Winston-Salem

City of Winston-Salem

2020

Sustainability Plan

Office of Sustainability

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

Climate change is a growing threat to communities all over the world. There have been more instances of extreme weather events and progressively warmer years over the past decade than ever before. Continuing to be complacent about reducing emissions will have major repercussions on the future of our planet. Cities are turning towards planning and setting emissions reduction targets as mitigation and adaptation techniques. There is an opportunity for the City of Winston-Salem to follow suit and plan for climate based threats to the city.

City officials have begun to take action to push Winston-Salem in a more sustainable direction. As one example, in 2017, Mayor Allen Joines signed on to the Climate Mayors Agreement to adopt, honor and uphold the goals of the Paris Agreement. He was one of the first 60 of now over 400 mayors to sign this agreement.

Online reporting tools like CDP, formerly the Carbon Disclosure Project, and STAR Communities, now part of LEED for Cities, are useful in measuring baselines for the city. These tools provided a thorough gap analysis for sustainability opportunities across various sectors of the city. The results have shown those areas that need the most attention fall under climate, energy, and natural systems.

Various hazard and vulnerability assessments of the city show the major threats to Winston-Salem are extreme temperatures, drought, and flooding. These potential events present threatss to many of our local systems and resources, especially those identified in the gap analysis. With guidance from the Legacy 2030 comprehensive plan, this plan focuses on four areas identified to set targets for reducing emissions. In Table 1 below are listed the objectives and strategies for the City of Winston-Salem to take to reduce local government operation emissions.

Table 1. Summary of the objective and strategy recommendations

Reduction Target	No relevant objectives - this is a policy goal
Transportation	**Encourage employees to use more diverse modes of transportation and reduce vehicle miles traveled** Initiate a Transportation Demand Management program for city employees > Educate employees on other transportation options Collect and analyze data to track employee travel behavior > Survey employees to understand regular travel behavior Continue to install electric vehicle charging stations > Implement electric vehicle policies to prepare for increased infrastructure > Identify areas for future installations of electric vehicle charging stations
Energy Systems	**Energy Use Conservation** Participate in energy conservation efforts > Continue to participate in Daylight Hour campaign. Strive to reach 100% of city office participation in those offices that have non-essential lighting

Energy Systems	**Increase Efficiency** Replace lights in city facilities and on city owned properties with LEDs > Create a multi-phase implementation plan for LED replacement Establish standards for new or renovated government buildings to meet the energy efficiency standards from LEED and/or Energy STAR
	Explore renewable energy generation options Work with the local utility to identify potential locations for solar panels on city facilities > Partner with other North Carolina municipalities to collaboratively support growth in Duke Energy's renewable energy efforts > Research options for acquiring solar PV systems as a local government entity > Invest in the installation of solar panels on solar ready city facilities
Green Space	**Carbon Sequestration** Assess the state of the city's urban forest Continue to plant trees throughout the city and county > Utilize an urban forest assessment to identify the most available spaces for future Community Roots Day events
	Bee City USA Expand and upgrade the vegetative surfaces within city parks > Continue to further develop new and existing pollinator gardens in city parks > Identify other parks where pollinator gardens could be planted Implement pollinator friendly practices in field operations > Increase the number of native pollinator plants utilized in landscape maintenance and flower beds annually Identify potential local partnerships to further promote and expand pollinator-friendly habitats throughout the community
Waste Systems	**Waste Reduction** Increase recycling participation in city facilities > Ensure city employees have access to recycling in their work area Promote a green purchasing program that emphasizes the purchase and use of environmentally-friendly products and services by the local government > Promote the use of recycled or recyclable products throughout city facilities
	Increase Education and Awareness Educate city employees on recycling and sustainability best practices in the work place > Create educational material to put in departments to inform employees of options to reduce waste > Create a Workplace Sustainability Workshop for city departments
	Recycling Market Awareness Staff will monitor market conditions to determine whether changes in the recycling commodity stream or collection process are necessary Staff will work on pursuing a new recycling services contract

INTRODUCTION

Climate change has been described as the most significant environmental issue the world is currently facing, but the United States leadership has withdrawn support from the Paris Climate Agreement. The Paris Climate Agreement from 2016 is an international agreement between 195 countries to combat climate change and adapt to its effects. Because of the lack of federal leadership, it is necessary for states and local governments to use emission reduction strategies to manage the risk of climate change. According to the United Nations Intergovernmental Panel on Climate Change (IPCC)[i], "human influence on the climate system is clear, and recent anthropogenic[1] emissions of greenhouse gases are the highest in history." The IPCC goes on to state that "continued emission of greenhouse gases will cause further warming and long-lasting changes" around the world.

Climate and energy planning for cities is common practice as the threat of climate change increases. According to data from CDP, formerly the Carbon Disclosure Project, over 300 cities around the world have already set emissions reduction targets, 114 of which are in North America. Greenhouse gas emissions are a global problem due to the widespread and even distribution of the gases, according to the STAR Communities technical guide. But "local governments can impact the sources and sinks[2]" of air pollution in their jurisdictions through actions such as development of alternative transportation, improved energy efficiency, and an increase in vegetation[ii] (p. 100).

STATE LEVEL EFFORT IN NORTH CAROLINA

North Carolina is taking action to better prepare for climate threats across the state. In September 2017, Governor Roy Cooper committed North Carolina to the U.S. Climate Alliance. The U.S. Climate Alliance is a way for states to stay committed to the terms of the Paris Climate Agreement since the federal government pulled out. There have also been several state senate bills passed as early as 2007 related to energy use that includes details about efficiency, use of renewable sources for energy, and alternative fuels. For details on the specific senate bills, see Appendix B.

On October 29, 2018, Governor Cooper further promoted efforts towards climate action by signing Executive Order 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy[iii]. Executive Order 80 (EO80) lays out goals for the state of North Carolina to work toward by 2025. The general goals are as follows:

- Reduce statewide greenhouse gas emissions to 40% below 2005 levels
- Increase the number of registered, zero-emission vehicles to at least 80,000

[1] Meaning caused or influenced by humans.
[2] Meaning a process that absorbs more carbon than is released.

