Teams to be the primary mechanism to involve experts and other engaged stakeholders in the PAQC’s efforts. Action Team members represent a range of organizations, including state, regional, and local government agencies; utilities; industry, business, and private sector entities; non-profit organizations and community groups; universities; and associations representing specific trades or interests (for example, manufacturing, electric transportation).

To develop the PCAP, Action Teams were asked to commit to three or four virtual meetings as SCOR and SC DHEC developed the PCAP and a statewide Implementation Grant application. Action Teams are organized by specific topics relevant to the development of the PCAP and are assisting SCOR and SC DHEC with identifying, assessing, and recommending GHG reduction measures (Table 1). As of December 29, 2023, 100 individuals, representing over 50 different organizations, had joined at least one Action Team.

Note: A list of participating organizations will be listed in the final PCAP.

Table 1. PAQC Action Teams

Action Team and Topic Overview	GHG Reduction Measures Under Consideration
<p>Transportation: GHG emissions primarily come from burning fossil fuel for cars, trucks, ships, trains, and planes, as well as non-mobile equipment.</p>	<ul style="list-style-type: none"> • Electric vehicle (EV) incentives, deployment of EV infrastructure (charging stations), vehicle fleet conversion • Reducing the carbon intensity of fuels used for ports, trucking, rail, airports, and non-mobile equipment • Reducing vehicle miles traveled • Supporting alternative modes of transportation (walking, biking, public transit)
<p>Industry: GHG emissions primarily come from burning fossil fuels for energy, as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials.</p>	<ul style="list-style-type: none"> • Programs to support energy and material efficiency at industrial facilities or in industrial processes • Adoption of low/no carbon fuels, renewable energy, and electrification at facilities • Programs to develop, expand, and support markets for low carbon materials and sustainable products • Support for the development of clean industry hubs • Technical assistance and technologies to support carbon monitoring and management

Action Team and Topic Overview	GHG Reduction Measures Under Consideration
<p>Residential & Commercial Buildings: GHG emissions primarily come from fossil fuels burned for heating, air conditioning, lighting, and appliances and the use of gases for refrigeration and cooling in buildings.</p>	<ul style="list-style-type: none"> • Programs to support increased energy efficiency and reduced energy demand • Weatherization and energy efficiency retrofits in existing buildings • Incentives for deploying efficient electric technologies in new buildings, adopting up-to-date energy codes, and adopting standards to enhance building performance
<p>Waste & Materials Management: The production, packaging, transport, and disposal of material goods has a significant impact on GHG emissions. Landfill food waste is a significant source of methane, a powerful GHG.</p>	<ul style="list-style-type: none"> • Recycling and reducing waste • Preventing food waste • Adopting local composting programs • Reducing water consumption
<p>Agriculture, Forestry, & Land Use: How land is used and managed affects emissions. GHG emissions from agriculture come from crop and livestock production. Managed forests and other lands can act as a net sink and reduce overall emissions.</p>	<ul style="list-style-type: none"> • Adjusting methods for managing lands, applying fertilizer, growing crops, and improving soil health • Adjusting feeding and manure management practices to reduce methane emissions • Increasing on-farm renewable energy and efficiency • Expanding use of biomass for energy • Adoption of sustainable forest management practices • Purchasing land to conserve natural environments • Implementing urban tree planting initiatives • Restoring wetlands and other ecosystems
<p>Greenhouse Gas Inventory: PAQC will use the EPA State Inventory Tool (SIT) to develop the statewide GHG inventory. SIT is a streamlined, but top-down, approach to developing an inventory.</p>	<ul style="list-style-type: none"> • The GHG Inventory Team will assist SCOR and SC DHEC with identifying and addressing data gaps, as well as identify and pursue opportunities to improve the measurement and monitoring of both sources and sinks of emissions after the PCAP phase.

4 The Planning Context

To understand the need for climate planning, identification of GHG reduction measure, and program implementation, this section provides an overview of greenhouse gases, the benefits of reducing emissions, and strategies that will be most effective in South Carolina.

4.1 Greenhouse Gases

This section describes the greenhouse gases found within the South Carolina statewide greenhouse gas emissions inventory (Section 5).⁹

4.1.1 What are Greenhouse Gases?

Greenhouse gases are found in the atmosphere and are exceptionally good at absorbing heat. These gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF₆) (see Table 2, below).

GHGs are natural and important for life on Earth. Without them, Earth would be uninhabitable with global temperatures about 60° colder than they are today. However, when greenhouse gases in the atmosphere accumulate at very high levels, more heat is trapped in Earth's atmosphere system by the Greenhouse Effect.¹⁰

4.1.2 What is the Greenhouse Effect?

The accumulation and fluctuations of greenhouse gases in the atmosphere, and their impact on the flux of solar radiation and heat on Earth, is referred to as the Greenhouse Effect. The sun sends solar energy in the form of shortwave radiation into the Earth-atmosphere system. The solar energy is either reflected to space by clouds and Earth's surface (about 30%), absorbed by the atmosphere (about 20%), or absorbed by Earth (about 50%). The energy absorbed by Earth warms Earth's surface, which then re-emits the energy towards space in the form of longwave, or infrared, radiation. Greenhouse gases in the atmosphere are very good at absorbing this longwave radiation, trapping the energy in the Earth-atmosphere system as heat. Similar to how a greenhouse lets light pass in through the glass but traps the heat inside, the gases in the atmosphere trap heat near Earth's surface. This is called the Greenhouse Effect. When greenhouse gases accumulate in the atmosphere at very high levels, more heat is trapped in Earth's atmosphere system by the Greenhouse Effect, and global temperatures rise.

4.1.3 How do Humans Affect Greenhouse Gases?

The slow carbon cycle is a process that describes the movement of carbon from reservoir to reservoir on a millennial timescale. One of the reservoirs of carbon, where it may sit for hundreds of thousands up to millions of years, is deep within Earth's surface. When humans drill into these reservoirs and extract that carbon in the form of oil and natural gas, combust (or burn) the gas, and then emit the fumes, they are directly transferring stores of carbon into the atmosphere that would otherwise not be there. This alteration of the slow carbon cycle has led to an overall flux of carbon into the atmosphere. The increase

⁹ SCOR used the EPA-provided [State Inventory Tool](#) to develop the GHG inventory. This tool is based on national and international standards utilized by the EPA. The summary information provided here is available in more detail on the EPA's [Overview of Greenhouse Gases](#) webpage and in the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 ([AR6](#)).

¹⁰ EPA, The Greenhouse Effect, <https://www.epa.gov/climatechange-science/basics-climate-change#greenhouse>

of atmospheric carbon has since trapped increasing amounts of infrared heat into Earth’s atmosphere system and has led to rising global temperatures at an unprecedented rate.

The primary source of greenhouse gases from human activities is the burning of fossil fuels. Fossil fuel combustion is used for generating electric power and for transportation. Electric power is used in industry and for heating and cooling commercial and residential buildings. Other sources of greenhouse gas emissions from human activities come from agriculture, waste, and land-use change (Table 2). These sources are represented in the South Carolina GHG emissions inventory (Section 5).

Table 2. Greenhouse gases, their chemical formula abbreviations, and common sources.

Greenhouse Gas	Chemical Formula	Common Sources
Carbon dioxide	CO ₂	Combustion through burning fossil fuels Land cover change
Methane	CH ₄	Combustion through burning fossil fuels Agriculture (livestock, rice cultivation) Waste and landfill decomposition
Nitrous oxide	N ₂ O	Combustion through burning fossil fuels
Sulfur hexafluoride	SF ₆	Electrical insulation
Hydrofluorocarbons	HFC	Refrigerants
Perfluorocarbons	PFC	Aluminum production and other industrial processes

4.1.4 For How Long Do GHGs Impact the Atmosphere?

Each gas remains in the atmosphere for different lengths of time, ranging from a few years (HFCs, about 5 years) to thousands of years (PFCs, about 50,000 years). Each gas also has its own level of efficiency at absorbing energy, or heat. A gas’ lifetime and efficiency is used to calculate the effects of emitting 1 ton of each greenhouse gas. This is called their Global Warming Potential (GWP; Table 3).

Internationally accepted calculations based on GWPs are used to convert each gas to a standard unit. CO₂ remains in the atmosphere for thousands of years and has a GWP of 1 because it is used as a reference for the other GHGs. The other GHG global warming potentials measure how much heat or energy that gas will absorb over a certain period of time compared to CO₂ over that same time (100 years is most frequently used and is shown in table 3). GWPs provide a standard measurement that allows decisionmakers and planners to compare reduction measures across sectors and gases.¹¹

¹¹ U.S. EPA: [Understanding Global Warming Potentials | US EPA](#)

Table 3. 100-year global warming potentials (GWP) by GHG.

GWPs are a quantitative representation of the effects of a particular gas over a 100-year period after emitted. Data sources: U.S. EPA¹², IPCC AR6 Table 7.15¹³

Greenhouse Gas	Global Warming Potential (GWP)
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	27-29.8
Nitrous oxide (N ₂ O)	273
Sulfur hexafluoride (SF ₆)	25,200
Hydrofluorocarbons (HFC)	771 - 1,526
Perfluorocarbons (PFC)	7,380

¹² EPA. [Climate Change Indicators: Greenhouse Gases | US EPA](#)

¹³ IPCC AR6, Table 7.15 (pg. 1017). [Climate Change 2021: The Physical Science Basis \(ipcc.ch\)](#)

4.2 South Carolina's Climate Trends and Impacts

Climate describes what the weather is like over a long period of time in a specific area. Climate includes averages of temperature, precipitation, humidity, sunshine, wind, and other measures over a thirty-year period, and how those averages may be changing over time.¹⁴ The increasing levels of greenhouse gases in the atmosphere have widespread impacts around the globe and in South Carolina as the climate of the Southeastern U.S. changes. These changes can alter rainfall, influence crop yields, change ecosystems and natural lands, and impact public health and the economy.¹⁵

4.2.1 Climate Trends

In South Carolina, the average annual temperature has increased by approximately 1°F since 1895. While lower than the average global increase of approximately 2°F, South Carolina's statewide temperature increases over the past 60 years match or exceed global increases, and the past 30 years have been warmer than any other consecutive 30-year period. Most long-term, individual weather stations in the state show significant increases in a) maximum temperatures in winter, spring, and summer, and b) minimum temperatures in summer. Climate models project temperature increases of 5°F to 10°F by the year 2100, depending on future greenhouse gas emissions.

Historically, South Carolina's precipitation is very variable. However, the state is seeing decreasing trends in summer precipitation and an increase in the number of precipitation days in the fall, and more extremes are expected in the future. Increasing temperatures can lead to higher evaporation rates and atmospheric moisture, while also contributing to more intense periods of drought.

South Carolina's location makes it vulnerable to tropical storms and hurricanes. While there is uncertainty about the number of future storms, those storms that do occur are expected to have greater intensity of wind and precipitation. Sea surface temperatures are also rising; high ocean temperature can increase the intensity of tropical systems. Precipitation amounts received during the extreme rainfall and flooding event of 2015, Hurricane Matthew (2016), and Hurricane Florence (2018), are consistent with expectations of a warming climate.

The South Carolina coast is also experiencing sea level rise. Sea levels have risen by approximately 1 foot during the past 100 years and are expected to rise approximately another 1 foot by 2050. Sea level rise exacerbates coastal flooding.

4.2.2 Climate Impacts

South Carolina is accustomed to climate variability (hot and cold temperatures, droughts, and heavy rainfall events) and natural hazards such as thunderstorms, hurricanes, and flooding. However, as the climate trends described above continue, it is likely that all sectors, groups, and regions of the state will be affected in some way by changing conditions and extreme events. Already vulnerable communities and groups are more likely to experience disproportionate effects.

¹⁴ National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental information, <https://www.ncei.noaa.gov/news/weather-vs-climate>

¹⁵ For more information about climate trends in South Carolina, see Chapter 4 (Climate Trends) of South Carolina's Strategic Statewide Resilience and Risk Reduction Plan, available on the SCOR website. Chapter 22 of the Fifth National Climate Assessment (2023) provides the most up-to-date assessment of climate risks and impacts for the Southeast U.S.

Examples of current and expected impacts include the following:

- Increases in smog, wildfire emissions, particulate matter, and pollen concentrations
- Increased energy demand and higher energy costs for cooling
- Higher temperatures exacerbated in areas with urban heat islands
- Reduced crop production due to extreme temperature, precipitation, and storm events
- Increased threats to agriculture, forestry, and natural ecosystems from invasive species, weeds, and pests
- Disruption to economic systems and transportation during extreme events
- Decreased worker productivity during periods of extreme heat and high temperatures
- Increases in coastal flooding due to extreme events and sea level rise

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4.3 Population Trends

As of July 1, 2023, the U.S. Census Bureau estimated South Carolina's population to be 5.37 million, a 5% increase from April 1, 2020 (5.12 million).¹⁶ South Carolina is one of the fastest growing states in the country, in terms of its percentage growth from year to year (see Figure 2).

While the overall statewide trend indicates continued growth into the next decade, county-level changes vary considerably (see Figure 3). In general, counties with or near larger urban areas (Charlotte, Myrtle Beach, Charleston, Greenville, Columbia) are experiencing dramatic population increases, while those in more rural areas are experiencing declines. These opposite trends have different implications for GHG emissions and options for reducing GHG emissions.

For example, growing areas will continue to see increasing emissions due to growing energy demand, vehicle traffic, waste, wastewater treatment needs, and land conversion (from agricultural or natural lands to developed areas).

Meanwhile, when rural counties lose populations, they also lose their tax base. Already under-resourced areas may have even less capacity to make critical investments needed to enhance community resilience, improve infrastructure, and reduce climate impacts.

