
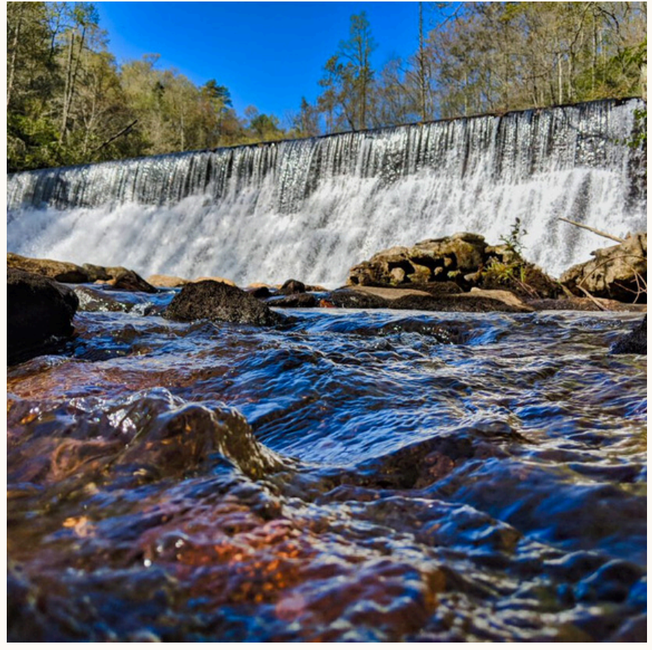

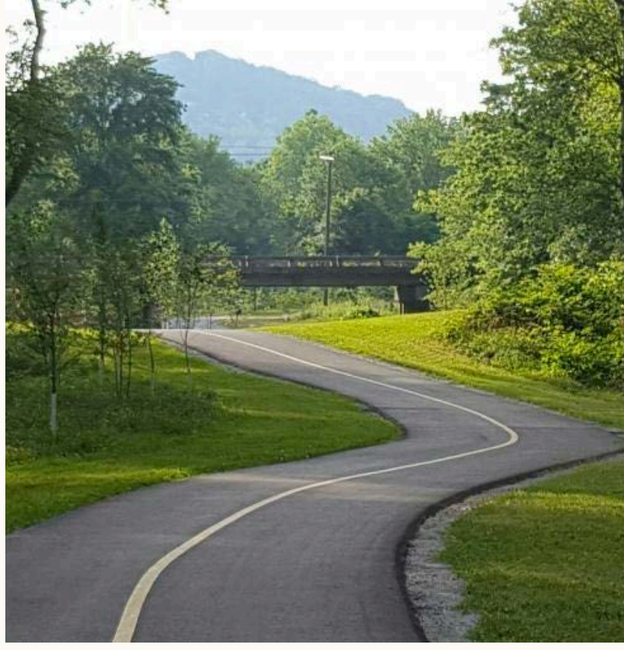

CITY OF HENDERSONVILLE

Sustainability Strategic Plan

2024

ACKNOWLEDGEMENTS

CITY LEADERSHIP

Mayor Barbara Volk
Mayor Pro Tem Lyndsey Simpson
Council Member Jennifer Hensley
Council Member Debbie O'Neal-Roundtree
Council Member Jeff Miller
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Garrett Demoss
Elizabeth Erwin

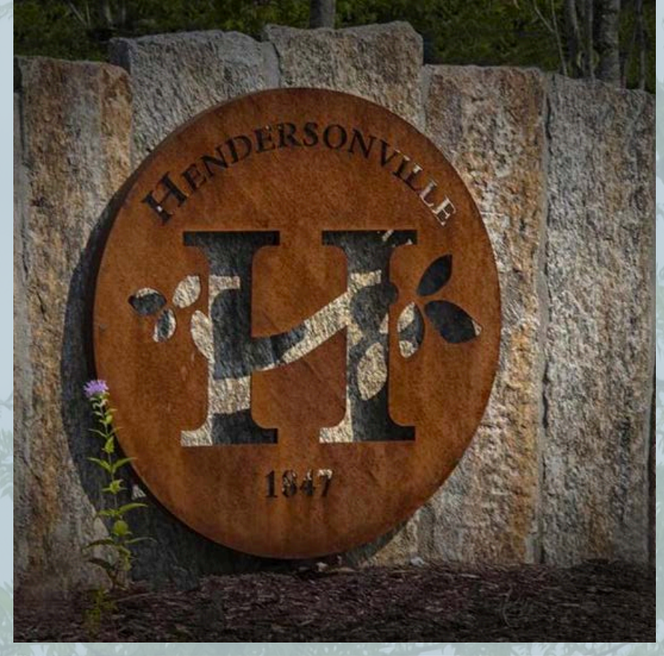
CITY BOARDS

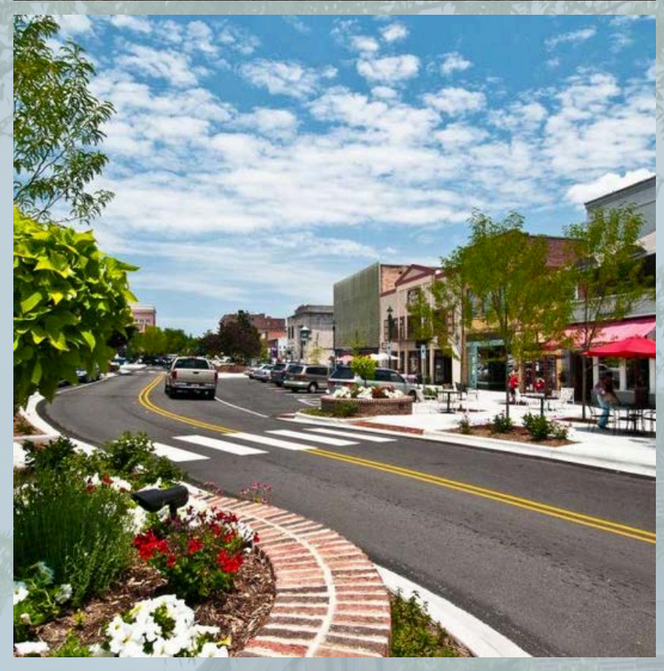
Environmental Sustainability Board
Tree Board
Diversity, Equity, & Inclusion Board

PHOTOGRAPHY

Camera Club of Hendersonville
Friends of Oklawaha Trail

The City of Hendersonville would like to thank and recognize all community groups and members who gave their time and energy to bring this plan to life.





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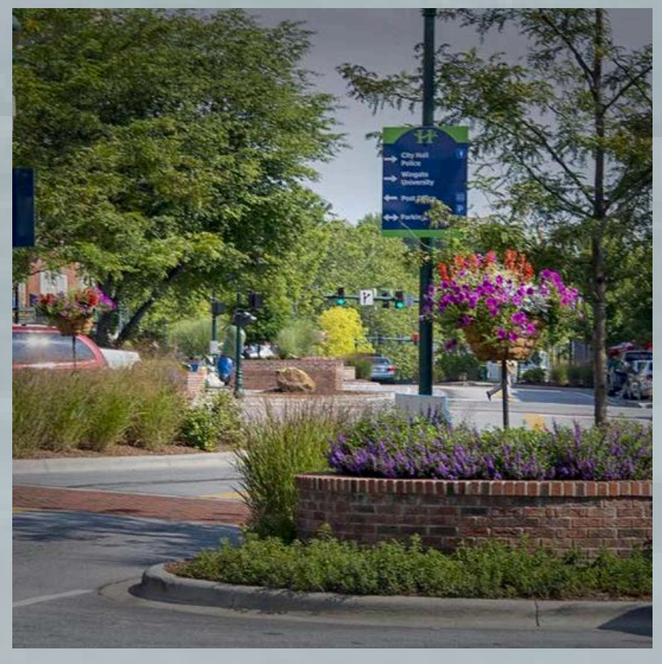



Letter from the Environmental Sustainability Board

What started as an initial goal of this board along with encouragement from our City Council liaison, Lyndsey Simpson, we are pleased to see this plan come to life. The mission of the Environmental Sustainability Board has always been to advise City Council in matters pertaining to environmental sustainability in the City of Hendersonville. A sustainability plan puts to action this mission in a way that ensures long-term success and is a necessary plan for this board and City at large to ensure we uphold sustainability as a key priority.

The inception of this plan began with a subcommittee formed of board members and community advocates who met for over a year in drafting the framework for this plan which included the five referenced focus areas as well as actions on the municipal and community level. Woven throughout are community level actions and resources related to the five focus areas that we hope will excite and encourage our community to take action in implementing more sustainable practices.

It became evident that to bring this plan to fruition and ensure sustainability is a key component to City operations and planning, that a paid staff member position would be essential. We commend this City Council for filling that position and supporting our efforts in the creation of this plan which along with this board of dedicated sustainability advocates, we can see a brighter future for our community and future generations.

City of Hendersonville Sustainability Strategic Plan

The City of Hendersonville's City Council recognizes the following core values and beliefs related to sustainability that should be upheld as stated in Resolution R-21-53:

- The City will evaluate the environmental sustainability of all projects and programs while maintaining a solid relationship with residential and business development;
- The City believes that it is our responsibility to protect all our natural resources and the environment through the implementation of sustainable and responsible projects;
- The City must lead by example by evaluating all city operations to ensure they protect or repair the natural environment and are environmentally sustainable; and
- The City will prioritize the protection of existing tree canopy and the development of greenspaces and parks.

In order to implement these values and beliefs, the City has created this Sustainability Strategic Plan which outlines measurable goals and actions to reduce our overall impact on the environment while strengthening our communities, especially those underserved to ensure we have a prosperous future now, and for generations to come. This plan addresses challenges with a path forward on actionable and measurable opportunities to reduce the City's municipal greenhouse gas emissions, GHG.

The five main focus areas for this plan include:

- Energy
- Transportation
- Waste Management
- Land Management
- Water

Within each of these focus areas are specific recommended actions designed to help reach our strategic goal of 30% reduction in greenhouse gases, GHG by 2035. This plan will be updated every 5 years to ensure our actions are ambitious yet achievable.

Community members provided input at two public meetings to inform and prioritize what actions the Plan should include.

A Challenge & Opportunity

The principles of sustainability integrate environmental, social, and economical values into solutions to some of the world's biggest challenges: social inequity, environmental health, air pollution, increasing operational costs and more.

For the City of Hendersonville, our community character and way of life is strongly rooted in the natural environment of the Appalachian mountains. As the population increases, we must look for opportunities to reduce our impact on the environment through integrating sustainability within city planning and operations.

The primary purpose of this Plan is to reduce the overall greenhouse gas emissions for City operations while preserving our environment. While some actions relate more to the community level such as increased bikeability and walkability infrastructure or recycling, this Plan focuses specifically on sustainability goals and actions at the municipal operational level with recommendations for residents, businesses, and community members.

What Does "Sustainability" Mean?

The meaning can vary across different fields and disciplines with three constant principals: economic viability, environmental protection, and social equity. For the City of Hendersonville, we must have smart growth that is both economically sound while respecting our environment for the collective community.

Where We've Come & Where We Are Going

Below is a summary of the history of sustainability in Hendersonville to show how far we have come and what opportunities lie ahead. This is not meant to be an exhaustive list but rather to show a snapshot of key accomplishments.

1991

Hendersonville becomes a Tree City USA member followed by the creation of the Tree Board

2007

Stormwater Division created

2012

Helping Hand Outreach or H2O assistance program started by Water & Sewer Dept. as a way to assist low and moderate-income families unable to pay for a City water and sewer bill

2015

Environmental Sustainability Board created

Hendersonville becomes a Bee City USA member

2024

City Council approves creation of Affordable Housing Steering Committee

2023

Sustainability Division created and first sustainability manager hired

First City electric vehicle purchased

2022

Environmental Sustainability Board initiates City Sustainability Plan

Hendersonville becomes a Caregivers of Mother Earth City

First City hybrid vehicle purchased

2021

City Council passed resolution including sustainability and tree canopy as key priorities

Greenhouse Gas Assessment

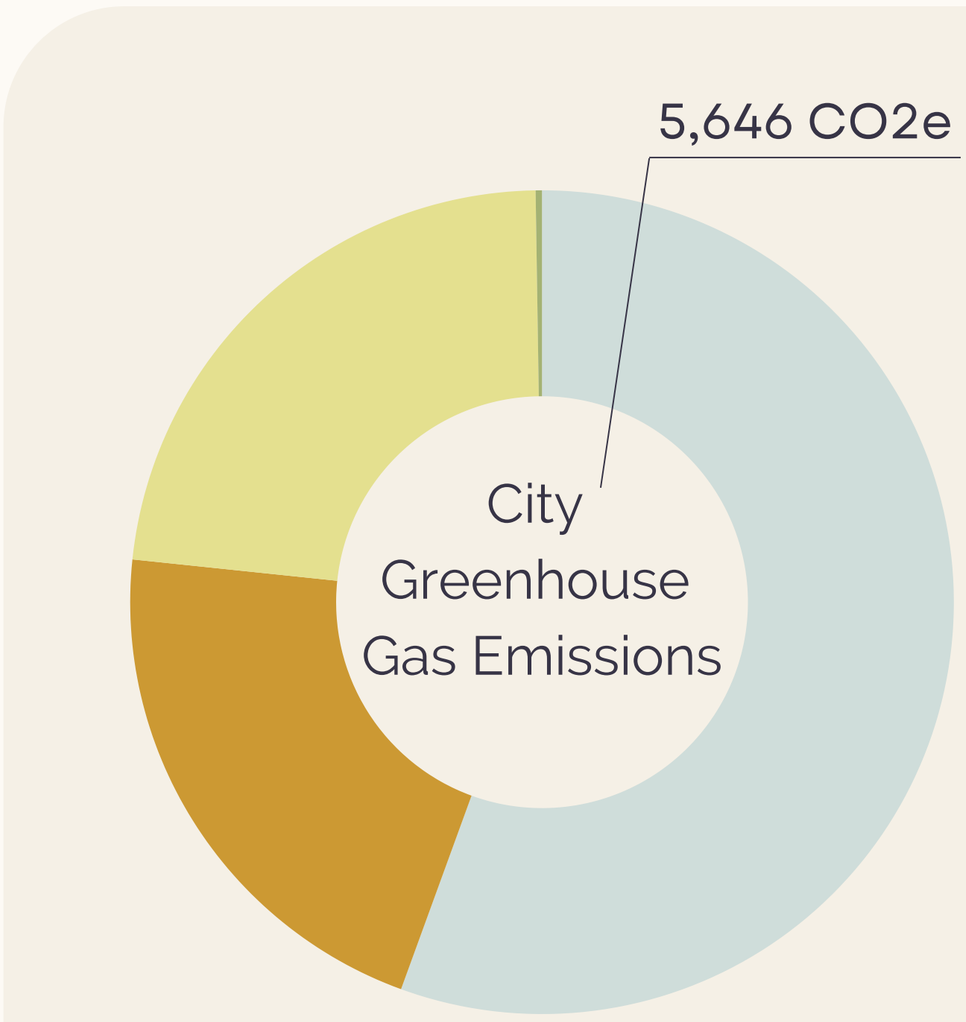
In order to ensure this Plan has measurable results, a greenhouse gas assessment was completed to identify the largest sources of emissions. Assessments like these are commonly used in municipal sustainability planning to provide a benchmark of our starting point and how we would like to improve as we look to the future.

Greenhouse gas emission reduction is a necessary step in ensuring a resilient economy, environment, and community.

GHGs are gases in the earth's atmosphere that trap heat and keep our planet warm enough to sustain life. GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated gases. Since the 1900's, Human activity such as burning fossil fuels has caused a dramatic increase in these gases and the trend has rapidly accelerated in recent years. When too much heat is trapped, overall temperature rises. This results in destructive weather patterns that include flooding, drought, and other natural disasters.

This Sustainability Plan will help the City mitigate these challenges while realizing cost savings and improved quality of life.

For this assessment, 2021 City emissions were used as a benchmark to measure our progress and goals. 2021 is the most recent year where emission factor sets are available for measuring.



Note:

Water & Wastewater Treatment was calculated for city-wide uses since it is City owned and operated while Buildings & Street Lights and Vehicle Fleet are specific to the municipal operational level.

Solid waste was not included in the GHG assessment since the City does not have tracking on what is produced only for municipal operations. Furthermore, the City does not own or operate the waste transfer station or landfill. Municipal solid waste is also expected to be very small. For informational purposes, the total CO_2e for City-wide solid waste is 2,208 MT CO_2e.

What process was used to create the GHG Assessment?

This assessment was completed through ICLEI: Local Governments for Sustainability, which is a global network of more than 2,500 local and regional governments committed to sustainable urban development. ICLEI's ClearPath model was used to complete a local government operations protocol for the quantification and reporting of greenhouse gas emissions inventories.

What was included in our GHG Assessment?

Buildings & Streets

This sector includes the emissions from energy used to operate City owned buildings, streets, lights (owned and leased), and traffic signals.

Fleet

Included are the emissions from on-road and off-road vehicles used for municipal operations ranging from garbage trucks to administrative vehicles for staff. The specific types of fuel and miles are tracked as well as the vehicle size.