- Reduce energy consumption per square foot in state-owned buildings by at least 40% from fiscal year 2002-2003 levels

EO80 also includes specific goals for individual North Carolina State Departments, including the Department of Environmental Quality, Department of Transportation and the Department of Commerce. Additionally, EO80 created the North Carolina Climate Change Interagency Council. This council comprises representatives from each state cabinet agency to help provide further direction for climate change efforts.

The creation of the 2019 State Clean Energy Plan is the first major action that has resulted from the signing of EO80. The North Carolina Department of Environmental Quality (DEQ) is responsible for the "roadmap for pursuing [a] collective vision" to "increase the utilization of clean energy technologies, energy efficiency measures, and clean transportation solutions."[iv]

LOCAL LEVEL EFFORTS IN WINSTON-SALEM

Mayor Allen Joines and members of Winston-Salem City Council have taken action to push the city towards a sustainable future. Mayor Joines was one of the first 60 mayors in the country to sign on to the Climate Mayors Agreement in 2017 to adopt, honor and uphold the climate goals of the Paris Agreement. There are now over 400 mayors representing 70 million Americans that have committed to the Paris Climate Agreement goals.

In May 2018, the Mayor and City Council members approved the re-establishment of the Community Sustainability Program Committee. The committee provides reports and recommendations to the City Council about municipal greenhouse gas emissions and related sustainability issues. They act in an advisory capacity for relevant sustainability efforts and initiatives to elected officials and the Office of Sustainability.

Additionally, the Greenhouse Gas Inventory and Local Action Plan to Reduce Emissions was completed in August 2008. The plan analyzed city and community-wide emissions from 2000 to 2006 and provided data-based recommendations for improvement. Specific recommendations from the 2008 plan are in Table 1 below, along with information as to whether they were achieved. This plan has not been updated since its release.

Table 2. 2008 Local Action Plan Recommendations

Recommendation	Achieved?
Establish a community-wide stakeholder process to further develop the Local Action Plan	No
Designate a full-time sustainability manager to manage both the community-wide and internal operations processes	Yes
Establish a Community Sustainability Program Committee	Yes
Develop a Community Sustainability Awards Program	No
Develop public/private/community partnerships to promote the Local Action Plan and encourage participation in the process	Ongoing
Develop a public education program	No

Promote and expand energy conservation and sustainability measures in the residential, commercial, and industrial sectors	Yes – Residential Sector
Expand and enforce sustainable land use planning strategies	See Legacy 2030
Promote the use of alternative vehicles and fuels in the transportation sector	Yes (EV Stations)
Promote the use of alternative transportation measures within the community	Yes
Establish a goal of stabilizing GHG emissions in City operations by setting an interim target of stabilizing emissions by 2010	No
By 2010, determine the costs and best methods for reducing GHG emissions from City operations to 2006 levels	No

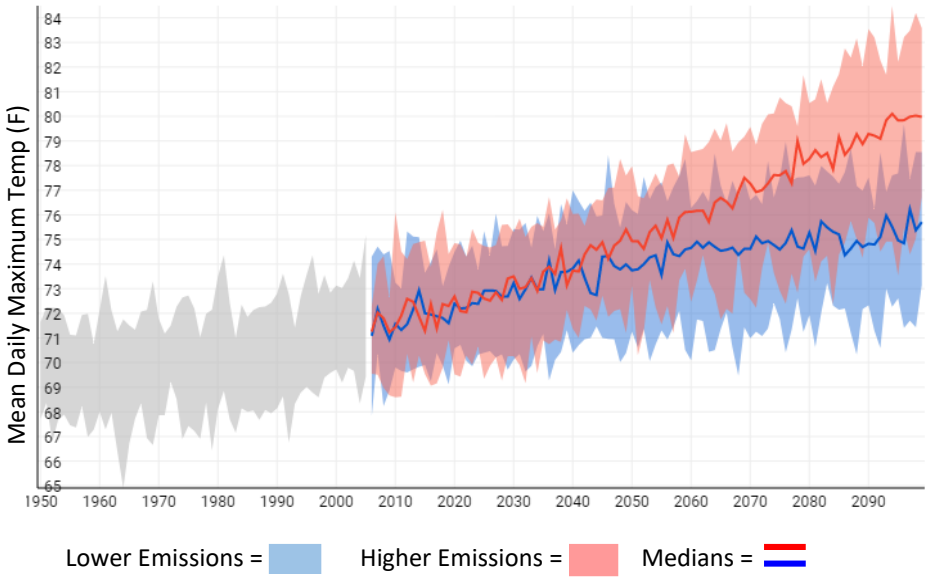
The following sections will act as a guide in how to lower emissions to a suggested level measured from the baseline year of 2008. The plan is meant to complement already existing goals identified in the Legacy 2030 plan and the City of Winston-Salem 2017-2021 Strategic Plan. This document is not meant to suggest a shift in priorities and goals.

WHERE WE STAND

The threat of climate change in recent years has become more evident. There have been several important reports released in past years about the magnitude of climate change impacts. First, the IPCC released the *Special Report on Global Warming of 1.5° C* in 2018. The IPCC presents information about why the world needs to limit warming to 1.5° C. This temperature threshold is important because exceeding it will have significant impacts on all aspects of human life, like increased death and illnesses from climate-related reasons, lack of access to food and water, and increased migration (CDP 2019, p. 3).[v] According to the CDP report For Cities by Cities, it will take ambitious action to limit global temperature rise to 1.5° C. We are currently on track for more than twice the safe limit by the end of the century. This is why leadership on a local level is necessary to achieve the limited warming of 1.5° C since "the effects of a city's actions are not limited to its own borders or region," (CDP 2019, p. 2).

According to the U.S. Global Change Research Program Climate Science Special Report, "the last few years have seen record-breaking, climate-related weather extremes," (2017 p. 10).[vi] The past five years (2015-2019) have been the five warmest years on record since 1880, when weather record-keeping began, according to the National Oceanic and Atmospheric Administration. The year 2019 was the second warmest year behind the record set in 2016[vii]. The longer we wait to reduce emissions, the more difficult and expensive it becomes to act. We also risk the health of our natural and human systems, the longer we postpone climate action. [viii] For example, projected weather patterns in Forsyth County could produce anywhere from 17 to 53 more extremely hot days per year, representing roughly another month of heat per year. [ix] In Figure 1, you can see a steady increase in emissions in Forsyth County linked to the predicted increase in temperature throughout this century.