¹⁶ U.S. Census Bureau, Quick Facts, <https://www.census.gov/quickfacts/fact/table/SC/PST040222#PST040222>

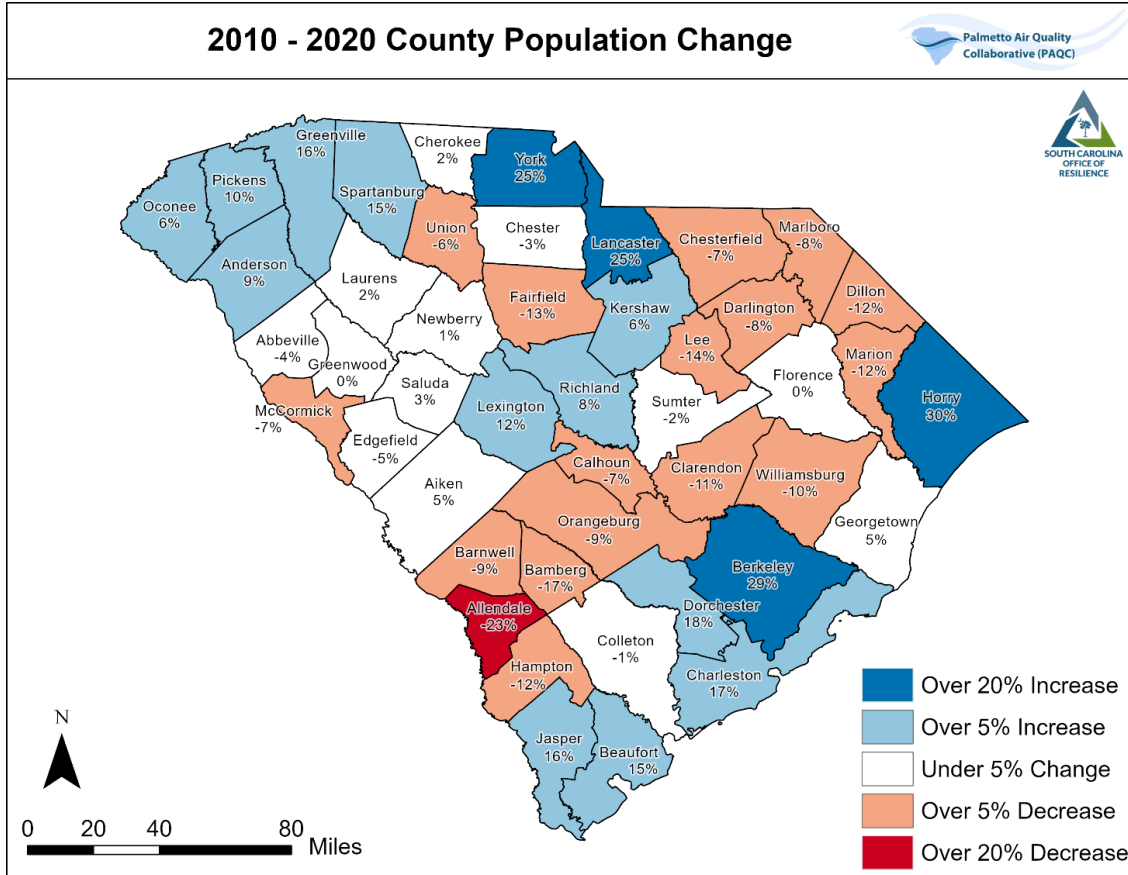


Figure 2. Population Change in South Carolina, By County, 2010-2020

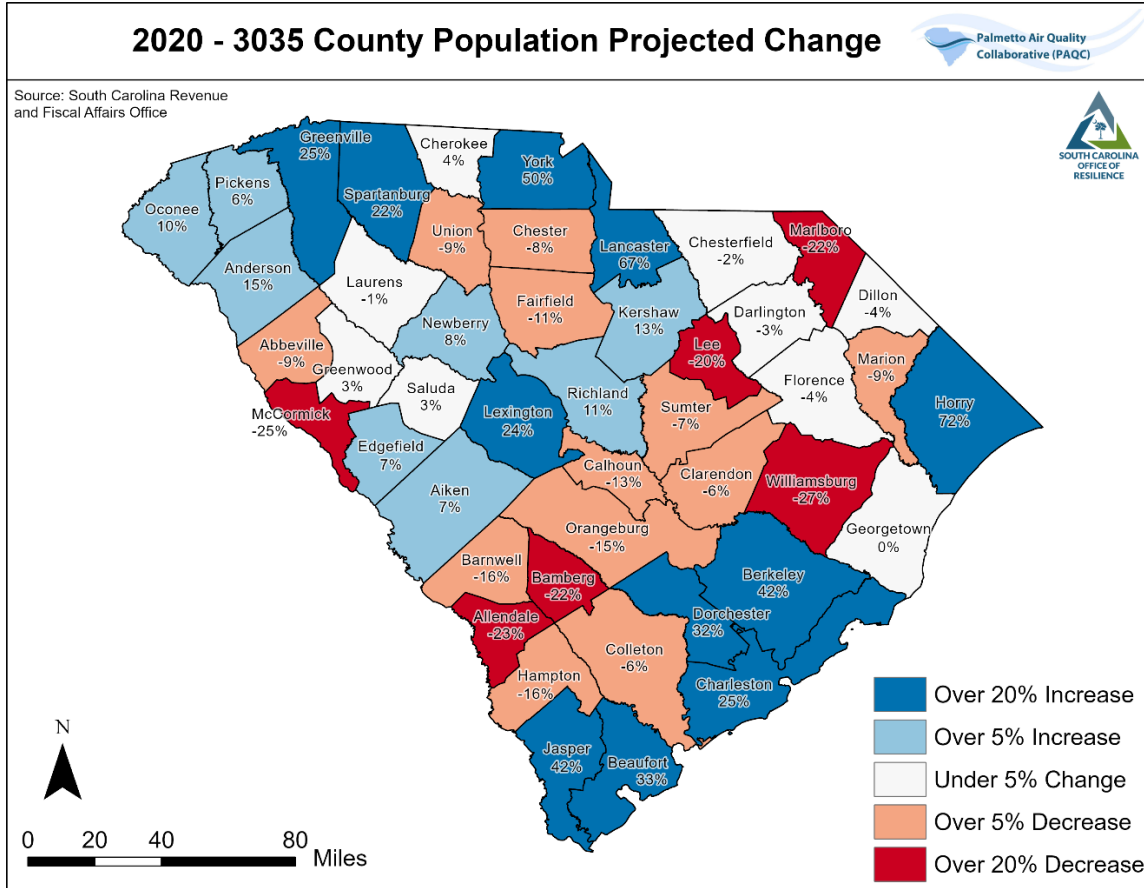


Figure 3. Projected Population Change in South Carolina, By County, 2020-2035

4.4 Low Income and Disproportionately Burdened Communities

EPA strongly recommends that CPRG grantees use the Climate and Environmental Justice Screening Tool (CEJST) to identify communities with a high percentage of residents that have limited access to resources and who experience disproportionate environmental and socioeconomic burdens.¹⁷ CPRG investments and activities should be consistent with the Justice40 initiative, where the federal government made a goal that 40 percent of overall benefits of certain federal investments flow to communities that are underserved and overburdened by pollution.¹⁸

South Carolina census tracts that have low incomes and experience one or more burdens are represented in Figure 4. Burdens are related to the following categories: air quality, climate change, energy, environmental hazards, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Beyond identifying these communities, the PAQC will build and evolve a plan to ensure meaningful engagement with these communities so that their needs, challenges, and priorities are incorporated into the planning process and in the identification and implementation of GHG reduction measures (see Section 3.3). More specific to the PCAP and CCAP, these plans must also include analyses of the benefits of GHG reduction measures for these communities. One important criterion for selecting priority GHG reduction measures for implementation will be the expected community benefits, such as those associated with reducing other air pollutants, reducing energy costs, providing workforce opportunities, and improving housing (see Section 6).

¹⁷ Council on Environmental Quality, Climate and Economic Justice Screening Tool (CEJST), <https://screeningtool.geoplatform.gov/en/>

¹⁸ Information and FAQs about the Justice40 initiative are available through The White House website, <https://www.whitehouse.gov/environmentaljustice/justice40/>

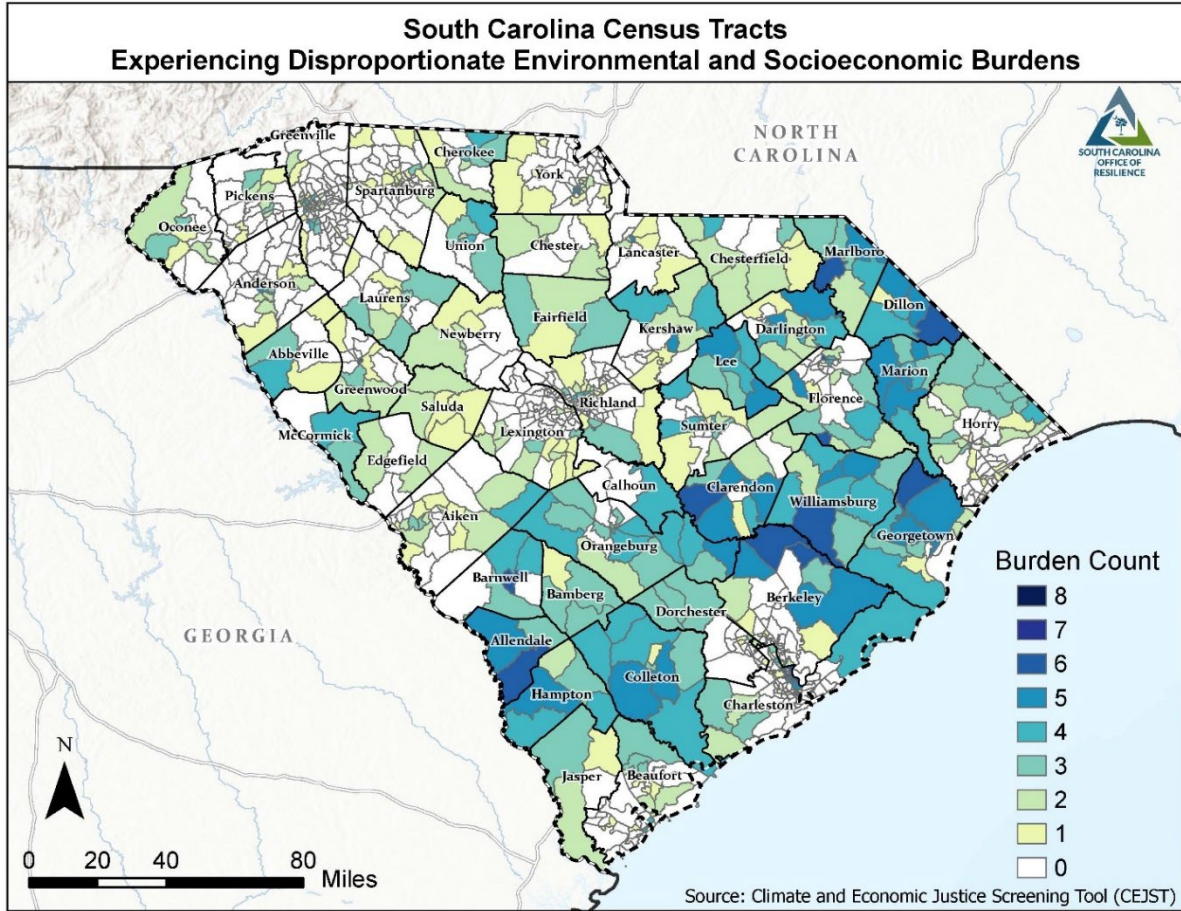


Figure 4. South Carolina Census Tracts Experiencing Disproportionate Burdens

4.5 Reducing Greenhouse Gases: Benefits and Strategies

GHG reduction measures often have multiple co-benefits. Reducing greenhouse gas emissions can slow or reduce the climate trends and impacts discussed above (Section 4.2) and help to keep communities safe and resilient. Reducing GHG emissions from transportation and industry sources can improve air quality and public health by reducing other air pollutants that are often co-emitted with GHGs. Deployment of new technologies can spur new innovation, create new jobs and workforce opportunities, and support economic growth and development. Enhancing and expanding carbon sinks through land conservation or land management practices can also provide flood mitigation, water quality, recreation, and habitat benefits.

There are many strategies available to reduce greenhouse gas emissions, and they can be implemented at any level of government, through organizational policies and practices, and by individual actions. Many GHG reduction measures and strategies are already being implemented voluntarily in South Carolina, while also providing other benefits. Examples of existing programs and planning activities are listed in Table 4 and Table 5.

Note: Information provided in the tables are intended to be examples, not representative of all activities taking place in South Carolina. If an agency or organization would like their strategy, program, or specific activity included in the PCAP, please submit information to PAQC.Comments@scor.sc.gov.