Wastewater & Water

This sector accounts for the emissions from the wastewater treatment process, from pumping water to treating wastewater and drinking water.

Process & Fugitive Emissions

These emissions calculate the amount of methane that is leaking out of pipes during distribution of natural gas.

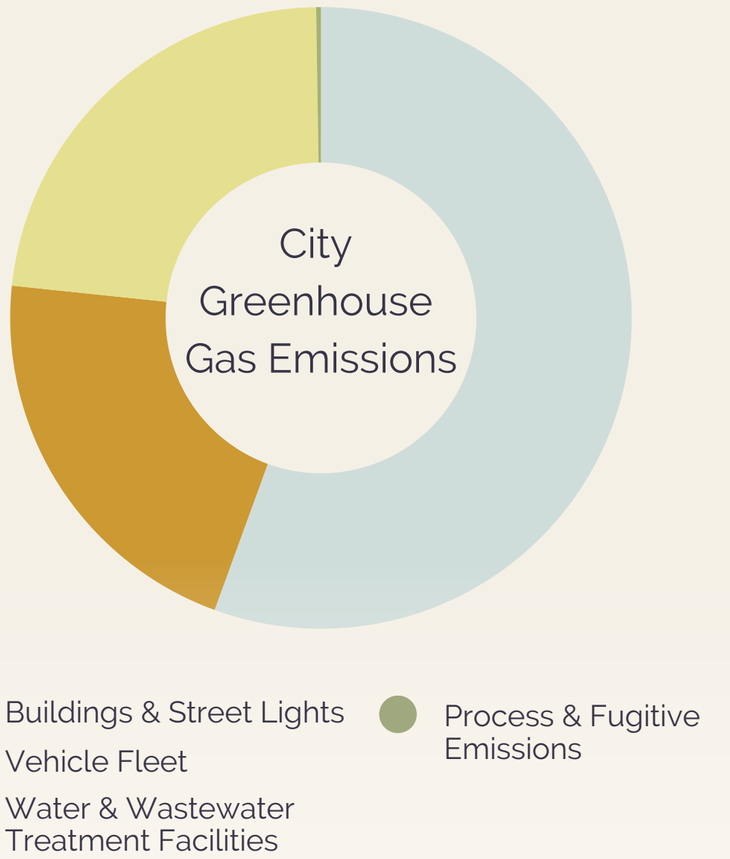
Solid waste is an important aspect of sustainable practices even though it is not included in the City's GHG assessment based on the reasons found on page 9. As a result, proposed waste reduction actions are included within this strategic plan to ensure we are making strides in reducing the City's solid waste consumption.

How do you measure GHGs?

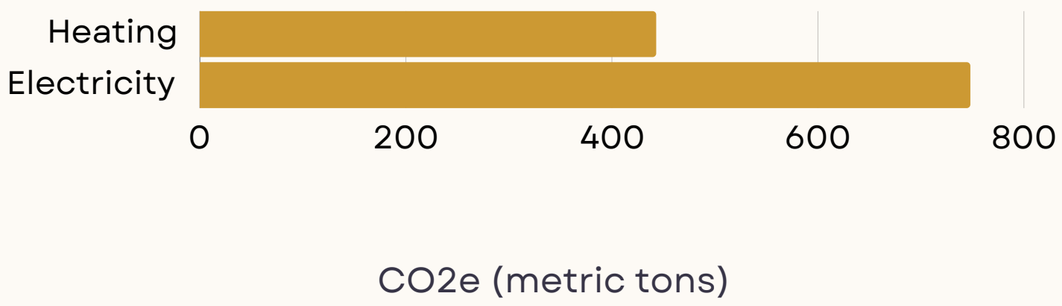
Greenhouse gases are measured in carbon dioxide equivalent otherwise known as CO2e. Various greenhouse gases ranging from carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons, and more. These gases are then converted to the amount of carbon dioxide in metric tons that would cause the same amount of atmospheric warming.

Greenhouse Gas Inventory Breakdown

Below is a breakdown of each emissions category and what data was used in the assessment. Under Buildings & Street Lights, heating is derived from Dominion Energy while electricity is from Duke Energy. Under Fleet, off-road vehicles are those that do not operate on main roads such as construction equipment or property maintenance equipment.

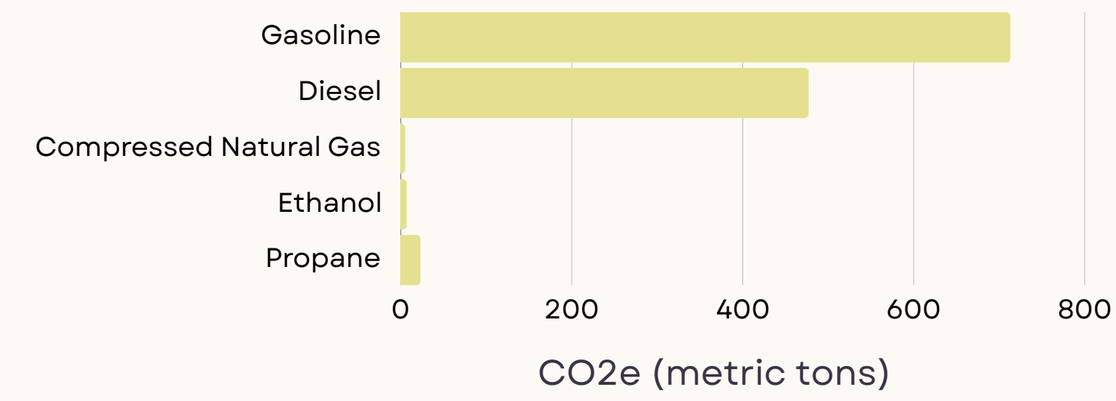


Buildings & Street Lights - 1,191 MT CO2e

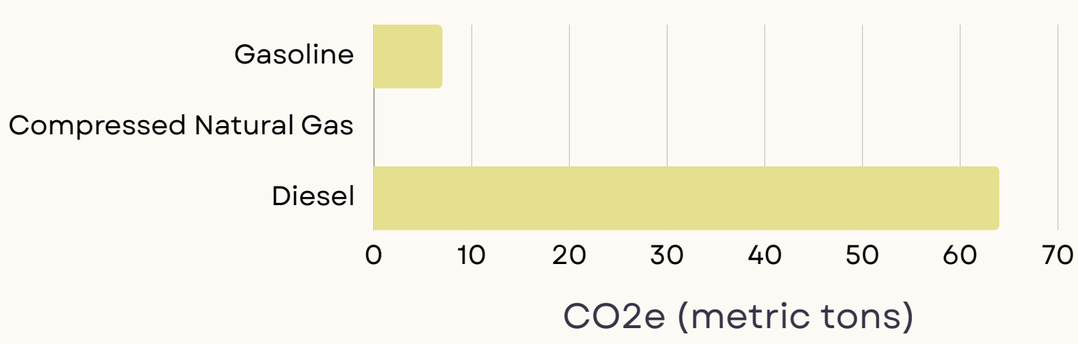


Fleet - 1,304 MT CO2e

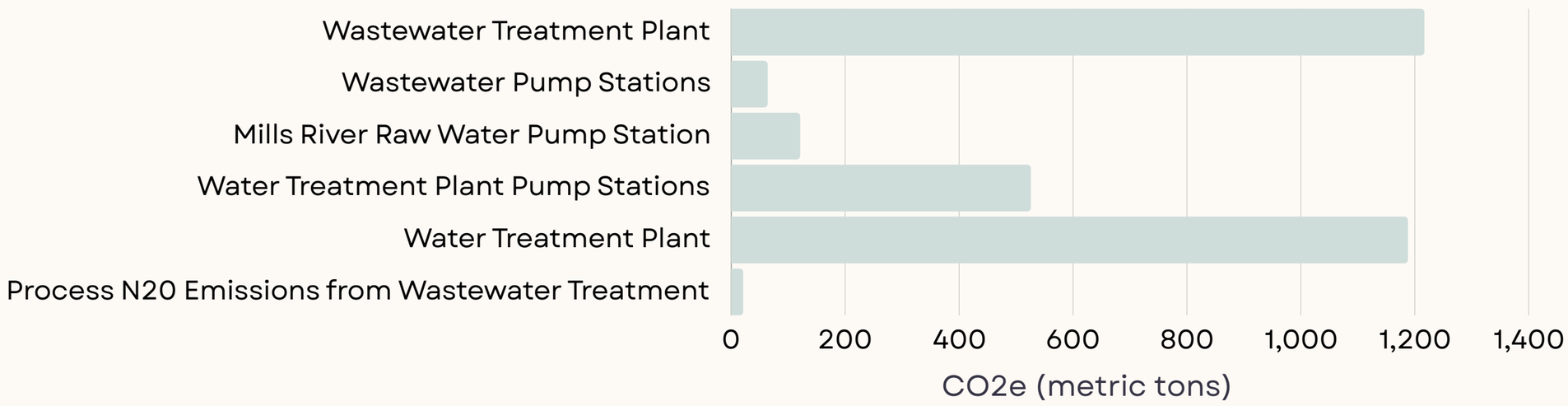
On-road vehicles



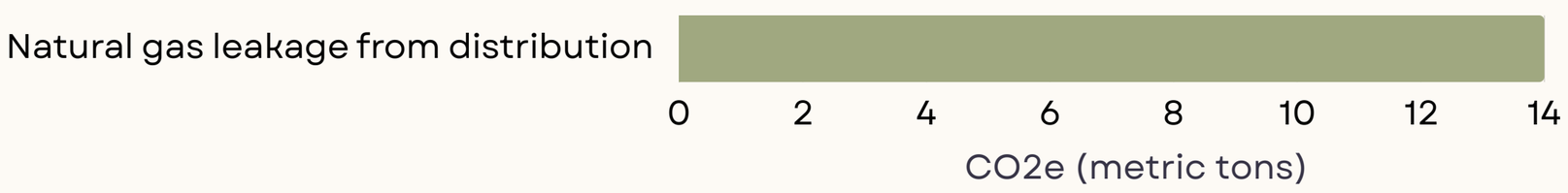
Off-road vehicles



Water & Wastewater - 3,137 MT CO2e



Process & Fugitive Emissions - 14 MT CO2e



City Services

To understand the scope of Hendersonville's greenhouse gas footprint, it is important to look at the services our City provides to show the complexities and population served as much to the surprise, the City's services can sometimes extend far beyond the City limits and includes residents, business owners, and more.

Police Deparment

Tasked with ensuring the safety and wellbeing of our community, the City's Police Department services the municipal limits of Hendersonville responding to calls ranging from traffic safety, assaults, larcenies, drug offences, among others. On occasion, officers will also provide oversight on City events for safety.

Fire Deparment

The City's Fire Department services our community within the municipal limits of Hendersonville in times of crisis minimizing risk to life, property, and the environment and provides crucial education on fire safety and prevention.

Environmental Services

Formerly known as the City's sanitation department, Environmental Services is a division within the Public Works Department that collects trash, recycling, yard waste, and other materials that is then taken to the Henderson County Transfer Station for processing. This division services City residents and business owners within the municipal limits of Hendersonville.

Streets & Traffic

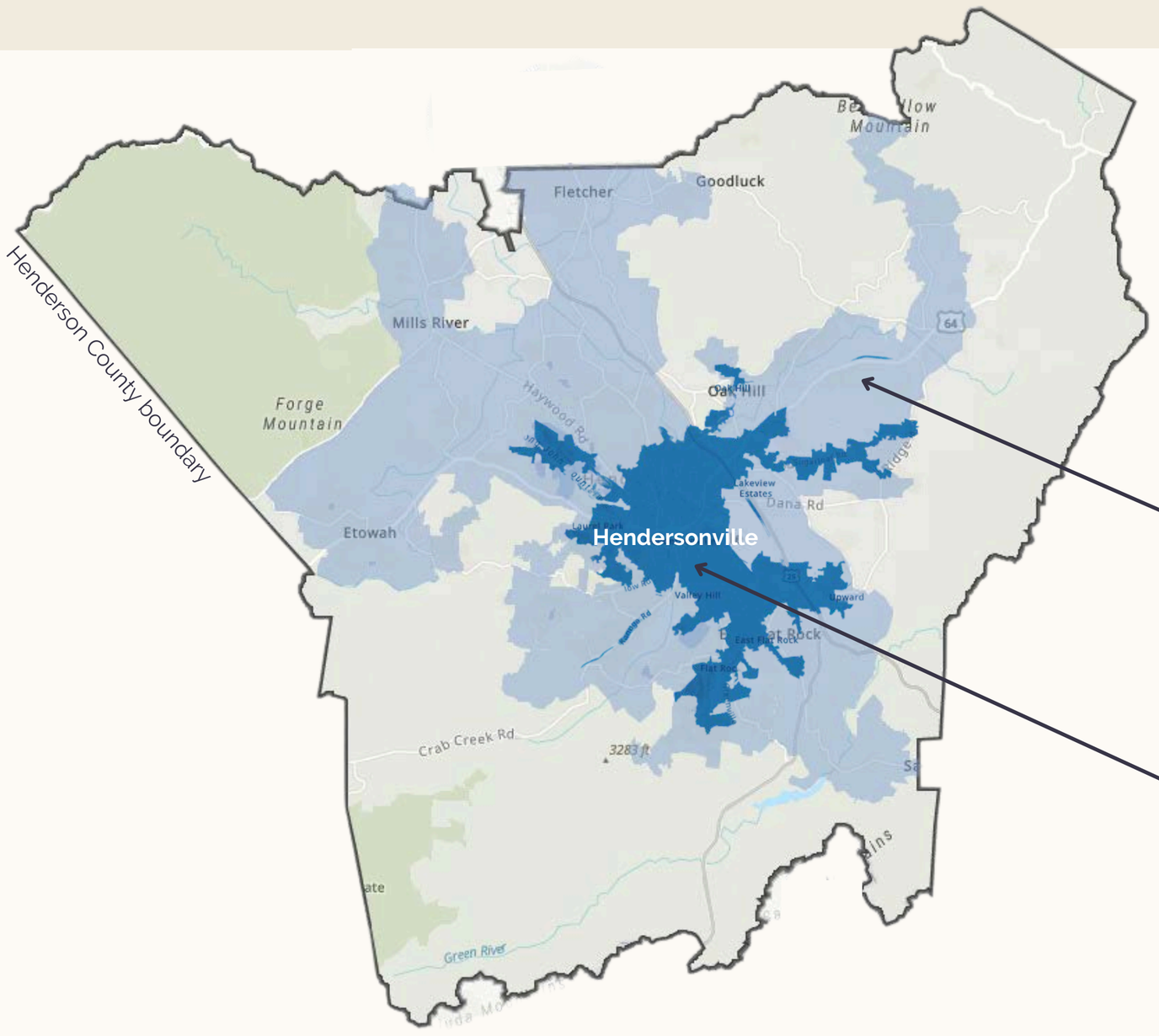
Streets & Traffic are divisions within the Public Works Department. Work includes maintaining 134 lane miles of City streets while the rest of streets within the City are maintained by N.C. Dept. of Transportation. Also included is snow and ice removal as well as streetlights. The traffic division maintains 42 City owned traffic signals, over 8000 signs and posts, 301 City owned decorative street lights, 175 historic banners, 5 trail emergency phones, 5 electric car charging stations, over 1500 parking spaces, & 27 parking kiosks within the City.

Parks & Cemetary

The Parks division is part of the City's Public Works Department and maintains public parks including: Berkeley Mills Park, Boyd Park, Dr. Martin Luther King Park, King Memorial Park, Lenox Park, Patton Park, Pets' Own Place on Seventh Avenue, Rotary Park, Sullivan Park (Green Meadows), Toms Park as well as the Oklawaha Greenway.

Water & Sewer Department

Hendersonville Water and Sewer provides water service to over 31,000 homes and businesses in Hendersonville and Henderson County as well as sewer service to over 10,000 homes and businesses. Over 72,000 people are being served with water and over 21,000 people receive sewer service. The Department also operates and maintains of over 683 miles of water mains, 54 water pumping stations, 24 water storage tanks, over 180 miles of sewer mains, and 31 sewer pumping stations.



Service Area

This light blue shaded region denotes the water service area which includes Hendersonville, Mills River, Etowah, Fletcher, Laurel Park, and Flat Rock.

This dark blue shaded region denotes the sewer service area which includes parts of Flat Rock and other areas in addition to Hendersonville.

+ more

Additional City services include Community Development, Customer Service, Stormwater, & Sustainability

Community Engagement

While this plan is specifically focused on actions that can be accomplished on the municipal, city operational side, community input, support, and action are integral in ensuring this Plan represents the focuses and goals of our diverse Hendersonville community.

A variety of engagement opportunities and events were completed that included two open houses, four pop-up events, as well as a public input survey. A main focus of the survey component was to gain insight on how actions in this Plan should be ranked based on community priority as well as what potential programs or resources are missing that could help our community adopt more sustainable practices. Key takeaways from these engagement efforts are included below with specific insights related to the five focus areas incorporated in the relevant focus area and implementation sections.