Figure 1: Temperature projections for Forsyth County from NOAA U.S. Climate Resilience Toolkit.



In November 2018, the U.S. Global Change Research Program released the Fourth National Climate Assessment Volume II. The report is the follow-up to the Climate Science Special Report discussed above and it builds on the underlying scientific concepts from the first volume and applies them to impacts, risks and adaptation in the United States. The assessment found that in communities across the country, climate change presents challenges to human health and safety, quality of life, and economic growth.[x] More specifically, the report tells us that "many southeastern cities are particularly vulnerable to climate change compared to cities in other regions, with expected impacts to infrastructure and human health."[xi]

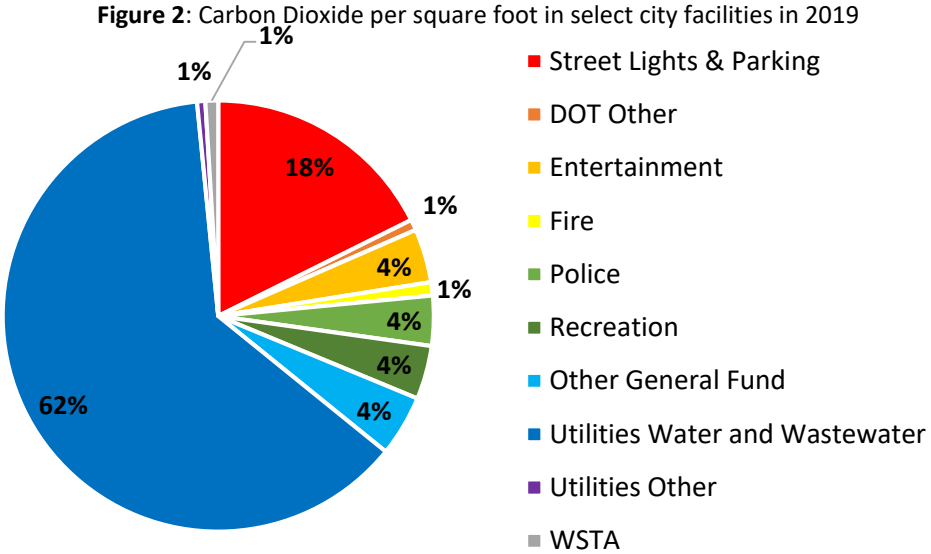
The biggest threats to the City of Winston-Salem are extreme temperatures, drought, and flood. At the root of these issues is the increase in greenhouse gas emissions. Greenhouse gas (GHG) emissions from man-made sources have increased more from 2000 to 2010 than in the past three decades.[xii] As the United States contributes a significant portion of these emissions, we need to do what we can at the local level to curb potential worst-case climate scenarios.

The city's Office of Sustainability is researching the potential risks threatening our community from GHG emissions. The office reports to the CDP, formerly the Carbon Disclosure Project, which allows local governments to report carbon emissions from operations and climate adaptation efforts each year.

In addition to this reporting, the office annually releases a sustainability report which includes energy, electricity and natural gas use from city-owned facilities to help benchmark municipal emissions. Figure 2 shows the carbon dioxide emissions per square foot from individual city facilities. This statistic shows the efficiency of the various facilities more effectively than total emissions as it accounts for changing square footage of the relevant departments.

Overall, the total emissions from internal operations in 2019 equals 154,550 tons of CO2, up 1.1% from the previous year's emissions, but are now virtually the same as the baseline year of 2008. The largest contributor to the emissions total in 2019 is the electricity use by municipal operations, comprising 83% of the total.

Figure 2: Carbon Dioxide per square foot in select city facilities in 2019



The data from the annual GHG reporting shows areas where the city can reduce emissions. The completion of the 2017 STAR Communities Rating System confirmed that the climate and energy fields and natural systems have the most room for improvement across city efforts. These areas need to show more progress to achieve lower emissions and reduce air pollution in the city.

The goals in this plan are the starting points in reducing emissions and improving air quality in the City of Winston-Salem local government operation. The goals and objectives for each section are as follows:

1. **Reduction Targets**
2. **Transportation Systems**
    a. Encourage employees to use more diverse transportation options
3. **Energy Systems**
    a. Energy use conservation
    b. Increase Efficiency
    c. Explore renewable energy generation options
4. **Green Space**
    a. Carbon Sequestration
    b. Bee City USA
5. **Waste Systems**
    a. Waste reduction
    b. Sustainability education and awareness
    c. Recycling market awareness

CLIMATE THREATS

Climate change is presenting threats that are becoming pressing matters to communities around the world. There have been more instances of extreme weather events and consistently warmer years over the past decade than ever before. The impacts of these, and other threats, will impact communities in different ways. Within Forsyth County, six ZIP codes are high risk for man-made environmental hazards, according to a 2018 report by Attom Data Solutions, summarized in a Winston-Salem Journal article.[xiii] The threatened ZIP code areas in Image 1 show the southwestern area of Forsyth County as the highest risk for man-made environmental hazards.

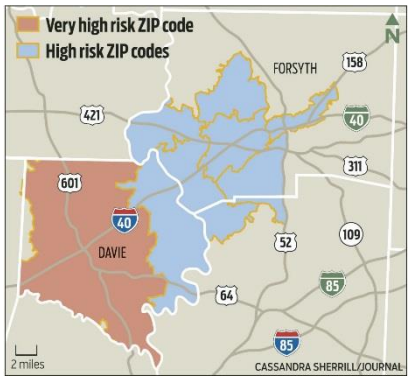


Image 1: At risk ZIP codes for man-made environmental hazards. Source: Cassandra Sherrill/Journal

Table 2 shows the most relevant climate vulnerability and risks in the city. This information is provided by the University of Notre Dame Urban Adaptation Assessment from 2018. A lower risk score and a higher readiness score is an ideal assessment.