Table 4. Federal funding opportunities and programs that align with or have co-benefits with GHG reductions

Implementing State Agency	Funding Program (funding amount)	Description/Connection to GHG Reductions	LINK
Energy Office	HOME Rebates High Efficiency Electric Home Rebates (HEEHR) \$136 million (expected)	Funded by the US Department of Energy, the South Carolina Energy Office will receive funding to implement the HOME and HEEHR programs. The programs provide rebates for energy efficiency retrofits, efficiency projects, and equipment. Individuals may be eligible for up to \$18,000 in rebates between the two programs.	LINK
SC Ports Authority	Diesel Emissions Reduction Act (DERA) Grant \$1.3 million	Funded by EPA and administered by SC DHEC, SCPA used this grant to support the replacement of diesel trucks with all-electric, energy-efficient trucks with private sector partners.	
Department of Commerce / Palmetto Railways	Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program Approximately \$4.1 million	Funded by the US Department of Transportation, Palmetto Railways will deploy two zero-emission, lithium battery electric power locomotives and install associated charging technology.	LINK
Department of Commerce	Tech Hubs Program Seeking \$75 million	The Department of Commerce is coordinating the SC NEXUS for Advanced Resilient Energy initiative, which was designated as a s Tech Hub by the U.S. Economic Development Administration (EDA) in 2023. Commerce is currently seeking EDA funding for specific projects centered on grid resiliency and distributed energy systems. EDA funding will drive additional sustainable energy investment and technology development.	LINK
Department of Transportation (SCDOT)	National Electric Vehicle Infrastructure (NEVI) Formula Program Approximately \$70 million total for 5 years (expected)	Funded by the USDOT, the NEVI program provides funding to states to strategically deploy electric vehicle (EV) infrastructure. SC's plan will prioritize deployment of passenger car EV charging equipment along the interstate highway system, to complement the national network, and or rural sections of the interstate where lack of urban facilities make private sector investments less feasible	LINK

	Carbon Reduction Program Approximately \$112 total for 5 years (expected)	Funded by the USDOT, the CRP provides funding to states to develop a Carbon Reduction Strategy (CRS) and implement projects to reduce CO2 emissions. In its CRS (Nov. 2023), SCDOT identified strategies and projects that will apply technological solutions to improve roadway operations through traffic control methods, information sharing and data analytics, and signal performance improvements.	LINK
Department of Education	Clean School Bus Program \$66 million	With EPA funding, the Department of Education has purchased 168 electric buses for 17 school districts. The new buses have led to fuel and maintenance cost savings, improve safety and efficiency, and reduced emissions of co-pollutants.	LINK

Table 5. Local governments and organizations with plans and activities that align with or have co-benefits with GHG reductions

Agency or Organization	Plan or Activity	LINK
City of Charleston	Climate Action Plan	LINK
Charleston County	Greenhouse Gas Inventory	LINK
	Climate Action Planning	LINK
Charleston Area Regional Transportation Authority (CARTA)	Battery Electric Bus Master Plan & Roadmap	LINK
City of Columbia	Climate Protection Action Campaign	LINK
City of Greenville	Sustainable GVL: Vision for a Greener Greenville	LINK
Coastal Carolina University	Sustain Coastal: Greenhouse Gas Inventory	LINK
Furman University	Climate Action Plan 2.0	LINK
College of Charleston	Sustainability Action Plan	LINK
Sustain SC	Roadmap to Sustain SC	LINK

5 Greenhouse Gas Inventory

A greenhouse gas inventory is a tool used by planners and decision makers to understand where emissions come from, and what land uses and land use types serve as sinks, within the state. Understanding the primary sources of emissions allows planners to target the highest emissions with priority reduction measures for the greatest impact. This inventory reports emissions, organized by emission source, from 1990 to 2020, to give a comprehensive assessment of emissions for the past 30 years.

5.1 Scope

The inventory presented here is a statewide GHG inventory. The year 2005 was chosen as a base line year since this is the most common year used by federal agencies and other states with developed inventories. The 2005 period also approximately represents the peak of emissions (Figure 7), which will be useful for tracking emission reductions over time and future planning. South Carolina chose to use a source-based inventory, which includes emissions of greenhouse gases that are generated within the state and does not represent consumption-based emissions. Consumption-based inventories include indirect emissions that may come from outside of the geographic scope (for example, goods produced in another state that were used in South Carolina).

5.2 Methods and Data

SCOR used the EPA State Inventory Tool (SIT) to produce this inventory, following international methods and standards.¹⁹ As South Carolina does not have one designated agency or entity that collects GHG emissions data, the SIT provides a starting point to identify and understand the relative contributions of different sectors and activities to the state's net GHG emissions.

The EPA SIT²⁰ is comprised of 11 modules, or interactive spreadsheet tools, developed to provide states with the ability to calculate statewide emissions for the years 1990-2020:

1. Agriculture
2. Fossil Fuel Combustion (CO₂ only)
3. Coal Mining
4. Electricity
5. Industrial Processes
6. Land Use, Land-Use Change, and Forest
7. Mobile Combustion (Transportation)
8. Natural Gas and Oil
9. Solid Waste
10. Stationary Combustion (CH₄ and N₂O)
11. Wastewater

The state-level default data provided by the SIT comes from EPA's annual report "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021."²¹ Data originates from a variety of federal and state agencies, trade and industry associations, and research and academic institutions. For example, the U.S. Energy Information Administration (EIA) provides energy consumption data, which comes from the EIA's

¹⁹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, <https://www.ipcc.ch/report/2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/>

²⁰ EPA State Inventory Tool (SIT), <https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool>

²¹ EPA (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021. U.S. Environmental Protection Agency, EPA 430-R-23-002. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021>.

State Energy Consumption, Price, and Expenditure Estimates (SEDS).²² The Federal Highway Administration (FHWA) provides vehicle class and vehicle miles traveled data, which it obtains from the states.²³ The modules include equations to estimate GHG emissions based on the pertinent data and emission factors that relate quantities of emissions to an activity (e.g., emissions based on energy consumption for space heating, water heating, lighting, or appliances; emissions based on miles traveled by a certain vehicle types).

One exception where South Carolina data was used for the SIT was in the Land Use, Land-Use Change, and Forest module. The South Carolina Forestry Commission provided hectares burned per year, for the years 2006 to 2020.

5.2.1 Measuring and Reporting Greenhouse Gases

Greenhouse gases have different global warming potentials (GWP, see Section 4.1.4 and Table 3). GWPs were developed to allow comparisons of the warming impacts of different greenhouse gases. A GWP measures how much energy the emissions of 1 ton of a gas will absorb over a given time, relative to the emissions of 1 ton of carbon dioxide. The larger the GWP, the more that gas warms the Earth compared to CO₂ over the given time. GWPs allow for a common unit of measurement across all greenhouse gases, regardless of their radiative efficiency or lifespan in the atmosphere.

GWPs are used to convert emissions of all greenhouse gases into CO₂ equivalent (CO₂e). The conversion used is emissions of the gas multiplied by its GWP. Throughout South Carolina's PCAP, emissions are measured by the weight of the gas emitted in million metric tons (MMT) carbon dioxide equivalent (MMT CO₂e). One million metric ton is equal to 1 billion kilograms, or 2.205 billion pounds (2,205,000,000 lbs.).

5.3 Uncertainties

Greenhouse gas inventories are meant to provide a general understanding of emissions within their scope, and therefore include a level of uncertainty. The statewide inventory developed for this PCAP followed the standard practices that are consistent with national and international guidelines and methodologies and used by most other states. However, because GHG emissions are not directly measured and used in the inventory, the SIT is considered a top-down approach to an emissions inventory. The SIT modules do provide flexibility and allow the user to enter more specific data, if and when available.

This initial inventory will help South Carolina identify gaps and areas for improvement in future inventories. During the process to develop the PCAP and GHG inventory, SCOR, SC DHEC, and Action Team members noted data gaps and questions that may be addressed during the process to develop the Comprehensive Climate Action Plan.

²² EIA State Energy Data System, <https://www.eia.gov/state/seds/>

²³ U.S. DOT, Federal Highway Administration, Highway Statistics Series, <https://www.fhwa.dot.gov/policyinformation/statistics.cfm>

5.4 Statewide Total Gross GHG Emissions in 2020

In 2020, South Carolina’s total gross GHG emissions was 73.727 million metric tons carbon dioxide equivalent (MMT_{CO2e}) (Table 6, Figure 5).

Table 6. South Carolina greenhouse gas emissions in 2020

Shown by total gross amount in million metric tons carbon dioxide equivalent (MMT_{CO2e}) and by percentage.

Source	Amount (MMT _{CO2e})	Percentage
Transportation	29.406	39.89%
Electric Power Generation	22.935	31.11%
Industry	13.002	17.63%
Agriculture	2.318	3.14%
Commercial	2.139	2.90%
Waste	2.039	2.77%
Residential	1.888	2.56%
Total	73.727	

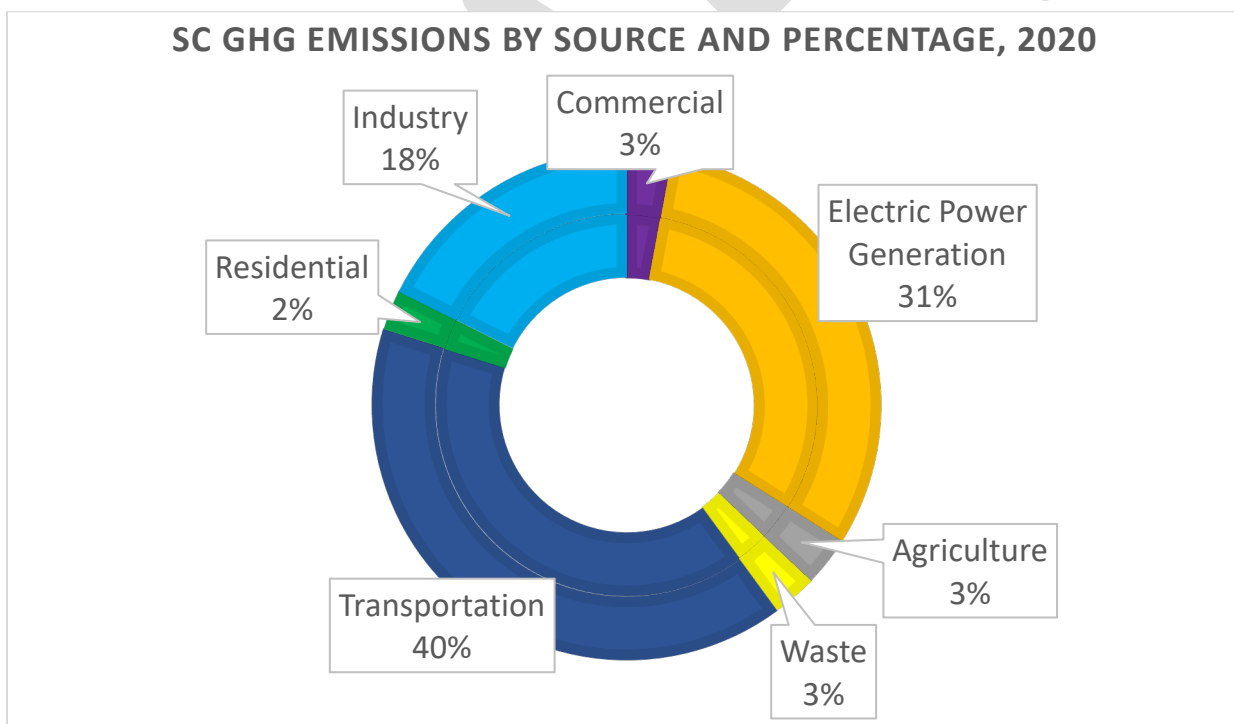


Figure 5. South Carolina gross total GHG emissions in 2020

Shown in million metric tons carbon dioxide equivalent (MMT_{CO2e}) and by percentage.

5.5 Statewide Total Net GHG Emissions in 2020

Total net emissions account for the storage of carbon in addition to emissions. A carbon sink is an environment that takes in or sequesters carbon and stores it long-term. Natural lands and forestry are a carbon sink because living things are made up of carbon. Biomass takes in carbon dioxide during the process of photosynthesis and stores it, making South Carolina’s forests a major carbon sink (Figure 6). Total net emissions are calculated by subtracting sinks from total gross emissions. In 2020, South Carolina’s total net emissions were 52.2 MMTCO_{2e}.

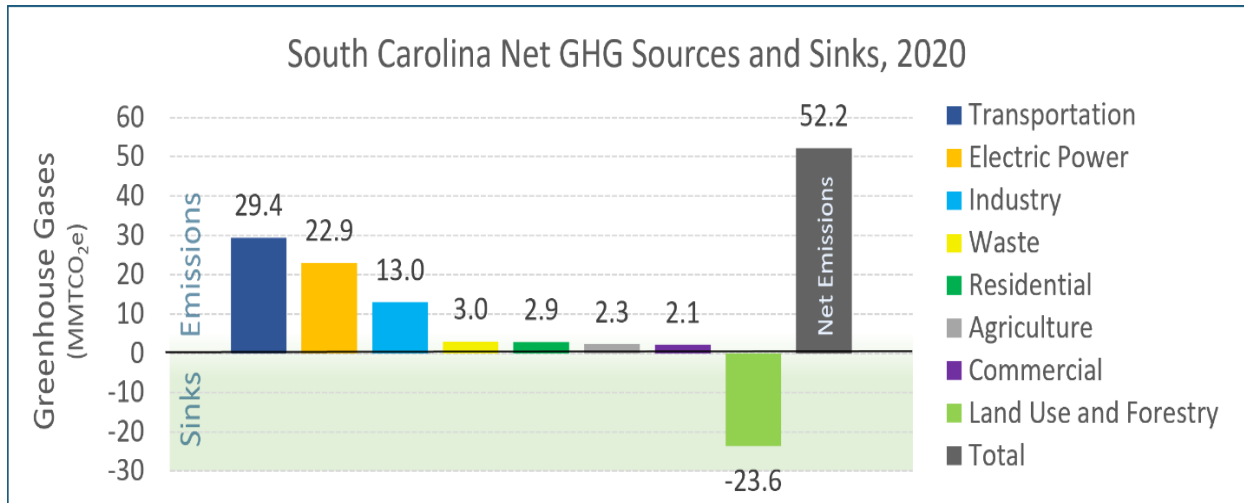


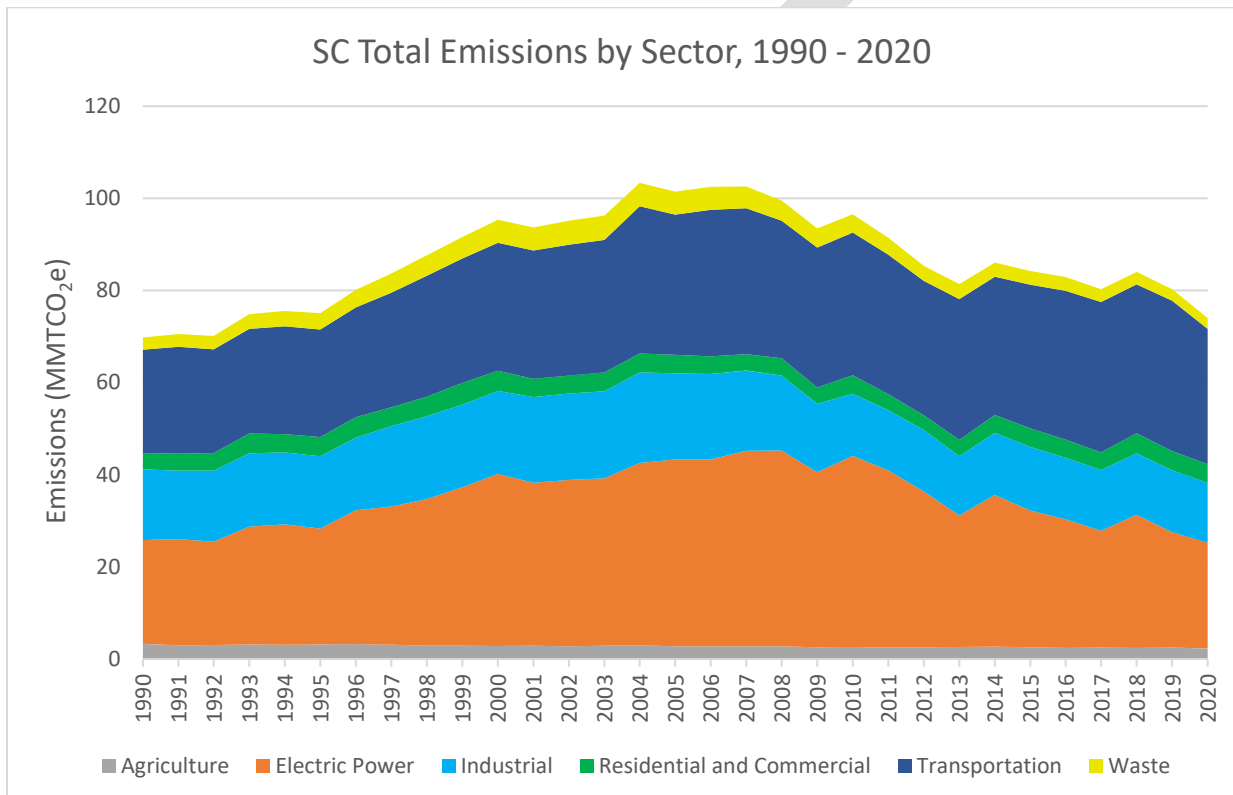
Figure 6: Total net GHG emissions for South Carolina in 2020