Most Important Focus Area:

#1 Land Management

#2 Water

#3 Energy & Transportation

#4 Waste Management

82%

Believe the City should take steps to reduce our municipal greenhouse gas emissions.

81%

Would be interested in a yearly sustainability impact report from the City

Key Takeaways from Community Input

- Financial savings ranked as top benefit to reducing emissions followed by reducing carbon foodprint.
- Majority of participants voted that the Plan should be funded through a hybrid of grant and City funds.
- Affordable housing raised as an important focus area which is addressed in the City's Comprehensive Plan.
- Public transit listed as a focus which while Henderson County handles this area and not the City, there could be improved City and County collaboration on expanding transit options.
- Cost seen as largest barrier preventing community members from implementing sustainability initiatives

Strategic Goal:

30 By 35

By 2035, reduce municipal greenhouse gas emissions by 30% from a 2021 baseline

NOTE: 30% reduction in GHG's would amount to 1,694 metric tons of CO2e.The United Nations urges communities keep global warming to no more than 1.5˚C, as urged for in the Paris Climate Agreement. To achieve this, emissions need to be reduced by 45% by 2030 and reach net zero by 2050. Consider revising this Plan's strategic goal in the future based on City Council and funding priorities.

How do we get there?

Focus Areas help prioritize what actions are needed to reach our strategic goal. While some focus areas have strong GHG emission reduction potential, others provide intrinsic and quality of life benefits. This approach enables us to tackle implementation in a holistic and integrated way bringing the various principles of sustainability to the forefront.

Energy

Energy efficiency and renewable energy progression

Transportation

Electric and low-emission municipal fleet; Bikeability & walkability infrastructure

Waste Management

Recycling, composting, and waste reduction measures

Land Management

Natural resource conservation

Water

Ensuring water quality and efficiency

Overview of Goal Actions

Within each of the five focus areas is an overall goal accompanied by measurable actions. The following table shows the 15 actions needed to reach the City's strategic goal. Actions are sectioned by their applicable focus area including energy, transportation, waste management, land management, and water. Level of investment is also included to indicate the financial capital needed to achieve the action.

Category	Actions	Estimated Initial Investment	Estimated Financial Returns
Energy	Receive 30% of electricity from renewable energy sources.	$808,000	$46,600 tax credit Avg.$21,879/year
Energy	Achieve 10% Energy Savings from Efficiency Upgrades	$0 for audit +/- $18,000/building for upgrades	Varies
Energy	Establish Sustainable building policy	$0	Indirect financial return
Transportation	Increase amount of Level 2 EV charging stations both publicly & for municipal operations	$5,000-$15,600/ charging station	Varies
Transportation	Transition to low emission vehicles & reduce fuel use	Propane: $6,300/vehicle Hybrid: $5,000 more/vehicle Electric: $4,500-$12,000 accounting for federal tax incentive	Propane: 30% less in cost than gasoline; ROI within 2.5-4 years Hybrid: Up to 50% less gasoline use Electric: Varies, typically 60% less/year in gasoline costs
Transportation	Implement Alternative Transportation Plans	$3,982,900+	N/A
Waste Management	Decrease City-wide Solid Waste by 15%	Unknown / low investment	Estimated $31,900/year

Sources:

* U.S. Department of Energy Alternative Fuels Data Center
* Alliance Auto Gas
* U.S. Department of Energy: Clean Cities Alternative Fuel Price Report
* Natural Resources Defense Council: Electric vs. Gas Cars

Overview of Goal Actions, *continued*

Category	Actions	Estimated Level of Investment	Return on Investment
Waste Management	Establish City compost program	$1,500/drop off location $55/home compost bin	Every ton diverted from landfill results in $63 savings
Waste Management	Reduce Biosolids landfill waste by 67%	$12,500,000	$194,200/year + roughly $5,400/year in gasoline saved
Land Management	Increase tree canopy on City owned property to 50% & maintain Citywide tree canopy	Approximately $171-$351/acre	Indirect financial benefits
Land Management	Build on existing efforts to reduce pesticide & herbicide use	Unknown / larger upfront investment with cost savings once established	Indirect financial benefits
Land Management	Enhance & restore City-owned natural areas and parks	Unknown / larger upfront investment with cost savings in long run	Indirect financial benefits
Water	Increase education and outreach on water conservation & water quality	Estimated $2,000/year	Varies
Water	Continue protecting and enhancing the water quality City streams and wetlands	Unknown / larger upfront investment with cost savings in long run	Indirect financial benefits

Energy

Overview

Energy is a necessity to power City operations. However, how we go about using energy and what sources of energy is an opportunity for not only reducing emissions but realizing financial savings in the long run.

While the City has limited authority to alter where our energy comes from, ensuring adequate building efficiency and reduced energy costs should be a top priority. In addition, we must look for opportunities to produce the City's own renewable energy where feasible such as solar energy installations on new and renovated municipal buildings while being an advocate for increased renewable energy supply from our utility providers.

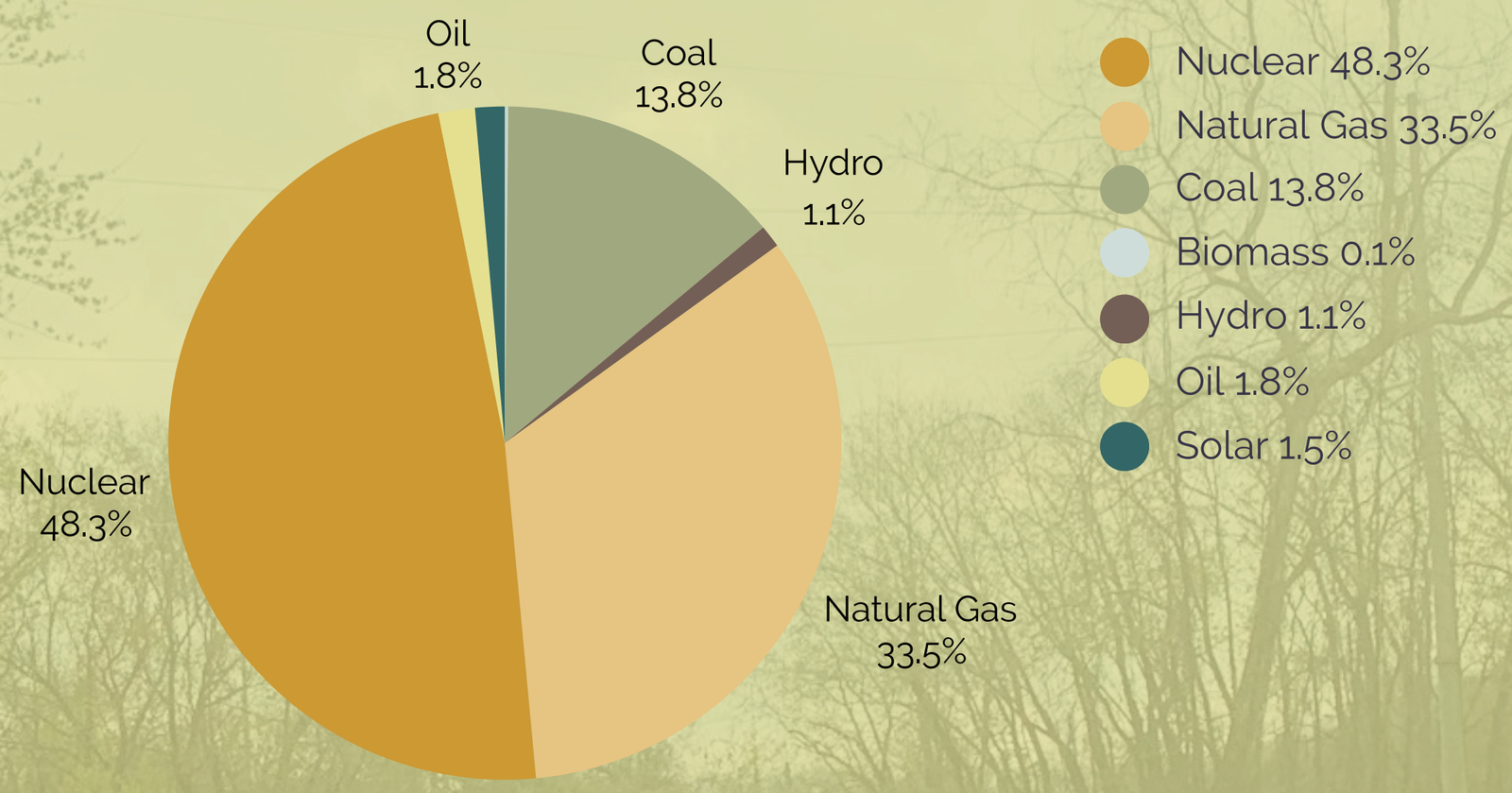
Goal

Reduce energy demand from municipal buildings & increase amount of renewable energy utilized

Actions

- [ ] Receive 30% of electricity from renewable energy sources.
- [ ] Achieve 10% Energy Savings from Efficiency Upgrades
- [ ] Establish sustainable building policy

The City's current energy utility providers are Duke Energy and Dominion Energy both of which have a goal of being carbon neutral by 2050



2022 Utility Power Consumption Breakdown, MWh

Sources:

* Duke Energy and Dominion Energy utility bills

Action

Receive 30% of electricity from renewable energy sources.

Investing in renewable energy sources such as on-site and off-site solar will greatly reduce GHGs while increasing energy independency. As of 2022, Duke Energy sources 2.7% of solar energy with the majority of energy production from nuclear, natural gas, and coal. In order to reach the City's renewable energy goal, off-site as well as on-site opportunities should be considered to ensure we bring about a cleaner, more resilient City.

Strategies to reach this action:

- Explore Duke Energy's Shared Solar Program (pending approval) and advocate for and collaborate with Duke Energy to develop more utility-scale renewable projects in our area.
- Assess current City buildings for roof mount solar, parking lots for solar carports, and park property for ground mount solar to see what is feasible
- Implement a policy to require all new buildings be constructed to accommodate solar panels in the future.
- Include solar as an optional add on for new municipal buildings
- Purchase renewable energy credits, RECs each year until the City's energy utility provider, Duke Energy transitions to more renewable energy sources.
- Leverage Duke's goal of 70% carbon reduction by 2030 in North Carolina to achieve strategic goal while exploring on site-solar and other renewable energy options.

Off-site solar:

A few options exist to increase solar energy including Duke Energy's Shared Solar Program, which is awaiting approval and renewable energy credits, RECs which are readily available. RECs are a certified way to offset energy produced from fossil fuels by purchasing a credit from a renewable energy source which represents one megawatt-hour (MWh) of electricity generated and delivered to the electricity grid from a renewable energy resource. The Shared Solar Program would enable the City to pay for the development and operation of solar facilities (as well as program administration expenses) and in return, receive bill credits for their share of the solar energy generation

On-site solar:

On-site solar options include ground mount, rooftop, canopy, and carport. There is also a requirement with Duke Energy that the maximum power generation at any time for solar cannot exceed the peak demand of the building. Therefore, a building can not be entirely operated by on-site solar.

Sources:

* 2022 Solar Feasibility Study by RN&M Engineers
* ICLEI USA ClearPath
* Environmental America Clean Energy Pathways
* Collaborative Solar price quote

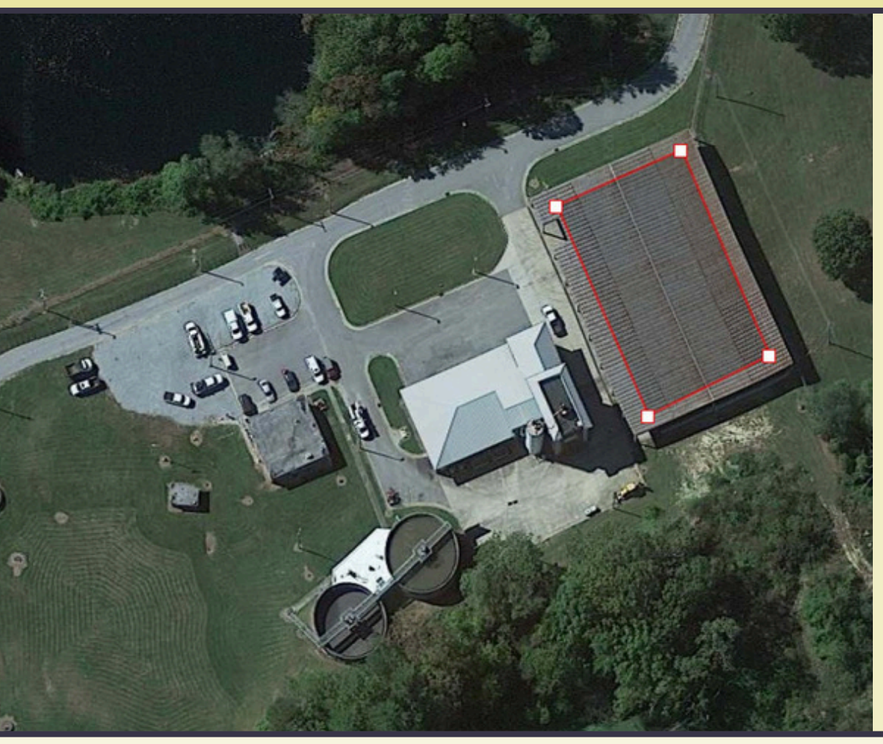
Proposed Strategy Implementation:

On-Site Solar Project - Firestation 1

The new Fire station located at the crossing of N Church St. and N Main St., will have multiple sustainability features such as heat island reduction with a white roof that reduces the amount of heat absorbed, light pollution reduction by using down-lighting and cut-off fixtures, as well as optimized energy performance. Also included is a solar-ready roof which if approved and installed, would create 48,000 kWh per year.

Cost: $124,500
- 0.55 cents/kW tax credit
- 6% tax credit for total qualified investment

$117,030 initial installation cost +0.55 cent credit/year



On-Site Solar Project - Biosolids Dryer

Estimated to be completed in fiscal year 2025, the new biosolids dryer located on Balfour Road will significantly reduce that amount of biosolids taken to landfill. View page 33 for more information on the system. Up for approval is a rooftop solar installation that would produce 285,479 kWh per year.

Cost: $660,000 loan
- 0.55 cents/kW tax credit
- 6% tax credit for total qualified investment

$620,400 initial installation cost +0.55 cent credit/year

Renewable Energy Credits, REC's

REC's as mentioned on the previous page are a great option if on-site solar projects aren't feasible on the scale needed for GHG reduction, as is the case currently. Therefore, this Plan recommends purchasing renewable energy credits each year to make up for the remainder of the clean energy action until Duke Energy as the City's electricity provider transitions to more renewable energy sources for the grid. As of 2023, Duke Energy has a goal of becoming carbon neutral by 2050, dependent on regulatory approvals.

Cost: $23,632/year for 3,581 MW/hr

Estimated costs for all solar methods

Ground mount: $1-$2/watt
Roof mount: $2.50-$3/watt
Canopy: $3-$4/watt

Carport: $3.50-$3.70/watt
RECs (as of 2021) $6.60/MWh
Shared Solar: TBD

Estimated payback period is 18-28+ years with additional net metering power savings for rooftop solar.

Sources:
* National Renewable Energy Laboratory PV Watts Calculator
* Collaborative Solar and Pisgah Solar

Action

Achieve 10% Energy Savings from Efficiency Upgrades

Ensuring energy efficiency begins with assessing the City's current buildings to see what opportunities are available for upgrading or retrofitting to decrease energy usage and associated emissions. Many municipal buildings within Hendersonville are several decades old and are now built to outdated energy and water standards. This is a tremendous opportunity to not only reduce emissions but also to realize financial savings from upgrades.

Strategies to reach this action:

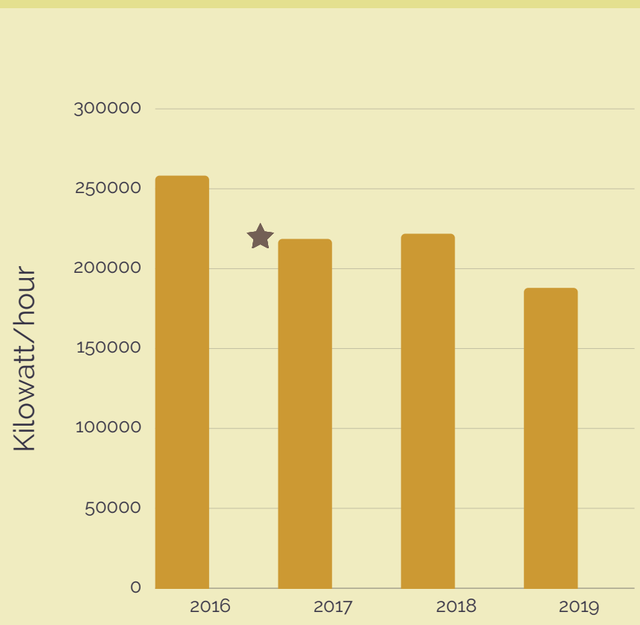
- Assess building energy performance through tools such as the ENERGY STAR® Portfolio Manager® and completing energy audits through free services offered by Waste Reduction Partners and Duke Energy's Virtual Energy Assessment.
- Complete audits at least every five years and consider tracking Energy Use Intensity (EUI) every year.
- Consider opportunities for building automation such as automatic light shut off or HVAC reduction over periods of infrequent need such as weekends and overnight.
- Implement energy efficiency recommendations from Water Treatment Facility Master Plan.