Table 3. Local climate vulnerabilities and risks

Event Type	Historical Average Cost (2011-2015)	Probability of 2040 event	Projected Cost	Risk	Readiness
Flood	$ 3,000.00	Low	$ 548,792.00	29.5%	58.1%
Heat	0 Casualties	Medium	N/A	27.9%	58.1%
Cold	0 Casualties	Low	N/A	27.9%	58.1%
Drought	$ 29,629.00	Medium	$ 91,079.00	41.8%	58.1%

SECTION 1

REDUCTION TARGET

In 2008, the City of Winston-Salem began to measure municipal operations emissions based on levels of carbon dioxide emissions from internal operations. The total emissions covers electricity and natural gas use in city facilities and vehicle fuel from city vehicles. The city also published a study in 2008 measuring greenhouse gas emissions in the community. The Office of Sustainability has continued to measure internal emissions since 2008. Through 2019, there has been a 1.08% decrease from the baseline year. The trend is inconsistent from year to year, and it is clear that the city has room to work towards a steady decrease in emissions. An important step towards reaching that goal is to set an emissions reduction target. According to the CDP data, more than 200 cities around the world have set emissions reduction targets with over 100 being North American cities. In North Carolina, there are a number of cities with local government operation targets seen in Table 5.

Table 4. Local government operation reduction goals in North Carolina

City	Goal
Apex	100% renewable energy by 2050
Asheville	80% below 2001-2002 ASAP
Cary	13% below 2020 business as usual
Chapel Hill	60% below 2005 by 2050
Charlotte	100% zero carbon for buildings/fleet by 2030
Durham| Co.	50% below 2005 by 2030
Hillsborough	80% renewable energy by 2030
Orange Co.	20%, 10% and 5% reductions from 2010 for buildings, vehicles, and water

MEASURING SUCCESS

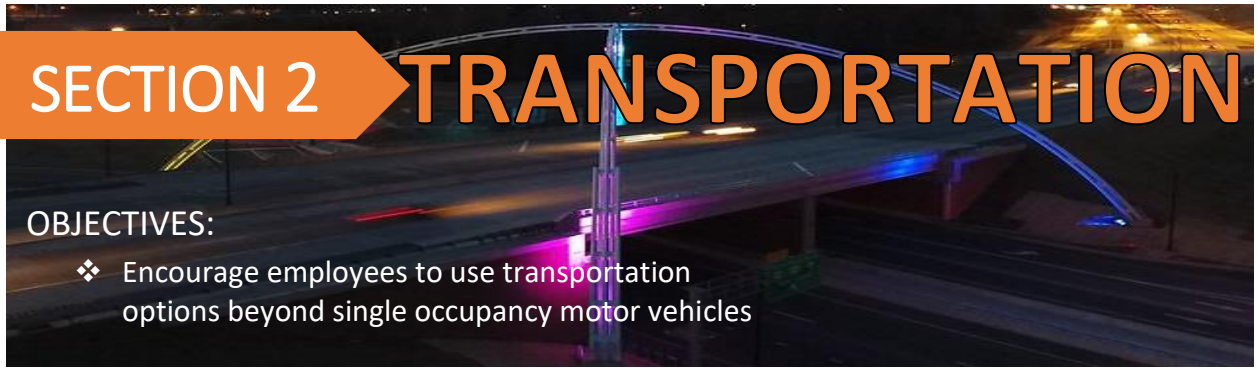
These actions are those that have been successfully implemented in the city that demonstrates our work towards reducing general emissions.

- CDP reporting
- Annual greenhouse gas reports for municipal operations
- STAR Communities rating system
- Community Sustainability Program Committee

POLICY SUGGESTIONS

- Establish a local government emissions target reduction goal of a 15% decrease by 2025 from baseline levels in 2008.[3]

[3] See Appendix B for a more detailed summary of the reduction goals we would need to meet annually



SECTION 2 TRANSPORTATION

OBJECTIVES:

- Encourage employees to use transportation options beyond single occupancy motor vehicles

The transportation sector is one of the biggest contributors to greenhouse gas emissions and air pollution communitywide. Within local government operations, vehicle fuel use accounts for about 15% of total emissions. Since 2008, the percentage of emissions from city fuel use has changed marginally, staying within one percent of the baseline data. Employee daily commutes are not considered in the city fuel use calculations.

Vehicle miles traveled also play a significant role in transportation emissions. Where people work has an enormous impact on their daily commute. Workplaces that are located in walkable neighborhoods with access to transit service and a variety of nearby destinations enable employees to rely less on their personal vehicles for commute and daytime trips. This can result in lower congestion and pollution impacts. For the City of Winston-Salem, the average daily vehicle miles travelled generated by each employee commuting to work is 20.1 miles per person per day. These travels account for about 4700 pounds of greenhouse gas emissions per year.[xiv]

The main goal of the following transportation objectives is to promote diverse modes of transportation among employees to reduce vehicle miles traveled. There is overwhelming dependence on automobile travel, particularly single-occupancy vehicles, with around 80% of city employees driving alone to work.[xv] This creates congestion, worsens air pollution and increases carbon emissions. As one of the three most sprawling North Carolina cities, actions taken to mitigate impacts from this sector are necessary.[xvi]

MEASURING SUCCESS

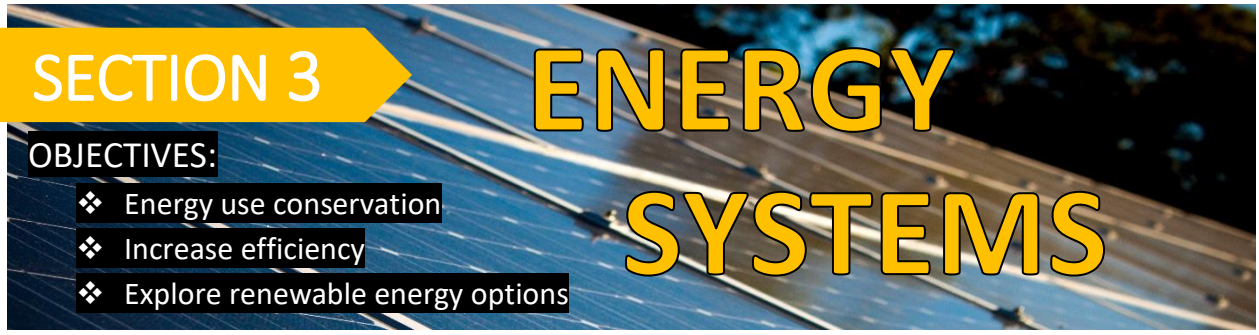
These actions are those that have been successfully implemented in the city to reduce emissions and improve air quality in the Transportation & Development sector.