Net emissions are calculated by subtracting carbon sinks from total gross emissions.

5.6 Statewide Total GHG Emissions, 1990 to 2020

Overall, statewide total gross emissions from 1990 to 2020 peak around 2005 and then begin to decrease (Figure 7). Technological innovations and energy efficiency measures are likely contributing factors. However, the major sources of emissions indicate differing trends. Emissions from the electric power generation source has declined as coal fired plants have been replaced. Transportation emissions have increased. Despite vehicle efficiency improvements and requirements, South Carolina’s growing population places more vehicles on the state’s roads. The state’s carbon sinks, indicated by “Land Use, Land Use Change, and Forestry”, exhibits smaller fluctuations and change over time.

Figure 7. Statewide Total GHG Emissions, Sources and Sinks, 1990 to 2020



5.7 Statewide Emissions by Sources and Greenhouse Gas Types

Looking at each source of emissions in greater detail is useful for planning and decision making. Below, the PCAP reviews each source of emissions. Table 7 summarizes gross total emissions by source and greenhouse gas, and Table 8 summarizes total net emissions (subtracting carbon sinks from gross total emissions). The tables show the beginning and ending years available in the SIT (1990 and 2020, respectively), as well as the selected baseline year of 2005.

The 2020 total represents a decrease from the 2005 base year emissions (100.602 MMTCO₂e) by 26.87 MMTCO₂e. The 2020 total shows a decrease from 2019 emissions by 6.2 MMTCO₂e, likely due to the global COVID-19 pandemic, which had a significant impact on the state's economy and led to a sharp decline of vehicle miles traveled (VMT) during quarantines. The year 2019 was chosen to be included in the table as a point of comparison with 2020, when the COVID-19 global pandemic likely had a significant impact on the lower levels of emissions seen in 2020. It is uncertain how significant the pandemic impact will be on emissions in subsequent years.

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Table 7. SC GHG emissions by source and greenhouse gas summary
(All emissions are measured in MMTCO₂e.)

South Carolina Gross Total GHG Emissions, by Source and Greenhouse Gas					
Source	GHG	1990	2005	2019	2020
Transportation					
Highway and Non-Highway	CO ₂	21.65	29.75	32.29	29.14
Highway and Non-Highway	CH ₄ , N ₂ O	0.75	0.66	0.30	0.26
Transportation Total		22.40	30.42	32.59	29.41
Electric Power Generation					
Coal	CO ₂	21.98	37.51	14.96	12.81
Petroleum	CO ₂	0.05	0.44	0.06	0.05
Natural Gas	CO ₂	0.38	2.47	9.93	9.98
Additional Emissions from Fuel Combustion	CH ₄ , N ₂ O	0.10	0.18	0.10	0.09
Electric Power Generation Total		22.51	40.60	25.06	22.94
Industry					
Fossil Fuel Combustion	CO ₂	12.91	13.16	7.23	6.83
Additional Emissions from Fuel Combustion	CH ₄ , N ₂ O	0.17	0.17	0.17	0.16
Industrial Wastewater	CH ₄ , N ₂ O	0.01	0.01	0.00	0.01
Industrial Production	CO ₂	1.43	2.95	2.51	2.41
Industrial Production	HFC, PFC, NF ₃ , SF ₆	0.85	2.37	3.49	3.60
Industry Total		15.37	18.65	13.41	13.00
Waste					
Landfill Emissions	CH ₄	1.83	3.60	1.56	1.40
Waste Combustion	CO ₂	0.06	0.15	0.13	0.13
Municipal Wastewater	CH ₄	0.25	0.30	0.36	0.37
Municipal Wastewater	N ₂ O	0.09	0.12	0.14	0.14
Waste Total		2.23	4.17	2.19	2.04
Agriculture					
Liming, urea fertilization	CO ₂	0.00	0.01	0.02	0.02
Enteric fermentation, manure management, agricultural residue burning	CH ₄	1.40	1.29	1.00	0.98
Manure management, agricultural soils	N ₂ O	1.89	1.46	1.48	1.33
Agriculture Total		3.30	2.75	2.50	2.32
Residential					
Fossil Fuel Combustion	CO ₂	2.07	2.27	1.94	1.89
Additional Emissions from Fuel Combustion	CH ₄ , N ₂ O	0.06	0.04	0.02	0.02
Residential Total		2.07	2.27	1.94	1.89
Commercial					
Fossil Fuel Combustion	CO ₂	1.43	1.72	2.24	2.13
Additional Emissions from Fuel Combustion	CH ₄ , N ₂ O	0.01	0.01	0.01	0.01
Commercial Total		1.44	1.73	2.25	2.14
GROSS TOTAL EMISSIONS		69.31	100.60	79.92	73.73

Table 8. South Carolina carbon sinks and net total greenhouse gas emissions

Net total emissions are calculating by subtracting carbon sinks found in natural & working lands and forestry from net total gross emissions. All emissions are measured in MMTCO₂e.

South Carolina Carbon Sinks and Net Total GHG Emissions					
Source	GHG	1990	2005	2019	2020
GROSS TOTAL EMISSIONS		69.31	100.60	79.92	73.73
Natural & Working Lands and Forestry					
Net Forest Carbon Flux					
<i>Forest Land Remaining Forest</i>		-20.87	-21.64	-22.28	-21.69
<i>Land Converted to Forest Land</i>		-2.32	-2.30	-2.28	-2.28
<i>Forest Land Converted to Land</i>		2.21	2.62	3.06	3.06
Urban Trees		-1.65	-2.47	-3.31	-3.37
Landfilled Yard Trimmings and Food Scraps		-0.26	-0.07	-0.11	-0.11
Forest Fires (CH ₄ , N ₂ O)		No data	No data	0.03	0.06
N ₂ O from Settlement Soils		0.03	0.03	0.03	0.03
Agricultural Soil Carbon Flux		1.11	1.00	0.83	0.73
<i>Natural & Working Lands and Forestry Total</i>		-21.75	-22.84	-24.03	-23.57
TOTAL NET EMISSIONS		47.57	77.77	55.90	50.16

5.8 Statewide Total Gross Emissions by Greenhouse Gas Type

The state GHG emissions inventory also breaks down emissions by type of greenhouse gas. This is useful because planners can then target specific greenhouse gases during planning and implementation of reduction measures. South Carolina’s largest GHG emitted in 2020 was CO₂ (Table 9; Figure 8). Fluorinated gases, including HFCs, PFCs, NF₃, and SF₆ made up 7% of GHG emissions. CH₄ made up 6% of total emissions, and N₂O made up 4% of South Carolina’s emissions.

Table 9. Statewide Total Gross Emissions and percentage by GHG Type
All emissions are measured in MMTCO₂e.

Greenhouse Gas	1990	2005	2019	2020	2020 Percentage
Carbon Dioxide (CO₂)	40.213	67.593	47.241	41.761	83%
Fluorinated Gases (HFC, PFC, NF₃, SF₆)	0.853	2.372	3.495	3.599	7%
Methane (CH₄)	4.149	6.203	3.470	3.272	6%
Nitrous Oxide (N₂O)	2.820	2.443	2.058	1.853	4%

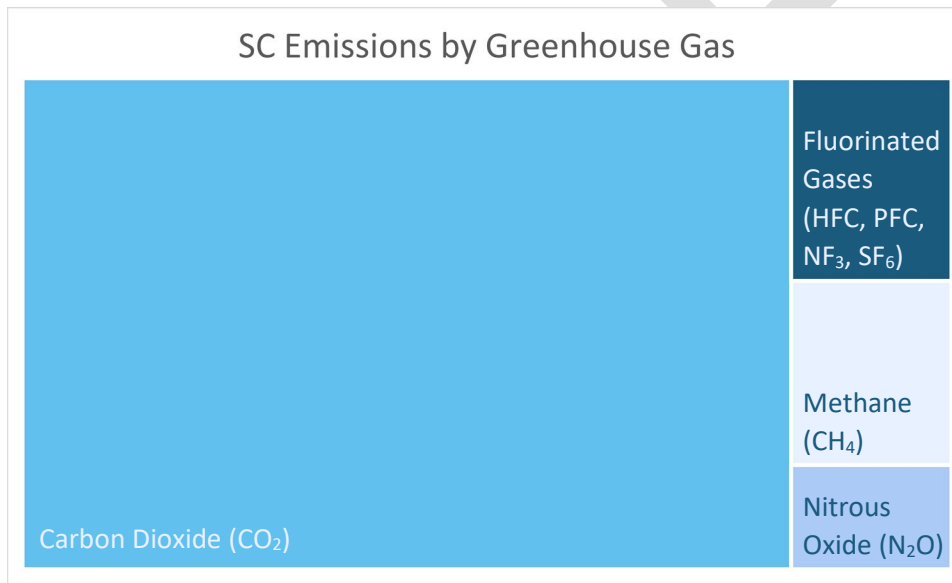
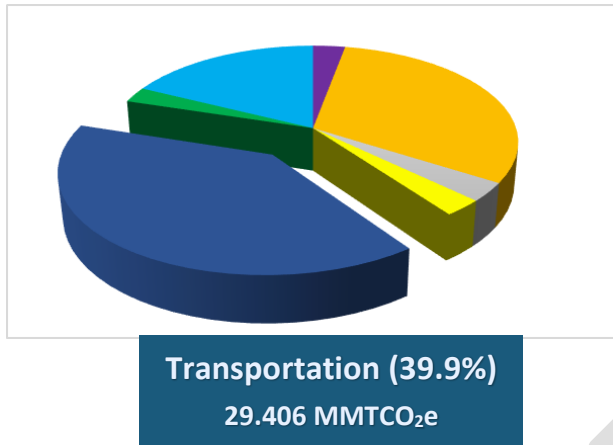


Figure 8. South Carolina 2020 emissions by greenhouse gas
Percentages: carbon dioxide 83%, fluorinated gases (including HFCs, PFCs, NF₃, SF₆) 7%, methane 6%, nitrous oxide 4%.

5.9 Emissions from Transportation

The transportation sector is South Carolina's largest source of emissions, accounting for nearly 40% of the state's total gross emissions at 29.41 MMTCO₂e in 2020.



5.9.1.1 Emissions by Vehicle Type

The SIT Mobile Consumption module provides an emissions breakdown by vehicle type (Table 10).

Emissions in the transportation sector include passenger vehicles, light-duty and heavy-duty vehicles, motorcycles, diesel vehicles, buses, boats, locomotives, aircraft, snowmobiles, and gasoline- or diesel-powered equipment including farm, construction, and utility equipment.

A significant source of transportation emissions is from passenger vehicles, with a total of 10.67 MMTCO₂e in 2020. Light duty trucks produced 4.75 MMTCO₂e, and aviation contributed another 1.15 MMTCO₂e.

Carbon dioxide is the highest greenhouse gas emitted in the transportation sector, with 28.07 MMTCO₂e emitted, compared to 0.043 MMTCO₂e of methane and 0.219 MMTCO₂e of nitrous oxide.

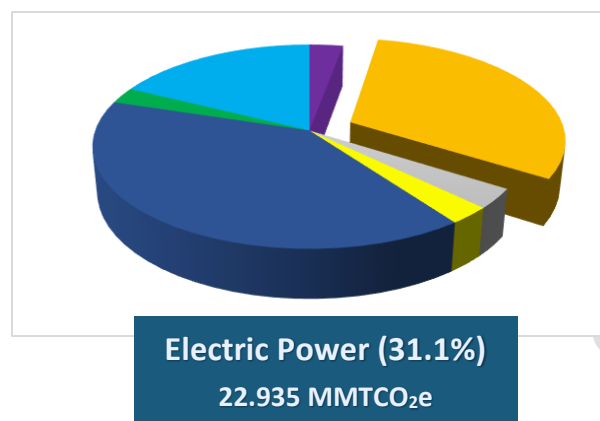
The main CO₂ emissions from transportation are from petroleum combustion at 29.035 MMTCO₂e, but a small number of emissions also comes from natural gas (0.109 MMTCO₂e). Gasoline is the predominant fuel type producing emissions with 16.282 MMTCO₂e in 2020, followed by 6.947 MMTCO₂e of emissions from distillate fuel oil, and 4.471 MMTCO₂e from off-road fuels including kerosene found in jet fuel, gasoline, diesel, and residual fuel oil.