Energy efficiency wasn't taken into consideration for North Carolina's building code until 1978. Buildings constructed prior did not include energy standards.

Estimated costs:

At City Hall alone, estimated costs for implementing energy and water efficiency recommendations were $28,700 with $3,800 in cost savings per year and a 0.1-5.4 year payback period. This represents one example of the energy and cost savings by upgrading existing municipal buildings. In this example, lighting upgrades were free of charge due to Duke Energy's rebate program. While a majority of the upgrades will not be free, there is oftentimes a minimal payback period when looking at the biggest energy saving upgrades. A key outlier is Water and Wastewater Treatment facilities which can have significantly higher price points and will require more funding.

Energy Efficiency Upgrade Case Studies



City Operations Center

In the first year after converting all lighting in the City's Operations Center to LED, over $2,700 was saved in 2017.

★ After conversion

Water Treatment Plant

the City's Water & Sewer Department replaced their high-service pumps and motors with high efficiency motors at the Water Treatment Plant. Monthly power use has dropped by 8% or 377,145 kWh while water production has increased by 2.5%.

Sources:

* U.S. Office of Energy Efficiency & Renewable Energy Building Energy Codes Program
* 2018 Waste Reduction Partners Energy Audits
* ICLEI USA ClearPath

Action

Establish Sustainable Building Policy

Throughout this Sustainability Strategic Plan, policy implementation will be essential to ensure our goals are efficiently met. Standard policies provide a clear understanding of what minimum requirements must be met for municipal buildings and other sustainability practices to minimize emissions.

Often called “green building design,” many features like orientation of the building, roof material, appliances and fixtures chosen, as well as other design and construction plans determine how the building will affect the environment. By making more environmentally friendly choices for our municipal buildings, we can minimize negative environmental impacts while saving money in the long term.

Currently, there is no City policy specifying minimum sustainability or green building measures that all buildings must include. Establishing and implementing a policy with these standards will provide a multitude of emission reduction and cost saving benefits.

Strategies to reach this action:

- Consult best practices from Leadership in Energy and Environmental Design (LEED) and Energy Star standards
- Policy requirements should be rigorous but not cost prohibitive with long term cost analysis planning in mind.
- Ensure policy is updated at least every 5 years to meet new technology improvements.

Estimated costs to implement:

There are no direct costs. Policies should be updated at least every five years to ensure they are up to date with new technology and improvements.

Community Level

Ensuring your home is as energy efficient as feasible will bring about greenhouse gas as well as financial savings. Below are resources and tax breaks available for energy conservation:

- **Energy utility programs** such as Duke Energy’s Energy Wise initiative where customers set an energy reduction goal and receive financial savings for the energy they save. Also available is a Shared Solar program where customers can subscribe to solar kilowatts for their energy.
- **Complete your own home energy audit** - Duke Energy also offers a free energy efficiency starter kit for customers. Start your own energy audit by first looking at your energy bill to see how much energy your home is consuming each month. From there, investigate ways to reduce this consumption. A few options include a smart thermostat, switching to LED bulbs, or ensuring your home has proper insulation. Take advantage of free energy incentives from your utility company and watch the savings come!

Interested in learning more? Visit www.hvlnc.gov/sustainability/energy to view more resources as well as initiatives the City has taken on sustainable energy practices.

Transportation

Overview

Transportation is the second highest emitter of GHG for the City. Changing the types of fuels as well as reducing mileage where possible will be key in reducing transportation emissions for the City. In 2021, the majority of fuel related emissions came from gasoline (56%), and diesel (42%). Remaining emissions came from low-emission fuel such as propane and compressed natural gas at a combined 2% as well as ethanol at less than 1%. To reach the City's emission reduction goals, a combination of hybrid, electric, propane, compressed natural gas, and other sustainable fuel options should be prioritized. In addition, reducing idling time will be essential though education and considering investing in idle mitigation technologies.

Increased biking and walking options are also key elements to a sustainable active transportation system for Hendersonville by reducing the number and length of drives needed. In 2018, a bicycle plan was created for the City with a pedestrian plan expecting to be finalized in 2023. Funding and implementing the plan's recommendations will be important to ensure residents, business owners, and employees are able to safely travel within the City without the need for an automobile.

Goal

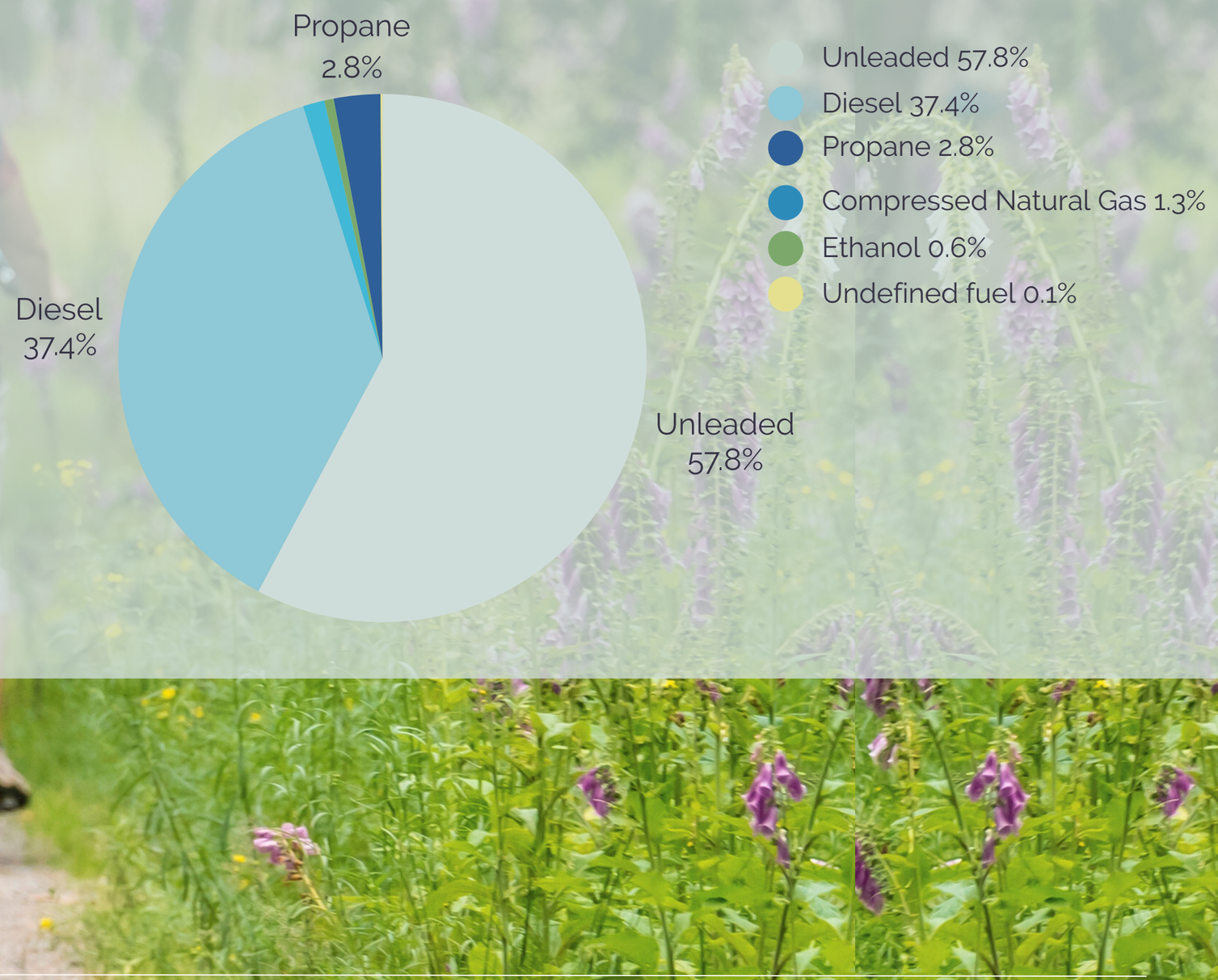
Transition to electric and low emission vehicles and fuel while ensuring there is a robust and safe walkable and bikeable city.

Actions

- [ ] Increase amount of Level 2 EV charging stations both publicly & for municipal operations
- [ ] Reduce City fleet fuel usage by 40%
- [ ] Implement alternative transportation plans

2017 Municipal Vehicle Fuel

Majority of the City's fuel consumption comes from unleaded gasoline followed by diesel. Propane fuel is used for lawnmowers and other property maintenance equipment. The 0.1% undefined fuel was not properly recorded with the fuel use



Action

Increase amount of Level 2 EV charging stations both publicly & for municipal operations

Expanding electric vehicle charging infrastructure will be key to encourage residents, business owners, and employees to purchase reliable electric vehicles. In addition, the City is able to transition more quickly to an electric fleet for municipal uses if adequate charging stations are available. The 2021 International Green Construction Code specifies that no less than 4% of parking spaces (or no less than 8% of designated employee only parking spaces) where 20 or more on-site vehicle parking spaces are provided shall be electric vehicle spaces. To the best of the City's ability, these best practices should be prioritized. Installing charging stations can be exorbitantly high in cases where the necessary conduit and electrical capacity wasn't included in the initial parking plans. Thus, at a minimum, all new municipal parking lots should be required to include conduit and electrical capacity for installing electric vehicle charging stations in the future.

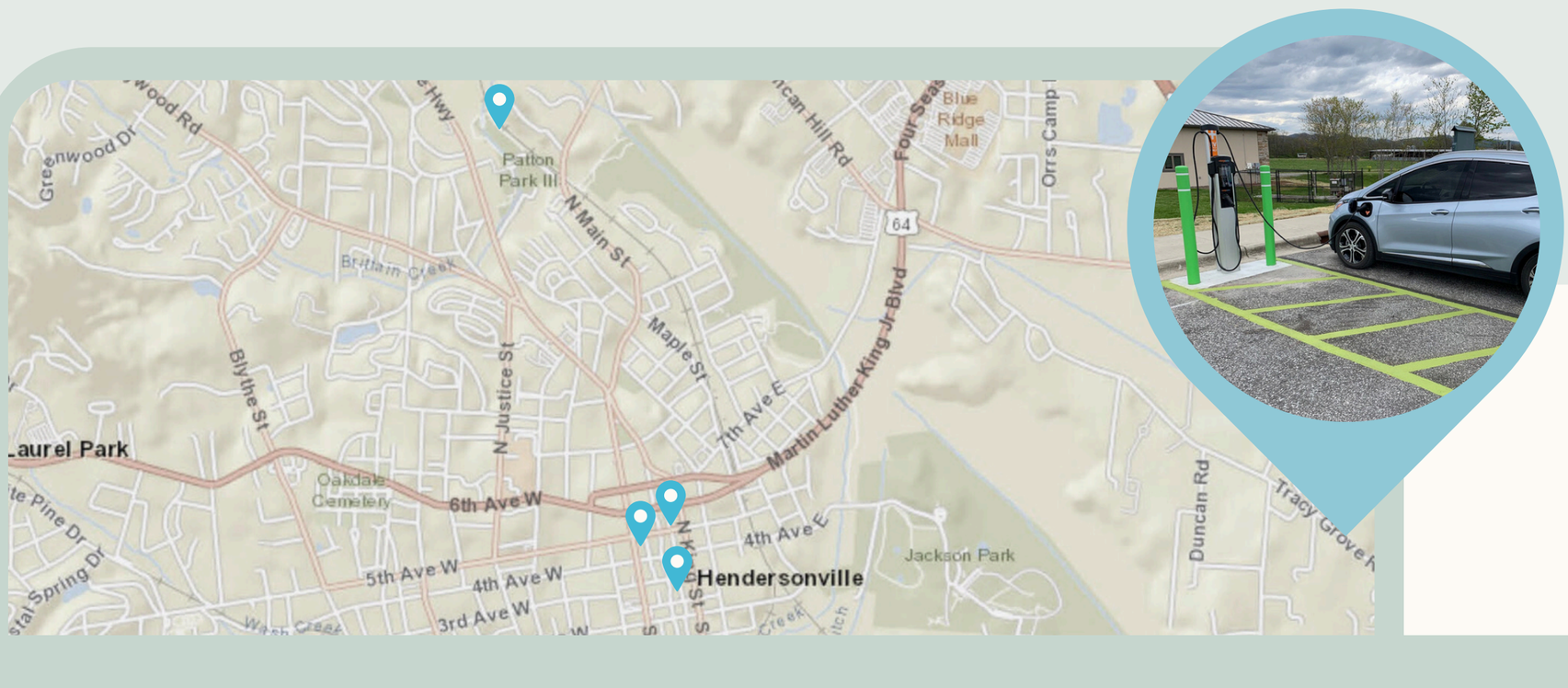
Strategies to reach this action:

- Consider creating a standard policy for all new and renovated municipal parking areas for including conduit and electrical capacity for electric vehicle charging stations
- Prioritize municipal charging stations for departments that have the greatest reliance on fuel to ease the transition to electric vehicles
- Improve radius of publicly assessible charging stations to offer a greater range for drivers

Estimated costs to implement:

As of 2022, the estimated cost for an electric vehicle charging station, warranty, and networking services is $12,000-$15,600 for a level 2 dual port system. Chargers for municipal operations are estimated at $5,000/charger.

Note this estimate does not include the potential additional cost if stations are being installed where the necessary conduit and electrical capacity wasn't included in the initial parking lot construction.



Current City Operated Level 2 Electric Vehicle Charging Stations

- Parking Deck - 2 spaces available
- Azalea Lot – 1 space available
- Dogwood Lot – 2 spaces available
- Patton Park Duke Energy – 2 spaces available

Sources:

* International Green Construction Code
* Level 2 dual port electric vehicle charging station quotes from JF Petroleum Group, Blink, and State Contracts

Note: A level 2 charging station charges an electric car 5 to 7 times faster or up to 3 times faster for a plug-in hybrid compared to a level 1 charger.

Action

Transition to low emission vehicles & reduce fuel use

Transitioning the City's fleet to more sustainable vehicle options such as hybrid, propane, and/or electric provide a cost-effective way to reduce or eliminate transportation related emissions like carbon monoxide, carbon dioxide, and nitrogen oxide as well as non-regulated emissions including aromatic hydrocarbons, benzene, and sulfur dioxide.

When looking at the transition of City fleet to zero or low emission fuels, some departments aren't able to utilize electric options such as portion of our Police Department which has roughly 75% of vehicles as take-home options. Other City vehicles, such as our Water & Sewer Department require long distance routes that may not be viable due to the limited range of an electric vehicle. Propane or hybrid vehicles provide more reassurance for longer range vehicles.

Propane

Propane also releases 60-70% fewer smog hydrocarbons than gasoline. The cost of propane is also lower than gasoline and is produced domestically, reducing gasoline price fluctuations resulting from overseas production. Traditional gasoline or diesel vehicles can be converted to propane while still keeping the ability to run on gasoline in emergency situations.

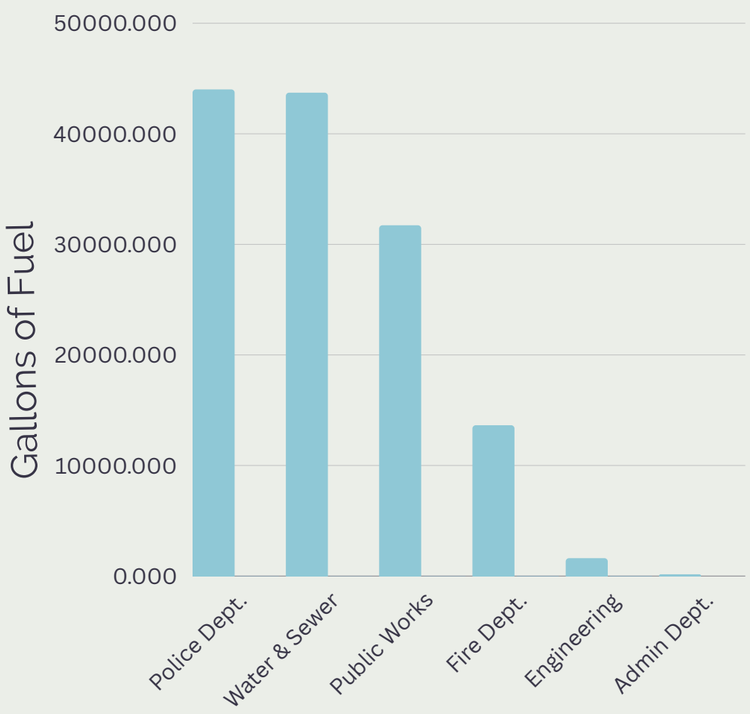
Hybrid

Hybrid vehicles emit less greenhouse gases and cost less to run than gasoline vehicles in the long-run. These vehicles also recharge while braking and through the motor, so there is no need to plug in to gain a charge. Hybrids are able to fill up on gasoline while running on battery power. Idling is another aspect of municipal fleet that contributes to vehicle emissions that can be greatly reduced by hybrid vehicles as battery power is used instead of gasoline when the vehicle is turned on.