- There are currently three public electric vehicle charging stations that the city installed since 2012 for those in the community who own electric vehicles.
- Action taken toward applying for the Zero Emissions Vehicle DC Fast Charging stations for the community through the Volkswagen settlement money provided to North Carolina
- Winston-Salem Transit Authority (WSTA) continues to seek grants to increase the number of hybrid buses in operation and replace 21 diesel buses with 21 hybrids.
- There is a bicycle master plan to help prioritize future projects for non-motorized transportation.
- The Winston-Salem Department of Transportation installed a community bike share program focused in the downtown area of Winston-Salem.
- Property and Facilities Management secured and completed a Clean Fuel Advanced Technology (CFAT) grant, which provided funding to add propane as a fuel source for 31 city vehicles.

OBJECTIVES

- **Encourage employees to use transportation options beyond single occupancy motor vehicles**
  The intent of this objective is to reduce pollution by promoting a wider variety of transportation options beyond the single occupancy motor vehicles. Using other forms of transit to commute will also help reduce vehicle miles traveled by city employees.
  - STRATEGY 1: Initiate a Transportation Demand Management program for city employees
    - ACTION 2: Offer educational opportunities to employees to spread awareness of walking, biking, etc. as a means of transportation
  - STRATEGY 2: Collect and analyze data to track employee travel behavior
    - ACTION 1: Survey employees to understand regular travel behavior
  - STRATEGY 3[4]: Continue to install electric vehicle charging stations for public use
    - ACTION 1: Identify areas for future installations of electric vehicle charging stations
    - ACTION 2: Implement electric vehicle policies to prepare for increased public electric vehicle infrastructure

[4] This strategy is from the Legacy 2030 Comprehensive Plan



SECTION 3

ENERGY SYSTEMS

OBJECTIVES:

- Energy use conservation
- Increase efficiency
- Explore renewable energy options

Energy systems in the United States account for a significant portion of emissions. Per capita energy use in the US is over 72% greater per person than in the rest of the world.[xvii] Contributing factors include industrial development, quality of life expectations, reliable power transmission, and safety. However, this means that there is room to improve systems and explore alternatives, such as renewable sources. One option is to make old buildings more energy efficient and create energy standards for new development. Another option is to look at forms of alternative transportation for community members. These two sectors along consume 47.6% and 28.1% of all energy produced in the country.[xviii]

In Winston-Salem, energy systems, like the use of electricity in city facilities, account for a majority of local government emissions. In 2018, 87% of local government emissions came from electricity and natural gas combined, which accounts for 133,553 tons of carbon dioxide. The city consumed a total of 10.4 million more kilowatt-hours (kWh) in 2018 than in 2017, a 9.5% increase.

Renewable energy options are becoming an important consideration for energy systems. Many states and cities are investing in renewable energy sources. One hundred cities worldwide are using at least 70% of renewables for their electricity needs. According to the CDP, in the United States there are currently four cities that are running on at least 70% renewables: Eugene, OR; Seattle, WA; Burlington, VT and Aspen, CO.[xix] In the United States, North Carolina ranked 28th in renewable energy consumption at 8% use. The state also ranked 24th in renewable energy production at 27.6%.[xx] In Winston-Salem, we are getting 6.48% of our energy from renewable sources according to Duke Energy. This percentage is below both the state and national averages of 9.9% and 17.2%, respectively, according to the U.S. Energy Information Administration.

MEASURING SUCCESS

These actions are those that have been successfully implemented in the city to reduce emissions and improve air quality in the Energy sector.

- Installation of LED lights in city facilities including the Annex, City Yard facilities, and parking decks
- Solar panels used on top of certain parking meters
- Participation in the Daylight Hour campaign

OBJECTIVES

- **Energy Use Conservation**

Energy use conservation in the form of reduction in use in city facilities and buildings is considered in the following strategy and actions.

- STRATEGY 1: Participate in energy conservation efforts

- ACTION 1: Continue to participate in Daylight Hour and increase the percentage of city offices participating to 100%.
  - NOTE: Only those offices and areas that can turn off all non-essential lighting will count towards the 100% participation rate. Offices that need the lights or that are essential to operations will not be included.

❖ **Increase Energy Efficiency**

This goal considers behaviors and technologies that reduce energy use in buildings. Lack of efficiency in buildings account for a majority of the energy use in the United States. For the city's internal carbon dioxide emissions, city-owned buildings make up 15% of annual emissions. There is opportunity to decrease this percentage by making more buildings energy efficient.

- STRATEGY 1: Replace lights in city facilities with LEDs
  - ACTION 1: Create a multi-phase implementation plan for LED replacement
- STRATEGY 2[5]: Establish standards for new or renovated government buildings to meet the energy efficiency standards from LEED and/or Energy STAR

❖ **Explore renewable energy generation options**

Investing in alternative energy sources is one way to save money as conventional energy prices rise. Solar, wind, and hydro systems are all becoming cheaper and more accessible. The Legacy 2030 plan identified renewables as a policy issue and an action to further examine and the local level.