Table 10. GHG Emissions from Transportation

Summary (Mobile Consumption Module)					
Vehicle Type	GHG	Amounts of MMTCO₂e			
		1990	2005	2019	2020
Gasoline Highway	CO ₂	14.86	18.93	19.73	16.28
Diesel Highway	CO ₂	4.41	5.49	7.70	7.29
Non-Highway	CO ₂	5.31	4.89	4.85	4.47
Alternative Fuel Vehicles	CO ₂	0.01	0.01	0.02	0.02
Gasoline Highway	CH ₄	0.094	0.041	0.016	0.012
Diesel Highway	CH ₄	0.000	0.000	0.002	0.002
Non-Highway	CH ₄	0.022	0.024	0.027	0.028
Alternative Fuel Vehicles	CH ₄	0.000	0.000	0.001	0.001
Gasoline Highway	N ₂ O	0.530	0.495	0.125	0.094
Diesel Highway	N ₂ O	0.003	0.005	0.052	0.050
Non-Highway	N ₂ O	0.102	0.097	0.080	0.074
Alternative Fuel Vehicles	N ₂ O	0.000	0.000	0.000	0.000
The Mobile Combustion module calculates carbon dioxide equivalent (CO ₂ Eq.) from the fuel consumption by the end-use equipment types, by end-use sector.	Amounts of MMTCO₂e				
	GHG	1990	2005	2019	2020
	CO ₂	24.58	29.33	32.31	28.07
	CH ₄	0.117	0.066	0.046	0.043
	N ₂ O	0.635	0.597	0.256	0.219

5.10 Emissions from Electric Power Generation

Electric power generation is South Carolina’s second major source of greenhouse gas emissions, making up a total of 31% of the state’s total gross emissions and emitting 22.94 MMTCO₂e in 2020.



The most significant source of emissions from electric power generation comes from burning coal, with 12.812 MMTCO₂e emitted in 2020, followed by natural gas with emissions of 9.976 MMTCO₂e. Other sources of GHG emissions in the electric power generation sector are petroleum and wood (Table 11).

Carbon dioxide is the largest greenhouse gas emitted in this sector, with 22.843 MMTCO₂e, followed by nitrous oxide (0.072 MMTCO₂e) and methane (0.020 MMTCO₂e).

Table 11. GHG Emissions from Electric Power Generation

GHG Emissions by Sources and Gases (Electric Power Generation)					
Source	GHG	Amounts of MMTCO ₂ E			
		1990	2005	2019	2020
CO₂		22.409	40.418	24.953	22.843
Coal	CO ₂	21.976	37.511	14.960	12.812
Petroleum	CO ₂	0.054	0.436	0.061	0.055
Natural Gas	CO ₂	0.379	2.470	9.931	9.976
Other	CO ₂	0.000	0.000	0.000	0.000
CH₄		0.007	0.018	0.021	0.020
Coal	CH ₄	0.006	0.011	0.004	0.004
Petroleum	CH ₄	0.000	0.000	0.000	0.000
Natural Gas	CH ₄	0.000	0.001	0.005	0.005
Wood	CH ₄	0.000	0.005	0.012	0.011
Other	CH ₄	0.000	0.000	0.000	0.000
N₂O		0.092	0.164	0.082	0.072
Coal	N ₂ O	0.092	0.156	0.062	0.053
Petroleum	N ₂ O	0.000	0.001	0.000	0.000
Natural Gas	N ₂ O	0.000	0.001	0.004	0.004
Wood	N ₂ O	0.000	0.006	0.015	0.014
Other	N ₂ O	0.000	0.000	0.000	0.000
TOTAL		45.016	81.199	50.113	45.871

5.10.1.1 Generated v. Consumed Energy

Emissions from electric power generation come from the generation of electric power. Emissions in energy production are from the combustion of fossil fuels such as coal and natural gas. Other types of energy production do not produce emissions, such as nuclear, hydroelectric, and solar energy. In 2022, South Carolina's generation came from the following sources²⁴:

Nuclear	65.94%
Natural Gas (Boiler and Combined Cycle)	17.98%
Coal	12.56%
Combustion Turbine (Natural Gas and Oil)	2%
Hydroelectric	1%
Pumped Storage	0.4%
Combined Heat and Power	0.08%
Biomass	0.03%
Solar	0.01%

Not all energy production in South Carolina creates GHG emissions; 66.95% of the energy produced in South Carolina is from sources other than fossil fuel combustion. This means that 31% of South Carolina's total emissions from electricity generation come from just 33.05% of the energy sector. This demonstrates potential to expand renewable energy as a way to reduce statewide greenhouse gas emissions.

Additionally, energy produced in South Carolina does not represent the energy actually consumed in the state, since two utilities (Duke Energy Carolinas and Duke Energy Progress) share the energy generated in both Carolinas with customers in South Carolina and North Carolina. Energy consumption for South Carolina came from the following sources in 2022²⁵:

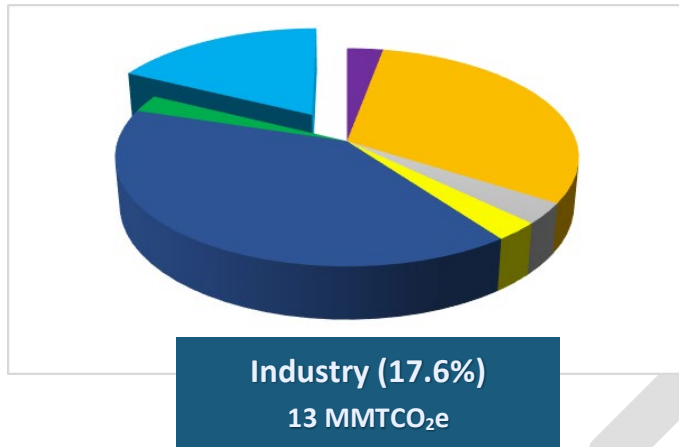
Nuclear	38.06%
Natural Gas (Boiler and Combined Cycle)	27.05%
Coal	27.05%
Combustion Turbine (Natural Gas and Oil)	5.01%
Hydroelectric	2%
Pumped Storage	0.60%
Combined Heat and Power	0.03%
Biomass	0.10%
Solar	0.10%

²⁴ SC Energy Office, data from EIA: [Energy Landscape | South Carolina Energy Office Data Hub \(arcgis.com\)](https://arcgis.com)

²⁵ SC Energy Office, data from EIA: [Energy Landscape | South Carolina Energy Office Data Hub \(arcgis.com\)](https://arcgis.com)

5.11 Emissions from Industry

Industry is South Carolina’s third largest source of greenhouse gas emissions, making up 17.6% of the state’s emissions in 2020 with 13 MMTCO₂e in 2020.



Industrial emissions come from industrial processes, stationary combustion, fossil fuel combustion, and wastewater (Table 12). Industrial production includes cement manufacture, limestone and dolomite use, soda ash, aluminum production, urea consumption, ozone depleting substances (ODS) substitutes, and electric power transmission and distribution systems.

Fossil fuel combustion in industry comes predominantly from natural gas, petroleum, and coal (totaling 6.827 MMTCO₂e). ODS substitutes is the largest source of emissions from industrial production with emissions of 3.185 MMTCO₂e, followed by cement manufacturing with 1.388 MMTCO₂e emitted.

Industry’s most significant greenhouse gas is carbon dioxide with 9.24 MMTCO₂e emitted in 2020, but it also is the sector that produces the most emissions of HFC, PFC, NF₃, and SF₆, with total emissions of 3.599 MMTCO₂e. N₂O emissions were 0.09 MMTCO₂e, and CH₄ emissions were 0.07 MMTCO₂e.

Table 12. GHG Emissions from Industry, by Activity

Dashes or blank fields mean that this industry is either not active in South Carolina, or there is no default data available.

GHG Emissions by Sources and Gases (Industry Summary)					
Source	GHG	Amounts of MMTCO2E			
		1990	2005	2019	2020
Fossil Fuel Combustion - Total	CO2	12.911	13.158	7.230	6.827
Coal		5.367	3.442	0.357	0.295
Petroleum		3.151	5.892	1.984	1.762
Natural Gas		4.393	3.824	4.889	4.769
Other		0.000	0.000	0.000	0.000
Additional Emissions from Fuel Combustion - Total		0.170	0.165	0.169	0.160
Industrial -Stationary	N2O	0.097	0.095	0.095	0.090
Industrial -Stationary	CH4	0.073	0.070	0.074	0.070
Industrial Wastewater - Total	CH4	0.006	0.008	0.005	0.006
Industrial Production - Total	CO2	1.433	2.950	2.508	2.409
Cement Manufacture		1.106	1.627	1.475	1.388
Lime Manufacture		-	-	-	-
Limestone and Dolomite Use		-	0.009	0.034	0.033
Soda Ash		0.038	0.037	0.031	0.029
Aluminum Production (CO2)		0.288	0.242	0.150	0.138
Iron & Steel Production		-	1.034	0.817	0.817
Ammonia Production		-	-	-	-
Urea Consumption		0.001	0.001	0.002	0.003
Industrial Production - Total	HFC, PFC, NF3, SF6	0.853	2.372	3.495	3.599
ODS Substitutes		0.003	1.884	3.069	3.185
Semiconductor Manufacturing		0.082	0.059	-	-
Magnesium Production		-	-	-	-
Electric Power Transmission and Distribution Systems		0.490	0.191	0.092	0.081
HCFC-22 Production		-	-	-	-
Aluminum Production (PFCs)		0.279	0.238	0.334	0.334
TOTAL		15.373	18.654	13.407	13.002

5.11.1 Indirect Industry Emissions

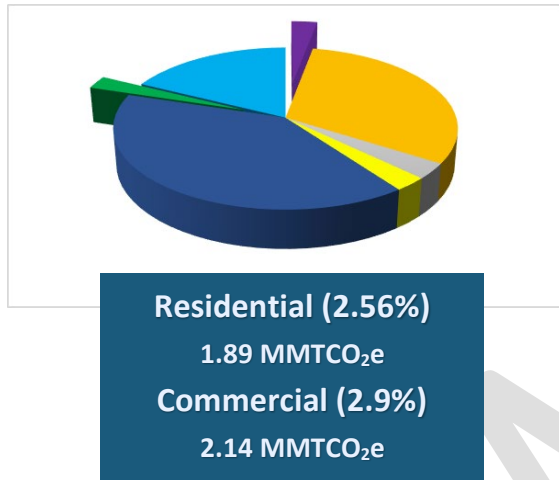
Table 13 summarizes indirect emissions from the Industry sector, calculated through the SIT Energy Consumption module. These emissions are considered indirect because they represent the energy obtained from the sources of electric power generation and then used to power industrial processes and uses of energy for lighting, heating, cooling, and other activities. This table supplements Table 12 which shows direct emissions from fossil fuel combustion occurring at industrial facilities and from industrial processes.

Table 13. Industry Energy Consumption by Use Types
Source: SIT Energy Consumption Module

Energy Consumption by Use Types (Industry Summary)					
Energy Use		Amounts of MMTCO ₂ E			
		1990	2005	2019	2020
Industry (TOTAL)		10.704	13.902	6.917	6.172
Indirect Uses-Boiler Fuel	Totals	0.052	0.413	0.096	0.086
	Conventional Boiler Use	0.036	0.408	0.096	0.086
	CHP and/or Cogeneration Process	0.016	0.005	0.000	0.000
Direct Uses-Process	Totals	8.590	11.151	5.739	5.121
	Process Heating	1.234	1.418	0.626	0.559
	Process Cooling and Refrigeration	0.770	0.947	0.558	0.498
	Machine Drive	5.503	7.206	3.682	3.285
	Electro-Chemical Processes	1.048	1.440	0.748	0.668
	Other Process Use	0.034	0.140	0.124	0.111
Direct Uses-Nonprocess	Totals	1.750	2.125	1.009	0.900
	Facility HVAC	0.946	1.094	0.522	0.465
	Facility Lighting	0.630	0.742	0.324	0.289
	Other Facility Support	0.149	0.231	0.118	0.105
	Onsite Transportation	0.014	0.029	0.026	0.023
	Other Nonprocess Use	0.010	0.029	0.019	0.017
Other		0.312	0.212	0.073	0.065

5.12 Emissions from Residential and Commercial Buildings

Residential and commercial emissions come predominantly from South Carolina’s buildings. In 2020, residential buildings made up 2.56% of the state’s total emissions with 1.89 MMTCO₂e, while commercial buildings consisted of 2.9% of the total emissions statewide (2.14 MMTCO₂e). Together, residential and commercial building sources accounted for 5.46% of South Carolina’s 2020 emissions at 4.03 MMTCO₂e.



These emissions primarily come from the direct use of natural gas, petroleum, and wood (i.e., fossil fuel combustion) for buildings’ energy needs (Table 14). Carbon dioxide was the predominant greenhouse gas emitted at 4.016 MMTCO₂e, followed by methane and small amounts of nitrous oxide.