Electric

Electric vehicles while more expensive initially result in significant cost savings over the lifetime of the vehicle. Many municipal vehicles are easily able to transition to electric with the prioritization on vehicles that have a shorter repeating route and primarily those that don't require a significant load such as the City's administrative staff.

Municipal Fuel Consumption by Department



Sources:

* ICLEI ClearPath
* Southwest Research Institute
* U.S. Department of Energy Alternative Fuels Data Center

Fuel is required to ensure the City provides reliable and safe services to our residents and business owners. Some departments naturally will use more fuel than others such as our Police Department and Water & Sewer Department. Prioritizing these departments for alternative fuel and low-emission vehicles while ensuring reliability and safety is an important step in a more sustainable transportation system for the City.

To convert fuel to low emission sources, there are a few options to consider. As of 2019, the Police Department and Water & Sewer Department each absorb roughly 30% of the total fuel municipal fuel consumption. In addition, all City divisions should consider transitioning to hybrid or electric vehicles where possible to ensure progress is made towards reaching this goal.

By transitioning 15% of Police Department fuel to electricity and accounting for a 50% fuel reduction on the remaining 85% from hybrid vehicles, this would amount to 222 MT CO_2e reduced. Coupled with converting all Water & Sewer vehicles to propane, 50 MT CO_2e will be reduced. This amounts to a total of 272 MT CO_2e reduction. Further reduction is feasible dependent on the adoption of electric vehicles and availability of renewable propane.

Strategies to reach this action:

- Assess municipal fleet to gauge which vehicles are the best candidate for hybrid, propane, or electric conversion/replacement while prioritizing those vehicles that utilize the most fuel/year.
- Partner with businesses that offer a pilot propane conversion trial to ensure success once implemented; complete cost analysis of cost savings for hybrids.
- Investigate technologies available to increase efficiency and fuel savings for existing vehicles with long idle times such as idle mitigation systems.
- Promote and provide increased education to staff on existing idling policy.
- Implement a sustainable fleet procurement policy for vehicle purchasing and a long term fleet replacement program. Consider resources like the Electrification Coalition Toolkit specifically designed for cities as reference.
- Consider an electric vehicle pilot program for other departments to test.
- Pursue grant funding such as Diesel Emissions Reduction Act (DERA) Funding for replacing diesel vehicles.
- Consider starting with transitioning administrative vehicles to electric. This would amount to 6% of Police Department administrative fuel use for example.

What are other municipalities doing?

Waynesville, NC

Waynesville converted 31 police and public works vehicles to run on propane. One issue found is ensuring drivers fill up on propane and not gasoline since the vehicle has a duel-fuel system. This can be addressed by setting gasoline fueling limits for staff and on refueling cards.

Boone, NC

The town recently purchased its first electric bus and has multiple electric vehicles used for admin and parking services.

Cary, NC

The town has a mix of hybrid and electric fleet including an electric garbage truck which gets four miles a gallon, twice that of normal trucks.

Raleigh, NC

Raleigh has converted all their police vehicles to hybrid or propane and recent started a renewable propane program.

Weaverville, NC

Nearly all of the town's Police Department fleet is hybrid or electric.

Travelers Rest, SC

The city recently started a pilot program for electric patrol vehicles, Officers have reported the vehicles run faster and have spent zero dollars in maintenance costs in the first year with an estimated 4-5 years ROI.

Wilmington, NC

The city's council adopted a goal that by 2050, their fleet will be entirely made up of electric vehicles.

Sources:

* Blossman Autogas
* City of Hendersonville Vehicle Use Policy

Hendersonville Propane Conversion

Initially as a way to save money for other projects, the City's Property Maintenance Department converted 12 lawnmowers from gasoline to propane back in 2020.

Estimated costs to implement:

Propane:
The estimated cost of converting a vehicle to propane is $6,300 with an estimated return on investment of 2.5-4 years. Greatest financial savings are from using vehicles with higher miles driven each year and lower mpg's.

Hybrid:
The estimated cost of a hybrid vehicle is roughly $5,000 more per vehicle than what is currently used. There is an average $0.12/mile in cost savings by driving a hybrid.

When the City's Police Department replaced a patrol vehicle with a hybrid, gasoline use dropped by 50%.

Electric:
Electric vehicles cost an average of $12,000 more than gasoline vehicles. While the initial cost of electric vehicles is more expensive, there is an average $0.14/mile difference in cost savings as well as lower maintenance costs since oil changes, valve adjustments, belt replacements, and other costs aren't needed with a non-gasoline fueled vehicle. Ensuring adequate charging stations is also a necessity for this transition.

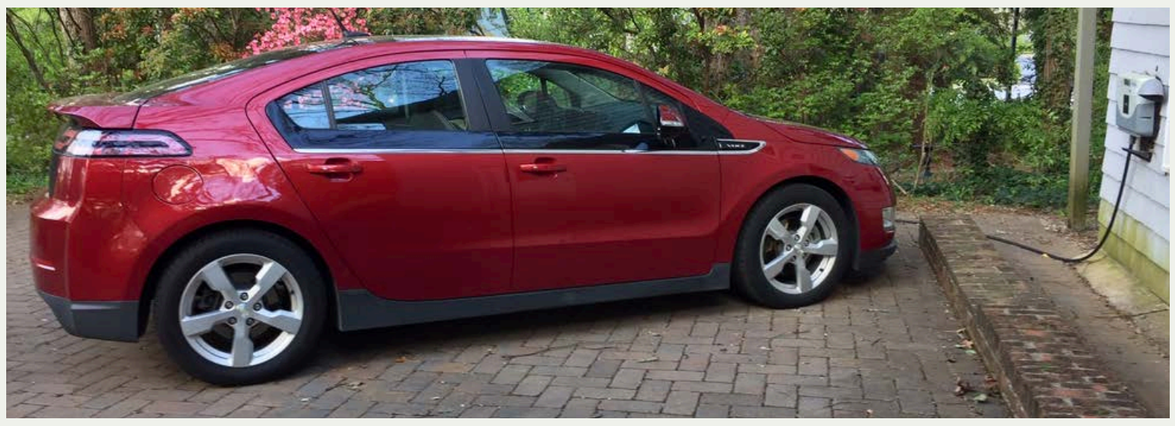
Large scale electric vehicle replacements for diesel vehicles such as firetrucks, garbage trucks and other similar vehicles cost an estimated $500,000 more than non-diesel vehicles. However, federal funding is available for 80% of the total cost.

Community Level

Consider purchasing an electric or hybrid vehicle next time you are in the market for a car. While initially more expensive, both provide significant long-term cost savings. Tax credits are also available to offset the initial cost. Many travels around Hendersonville can also be done with a bicycle which is the most environmentally friendly transportation option to choose, in addition to walking. Construction for the Ecusta Trail will also bring about extended multi-modal transportation options to visit Hendersonville all the way to Brevard.

City Council Member Spotlight

Hendersonville's own Mayor, Barbara Volk, owns a Chevrolet Volt plug-in hybrid, one of the first hybrid cars available. Mayor Volk says most of her driving is on battery power, which emits zero pollutants - I'm pleased that I can do at least a little toward making our mountain air easier to breathe."



Sources:
* U.S. Department of Energy Alternative Fuels Data Center
* Alliance Auto Gas
* U.S. Department of Energy: Clean Cities Alternative Fuel Price Report

Action

Implement Alternative Transportation Plans

Adequate biking and walking infrastructure enables our community to reduce congestion and reliance on driving internal combustion engines, thus reducing the overall emissions from the transportation sector. According to the City's 2017 Bicycle Plan, when considering the economic benefits, increased biking and walking infrastructure has been shown to increase property value and retail sales. In Western North Carolina as a whole, outdoor recreation and tourism are integral in our way of life. In addition, with less cars on the street will lead to a decrease in congestion not only lowering emissions but also reduces the cost for future expansion projects on roads. Increasing the City's bikeability and walkability will bring about numerous benefits including increased quality of life, equity, economical, and environmental impacts.

Strategies to reach this action:

- Implement at a minimum, the top 4 recommendations from the 2017 bicycle plan
- Ensure upcoming Walk Hendo and Greenway plans include implementation.
- Pursue grant funding such as the U.S. Department of Transportation Safe Streets and Roads for All Grant
- Ensure there is an implementation plan for the walkability plan

Estimated costs to implement:

Project recommendation 1: $230,000
Project recommendation 2:
- Phase 1: $2,240,000
- Phase 2: $1,176,000

Project recommendation 3: $51,000
Project recommendation 4:
- Locust Street Bicycle Lanes: $73,800
- Maple Street Shared Lane: $13,100
- New Shared Use Path: $199,000

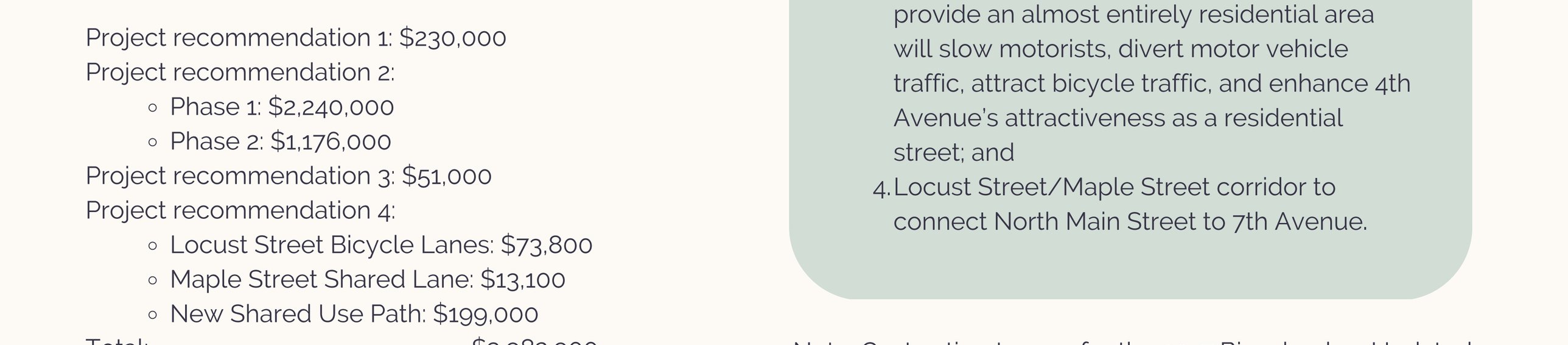
Total: $3,982,900

TOP 4 BICYCLE PLAN PROJECT RECOMMENDATIONS

1. 7th Avenue corridor to connect Historic Downtown District to the Oklawaha Greenway to the east;
2. Grove Street bicycle lanes to provide primary connection between downtown Hendersonville and the residential area around Substation Street;
3. 4th Avenue bicycle boulevard upgrade to provide an almost entirely residential area will slow motorists, divert motor vehicle traffic, attract bicycle traffic, and enhance 4th Avenue's attractiveness as a residential street; and
4. Locust Street/Maple Street corridor to connect North Main Street to 7th Avenue.

Note: Cost estimates are for the 2017 Bicycle plan. Updated estimates will be available upon completion of additional alternative transportation plans.

Visual of proposed project #2



Waste Management

Overview

Waste management includes the prevention of waste to reduce the resources and associated emissions from disposing. When this waste is taken to a landfill, methane is released, a gas that is ten times more damaging than carbon dioxide. Waste also negatively impacts our creeks and streams resulting in build up of trash that alters water flow and migratory patterns for fish and aquatic life.

Waste conversion is an important strategy for managing the City's waste by looking at ways to turn what would have otherwise been destined for a landfill into a usable product such as composting, recycling, mulch, and even fertilizer.

Hendersonville is fortunate to have a robust recycling, trash, and yard debris pick up service. All City waste is taken to Henderson County's transfer station which offers hard to recycle and composting drop off services in addition to trash and recycling. There are more opportunities available for the City to increase services offered to our residents along with a need for increased recycling and plastic reduction.

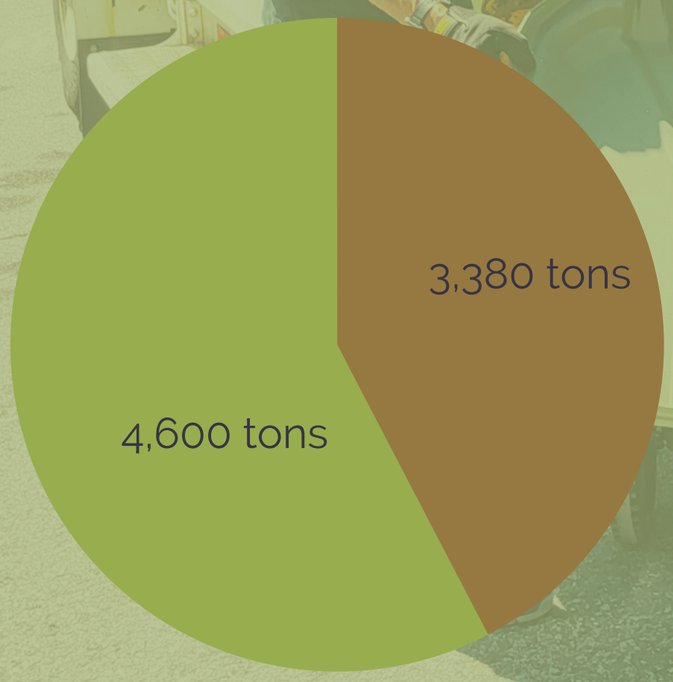
Goal

Reduce the amount of solid waste send to the landfill through recycling, composting, and other waste reduction efforts

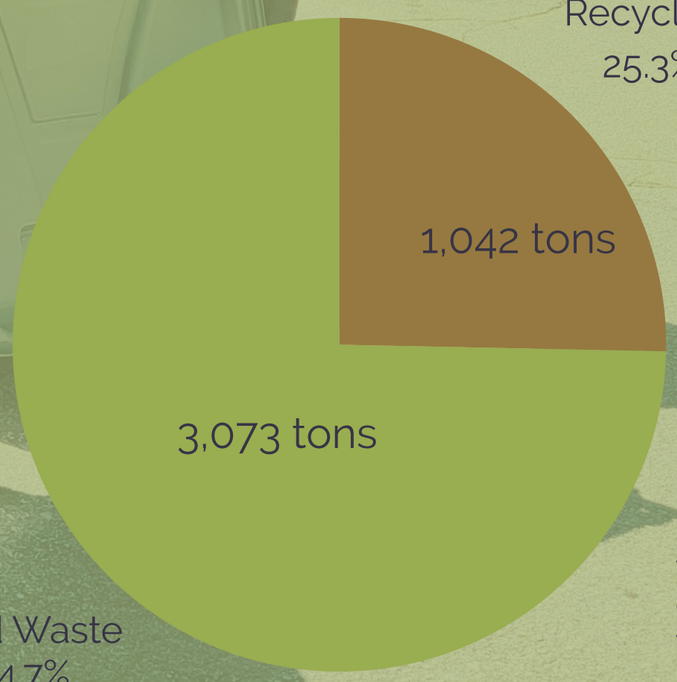
Actions

- [ ] Decrease City-wide Solid Waste by 15%
- [ ] Establish City compost initiatives
- [ ] Reduce biosolids landfill waste by 67%

2019 Landfill Consumption



2019 Recycling & Yard Waste



Note: Yard waste is turned into leaf compost and mulch that is provided to residents

Action

Decrease City-wide Solid Waste by 15%

The primary principal of waste management is first reducing the amount of municipal solid waste sent to a landfill. Solid waste requires transportation related fuel costs and emissions as trash is transported from Henderson County's Transfer Station to two landfills in SC. In addition, methane is released by food waste since this material is in an anaerobic environmental not containing oxygen to properly decompose.