- STRATEGY 1: Work with the local utility and the City/County Planning Department to identify potential locations for solar panels on city facilities
  - ACTION 1: Partner with other North Carolina municipalities to collaboratively support growth in Duke Energy's renewable energy efforts.
  - ACTION 2: Research options for acquiring solar PV systems as a local government entity
  - ACTION 3: Invest in the installation of solar panels on solar ready city facilities

[5] This strategy is from the Legacy 2030 Comprehensive Plan

SECTION 4

GREEN SPACE

OBJECTIVES:

- Carbon sequestration
- Bee City USA

Green space is important to cities for many reasons. Green spaces provide many ecosystem services, recreational areas, and habitat for local animals and pollinators. In this section, there is a focus on certain important ecosystem services to improve air quality in the city. By having more green space and vegetation, cities can reduce impacts from climate change and air pollution. Green infrastructure is an effective way to address these problems as it can use natural systems found in nature to enhance environmental quality. One specific example of the benefit of green infrastructure is the ability of tree canopy cover and vegetative surfaces to provide a cooling effect for surrounding areas. The tree canopy is at the same time working to remove harmful pollutants from the air.

One of the most effective ways green infrastructure could reduce air pollution in Winston-Salem is through tree planting and preservation. While the city has an ordinance to preserve trees, there is not a clear understanding how development is impacting the local tree canopy as a whole. According to the North Carolina Forest Service, "finding out what your current coverage is, and monitoring regularly, will help you know if you are achieving your goals and if your tree ordinance is working as you intended in terms of maintaining or increasing cover." The group also states that "the benefits of areas of trees, and the resiliency and health of these areas and the people and wildlife using them, increase with size."[xxi] (Macie 2017, p. 12).

Green infrastructure can be further utilized to promote the health and support of wildlife and pollinator populations. As a recently established Bee City USA, the City of Winston-Salem has committed to protect local pollinator populations. In this context, relevant green infrastructure could be pollinator gardens, increased vegetative cover in city parks, and an increase in native pollinator plant species planted throughout the city.

MEASURING SUCCESS

These actions are those that have been successfully implemented in the city to reduce emissions and improve air quality in the Land Use sector.

- Annual Community Roots Day tree planting event by Keep Winston-Salem Beautiful
- Designation as a Tree City USA since 2001
- Designation as a Bee City USA since 2018
- Inventory of existing pollinator assets including city maintained flower beds and the flower bed program
- Installation of Bee City USA signs
- Pollinator week recognition and celebrations

OBJECTIVES

❖ **Carbon Sequestration**

Carbon sequestration is the process of capturing and storing carbon dioxide from our atmosphere, according to the United States Geological Survey agency. It is often the result of increased green infrastructure features such as a street tree system, green roofs, and an interconnected park system.

- STRATEGY 1[6]: Assess the state of the jurisdiction's urban forest
- STRATEGY 2: Continue to plant trees throughout the jurisdiction
  - ACTION 1: Utilize an urban forest assessment to identify the most available spaces for future Community Roots Day events

❖ **Bee City USA**

The Bee City USA program aims to protect pollinators in the City of Winston-Salem by raising awareness through education opportunities, enhancement of habitats and celebrating achievements among other efforts. In light of becoming the 75th Bee City USA in 2018, the city commits to improving efforts to protect and improve pollinator habitats and understanding.

- STRATEGY 1: Expand and upgrade the vegetative surfaces within city parks
  - ACTION 1: Continue to further develop new and existing pollinator gardens in city parks
  - ACTION 2: Identify other parks where pollinator gardens could be planted
- STRATEGY 2: Implement pollinator friendly practices in field operations
  - ACTION 1: Increase the number of native pollinator plants utilized in landscape maintenance and flower beds annually
- STRATEGY 3: Identify potential local partnerships to further promote and expand pollinator-friendly habitats throughout the community

[6] This strategy is from the Legacy 2030 Comprehensive Plan

Waste and the waste stream are quickly becoming more important topics across the country, especially as they relates to recycling. With recent changes made by China in what they will accept from the United States' recycling programs, it has led to rapidly changing recycling markets. China now only accepts recyclable materials with a contamination rate limited to 0.5%. In comparison, the City of Winston-Salem has a consistent recycling rate between 10-20%.

The issue of contamination in the waste stream is important to address around the country. Many cities may need to fundamentally change how they recycle if they don't want recyclables ending up in landfills. Recycling improves air quality by preventing more greenhouse gas emissions, saving resources like trees and water, and saving landfill space. The recycling that was collected in the City of Winston-Salem alone in FY 18-19 avoided just over 21,000 metric tons of emissions, preserved 87,484 mature trees and 51 million gallons of water, and saved roughly 42,000 cubic yards of landfill airspace.[xxii] Reducing garbage but increasing recycling tonnage will continue to avoid worsening air pollution and preserve resources. In order to do this, it is necessary to pay attention as the recycling markets continue to change and to plan for the future.

The uncertainty around the future of recycling is something municipalities also need to consider when planning for the future of the waste industry. If Winston-Salem wants to continue to recycle, but make sure the contamination rate stays below a reasonable threshold, start by looking internally. Action from the local government to educate employees on correct recycling practices and reduce contamination in city facilities is a good way to demonstrate the importance of doing so to the rest of the community. Eventually, it could lead to further sustainable changes from the local government such as looking at the products purchased and making a conscious effort to purchase more sustainable options.

MEASURING SUCCESS

These actions are those that have been successfully implemented in the city to reduce emissions in the Waste sector.

- Operation of a Materials Recovery Facility (MRF)
- Utilities extracts and converts methane gas from the Hanes Mill Road Landfill to electricity under contract with Salem Energy Systems.
- The City of Winston Salem contracts with Waste Management, Inc. for single-stream, bi-weekly recycling collection to increase the quantity of recyclables being diverted from the landfill

OBJECTIVES

- **Waste Reduction**

  Recycling is an important form of waste reduction. It helps keep materials that can be turned into other goods out of the landfill. Recycling also helps reduce the amount of natural resources that need to be processed in order to create those same goods, ultimately avoiding unnecessary emissions of carbon dioxide and other greenhouse gases.

  - STRATEGY 1: Increase recycling participation in city facilities
    - ACTION 1: Ensure all city employees have access to recycling in their work area
  - STRATEGY 2[7]: Promote a green purchasing program that emphasizes the purchase and use of environmentally-friendly products and services by the local government
    - ACTION 1[8]: Promote the use of recycled or recyclable products throughout city facilities

- **Increase Education and Awareness**

  Increasing education around recycling practices is an important part of recycling right. Contamination of the waste stream is a common problem which can be addressed through proper education of how to correctly recycle. It is also important to spread awareness related to the choices consumers can make to reduce the amount of waste they create. Reducing waste will also help reduce the amount of contamination.

