ENERGY ACTION PLAN

FAYETTEVILLE, ARKANSAS

ENERGY ACTION PLAN FOR THE CITY OF FAYETTEVILLE, ARKANSAS

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ADOPTION:

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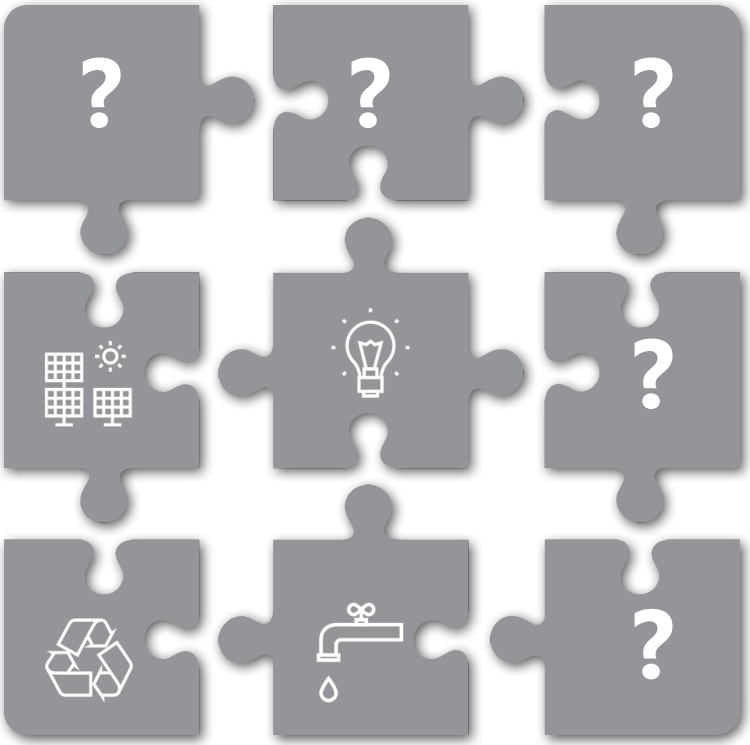
INTRODUCTION:

Being a member of a nature-loving, smart, thrifty community like Fayetteville, you probably already take many small actions to cut down on your energy usage.

You probably know to recycle, turn the water off when you brush your teeth, buy LED bulbs to keep electric costs down, and walk or ride your bike to close destinations. These everyday actions make great contributions to keeping costs and energy use down.

This plan takes an in-depth look at how we can build on our small, everyday actions to make the biggest positive impact on both Fayetteville and the globe. Fayetteville can do more to build an innovative and resilient community with a strong legacy of stewardship for future generations.

This plan is a guide to reducing waste, reducing our energy use, and moving to cleaner and more sustainable types of energy. The City believes that this plan will lay the groundwork for a thriving, beautiful community for generations to come.



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"Climate change poses a very serious threat, but also a significant economic opportunity for our City and our nation. Fayetteville is committed to working with leaders of other cities, states, universities, and businesses to combat climate change by supporting a low-carbon economy and creating good jobs in energy efficiency and renewable energy."
-Mayor Lioneld Jordan

INTRODUCTION: THE VISION OF THE ENERGY ACTION PLAN

Fayetteville is proud of its creative local economy, its rich history of educational excellence, and the many opportunities for outdoor recreation and healthy living that characterize the City. As environmental, educational, and economic leaders of our region, we are striving to build the most resilient, sustainable community possible - for current and future residents.

This Energy Action Plan was created to build a framework and energize action around the City of Fayetteville's efforts to be a resource and energy efficient community. This plan aims to:

1. Maintain clean air, water, and soil, building a City where every citizen (present and future) can experience a naturally beautiful, healthy, and sustainable Fayetteville

2. Create jobs and build capacity in new sectors while enabling local businesses to be more resource efficient, more profitable, and more competitive in a global market

3. Create more energy efficient homes and businesses, giving all citizens greater financial security and flexibility

4. Address public health threats from pollution, food insecurity, natural disasters, and changing weather patterns, particularly for our most vulnerable and at-risk populations

5. Lead the South in energy independence and efficiency by developing local, equitable, and cost-effective solutions to our energy needs