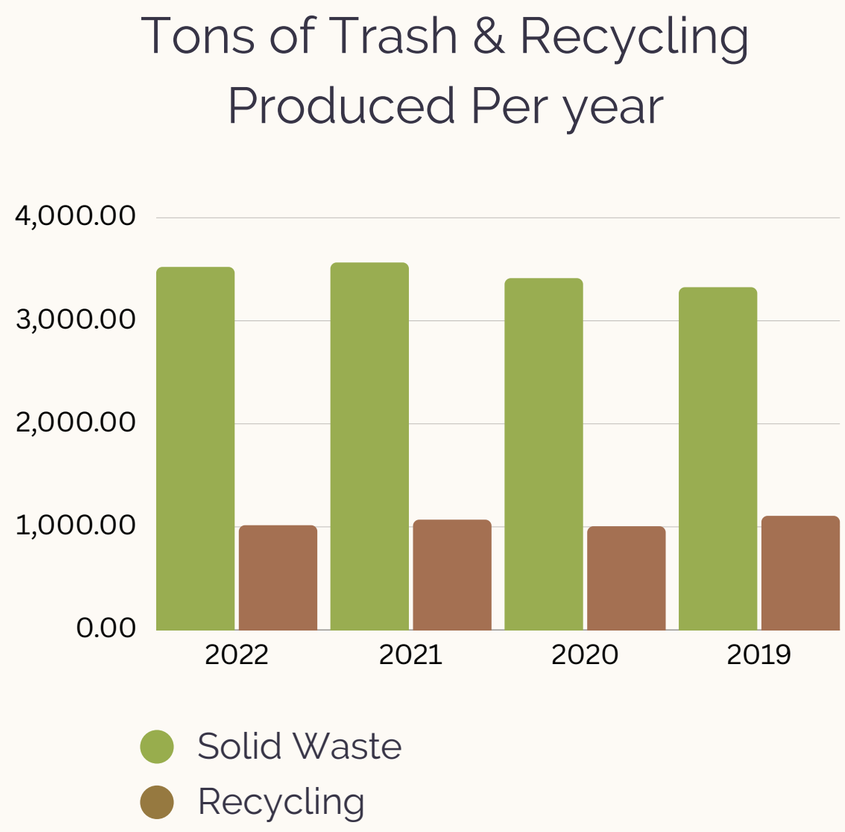
The City is fortunate to have a robust recycling, trash, and brush curbside pick-up program in part through Henderson County's Transfer Station which accepts what many municipalities do not. As a community, we must assess the waste we produce and seek opportunities to reduce our trash footprint through reducing, switching to reusable options instead of single-use.

Strategies to reach this action:

- Coordinate with Henderson County to ensure the existing recycling and disposal services are maintained or improved with the City's efforts and goals in alignment with Henderson County's Solid Waste Management Plan.
- Create an internal policy for single-use plastic, waste reduction, and purchasing for municipal City operations and events
- Increase educational resources and programs for residents and business owners on waste reduction

Estimated costs to implement:

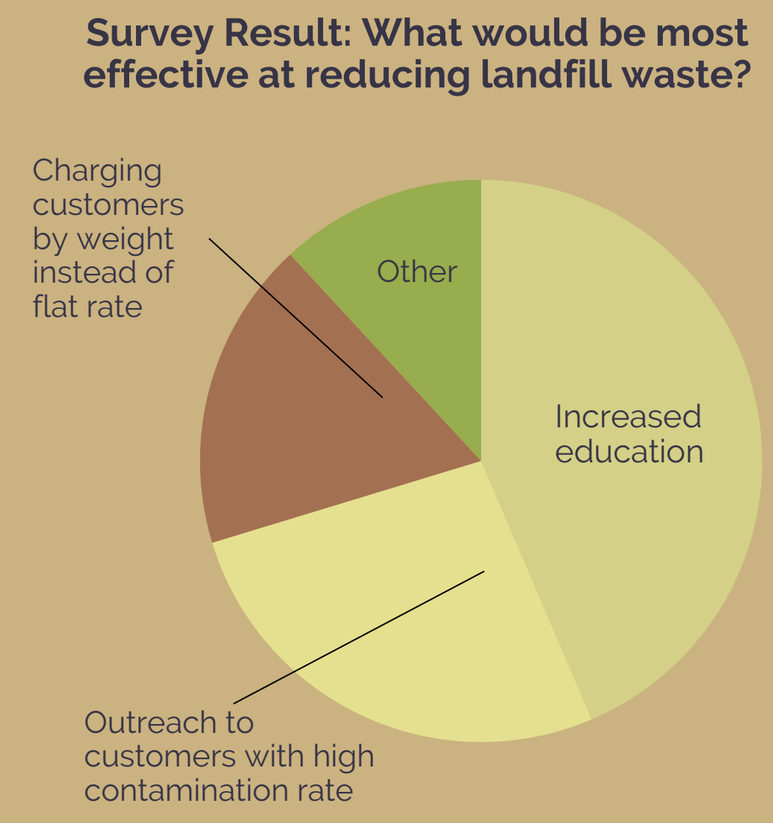
In 2021, 3,380 tons of solid waste was taken to Henderson County's Transfer Station. Using the current rate of $63/ton and goal of decreasing total solid waste by 15%, this would amount to $31,941/year in savings.



Community Level

Community engagement is essential in the City's waste reduction goal. This not only contributes to a cleaner environmental but also is a more responsible use of City funds. Below are a few ways to reduce waste in your own home:

- Review the City's Environmental Services Guide to see what is and isn't acceptable for trash and recycling
- Opt for reusable products instead of disposable where possible
- Compost your foodwaste. There are many options for homeowners as well as renters. Henderson County also has a discounted compost bin program for County and City residents.



Sources:

* U.S. Census Bureau, American Community Survey (ACS)
  Environment America Research & Policy Center: Trash in America

Action

Establish City compost initiatives

Food waste is the single greatest contributor to landfill waste which emits methane, a greenhouse gas more than 25 times as potent as carbon dioxide. An estimated 24% of landfill waste is food waste. Moreover, an estimated 25% of food is thrown away before it ever reaches our mouths.

Composting provides a low cost and value adding way to reduce landfill waste. Food scraps or "green" items and "brown" items such as dry leaves, newspaper, and plant clippings are mixed in a roughly 1 to 1 ratio to create compost. Once these materials break down, compost can be used as a soil amendment while reducing food waste and yard debris picked up by the City's Environmental Services Division. Various municipalities have different compost programs for their own operations and for residents and businesses. Low cost and accessible options for Hendersonville are incentivizing at-home compost bins and designated compost drop off locations.

Survey Results: Top actions for increasing composting participation

- Increased education on how to compost
- 80% interested in composting drop-off locations
- 67% interested in free or discounted compost bins specifically for City residents

Strategies to reach this action:

At-home compost bins

- Collaborate with Henderson County's compost program to strategize ways to increase at-home compost bins for City residents.
- Reduce perceived barrier of entry by providing educational opportunities to residents.

Compost drop-off locations

- Partner with existing community locations such as the Brooklyn Community Garden and other City parks and greenspaces to install compost drop-off locations while encouraging more visitors to enjoy City amenities.
- Prioritize low maintenance composting systems, such as the one shown on this page that do not require an external provider to transfer the food waste to a secondary location for processing. Partners should be defined to ensure maintenance and success of program.
- Minor introductory training should be available for community members who opt into the free program to ensure compost isn't contaminated while providing an educational opportunity for residents and businesses to reduce their food waste.

Estimated costs to implement:

Wholesale at-home compost bins are approximately $55 each. Most municipalities with a similar program have residents pay half the cost of the bin. Bins are also offered during certain times of the year to maximize savings by buying in bulk at one time.

Compost drop-off locations would require a highly efficient low maintenance composter with a covered structure. Estimate cost for a composter is $350-$500 not including the cost of a covered structure for bins and signage.

Sources:

* U.S. Food & Drug Administration Food Loss & Waste
* U.S. Environmental Protection Agency

What are other nearby municipalities doing?

Compost drop-off locations

in partnership with Buncombe County, the City of Asheville offers a free food scrap drop-off program. In the first year, 51 tons of food waste were collected. Similarly, Durham has started a food waste collection pilot program for curbside pickup.

At-home compost bins

Greensboro, Cary, Wake County, and Henderson County all offer subsidized compost bins to residents.

Action

Reduce Biosolids landfill waste by 67%

1 **Biosolids are treated & processed at Wastewater Treatment Facility**

2 **Biosolids are then dewatered to approximately 18% solids & 82% water**

3 **Lastly, biosolids are transferred to Haywood County landfill**

3,263 total gallons of diesel fuel/year
4,600 tons of landfill waste in 2021

Currently, the City's Water & Sewer Department dewaters biosolids produced at Hendersonville's Wastewater Treatment Plant to 18% solids, or on average 82% water. This material is then transported to Haywood County to a privately owned and maintained landfill at $104/ton. We also dewater our Water Treatment Facility residuals and transport them to the Wastewater Treatment Facility with the same final destination. Over the past couple of years, the cost to do this has almost doubled in cost for both treatment facilities.

With the new biosolids thermal drying system, we will have the ability to increase the solids content from ~18% to ~85-90% thus reducing the amount of water that we are paying to landfill. The second part of this project is to generate a much more sustainable final product that no longer needs to go to a landfill but can instead be used as a soil amendment in both residential and commercial applications. This project is slated to begin engineering design and permitting in FY2024 with construction beginning some time in FY2025 at a cost of ~$12,500,000.

Strategies to reach this action:

In 2025, our Water & Sewer Department will begin construction installing a Biosolids Thermal Drying System at the City's Waste Water Treatment Facility.

Currently, the City pays to take this waste to a landfill. The new thermal drying system will reduce the amount of biosolid weight by about 67%, reducing the amount needed to be taken to a landfill. The ultimate goal is to have zero biosolids transported to a landfill.

Estimated costs to implement:

This project is slated to begin engineering design and permitting in fiscal year 2024 with construction beginning in fiscal year 2025 at a cost of around $12,500,000 from City funds.

View of wastewater treatment plant

Land Management

Overview

A resilient natural environment is critical to our community's quality of life. We rely on scenic openspace for recreation and enjoyment. Our tree canopy provides shade and habitat for wildlife as well as reducing CO2 emissions. Hendersonville has long been an advocate for integrating sustainable land management practices into the City such as becoming a Bee City USA member, Caregivers of Mother Earth City, and a Tree City. However, more work is needed to ensure we are proactively preserving and enhancing pollinator biodiversity, maintaining and expanding our tree canopy, and being stewards of our natural environment.

Goal

Increase and enhance Hendersonville's green spaces while improving tree canopy cover, protecting biodiversity, promoting outdoor recreation, and improving the overall health and character of our City.

Actions

- [ ] Increase tree canopy on City property to 50% Maintain and expand Citywide tree canopy
- [ ] Build on existing efforts to reduce pesticide & herbicide use
- [ ] Enhance & restore City-owned natural areas and parks

Community Level

In addition to getting involved in the City's current Bee City USA, Caregivers of Mother Earth, and Mayor's Monarch Pledge commitments, community gardens play an important role in bringing residents and visitors together to not only improve the natural environment around us but by fostering connections and quality of life benefits. The first community garden in Hendersonville was started by a few dedicated residents who came together with City Council support to designate City-owned property for the Brooklyn Community Garden, located in the historic 7th Avenue District. This exemplifies the key role community members play in creating more public spaces where discovery and healthy eating can bring a community together.

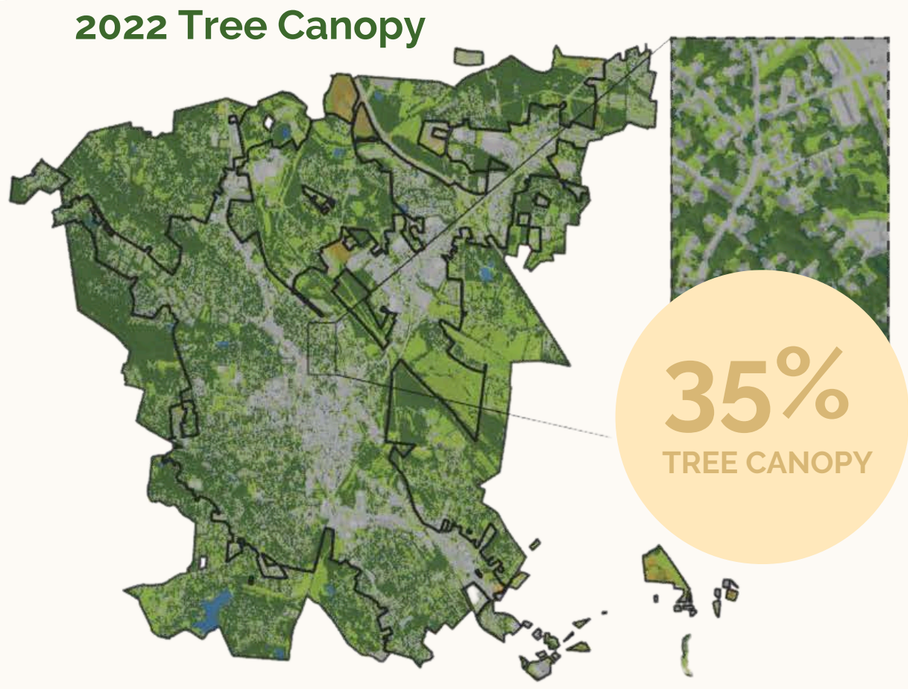
Note: To learn more about Hendersonville's commitment to being a Bee City USA, Caregivers of Mother Earth, and Tree City member, please visit hendersonvillenc.gov/sustainability/land-management

Actions

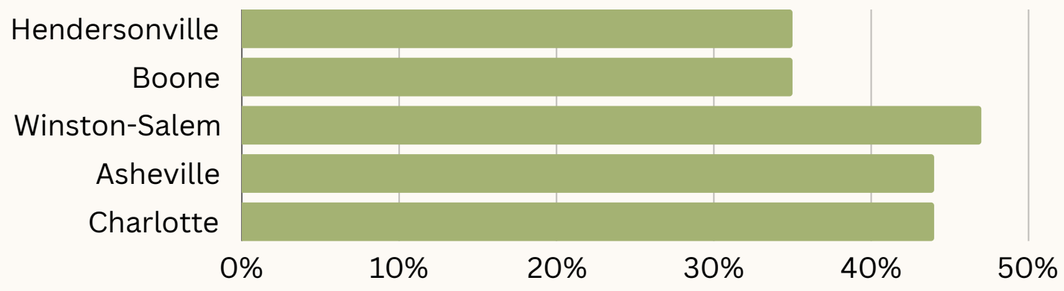
Increase tree canopy on City owned property to 50% & maintain Citywide tree canopy

Hendersonville's tree canopy has long been a priority and an integral attribute of our community character since the City became a Tree City member in 1991. Furthermore, the City Council recognizes the need to protect tree canopy as stated in Resolution R-21-53 as a core value and belief related to sustainability. While the City's tree canopy coverage dropped a mere 2% from 2014 to 2022, Hendersonville has a relatively low tree canopy percentage compared to other municipalities in North Carolina. Trees provide numerous ecosystem and community benefits including providing shade, decreased crime, erosion prevention and air purification. In just one year, a mature tree will absorb more than 48 pounds of carbon dioxide from the atmosphere and release oxygen in exchange.

A major driver of loss in forest canopy is due to development. While Hendersonville is certainly not opposed to development, there needs to be smart growth that encourages developers to integrate trees and other natural vegetation into the planning of the development. Furthermore, residents play a vital role in increasing our tree canopy since 35% of land conducive for tree planting is located on residential properties. To properly manage our natural environment and keep our tree centric community character intact, a collaborative approach with developers, residents, and businesses is essential.



Tree canopy percentages of other municipalities:



Out of 79 North Carolina cities and towns, 22 have completed tree canopy surveys. Of that number, 41% had canopies 50% or more while 36% had canopies 41-49%. Only 23% had canopies 40% or less.

Trees provide significant quality of life benefits including:

- Reduction in cooling electric costs
- Provides shade which can increase the amount of time community members spend in City greenspace & parks as well as encouraging walking and biking
- Absorbs CO2 out of the atmosphere
- Studies have even shown trees in a neighborhood lead to lower crime rates.

Strategies to reach this action:

- Consider expanding Tree Board's responsibilities as a key partner in ensuring success of tree canopy improvement.
- Ensure success of Tree Canopy Ordinance.
- Prioritize planting of larger caliper trees that provide a greater shade and carbon capturing potential
- Consider annual City goal of tree planting/year
- Strategize areas on City parks and other City-owned greenspace for tree planting.
- Promote and consider increased funding for the Tree Board's Neighborwoods program with prioritization of plantings in low-income and minority neighborhoods as well as areas deemed "nature deficient" in 2023 Tree Canopy Cover Assessment.

Estimated costs to implement:

Approximately $171-$351/acre for medium to high caliper trees.

78% **Of survey respondents think tree canopy is important**

Sources:
Arbor Day Foundation
City of Hendersonville 2023 Tree Canopy Cover Assessment
U.S. Forest Service

Action

Build on existing efforts to reduce pesticide & herbicide use

Pest and weed management is essential for maintaining Hendersonville's landscaping. By controlling weeds and other noxious species, invasive plants and safety risks can be reduced while ensuring trails are well marked and are accessed safely. Apart from essential uses, spraying synthetic pesticides and herbicides are often used as a first resort without considering the larger picture of an integrative approach to pest and weed management.

Currently, the City has an integrated pest management plan which includes promoting tree health by proper pruning, soil & nutrient management, pest management, and routine monitoring. In addition, the City's Public Works Department routinely removes and treats invasive species and promotes the use of native species where feasible. No invasive species are ever planted. Pesticides are not used within pollinator habitat areas. By building on these existing efforts while seeking opportunities to decrease chemically and maintenance intensive laws in our parks, we can protect biodiversity and ensuring the City maintains a reputation of attractive and well-maintained landscaping.