  - STRATEGY 1: Educate city employees on recycling best practices in the work place
    - ACTION 1: Create educational materials to put in departments to inform employees of the options they have to reduce waste
    - ACTION 2: Create a Workplace Sustainability Workshop that focuses on sustainability and recycling practices for city departments

- **Recycling Market Awareness**

  Recycling markets are rapidly changing, in large part due to the restrictions China placed on the recycled materials they accept. It is important for staff to stay informed of relevant changes and how those may impact the local market and the city's recycling program.

  - STRATEGY 1: Staff will monitor market conditions to determine whether changes in the local recycling stream or collection process are necessary
  - STRATEGY 2: Staff will work on pursuing a new recycling services contract

[7] This strategy is from the Legacy 2030 Comprehensive Plan

[8] This action is from the Legacy 2030 Comprehensive Plan

APPENDIX A

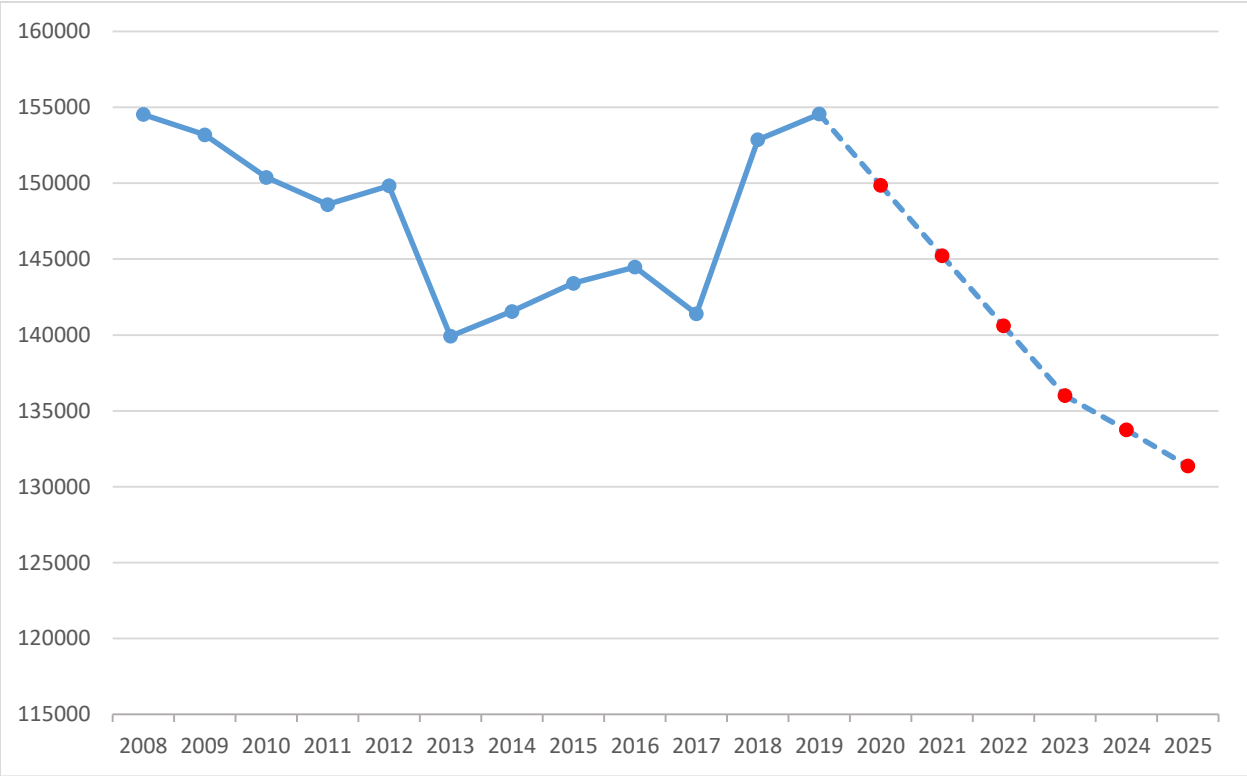
Table 5. Annual reduction target goals

YEAR	TOTAL	PERCENT REDUCTION
2008	**154,537**	**Baseline**
2009	**153,194**	**0.9%**
2010	**150,392**	**2.7%**
2011	**148,598**	**3.8%**
2012	**149,833**	**3.0%**
2013	**139,926**	**9.5%**
2014	**141,554**	**8.4%**
2015	**143,412**	**7.2%**
2016	**144,477**	**6.5%**
2017	**141,401**	**8.5%**
2018	**152,873**	**1.1%**
2019	**154,550**	**0.0%**
2020	149,850	3.0%
2021	145,200	6.0%
2022	140,600	9.0%
2023	136,000	12.0%
2024	133,750	13.5%
2025	131,360	15.0%

In Table 5, the bolded information is that which has already been measured and confirmed by the City of Winston-Salem Energy Manager. The rest of the information in the table are the projected emissions from city operations on an annual basis. The reduction target goals are listed in a percent reduction from the baseline number, which is in red. The target reduction goal is based on the outcome of energy upgrades to city facilities. The actual reduction achieved by 2025 may be higher if further action is taken in addition to the basic energy upgrades assumed.

Figure 3 is a graphic representation of the table above.