Table 14. GHG Emissions from Residential and Commercial Buildings, by Fuel Type

GHG Emissions by Fuel Type (Resid. & Comm. Summary)					
Source	GHG	Amounts of MMTCO2E			
		1990	2005	2019	2020
Residential - Totals		2.134	2.319	1.957	1.907
Coal	CO2	0.003	-	-	-
Natural Gas		1.003	1.570	1.648	1.588
Other		-	-	-	-
Petroleum		1.066	0.705	0.287	0.299
Coal	CH4	0.000	-	-	-
Natural Gas		0.003	0.004	0.004	0.004
Other		-	-	-	-
Petroleum		0.004	0.003	0.001	0.001
Wood		0.047	0.031	0.013	0.011
Coal	N2O	0.000	-	-	-
Natural Gas		0.000	0.001	0.001	0.001
Other		-	-	-	-
Petroleum		0.002	0.002	0.001	0.001
Wood		0.006	0.004	0.002	0.001
Commercial - Totals		1.440	1.733	2.249	2.139
Coal	CO2	0.012	-	-	-
Natural Gas		0.839	1.213	1.397	1.303
Other		-	-	-	-
Petroleum		0.577	0.508	0.840	0.825
Coal	CH4	0.000	-	-	-
Natural Gas		0.002	0.003	0.004	0.003
Other		-	-	-	-
Petroleum		0.002	0.002	0.003	0.003
Wood		0.005	0.005	0.002	0.002
Coal	N2O	0.000	-	-	-
Natural Gas		0.000	0.001	0.001	0.001
Other		-	-	-	-
Petroleum		0.001	0.001	0.002	0.002
Wood		0.001	0.001	0.000	0.000

5.12.1 Indirect Residential and Commercial Emissions

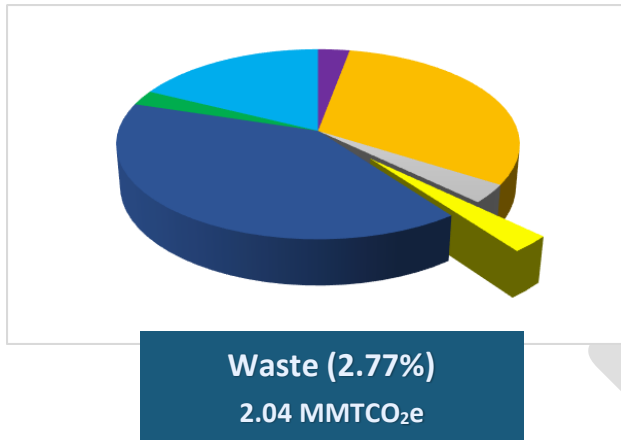
Table 15 summarizes indirect emissions from Residential and Commercial buildings, calculated through the SIT Energy Consumption module. These emissions are considered indirect because they represent the energy obtained from the sources of electric power generation and then used to residential and commercial uses of energy for lighting, heating, cooling, ventilation, refrigeration, appliances, and other needs. This table supplements Table 14 which shows direct emissions from fossil fuel combustion occurring at residential and commercial buildings.

Table 15. Residential and Commercial Energy Consumption by Use Types
Source: Energy Consumption Module

GHG Emissions by Energy Use Type (Residential and Commercial Summary)					
Source	GHG	Amounts of MMTCO2E			
		1990	2005	2019	2020
Residential - Totals		7.912	12.426	8.019	7.588
Space Heating	CO2	0.857	0.921	1.274	1.205
Air Conditioning		1.771	3.398	1.820	1.722
Water Heating		0.857	1.433	1.235	1.168
Refrigeration		0.971	1.187	0.442	0.418
Other Appliances and Lighting		3.456	5.486	3.249	3.074
Commercial - Totals			5.500	8.883	5.705
Space Heating	CO2	0.183	0.259	0.086	0.077
Cooling		1.071	1.747	1.160	1.043
Ventilation		0.633	1.077	0.817	0.734
Water Heating		0.170	0.225	0.032	0.029
Lighting		1.935	2.754	0.935	0.840
Cooking		0.049	0.102	0.118	0.106
Refrigeration		0.596	1.054	0.881	0.792
Office Equipment		0.073	0.170	0.226	0.203
Computers		0.207	0.427	0.483	0.435
Other		0.584	1.068	0.967	0.869
TOTAL			13.412	21.309	13.724

5.13 Emissions from Waste and Wastewater

Waste emissions come from landfills, wastewater, municipal and industrial waste, and waste combustion. In 2020, South Carolina’s waste emissions totaled 2.77% of gross state emissions at 2.04 MMTCO₂e.



Methane is the largest greenhouse gas emitted in the waste sector (1.78 MMTCO₂e coming from landfills and wastewater), with carbon dioxide and nitrous oxide also coming from this sector.

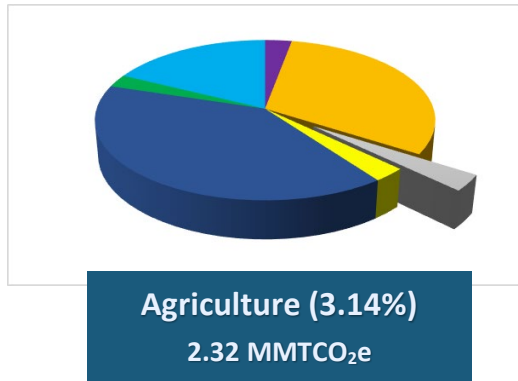
Due to landfill gas-to-energy systems and flares, emissions of 2.949 MMTCO₂e were captured and converted to energy, reducing net methane emissions.

Table 16. GHG Emissions from Waste and Wastewater Sources

Note: This table will be included in the final PCAP.

5.14 Emissions from Agriculture

Emissions from the agriculture sector in South Carolina in 2020 made up 3.14% of the state's total emissions with 2.32 MMTCO₂e emitted.



The main sources of emissions from agriculture are from enteric fermentation, manure management, rice cultivation, urea fertilization, agricultural residue burning, manure management, and agricultural soils (Table 17).

Nitrous oxide is the most produced GHG from this sector (1.325 MMTCO₂e), followed by methane (0.976) and small amounts of carbon dioxide (0.017 MMTCO₂e).

Table 17. GHG Emissions from Agriculture

GHG Emissions by Sources and Gases (Agriculture Summary)					
Source	GHG	Amounts of MMTCO ₂ E			
		1990	2005	2019	2020
CO₂		0.004	0.006	0.015	0.017
Liming	CO ₂	-	-	-	-
Urea Fertilization	CO ₂	0.004	0.006	0.015	0.017
CH₄		1.400	1.287	1.002	0.976
Enteric Fermentation	CH ₄	1.029	0.867	0.664	0.653
Manure Management	CH ₄	0.369	0.420	0.338	0.323
Rice Cultivation	CH ₄	-	-	-	-
Agricultural Residue Burning	CH ₄	0.002	0.001	0.000	0.001
N₂O		1.892	1.460	1.479	1.325
Manure Management	N ₂ O	0.104	0.152	0.177	0.169
Ag Soils	N ₂ O	1.787	1.308	1.303	1.156
Agricultural Residue Burning	N ₂ O	0.000	0.000	0.000	0.000
TOTAL		3.296	2.754	2.497	2.318

5.15 Emissions from Land Use and Forestry

Natural and working lands and forestry is a net sink for South Carolina, since the biomass in this sector sequesters or stores carbon. In 2020, this sector stored a total of 23.57 MMTCO₂e, mostly in net forest carbon fluxes (20.91 MMTCO₂e) and urban trees (3.37 MMTCO₂e) (Table 18). Forest fires and settlement soils were small sources of greenhouse gas emissions, including methane and nitrous oxide.

Forest carbon fluxes include sequestered carbon from forest land remaining forest and land converted to forest land. These classifications included above- and below-ground biomass, deadwood, litter, mineral and organic soil, and wood products and landfills. Emissions from forest carbon fluxes were from forest land converted to land for other uses (farming, urban, fields), including biomass, deadwood, litter, and mineral soil. Landfilled yard trimmings and food scraps also stored small amounts of carbon in grass, leaves, branches, and landfilled food scraps.

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Table 18. GHG Emissions from Land Use, Land-Use Change, and Forestry (Sources and Sinks)

South Carolina Land Use, Land-Use Change, and Forestry (LULUCF) Emissions and Sequestration (Summary, Selected Years)				
Emissions* (MMTCO₂E) * Note that parentheses indicate net sequestration.	1990	2005	2019	2020
Total	(21.75)	(22.84)	(24.03)	(23.57)
Net Forest Carbon Flux	(20.98)	(21.32)	(21.50)	(20.91)
<i>Forest Land Remaining Forest Land</i>	(20.87)	(21.64)	(22.28)	(21.69)
<i>Aboveground Biomass</i>	(9.64)	(9.46)	(9.59)	(9.14)
<i>Belowground Biomass</i>	(2.08)	(1.98)	(1.94)	(1.84)
<i>Deadwood</i>	(0.76)	(0.94)	(1.26)	(1.25)
<i>Litter</i>	0.31	0.09	(0.04)	(0.02)
<i>Soil (Mineral)</i>	(0.05)	(0.29)	(0.40)	(0.39)
<i>Soil (Organic)</i>	-	-	0.01	0.01
<i>Drained Organic Soil</i>	-	-	-	-
<i>Total wood products and landfills</i>	(8.65)	(9.06)	(9.06)	(9.06)
<i>Land Converted to Forest Land</i>	(2.32)	(2.30)	(2.28)	(2.28)
<i>Aboveground Biomass</i>	(1.43)	(1.42)	(1.41)	(1.41)
<i>Belowground Biomass</i>	(0.28)	(0.28)	(0.28)	(0.28)
<i>Deadwood</i>	(0.19)	(0.18)	(0.18)	(0.18)
<i>Litter</i>	(0.40)	(0.40)	(0.40)	(0.40)
<i>Soil (Mineral)</i>	(0.02)	(0.02)	(0.01)	(0.01)
<i>Forest Land Converted to Land</i>	2.21	2.62	3.06	3.06
<i>Aboveground Biomass</i>	1.54	1.81	2.12	2.12
<i>Belowground Biomass</i>	0.30	0.36	0.42	0.42
<i>Deadwood</i>	0.10	0.12	0.14	0.14
<i>Litter</i>	0.24	0.28	0.33	0.33
<i>Soil (Mineral)</i>	0.03	0.05	0.05	0.05
Urban Trees	(1.65)	(2.47)	(3.31)	(3.37)
Landfilled Yard Trimmings and Food Scraps	(0.26)	(0.07)	(0.11)	(0.11)
<i>Grass</i>	(0.03)	(0.01)	(0.01)	(0.01)
<i>Leaves</i>	(0.07)	0.03	0.02	0.02
<i>Branches</i>	(0.14)	(0.04)	(0.05)	(0.05)
<i>Landfilled Food Scraps</i>	(0.03)	(0.05)	(0.06)	(0.06)
Forest Fires	-	-	0.03	0.06
<i>CH₄</i>	-	-	0.02	0.05
<i>N₂O</i>	-	-	0.00	0.01
N₂O from Settlement Soils	0.03	0.03	0.03	0.03
Agricultural Soil Carbon Flux	1.11	1.00	0.83	0.73

6 Priority Greenhouse Gas Emissions Reduction Measures

Sections 6 and 7 discuss the measures South Carolina may take to 1) reduce greenhouse gas and co-pollutant emissions or 2) increase carbon sequestration and storage. Emission reduction measures are presented in this document as priority measures or recommended measures.

To identify priority measures, SCOR and SC DHEC considered input and feedback received from the Action Teams, the stakeholder survey, and state, regional, and local government agencies.

EPA guidelines specify that priority measures should be implementation ready, achieve near-term GHG reductions, and demonstrate benefits for low income and disproportionately burdened communities.²⁶ SCOR and SC DHEC used the criteria listed in Table 19 to review and assess measure ideas.

Note: SCOR and SC DHEC will continue to refine these measure ideas while the draft PCAP is publicly available. "Implementation ready" refers to the presence of existing or planned that can be leveraged, expanded, or augmented by the Palmetto Air Quality Collaborative and through the CPRG award.

Stakeholders interested in providing information for additional priority or recommended measures to include in the PCAP should submit proposals as soon as possible, and by February 14, 2024, at the latest, to PAQC.Comments@scor.sc.gov. Ideas for priority measures should address the criteria specified in Table 19.

Recommended measures are intentionally broader than the priority measures and include a variety of ways to reduce GHG emissions. These recommendations may have large emissions reduction potential, but may take longer to implement, require large amounts of funding, or may not have a clear authority to implement or determined implementation pathway.

²⁶ EPA's [Program Guidance](#) (p. 53) states: "A PCAP must include a focused list of near-term, high-priority, implementation-ready measures that have been identified for implementation by the lead organization and any other collaborating entities (e.g., municipalities, tribes). For the lead organization, such measures should be those that it plans to implement directly and/or in partnership with collaborating agencies as described in their workplan. The PCAP should also indicate which measures could be implemented by other entities (e.g., air pollution control agencies, counties, and municipalities) within the state or metropolitan area. For each measure, the PCAP must provide an estimate of the quantifiable GHG emissions reductions, key implementing agency or agencies, implementation schedule and milestones, expected geographic location if applicable, milestones for obtaining legislative or regulatory authority as appropriate, identification of funding sources if relevant, and metrics for tracking progress."

Table 19. Criteria to Review and Assess Priority Measures

Criteria	Considerations
Impact on GHG Emissions	
What is the potential impact on reducing GHG emissions?	<ul style="list-style-type: none"> • High potential reduction amount • Medium potential reduction amount • Low potential reduction amount
What are the estimated, quantified GHG reduction amounts?	<ul style="list-style-type: none"> • Estimated amount • Method(s) or tool(s) used to estimate
Is this measure implementation-ready (within 5 years)?	<ul style="list-style-type: none"> • Yes, related activities and/or plans currently in place • Possible, in development or in a planning process • No
How quickly could GHG emissions reductions be realized?	<ul style="list-style-type: none"> • Within 5 years (2025-2030) • Within 10 years (2025-2035) • Within 25 years (2025-2050)
Implementation Readiness	
<p>Who has the authority and ability to implement?</p> <p>Who are the potential partners?</p>	<ul style="list-style-type: none"> • State, regional (COGs), and/or local government • Private sector • Non-profit organizations • Professional associations • Academia • Community-based organizations • Other
What is the estimated cost of implementing this measure?	<ul style="list-style-type: none"> • Dollar amount
What are the potential opportunities and constraints?	<ul style="list-style-type: none"> • Cost effectiveness, commercial viability • Funding (including other investments or grant opportunities) • Policy • Public support • Technology • Workforce/staff capacity • Other
Benefits	
How will the measure benefit low income and disproportionately burdened communities?	<ul style="list-style-type: none"> • EPA requires use of the Climate and Economic Justice Screening Tool to identify communities
What are the co-benefits?	<ul style="list-style-type: none"> • Co-pollutant reductions, air quality improvements • Community resilience • Cost savings, increased efficiency • Economic growth and diversity • Ecosystem and habitat restoration and/or conservation • Historic or cultural preservation • Public and community engagement • Other community priorities

6.1 Residential Weatherization and Energy Efficiency

6.1.1 Objective

Expand and coordinate weatherization and energy efficiency programs for residential buildings

6.1.2 Description

Weatherization is the reduction of consumption by protecting the interior of the home from the exterior elements. Energy efficiency means using less energy to support the same output and building to the highest standard with modern, efficient appliances. Weatherization and energy efficiency are two major ways that South Carolina can update its aging housing inventory. As the population grows throughout the state, the demand for homes is increasing rapidly, but the energy and money required to heat and cool old, inefficient, and less durable homes is a huge struggle for many state residents. The resident's financial burden of energy bills also creates a financial burden to update the home. Funding is available for certain, weatherization or appliance upgrades, but gaps exist in funding critical home repairs, often necessary before weatherization can occur. With a variety of related efforts occurring across the state, there is a need to coordinate disparate programs (for example, those run by utilities, non-profits, government agencies), encourage consistent communications among service providers, and provide a more efficient and understandable process for households in need of assistance.