Strategies to reach this action:

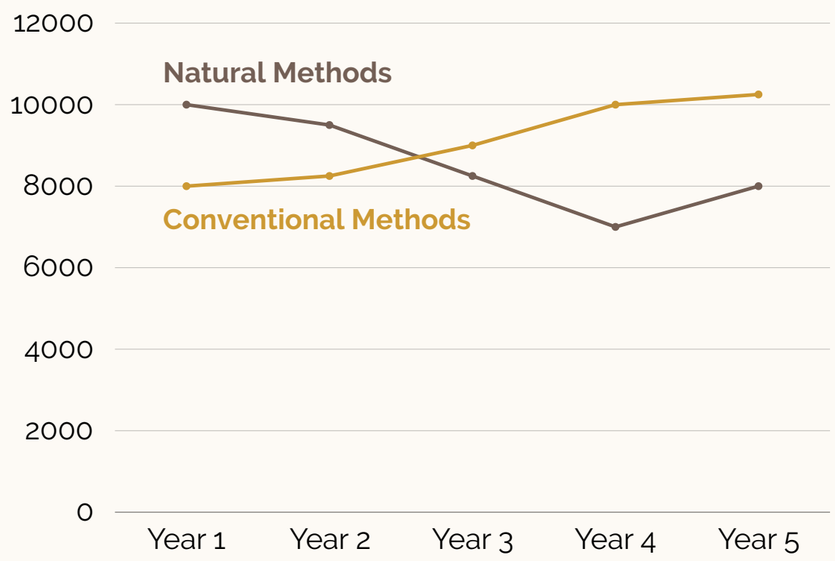
- Design City public landscaping that requires less maintenance, water and pesticides such as using drought tolerant species or native plants
- Design City landscaping that eliminate the need for synthetic pesticides such as low maintenance pollinator meadows or rain gardens for example
- Regularly evaluate alternative products to be used instead of synthetic pesticides such as neem oil or diatomaceous earth.
- Increase training opportunities for Property Maintenance staff such as N.C. State Extension's Organic Lawn Care: A Guide to Organic Lawn Maintenance and Pest Management for North Carolina
- Update and facilitate training to staff on integrated pest management plan.

The City has multiple pollinator beds which not only provide food for bees, butterflies, and more but also don't require any herbicides.

Estimated costs to implement:

Reports from Harvard University, non-profit organization, Grassroots Environmental Education, and Connecticut's Department of Energy and Environmental Protection all found that initial costs of an organic approach was more expensive. However, once the program is established, costs are expected to decrease or stay the same as the previous chemical-based program. Examples of initial costs include training, purchasing equipment, and improving soil health. Once established, landscape maintenance will require less water and fertilizers as well as other maintenance costs.

Grassroots Environmental Education found that an organic turf management approach results in savings greater than 25% over chemical management, shown in the figure to the right.



A Comparison of Costs for Conventional and Natural Turf Programs Over A Five-Year Period Grassroots Environmental Education

Sources:
Osborne, Charles and Wood, Doug. 2010. A cost comparison of Conventional (Chemical) Turf Management and Natural (Organic) Turf Management for School Athletic Fields.
Harvard Facilities Operations Maintenance. 2009. Harvard Yard Soils Restoration Project—Summary Report.
Connecticut Department of Energy and Environmental Protection. 2019. Organic Lawn Care: Your neighbors will "go green" with envy!

Action

Enhance & restore City-owned natural areas and parks

Hendersonville's parks and open spaces are increasingly more important as population and development increases. The quality of our natural environment as well as maximizing the quality of life benefits our parks and open space brings is an opportunity for engaging more residents and community members to enjoy green spaces and recreation. Many quality of life benefits and amenities can be found by enhancing our existing greenspaces to include edible landscaping, land restoration & invasive species removal, and community gardening, among others.

Strategies to reach this action:

Land restoration

- Partner with land conservation organizations such as Conserving Carolina to identify areas of invasive species and degraded land and restore City property and parks.
- Increase participation in City's Adopt-a-Trail/Park program for maintaining pollinator beds and reducing spread of invasive plants.
- Consider increased funding for invasive species removal on City-owned land.
- Consider serving as a host for an AmeriCorps Project Conserve volunteer to expand invasive species removal efforts.

Estimated costs to implement:

A study in the journal Science of the Total Environment found that in the 1960s, annual costs of managing invasive species were $2 billion. By 2010 to 2020, these costs were $21.08 billion per year.

While costs are difficult to decipher from the complexity of the issue, staff time is expected to increase initially. However, as most are aware, invasive species can quickly spread resulting in an even bigger area of damage in the long run to manage.

1960

$2 billion

Global cost of invasive species

2020

$21 billion

Global cost of invasive species

72%

Of survey respondents believe we should have more pollinator & native landscaping on City property

Large patch of Kudzu, a non-native invasive species by Sullivan Park's new bird sanctuary.

Community landscaping

Community landscaping is a method of designing parks and greenspaces that meet the needs of community members while enhancing community benefits. This can include edible landscaping and community gardens as well as adding picnic tables, and benches, among others. These quality of life strategies bring amount multiple co-benefits such as providing food for low income and other disadvantaged communities from edible landscaping. Meanwhile, community gardening provides an avenue for collaboration of multiple ages to learn where food comes from and the importance of a local food system. Benches, tables, and other amenities encourage community members to stay for longer durations at City parks. Strategies for community landscaping include:

- Seek opportunities for including community gardens in existing and new City parks. Henderson County's widely successful Bountiful Harvest Community Garden has a waitlist each year of members wanting to join a community garden which highlights the need for this initiative.
- Seek opportunities to connect City community to natural resources
- Partner with the Tree Board to plant edible fruit trees on City parks, greenspaces, and especially in low-income communities while securing dedicated staff and community volunteers for maintenance.
- Increase public input on parks and greenspace planning to better understand community needs.

Estimated costs to implement:

$40/tree
$25,000/community garden
$1,500/bench or picnic table

NOTE: 48% of survey participants would rent a garden plot for $10-$40/year.

While costs range, grant funding is typically more common for community level projects, especially those that include strengthening underserved communities.

Spotlight on Current Success

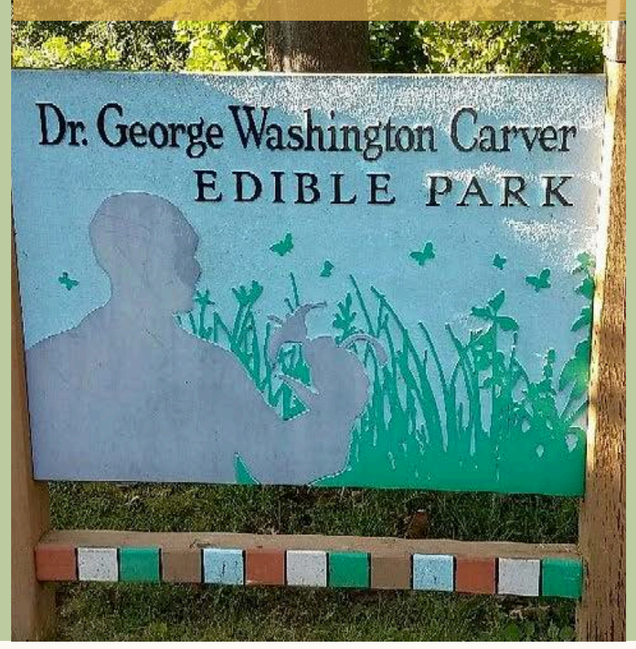
Located adjacent to Sullivan Park in the historic 7th Avenue district, this community garden was started in 2011 with a partnership between the City of Hendersonville and a few dedicated community members to use City land for a community garden in the Green Meadows community. Upcoming improvements include an expansion, blueberry and bee houses, pollinator plantings, and picnic tables, among others.

View of current project area prior to updates.

What are other municipalities doing?

Asheville

The City has an "Asheville Edibles Map" which shows where fruit trees and community gardens are located. Five edible parks are also located within the City.



Henderson County

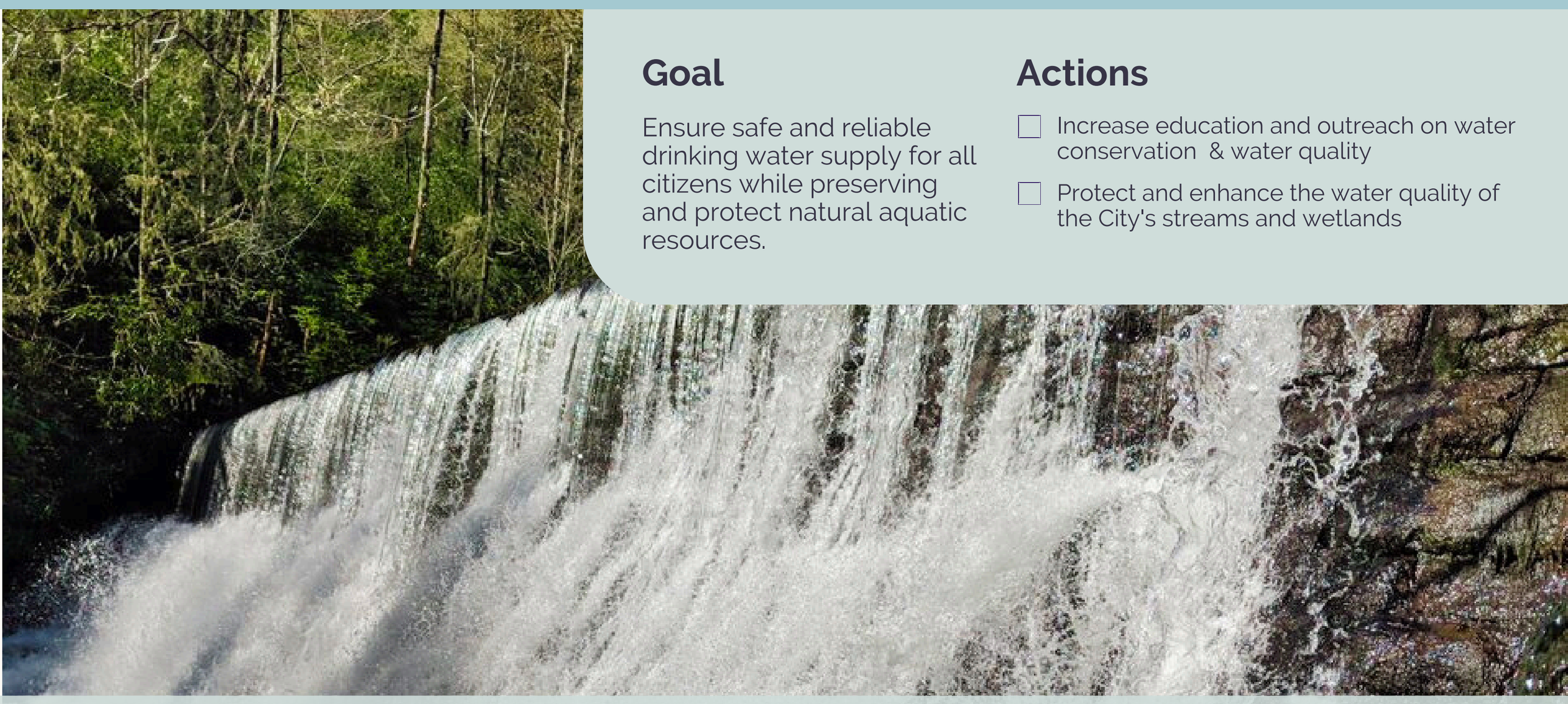
The Bountiful Harvest Community Garden is a partnership between the County and Master Gardener volunteers where community members who might not have land can obtain space to garden. It is also a place of fellowship and learning. Currently, the garden has 35 plots including one bed dedicated to food donations to area non-profits who work with those in need.

Sources:
Science of the Total Environment: Economic costs of biological invasions in the United States

Water

Overview

We must ensure there is a safe and reliable drinking water supply for the Hendersonville community while preserving and protecting natural aquatic resources. Conserving water results in energy savings and decreased emissions from water treatment. Protecting the City's natural environment also leads to an increased quality of life for our community and a resilient water supply. The City is fortunate to have a Stormwater Division that handles runoff and flood hazards as well as a Water & Sewer Department that provides safe and reliable drinking water.



Goal

Ensure safe and reliable drinking water supply for all citizens while preserving and protect natural aquatic resources.

Actions

- [ ] Increase education and outreach on water conservation & water quality
- [ ] Protect and enhance the water quality of the City's streams and wetlands

Community Level

Residents, businesses, and other community members can have a tremendous impact in improving the water quality and quantity for Hendersonville. The City has a water rebate program aimed at reducing the cost barrier for replacing low efficiency water fixtures and appliances with updated options that can reduce your water bill in return. Other best management practices include:

- Irrigating in the early morning before 7am and in the evening after 7pm to reduce water evaporation;
- Turning off water while brushing your teeth,
- Taking shorter showers over baths
- Washing your hair as needed, not daily
- Do laundry and dishes only when you have a full load
- Periodically check for leaks
- Sign up for aqua hawk which is a free service for City water customers that offers information about your water usage, potential leaks, and costs.

Action

Increase education and outreach on water conservation & water quality

In addition to increasing water efficiency in municipally owned buildings, there are a multitude of opportunities to encourage residents and the Hendersonville community to improve water quality and water conservation. Currently, the City has programs such as the Stormwater Division's rainbarrel program, the Water & Sewer Department's rebate for customers that replace inefficient water fixtures with low flow and more efficient models as well as AquaHawk and leak test kits to prevent unnecessary water loss. All these programs provide residents and customers opportunities to take action in reducing their water usage. An evident theme from the public input outreach completed for this Plan was a desire from the City's community to have increased education on water conservation as well as on the other Plan's focus areas.

99%

Of surveyed participants think conserving water is important

Strategies to reach this action:

- Strategize ways to reduce water consumption for municipal buildings to serve as example to residents
- Expand current Water & Sewer rebate program
- Increase education to residents and customers on currently available water conservation programs to take advantage of
- Increase event engagement opportunities such as stream cleanup days, live staking, and stream restoration and beautification efforts to demonstrate the importance of riparian buffers and water quality

Estimated costs to implement:

- Water conservation rebate programs typically refund up to $100 for replacements and save customers $29-$176/year for residential customers and $269-$803/year for commercial customers depending on the fixtures replaced.
- The City's rain barrel program subsidizes $24 of the $100 total cost for a rain barrel.
- Leak detection and educational efforts result in increased staff time but not an additional cost.

Water Quality Hendersonville's new tap water branding and campaign, "Mountains on Tap" not only promotes the quality of its water source but also educates consumers about the affordability of tap water. By showcasing the natural beauty of the mountains of western North Carolina as the source of their tap water, Hendersonville is creating a unique and memorable brand that can help attract visitors and promote the city's water resources.

Water Equity Hendersonville Water and Sewer and the Interfaith Assistance Ministry started this program in 2012 as a way for our customers to voluntarily assist low and moderate-income families in our community when they are unable to pay for a City water and sewer bill or may be unable to pay for a water and/or sewer connection to City-owned utilities.

Sources:
* Waste Reduction Partners

Action

Continue protecting and enhancing the water quality City streams and wetlands

We cannot have a reliable water supply or healthy natural environment without ensuring water quality is a top priority. By nature of living in an urban environment, there are many water quality impacts from development such as erosion, sedimentation, altering water flow and land topography, among others. These factors hinder the water quality of our watershed and streams with impacts most often felt by the most vulnerable communities. To mitigate these impacts, we can implement comprehensive stormwater planning, green infrastructure, strengthen stormwater regulations, and foster collaborative partnerships while maximizing resource efficiency, reducing pollution, and enhancing the overall sustainability of our water system.

Short term strategies to reach this action:

- Implement a comprehensive stormwater management plan that includes strategies and goals for reducing runoff, implementing green infrastructure practices (such as rain gardens, bioswales, and permeable pavements), and improving water quality.
- Keep up to date stormwater policies and regulations for runoff control, erosion prevention, and sediment management
- Increase education and enforcement of mitigating pollutants in waterways.
- Foster Collaborative Partnerships: Collaborate with neighboring municipalities, local organizations, and environmental agencies to share resources, knowledge, and best practices related to stormwater management and water quality.

The City is currently working on a comprehensive stormwater master plan. The primary focus is developing an asset management plan and identifying capital projects to complete over the next 5 years.

Long term strategies to reach this action:

- Establish integrated water management systems at the municipal level with other water-related initiatives, such as wastewater treatment and water conservation programs. This involves adopting a holistic approach that considers the entire water cycle, from stormwater collection to water treatment and reuse.
- Establish monitoring programs to assess the effectiveness of stormwater management initiatives over time. Regularly evaluate the performance of infrastructure, measure water quality indicators, and gather feedback from stakeholders to make data-driven decisions and identify areas for improvement.
- Develop strategies to adapt to changing precipitation patterns and extreme weather events. This may involve conducting vulnerability assessments, updating stormwater infrastructure designs, and incorporating climate resilience into long-term planning.

Cost Savings:

- New pipe infrastructure: $450/linear foot
- Estimated increase of 1% in property value from tree planting: $5,210/home based on June 2023 average home price
- Reduced irrigation needs

Estimated costs:

Majority of costs are indirect since the strategies listed above are based on policy work. The chart to the right lists the average annual routine maintenance costs for stormwater improvements.