Figure 3: Projected carbon dioxide emissions from internal operations with a 15% reduction target goal by 2025



APPENDIX B Senate Bills from State Climate Action Plan[xxiii]

- Senate Bill (SB) 3 (Promote Renewable Energy/Energy Efficiency) includes the following:
    - Requires a percentage of energy sales in North Carolina to come from new renewable sources and efficiency measures on the following schedule: 3% by 2012 (up to 0.75% from efficiency); 6% by 2015 (up to 1.5% from efficiency); 10% by 2018 (up to 2.5% from efficiency); and 12.5% by 2021 (up to 5% from efficiency).
    - Requires specific amounts of electricity sales from: (1) solar (0.02% in 2010 up to 0.2% in 2018); (2) swine waste (0.07% in 2012 up to 0.2% in 2018); and (3) poultry waste (170,000 megawatt hours in 2012 up to 900,000 megawatt hours in 2014.
    - Requires any new biomass energy facility to meet Best Available Control Technology (BACT). Other language was included to ensure that renewable energy technologies do not have secondary, undesirable consequences. Impacts on residential consumers must not exceed $10 per year 2008-2011; $12 per year 2012-2014; and $34 per year 2015 and beyond.
    - Allows for ongoing review of construction costs for new power plants and recovery of costs in a general rate case.
- SB 567 (Allow Distribution of E-Blend Fuels) - Allows E85 to be dispensed from dispensers approved for E10 provided the manufacturer has initiated the process for approval by an independent testing lab.
- SB 1272 (Definition of Biodiesel) - An individual that produces biodiesel for use in a private (non-commercial) vehicle is exempt from the motor fuels tax.
- SB 1277 (State Diesel Vehicles' Warranties/B20 Fuel) - Every new diesel vehicle purchased by the State shall be covered by an express manufacturer's warranty that allows the use of B20 fuel.
- SB 1452 (Diesel School Buses to Use Minimum B20 Fuel) - Requires that 2% of the annual diesel used by North Carolina school buses be B20 by June 2008 (2% = ~ 500,000 gallons).
- SB 668 (Energy Conservation in State Buildings) - Energy Conservation in State Buildings – Specific performance criteria and goals for sustainable, energy efficient public buildings must be established.
- SB 670 (Energy Devices That Use Renewable Resources) - Use of Solar Collectors on detached single-family residences – As long as they aren't facing public access or common areas, an ordinance, deed restriction, covenant and other similar agreements cannot prohibit or have the effect of prohibiting their installation.

---

[i] Pachauri, R. K., Meye, L. A. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva, Switzerland, 151 pp. 2

[ii] STAR Communities (2016). Technical Guide to the STAR Community Rating System Version 2.0, pp. 100.

[iii] Executive Order No. 80 (2018).

[iv] North Carolina Department of Environmental Quality (2019). Clean Energy Plan. Retrieved from https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-16

[v] CDP (2019). For Cities by Cities report. Page 3. Retrieved from https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/695/original/For_Cities_By_Cities_1.5C_Final.pdf?1568017117

[vi] Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, B. DeAngelo, S. Doherty, K. Hayhoe, R. Horton, J.P. Kossin, P.C. Taylor, A.M. Waple, and C.P. Weaver (2017): Executive summary. In: *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. U.S. Global Change Research Program, Washington, DC, USA, pp. 12-34, from https://science2017.globalchange.gov/chapter/executive-summary/

[vii] NOAA (2020). National Centers for Environmental Information, State of the Climate: Global Climate Report for Annual 2019. Retrieved from: https://www.ncdc.noaa.gov/sotc/global/201913

[viii] CDP (2019). For Cities by Cities report. Page 2. Retrieved from https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/695/original/For_Cities_By_Cities_1.5C_Final.pdf?1568017117

[ix] *Risky Business Report* (June 2014). Page 26.

[x] USGCRP, 2018. Summary Findings. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018. Retrieved from: https://nca2018.globalchange.gov/

[xi] Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm, 2018. Chapter 19: Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 743–808. doi: 10.7930/NCA4.2018.CH19. Retrieved from: https://nca2018.globalchange.gov/chapter/19/

[xii] IPCC Fifth Assessment Report. *Climate Change 2014: Mitigation of Climate Change*. Retrieved from http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_technical-summary.pdf

[xiii] Craver, R. (2018, February 27). *Fewer Local ZIP Codes are Very High Risk for Environmental Hazards*. Retrieved from http://www.journalnow.com/business/fewer-local-zip-codes-are-very-high-risk-for-environmental/article_d8c06c51-c5fa-54d1-839a-f62c622ff355.html?utm_source=WSJ%20Email

[xiv] General Services Administration (2017). *Smart Location Calculator – Measuring the environmental benefits of workplace location efficiency.* Retrieved from https://www.slc.gsa.gov/slc/#

[xv] See previous source.

[xvi] North Carolina Conservation Network (2019). North Carolina: State of the Environment. Page 18. Retrieved from https://www.ncconservationnetwork.org/wp-content/uploads/2019/05/SOE-Summary-Report.pdf

[xvii] U.S. Energy Information Administration. "How much energy does a person use in a year?" Retrieved from https://www.eia.gov/tools/faqs/faq.php?id=85&t=1

[xviii] STAR Communities (2016). Technical Guide to the STAR Community Rating System Version 2.0, pp. 116

[xix] CDP. (n.d.). *The World's Renewable Energy Cities*. Retrieved from https://www.cdp.net/en/cities/world-renewable-energy-cities

[xx] Future Now. (n.d.). *America's Goals for 2030: North Carolina Report Card*. Retrieved from https://www.americasgoals.org/reportcard/#/state/NC

[xxi] Macie, E. (2017). *Developing Tree Protection Ordinances in North Carolina: A Guide to Local Ordinance Creation*. Nicholas Institute for Environmental Policy Solutions for (and with guidance from) the Urban & Community

Forestry Program of the North Carolina Forest Service and the North Carolina Wildlife Resources Commission. Page 12. Retrieved from https://www.ncforestservice.gov/Urban/pdf/treeProtection.pdf

[xxii] Waste Management (September 2019). WMRA of the Piedmont 2018-19 Recycling Benefits for City of Winston-Salem, North Carolina.

[xxiii] Peterson, T. D., Taylor, J., Cullen, L., Strait, R., Bailie, A., Colburn, K., Dougherty, B., Hausker, K., Kartha, S., Lem, L., Roe, S., Schroeer, W., Von Hippel, D., Wei, D. (2008). *Recommended Mitigation Options for Controlling Greenhouse Gas Emissions*. North Carolina Climate Action Plan Advisory Group pp. 22. Retrieved from http://www.climatechange.nc.gov/Part_1_Cover_TOC_Preface_ExSum_Chapters.pdf