A new statewide program could be created to address these gaps and needs. Following the model of SCOR's Disaster Recovery and Disaster Case Management programs, a Residential Weatherization and Energy Efficiency program would develop a one-stop shop for applicants to receive guidance on available services. This program will be modeled after the SC Office of Resilience Disaster Recovery and Disaster Case Management programs, extend and expand work being done by The Sustainability Institute, and follow recommendations made in the South Carolina Energy Offices' Energy Efficiency Roadmap.²⁷

The program will aim to provide comprehensive services for eligible applicants, with options to address critical home repair, health and safety, energy efficiency, and indoor air quality. In addition, the program will seek to establish standard energy efficiency guidelines and/or a certification program, to encourage consistent program implementation by households, developers, and assistance providers. There may also be opportunities to leverage other funding sources to install solar on eligible structures.

6.1.3 Implementation

Lead/Coordinating Agency: SCOR

Expected/Potential Partners: South Carolina Energy Office, The Sustainability Institute, City of Columbia, local governments, housing authorities, utilities

This program would be administered by SCOR, who already has an established similar program in place for remodeling and rebuilding homes post-disaster. Home renovations would be contracted out to small local businesses that agree to meet program building standards to boost South Carolina's local

²⁷ South Carolina Energy Office, <https://energy.sc.gov/focus-area/energy-efficiency>

economy. Audits on the builders' work would ensure standards are met. This program would increase jobs as new auditors are trained through established certification programs.

6.1.4 Emissions Reductions

TBD

6.1.5 Benefits Analysis

The South Carolina housing inventory is aging, which contributes to a large energy burden for residents, especially in disproportionately burdened and low-income communities, where large percentages of income spent on the high energy costs to heat, cool, and electrify homes. Goals of this program will be to reduce household energy costs while also reducing energy consumption.

The City of Columbia recently received a technical assistance grant from the U.S. Department of Energy's Communities Local Energy Action Program (LEAP) to assess the benefits of energy efficiency measures for low-income residents. SCOR and partners will use their findings to inform a broader assessment of household and community benefits.

6.1.6 Intersection with other programs and funding

SC Energy Office is developing a portal to communicate available funding within the state to pre-weatherize and weatherize the aging statewide housing inventory.

The final PCAP will list specific funding streams and opportunities.

6.2 Climate Smart Forestry

6.2.1 Objective

Expand the Clemson Climate Smart Forestry program and accelerate the rate of carbon sequestration through Climate Smart Forestry practices.

6.2.2 Description

Forestry is a pillar of our state's economy, contributing \$23.2 billion annually while providing more than 100,000 jobs and \$5.5 billion in annual labor income.²⁸ The state's forests have the capacity to sequester carbon from the atmosphere on an annual basis, and there is substantial opportunity to accelerate the rate of carbon sequestration through Climate-Smart Forestry practices. Climate-Smart Forestry (CSF) is an approach to forest management that supports traditional practices to enhance forest growth, such as planting, thinning and harvesting, along with modern objectives for carbon storage and ecosystem resilience.²⁹ CSF is categorized by three main objectives: forest adaptation and resilience, increased forest mitigation potential, and sustainably ensured production and income.

South Carolina's two land-grant institutions, Clemson University and SC State University have partnered on a pilot project funded by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), through the USDA-NRCS Partnership for Climate-Smart Commodities grant program.³⁰ The USDA-NRCS defines a "climate-smart commodity" as an agricultural commodity that is produced using agricultural (farming, ranching, or forestry) practices to reduce greenhouse gas emissions or sequester carbon. The goal of the project is to increase the acreage and number of farmers using climate-smart practices like cover cropping, prescribed grazing, reduced tillage, and other conservation tactics. The pilot project provides technical assistance and financial incentives to farmers to enable adoption of these climate-smart practices. In addition, the project employs marketing specialists to analyze new market opportunities for the resulting products and help create new opportunities for the agricultural community across the state. Expansion of wood use has the potential to place carbon from South Carolina forests into long-term storage, such as in above-ground structures. The initial round of funding occurred in Fall of 2022 and has been an overwhelming success, so much so that the program is currently oversubscribed and additional funding is needed to expand access.

6.2.3 Implementation

Lead/Coordinating Agency: Clemson University

Expected/Potential Partners: SC State University, Clemson Extension, Longleaf Alliance, Center for Heirs Property, U.S. Endowment for Forestry and Communities, The Nature Conservancy, non-profit organizations, landowners

Implementation would focus on climate smart forestry practices to maximize carbon sequestration and expand the current project focused on incentive-based participation.

²⁸ South Carolina Forestry Commission, <https://www.scfc.gov/development/economic-development/>

²⁹ Shephard and Maggard, What Is Climate-Smart Forestry? <https://www.aces.edu/blog/topics/forestry/what-is-climate-smart-forestry/>

³⁰ USDA, Partnerships for Climate-Smart Commodities, <https://www.usda.gov/climate-solutions/climate-smart-commodities>

6.2.4 Emissions Reductions

TBD

6.2.5 Benefits Analysis

An expansion of the Climate-Smart Commodities program would allow more landowners into the program, and an expanded program could focus on landowners with 20-100 acres, who are often live in underserved, low-income and disproportionately burdened communities. New funding could expand the program's focus to include afforestation, longleaf pine restoration, urban forest expansion, and forestry protection in rapidly developing counties. Individual landowners will benefit by gaining access to new tools and resources.

Encouraging forest growth and restoration also has benefits for water quality and quantity, flood mitigation, wildlife habitat, and restoration.

6.2.6 Intersection with other programs and funding

USDA NRCS

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6.3 Land Conservation and Restoration

6.3.1 Objective

Improve South Carolina’s ability to store carbon and reduce net GHG emissions through coordinated land conservation, preservation, and restoration efforts.

6.3.2 Description

South Carolina’s natural resources are an important asset to our state. Our managed forests, natural ecosystems, and other lands act as “sinks”, meaning they store carbon. Land conservation and restoration is thus an important tool for reducing our overall emissions. SCOR will coordinate and collaborate with other agencies and organizations to enhance carbon sequestration, reduce loss of effective carbon sink, and optimize additional ecosystem and community benefits.

6.3.3 Implementation

Lead/Coordinating Agency: SCOR

Expected/Potential Partners:

- SCOR is considering joining a CPRG multi-state coalition with North Carolina, Virginia, Maryland to pilot methodologies, approaches, and strategies related to identifying high-impact lands to conserve, measuring and monitoring carbon sequestration, and share lessons learned across the region.
- Within South Carolina, SCOR expects to coordinate with the Open Space Institute, The Nature Conservancy, state agencies with land conservation programs and projects, S.C. Sea Grant Consortium, universities, non-profit organizations, land trusts, South Atlantic Salt Marsh Initiative, and federal, regional, and local agencies.

6.3.4 Emissions Reductions

TBD

6.3.5 Benefits Analysis

Restoring coastal habitats, wetlands, and forests to sink carbon will also help to restore ecosystem services, enhance access to economic opportunities, protect culturally significant places, and prevent emissions from land use change. Conserving natural lands in floodplains can help reduce flood risks and impacts for built infrastructure in those areas.

6.3.6 Intersection with other programs and funding

Climate-Smart Agriculture and Forestry

Blue Carbon projects and strategies to enhance carbon sequestration in the state’s coastal ecosystems including salt marsh, submerged aquatic vegetation, tidal freshwater forested wetlands, coastal peatlands, and maritime forests.

Green Infrastructure Plans, urban forest initiatives

6.4 Organics Recovery and Food Waste

6.4.1 Objective

Reduce food waste and enhance organic recovery systems, infrastructure, and programs.

6.4.2 Description

Food waste is the most commonly (approximately 24%) disposed material in landfills nationwide and is estimated to be the third-largest source of methane emissions from human activities in the United States. South Carolina disposed of an estimated 1 million tons of unwanted food between July 1, 2021, and June 30, 2022, while only recovering an estimated 28,000 tons, for a 2.8 percent recycling rate. Currently, South Carolina has a population of over 5.1 million inhabitants and is one of the fastest growing states, but only has three facilities that compost food waste.

An organics recovery and food waste program will build on existing SC DHEC programs and support local government and the private sector. Components include:

- Develop a “hub and spoke” system to increase recovery, divert material from landfills, reduce greenhouse gas emissions from landfills, and include as many of the state’s 46 counties as possible
- Improve infrastructure and equipment at existing or new composting facilities
- Develop an incentive program to facilitate the transport of waste to composting facilities
- Establish a state liaison to coordinate with local governments, municipalities, and counties
- Expand education and training for commercial partners, local government, communities and individuals

6.4.3 Implementation

Lead/Coordinating Agency: SC DHEC

Expected/Potential Partners: S.C. Department of Commerce, composting contractors, public solid waste management agencies and authorities, municipal and county governments, food waste providers (commercial and public entities, such as food retailers, restaurants, hospitals, schools, universities), farmers, food banks, food rescue organizations

6.4.4 Emissions Reductions

TBD

6.4.5 Benefits Analysis

Building out a robust organics and food waste program will help to reduce methane emissions from landfills by preventing food waste and increasing food waste recovery. Other benefits include business opportunities, support for sustainable material management initiatives, job creation, household and business cost savings, reduced need for new landfills, and coordination with food banks.

6.4.6 Intersection with other programs and funding

DHEC’s existing solid waste grant program

6.5 Alternative and Multi-Modal Transportation Options

6.5.1 Objective

Reduce vehicle miles traveled by expanding and enhancing opportunities for biking, and walking, as well as micromobility projects

6.5.2 Description

There is considerable interest in improving current bicycle and pedestrian infrastructure, and many statewide, regional, and local plans have identified this as a priority. A PAQC grant program focused on alternative transportation could augment existing programs by providing gap funding to ensure projects are completed. Such a program could also support design and pre-construction activities to help communities develop high-impact, shovel-ready projects so they may take advantage of funding opportunities when they arise. Another important component would include coordination with land-use planning, housing and commercial development planning, greenspace, and trails initiatives to improve access, connectivity, and other community benefits.

6.5.3 Implementation (Lead Agency, Partners)

Potential Lead/Coordinating Agency: SCOR, Councils of Governments

Expected/Potential Partners: SC Department of Transportation, Metropolitan Planning Organizations, municipal and county governments, non-profits and community organizations

6.5.4 Emissions Reductions

TBD

6.5.5 Benefits Analysis

Replacing vehicle trips with bicycle or pedestrian travel reduces GHG emissions and other air pollution. Robust biking and pedestrian infrastructure can support community priorities related to improved health, public safety, recreation, economic opportunities for business, cost savings for travelers, and environmental amenities.

6.5.6 Intersection with other projects and funding

SC DOT funding opportunities and programs, such as the Bicycle & Pedestrian Program, Transportation Alternatives, and Complete Streets

7 Recommended Greenhouse Gas Emissions Reductions Measures

Sections 6 and 7 discuss the measures South Carolina may take to 1) reduce greenhouse gas and co-pollutant emissions or 2) increase carbon sequestration and storage. Emission reduction measures are presented in this document as priority measures or recommended measures.

Recommended measures included in this plan were recommended and discussed by stakeholders and Action Team members during the planning process. Subsections of this section are broken down by sector and will include relevant reduction measures and related descriptions and analysis.

Recommended measures are broader than the priority measures and include a variety of ways to reduce GHG emissions. These recommendations may have large emissions reduction potential, but due to funding, implementation, or time constraints, have not been chosen as priority measures for this plan.

The PAQC received a variety of diverse, innovative, and beneficial reduction measure ideas from engaged stakeholders and Action Team members throughout the planning process. The recommended reduction measures included in this section package a wide range of co-benefits for the state, communities, and residents.

Stakeholders interested in providing information for additional priority or recommended measures to include in the PCAP should submit proposals as soon as possible, and by February 14, 2024, at the latest, to PAQC.Comments@scor.sc.gov. Ideas for priority measures should address the criteria specified in Table 19.

7.1 Transportation

7.1.1 Description

The transportation sector is the largest source of GHG emissions in South Carolina, providing many opportunities for reduction measure recommendations statewide. Addressing multiple modes of transportation and transit is a key piece of this report and was supported by stakeholders and Action Team members.

The SC Department of Transportation (SC DOT) participated in the PAQC’s Transportation Action Team and houses the state’s National Electric Vehicle Infrastructure (NEVI) Formula Program, Transportation Alternatives Program (TAP), and Bicycle and Pedestrian Program. The SC Ports Authority (SCPA) also participated in the Transportation Action Team and has several planned projects to reduce emissions from South Carolina ports.

7.1.2 Recommended Reduction Measures

South Carolina’s recommended transportation reduction measures include public transit, electric vehicles (EVs), alternative fuels, EV infrastructure, alternative transportation, ports, rail, and air. Key partners for implementation and development of projects or programs in this sector may include SC DOT, SC Ports Authority (SCPA), Palmetto Railways, SC Aeronautics Commission, SC Councils of Government (COG), municipalities, communities, and non-governmental organizations (NGO).