Sources:

* Sacramento State University Environmental Finance Center
* N.C. State University; Costs of Maintaining Stormwater Control Measures

City Stream Restoration Projects Completed

2016

Water & Sewer Department

As a result of streambank erosion and degradation of riparian zones impacted from development over the years, the City's sanitary sewer infrastructure was threatened by these streams at twelve different locations. The resulting stream restoration project renewed the protection of the existing sanitary sewer infrastructure through a combination of live plantings and bioengineering while enhancing the overall health of the stream. The total cost for this project was ~$2,900,000.

2021

Water & Sewer Department

Similar to the 2016 project above, the integrity of existing sanitary sewer infrastructure has been threatened by nearby streams at several different locations. These streams, also impacted by development and redevelopment over the years had significant bank erosion and degradation of riparian zones, are encroaching on sewer pipes and/or manholes. The goal of this project is to protect the existing sanitary sewer infrastructure through a combination of live plantings and bioengineering and enhance the overall health of the stream. The estimated cost of this project is currently ~$600,000.

Current

Stormwater Division

This project will complete final design, permitting, and construction activities for the restoration of 2,359 linear feet, LF of stream, 1,556 LF of streambank restoration along Mud Creek, 8.5 acres of wetland restoration, and an additional 9.2 acres of riparian floodplain restoration to provide ecological enhancement and stormwater treatment. Funds will also be used for the implementation of flood reduction activities and additional land acquisition to further improve climate resiliency and stormwater management in the flood-prone and impaired Mud Creek and Johnson Ditch watersheds. Total cost: ~ $1.9 million.

View of completed work of Water & Sewer's 2021 stream restoration project

Implementation

The completion and adoption of this Sustainability Strategic Plan by City Council is just the start. In order for this Plan to be successful, actions and goals need to be achieved by having a robust and well thought out implementation strategy. Relevant departments should be considered as key stakeholders in the evaluation of action plans to ensure buy in and success. Funding is also an essential component of implementation with the majority of community members voting that the Plan should be funded through a hybrid of grants & city funds. Actions have been evaluated based on involved departments, timeframe, cost, return on investment, GHG reduction potential, and any co-benefits.

Priorities

While all actions are essential to implement for the Plan's success, those actions which members of the public voted as most important are highlighted. In addition, for optimal greenhouse gas emission reduction, **priority actions for the Wastewater Treatment Plant, pumps, and other associated infrastructure should be held as top priority with total greenhouse gas emissions comprising over 40% of the City's total emission footprint.** For the transportation sector, the Police Department and Water & Sewer Department should be top priority for sustainability vehicle upgrades as these departments comprise 64% of the City's total fuel consumption.

Ranking Criteria

Below is a legend on each criteria with the implementation guide in the following pages.

Focus Areas

- Energy
- Land Management
- Transportation
- Water
- Waste Management

Timeframe

Ongoing: actions that will involve a continual process instead of an end point.
Immediate: actions that require a relatively short amount of time and minimal resources to complete.
Short-term: actions that will be achieved within 1-3 years.
Medium-term: actions that will be achieved within 4-6 years.
Long-term: actions that will be achieved within 7-10+ years.

Cost

$	< $50,000; costs feasible through Capital Improvement Budget
$$	$51,000-$100,000; costs potentially through Capital Improvement Budget or grant funding
$$$	$101,000-$500,000; costs requiring Capital Improvement Budget and grant funding
$$$$	$501,000-$1M+, funding would require significant grant funding and Capital Improvement Budget

Involved Department(s) and Boards

Specified are the City departments and boards that are integral to achieving the proposed actions. Many actions require departmental changes to the typical way of operating that should be driven by a collaborative approach. Actions denoting boards rely on advising and sometimes implementation assistance.

GHG Reduction Potential (MTCO2e)

Estimated metric tons of carbon dioxide equivalent by action implementation. For more information on how carbon dioxide equivalent is determined, please see page 7.

Return on Investment

Estimated cost returns from implementing actions. Also included are non-monetary returns.

Co-Benefits

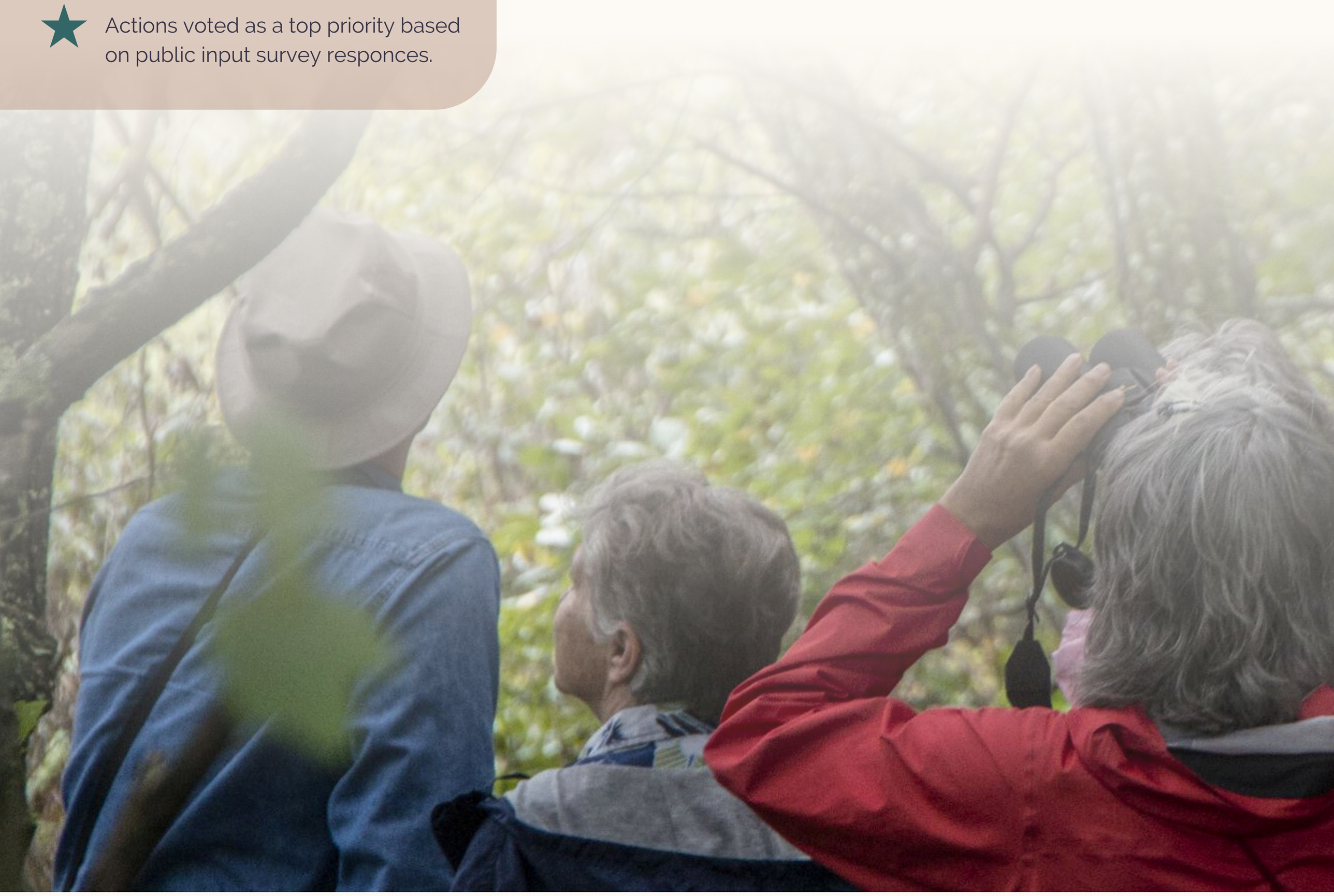
Equity & Inclusion; Actions address disproportionate burden of greenhouse gas emissions & leads to quality of life improvements for underserved and low income communities.

Environmental Quality: Action improves air and water quality while building a resilient ecosystem.

Economic Vitality: Action provides strong net cost (cost - savings) and/or may have a high initial cost but results in significant long-term cost savings.

Community Priority

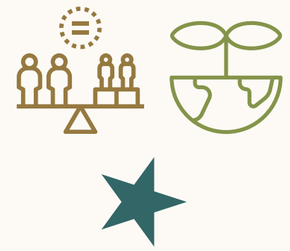
★ Actions voted as a top priority based on public input survey responces.



Category	Actions	Involved Department(s) and Boards	Timeframe	Cost	Return on Investment	GHG Reduction Potential (MTCO2e)	Co-Benefits
	Receive 30% of electricity from renewable energy sources.	Public Works; Building Maintenance, Water & Sewer & Sustainability	Medium-term	$$$$	Varies ($184,000+ by 2035)	1,159	
	Achieve 10% Energy Savings from Efficiency Upgrades	Public Works; Building Maintenance & Sustainability; and Water & Sewer	Ongoing	Varies	Varies (Estimated energy reduction of 5% - 10%, or 10%-15% for non-LED buildings)	433	
	Establish Sustainable building policy	Public Works; Building Maintenance & Sustainability	Short-term & Ongoing	N/A	Indirect return on investment	Indirect GHG reduction	
	Increase Level 2 EV charging stations	Public Works; Street Maintenance, Fleet Maintenance & Sustainability	Medium-term	$$	Varies; typically saving over 50% on fuel costs	Varies	
	Transition to low emission vehicles & reduce fuel use	Public Works; Fleet Maintenance & Sustainability	Long-term	$$$$	Varies ($90,979+)/year	Varies (272+)	

Sources:
2022 Solar Feasibility Study by RN&M Engineers
ICLEI USA ClearPath
Waste Reduction Partners 2018 energy audits on City Hall & City Operations Buildings
Level 2 dual port electric vehicle charging station quotes from JF Petroleum Group.
Blink, and State Contracts

Note: GHG reduction potential related to renewable energy does not include Duke Energy's net zero by 2050 goal which would drastically reduce overall GHG emissions if adopted.

Category	Actions	Involved Department(s) and Boards	Timeframe	Cost	Return on Investment	GHG Reduction Potential (MTCO2e)	Co-Benefits
	Implement Alternative Transportation Plans	Public Works; Streets & Sustainability	Long-term	$$$$	Unknown / also provides Intrinsic benefits	Unknown	
	Decrease City-wide Solid Waste by 15%	Public Works; Building Maintenance & Sustainability	Long-term	$	$31,941/year	331 (note this number represents entire City-wide GHG reduction)	
	Establish City compost program	Sustainability	Short-term	$	$51,105	529.73 (note this number represents entire City-wide GHG reduction)	
	Reduce Biosolids landfill waste by 67%	Water & Sewer	Medium-term	$$$$	$320,528 /year/ ROI varies with landfill cost savings in 40 years	N/A (no established methods from ICLEI to calculate CO2e)	

Sources:
Ford Hybrid Utility Calculator utilizing Police Department vehicles for the estimate which comprise 32.6% of the City's total fuel consumption
ICLEI USA ClearPath
City of Hendersonville 2017 Bicycle Plan

Category	Actions	Involved Department(s) and Boards	Timeframe	Cost	Return on Investment	GHG Reduction Potential (MTCO2e) /yr	Co-Benefits
	Increase citywide tree canopy to 45%	Public Works & Tree Board	Long-term	$$$	Unknown / also provides Intrinsic benefits	492 MT CO2 (note this number represents entire City-wide GHG reduction)	
	Build on existing efforts to reduce pesticide & herbicide use	Public Works Property Maintenance	Long-term	Unknown	Unknown / estimated 25% in savings	N/A	
	Enhance & restore City-owned natural areas and parks	Public Works; Property Maintenance	Long-term	$	Unknown	N/A	
	Increase education and outreach on water conservation & water quality	Water & Sewer, Stormwater, & Sustainability	Ongoing	$	Varies	N/A	
	Continue protecting and enhancing the water quality City streams and wetlands	Stormwater	Ongoing	$$$	Indirect return on investment	Indirect GHG reduction	

Sources:
ICLEI USA ClearPath
U.S. Food & Drug Administration Food Loss & Waste
U.S. Environmental Protection Agency Greenhouse Gases Equivalencies Calculator - Calculations and References

Planning

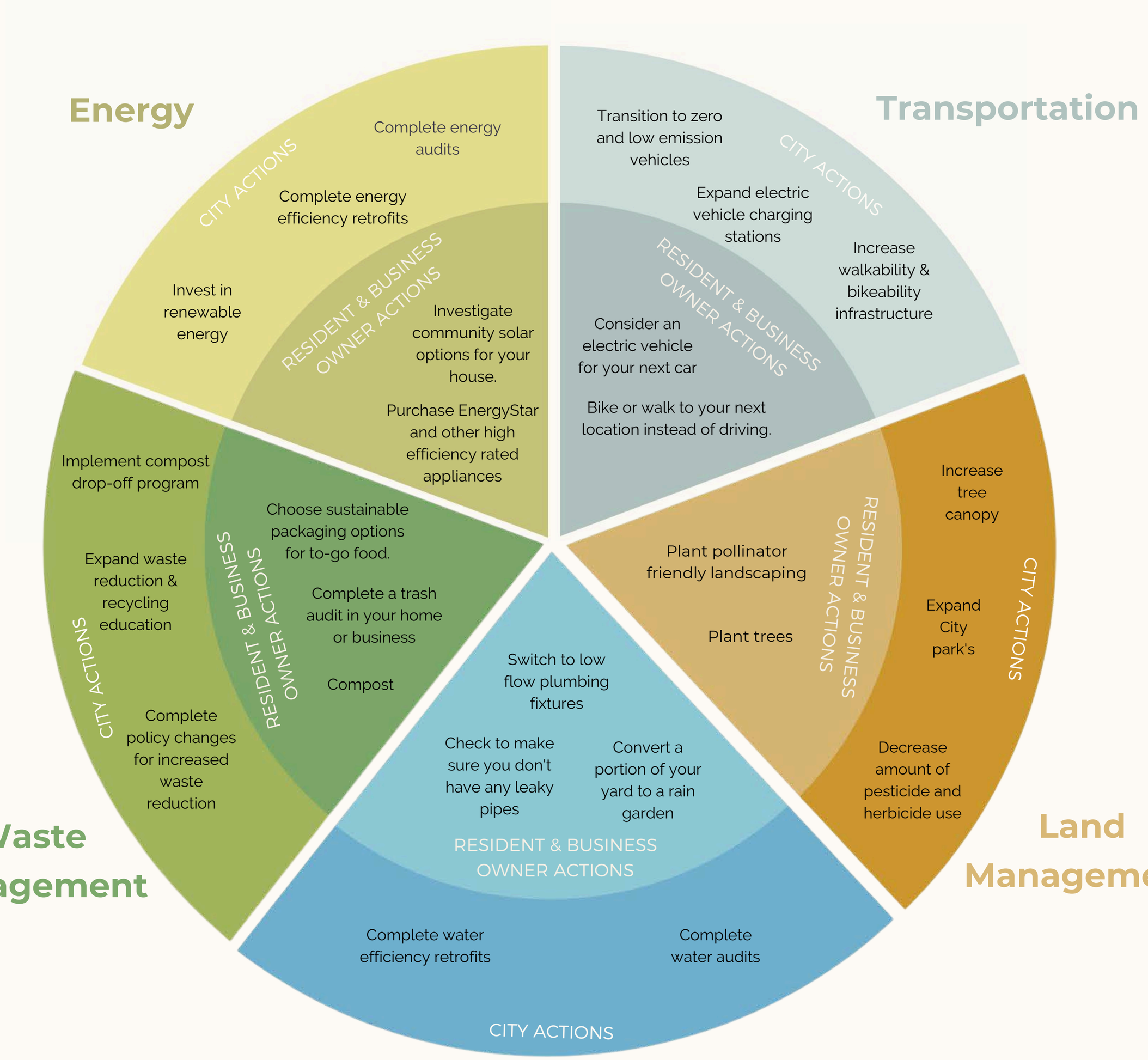
Ensuring equity and social sustainability relies on forward thinking planning to make necessary improvements in the areas of affordable housing, smart infrastructure development and reducing sprawl. These focuses are addressed in the **2024 City of Hendersonville Comprehensive Plan**. This plan will be Hendersonville's strategy for how growth and development is managed over the next 20+ years. The plan will be used as a tool for prioritizing resources and future planning efforts.

Additionally, planning efforts oftentimes rely on County and State partnerships as the City of Hendersonville can only control what is within our jurisdiction and authority. This particularly comes into play when considering street and infrastructure improvements.

Collective Action

The integral role of community cannot be overstated. Many of the actions throughout this Plan require community participation such as waste reduction, water, and land management. Other areas such as sustainable energy and transportation will only be able to grow and lead to significant emission reductions if we as a collective community engage and advocate for an entire systems approach to sustainability within Hendersonville.

Throughout this Plan, community recommendations for each focus area category were specified as a starting point for individualized engagement and sustainability improvements in the residential and commercial sectors. As the Sustainability Strategic Plan moves towards implementation, consider the impact of collective actions as a driving force towards an even better Hendersonville.



City of Hendersonville
Sustainability Strategic Plan
hendersonvillenc.gov/sustainability