6. Develop a culture of innovation where value is compounded and waste is minimized

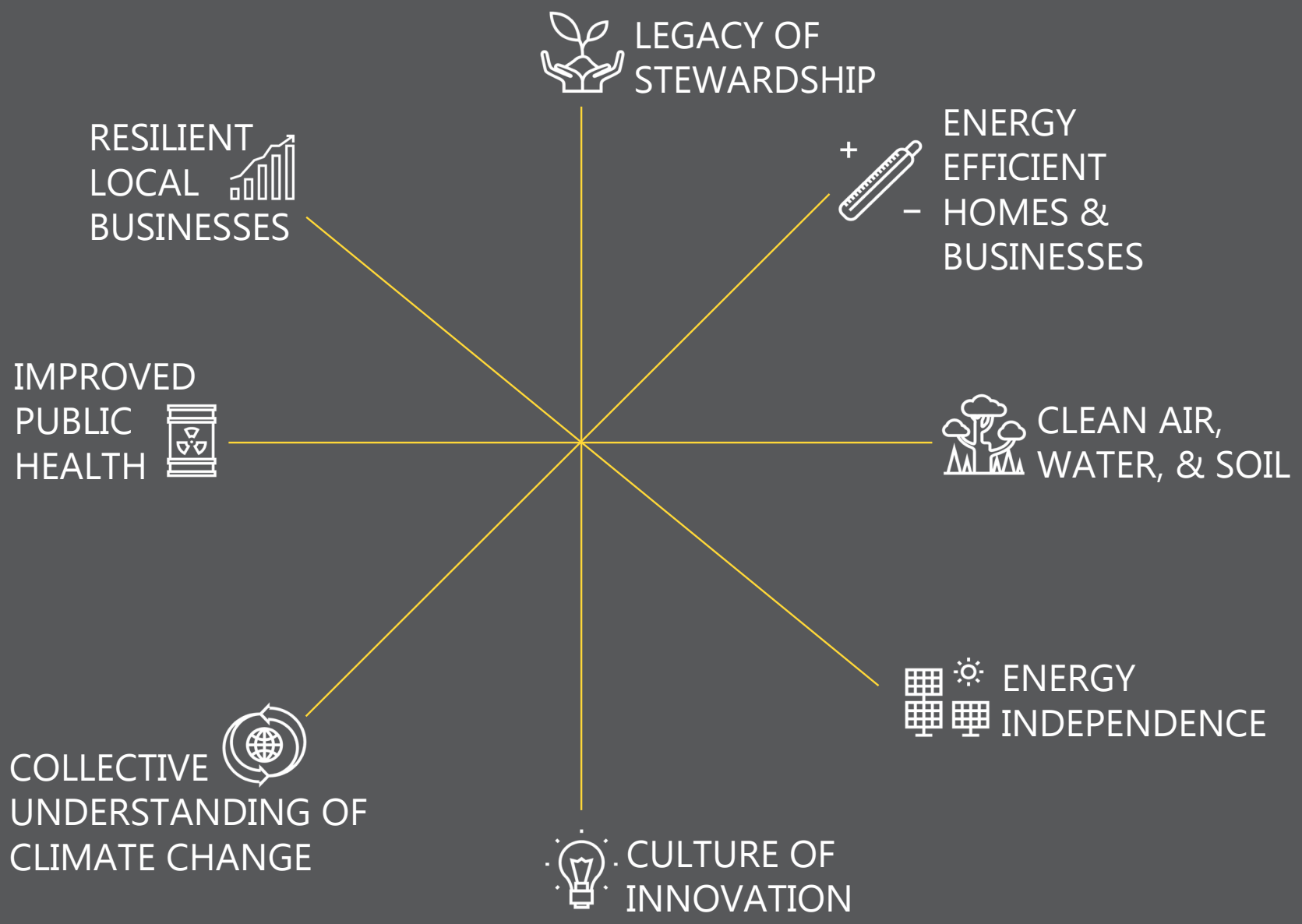
7. Lead conversation about climate change and determine how to effectively address current and future effects in Northwest Arkansas, connecting on shared values of conservation and innovation

8. Build a legacy of stewardship, demonstrating the financial and social feasibility of a clean energy future

This plan will outline the City's strategy for achieving these goals through the primary mechanism of reducing carbon pollution through four sectors: reducing overall energy use, diverting waste from landfills, shifting toward clean energy production, and reducing transportation-related emissions. By taking action together and adopting this Energy Action Plan, we can preserve a clean, healthy, beautiful future for Fayetteville.