Sub-Sector	Recommended Reduction Measure(s)
Public Transit	Expand and enhance public transit options: <ul style="list-style-type: none"> • Regional public transportation, including incentives for low- to zero-emission vehicle fleets, charging infrastructure, and coordination and strategy development for priority networks. • Rapid transit and train expansion for intercity travel.
Electric Vehicles (EVs) and Alternative Fuels	<ul style="list-style-type: none"> • Promote transition to electric and alternative fuel vehicles (including passenger, commercial, industrial, and government vehicles/ fleets).
EV Infrastructure	Promote installation of public, level 2 and fast charging electric vehicle charging stations and infrastructure: <ul style="list-style-type: none"> • Community locations found throughout the state (e.g., government buildings, community centers, schools, hospitals). • Multi-family housing. • Heavily trafficked roads not covered by existing EV infrastructure programs, such as those targeting interstate corridors.
EV Batteries	<ul style="list-style-type: none"> • Promote responsible end-of-life management and recycling for Li-ion batteries.
Ports and Rail	<ul style="list-style-type: none"> • Support initiatives to electrify port equipment, vehicles, and other modes of transportation for the transport of goods and products. • Pilot and deploy alternative fuel options including hydrogen fuel cells. • Develop rebate programs to incentivize owner operators and trucking companies to upgrade equipment and purchase EV or alternative fuel vehicles.

	<ul style="list-style-type: none">• Support businesses in applying for U.S. DOT funding opportunities for diesel transition programs.
Air Emissions	<ul style="list-style-type: none">• Promote installation of renewable energy at SC airports, including solar (e.g., installation of solar canopies over terminal parking to generate electricity while protecting travelers' vehicles).• Establish energy efficiency practices within airports and terminals.

7.1.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to (TBD) MMT CO₂e annually. In addition, these measures may promote improved public health throughout the state but especially in disproportionately burdened communities who are at greater risk of disease from poor air quality. Many of the recommended measures will increase connectivity and safety throughout South Carolina; reduce the heat island effect in urban areas; reduce congestion and traffic; save individuals, businesses, and government offices money; promote economic growth; and develop the workforce within the state.

Implementation of these reduction measures would likely require an intergovernmental, interagency, and community coordinated effort that may take extensive time and funding.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

7.2 Industry

7.2.1 Description

The industry sector accounts for approximately 17.6% of GHG emissions within the state. Emissions reductions paired with economic growth and workforce development may be the primary benefits of addressing the recommended reduction measures in this section.

7.2.2 Recommended Reduction Measures

South Carolina’s recommended industrial reduction measures include energy efficiency in industry and business, electrification and reduction of fossil-fuel-based energy sources, material efficiency, procurement, and measuring, monitoring, and reporting assistance for local businesses and national or international branches of businesses located within the state. Key partners for implementation and development of projects or programs in this sector may include SC Manufacturing Extension Partnership (SCMEP), SC Department of Commerce, trade and manufacturing associations, private sector businesses, and non-governmental organizations (NGO). These reduction measures can be implemented by businesses and industry throughout the state.

Sub-Sector	Recommended Reduction Measure(s)
Energy Efficiency	<ul style="list-style-type: none"> • Adopt new technologies, processes, and/or equipment to reduce energy use in industrial processes. • Deploy energy efficiency measures for non-process uses of energy (building or facility energy use (HVAC, lighting). • Deploy energy efficiency measures in logistics, on-site equipment, transportation (passenger vehicles, light- and heavy-duty trucks).
Electrification/Reduce Use of Fossil-Fuel Based Energy Sources	<ul style="list-style-type: none"> • Develop incentives to transition from fossil fuel. • Adopt new technologies, processes, and/or equipment to reduce energy in industrial processes. • Deploy renewable energy, battery storage, new technologies (clean hydrogen), and microgrids. • Partner with private sector businesses (such as Sunoco) to pilot a program testing hydrogen-fuel operated manufacturing equipment.
Industrial Recycling	<ul style="list-style-type: none"> • Establish a statewide industrial recycling program (e.g., steel).
Material Efficiency/Product Development and Markets	<ul style="list-style-type: none"> • Promote the use of low-carbon material and raw material substitution in production processes (e.g., biochar for cement; recycled steel; carbon-storing building materials). • Promote circular economy opportunities.
Procurement	<ul style="list-style-type: none"> • Support the establishment of sustainable and climate-friendly procurement practices in government agencies. • Develop strategies and incentives to transition existing equipment and products to more climate-friendly solutions, (e.g., refrigeration systems; variable frequency drives).
Measuring, Monitoring, and Reporting	<ul style="list-style-type: none"> • Support businesses in efforts to develop GHG reduction measures, monitor and report GHG emissions, and align with other sustainability standards and reporting metrics.

7.2.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually. These recommended reduction measures may improve air quality and public health for disproportionately burdened communities located near industrial site.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

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7.3 Commercial

7.3.1 Description

The commercial buildings sector is the source of 2.9% of GHG emissions in South Carolina and may include several cross-cutting recommended reduction measures (particularly with the Residential Buildings and Industry sectors).

Note: The final PCAP may include a statement here about indirect emissions (emissions sourced from electric power generation but used by commercial buildings).

Note: The final PCAP may include organizations that participated in the Residential and Commercial Buildings Action Team discussions here.

7.3.2 Recommended Reduction Measures

South Carolina’s recommended reduction measures in the commercial sector include energy efficiency in commercial and public buildings, reduction of fossil-fuel-based energy, and community resilience and sustainability. Key partners for implementation and development of projects or programs statewide in this sector may include Sustain SC, SC Department of Commerce, Coastal Carolina University, utilities, SC Office of Economic Opportunity (SC OEO), Councils of Government (COG), and municipalities.

Sub-Sector	Recommended Reduction Measure(s)
Energy Efficiency in Commercial, Public, and Other Buildings	<ul style="list-style-type: none"> • Fund and/or incentivize energy audits to assist private, public, and non-profit entities in identifying goals and priorities for energy efficiency upgrades. • Fund and/or incentivize energy efficiency upgrades for private, public, and non-profit buildings. • Promote energy efficiency through public education and outreach.
Strategies to Reduce Use of Fossil Fuel-Based Energy Sources	<ul style="list-style-type: none"> • Deploy solar panels, battery storage, new technologies (clean hydrogen), and microgrids in residential/multi-family housing, commercial, and public buildings. • Incentivize carbon-storing or carbon-neutral materials in new construction. • Incentivize the installation of solar panels and solar canopies on commercial and government buildings, and over parking lots and parking garages.
Community Resilience and Sustainability	<ul style="list-style-type: none"> • Develop a network of community resilience hubs at a location found in communities throughout the state (e.g., schools, hospitals, community centers, or emergency management centers): <ul style="list-style-type: none"> • Install EV charging stations and solar panels on location. • Install microgrid and battery storage. • Educate the community about resilience hubs through public outreach and public engagement.

7.3.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

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7.4 Agriculture

7.4.1 Description

Agriculture is the source of about 3.14% of GHG emissions in South Carolina. Addressing multiple modes of transportation and transit is a key piece of this report and was supported by stakeholders and Action Team members.

Note: The final PCAP may include a statement here about indirect emissions (emissions listed under transportation, for example, for farm equipment).

Note: The final PCAP may include organizations that participated in Action Team discussions here.

7.4.2 Recommended Reduction Measures

Key partners for the development and implementation of statewide projects or programs in this sector may include Clemson University, SC Department of Agriculture (SCDA), SC Farm Bureau, and local communities of farmers.

Sub-Sector	Recommended Reduction Measure(s)
Climate-Smart Agriculture	<ul style="list-style-type: none"> • Fund and/or expansion of existing programs to incentivize and assist producers to adopt climate-smart practices. Focus areas may include: <ul style="list-style-type: none"> ○ Implementation of different soil management practices (cover crops, residue and till management). • Improvements to forage and livestock management systems. • Incentivize regenerative agricultural practices.
Climate-Smart Grasslands	<ul style="list-style-type: none"> • Grasslands are one of the major carbon sinks; potential for expanding the understanding about and the adoption of improved management practices in SC, given the number of forages and livestock producers in the state.
Product Research and Development	<ul style="list-style-type: none"> • Incentivize product development that optimizes carbon storage and support markets for those products.
Reduce Fossil-Fuel-Based Fuels and Energy	<ul style="list-style-type: none"> • Support farms in alternative fuel farming equipment. • Incentivize farm-to-farm cooperation for transportation of goods. • Incentivize biomass/biofuel energy production.

7.4.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

7.5 Waste Management

7.5.1 Description

7.5.2 Recommended Reduction Measures

South Carolina’s recommended waste management reduction measures include recycling, waste reduction, materials management, and landfill gas to energy. Key partners for development and implementation of statewide projects or programs in this sector may include SC Department of Health and Environmental Control (SC DHEC), SC Department of Commerce, private and municipal waste management authorities, private sector, municipalities, and local communities.

Sub-Sector	Recommended Reduction Measure(s)
Develop Recycling and Waste Reduction Programs	<ul style="list-style-type: none"> • Encourage the sustainable recovery of materials by creating recycling programs using private-sector capacity (including infrastructure, equipment, collection, transport, education and outreach, and market development) for: <ul style="list-style-type: none"> ○ Multifamily homes. ○ Businesses / private sector. ○ State agencies.
Materials Management	<ul style="list-style-type: none"> • Coordinate with other sectors and programs to incentivize use of sustainable products and support markets. Opportunities and interests include: <ul style="list-style-type: none"> ○ Circular economy; business, market, and economic opportunities. ○ Practices and products to optimize long-term carbon storage. • Procurement policies (e.g., government purchasing to encourage recycling markets).
Landfill Gas to Energy	<ul style="list-style-type: none"> • Fund and/or incentivize expansion of existing facilities and programs. • Fund and/or incentivize new facilities/programs. • Support coordination with utilities.

7.5.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

7.6 Residential Buildings and Energy Demand

7.6.1 Description

The residential buildings sector is the source of 2.56% of GHG emissions in South Carolina, but also accounted for the end-use of approximately 17% of electric power generation in the state.

Note: The final PCAP may include a statement here about indirect emissions (emissions sourced from electric power generation but used by residential buildings).

Note: The final PCAP may include organizations that participated in the Residential and Commercial Buildings Action Team discussions here.

7.6.2 Recommended Reduction Measures

South Carolina’s recommended residential buildings reduction measures include energy efficiency, residential building practices, and reduction of fossil fuel-based energy sources. Key partners for implementation and development of projects or programs in this sector may include SC Energy Office; The Sustainability Institute; SC Housing and Urban Development (HUD); private, cooperative, municipal, and investor-owned utilities (IOUs); SC Office of Economic Opportunity (SC OEO); SC Department of Labor, Licensing, and Regulation (SC LLR); state and local housing authorities; Councils of Government (COG); municipalities; non-profit organizations; and local communities.

Sub-Sector	Recommended Reduction Measure(s)
Energy Efficiency	<ul style="list-style-type: none"> Establish standard energy efficiency guidelines and/or a certification program, to encourage consistent program implementation by households, developers, and assistance providers. Promote energy efficiency through public education and outreach. Promote energy efficient appliances and technology.
Residential Building Practices	<ul style="list-style-type: none"> Encourage or incentivize builders and contractors meet criteria for energy efficiency standards such as Energy Star, Home Energy Score, and Home Energy Rating System (HERS) Index. Incentivize the use of carbon-storing building equipment such as sustainably sourced lumber as well as recycled materials.
Strategies to Reduce Use of Fossil Fuel-Based Energy Sources	<ul style="list-style-type: none"> Incentivize the deployment of solar, battery storage, new technologies (clean hydrogen), and microgrids in residential/multi-family housing. Coordinate with utilities to deploy demand-side management technologies and customer education. Coordinate with existing incentives or funding opportunities (e.g., SCOR’s Solar for All application, if funded) that provide new opportunities for community solar development. Educate the public about the benefits and safety of solar technology to encourage growth of public support.

7.6.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

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7.7 Greenhouse Gas Data Collection and Monitoring

7.7.1 Description

Statewide greenhouse gas and air pollutant monitoring can be easily and quickly deployed throughout the state to provide better monitoring capabilities.

Note: The final PCAP may include organizations that participated in Greenhouse Gas Inventory Action Team discussions here.

7.7.2 Recommended Reduction Measures

South Carolina’s recommended transportation reduction measures include public transit, electric vehicles (EVs) and alternative fuels, EV infrastructure, alternative transportation, ports, rail, and air. Key partners for implementation and development of projects or programs in this sector may include SC DOT, SC Ports Authority (SCPA), Palmetto Railways, SC Aeronautics Commission, SC Councils of Government (COG), municipalities, communities, and non-governmental organizations (NGO).

Sub-Sector	Recommended Reduction Measure(s)
	<ul style="list-style-type: none">• Install a network of GHG monitoring sensors statewide
Clemson University Statewide GHG Measurement Network	<ul style="list-style-type: none">• Clemson University builds and installs GHG and air pollutant sensors statewide to track emissions utilizing other monitoring networks and sites (e.g., weather stations, Intelligent River network), including locating sensors near disproportionately burdened communities.

7.7.3 Analysis

Implementing these reduction measures may reduce GHG emissions by up to **TBD** MMT CO₂e annually.

Note: The final PCAP will include a more thorough analysis of community benefits, co-benefits, and implementation readiness, authority, and funding required.

8 Community Analysis and Engagement

Note: The final PCAP will include a section summarizing the benefits of GHG emissions reductions for low-income and disproportionately burdened communities and present a strategy for continuing to engage communities in South Carolina's CPRG planning process.

9 Review of Authority

Note: The final PCAP will include a section that summarizes the existing statutory or regulatory authority in place to support the implementation of proposed GHG reduction measures. This section will also discuss implementation roles for partnering agencies and organizations and other entities.

10 Conclusions and Next Steps

Note: The final PCAP will include a section that discusses the next steps to develop the South Carolina Comprehensive Climate Action Plan (CCAP), the timeline for the CCAP development, and expected future engagement opportunities.