INTRODUCTION: THE PURPOSE OF THE ENERGY ACTION PLAN

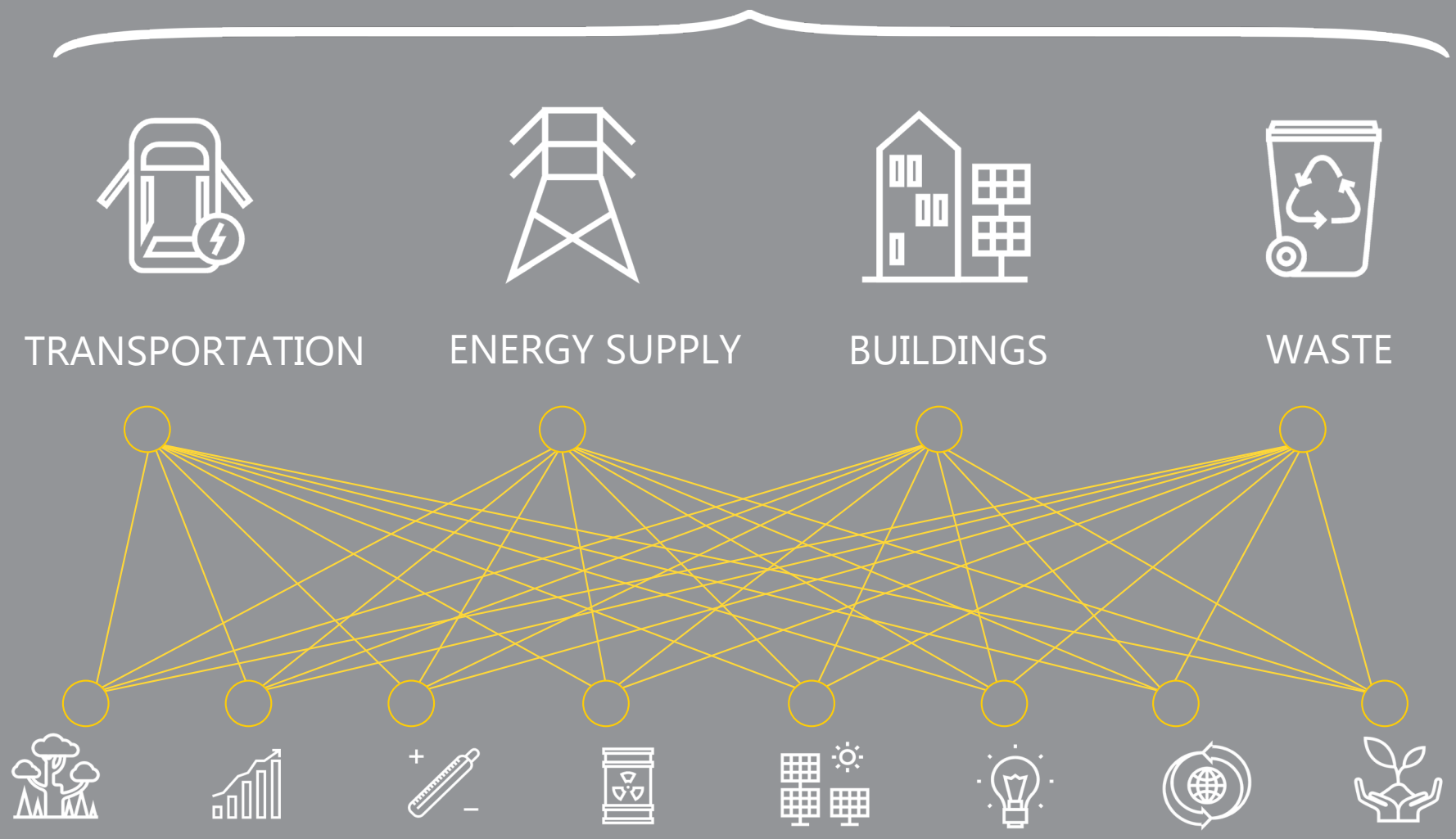
The plan can be summed up by the following purpose statements. In this plan, you will see these statements repeated often, in icon form, to highlight how each goal, action item, and implementation step is aligned with the overall purpose of the plan.



INTRODUCTION: THE SCOPE OF THE ENERGY ACTION PLAN

The Energy Action Plan will address Fayetteville's current conditions in the areas below, set goals for improvement, and provide detailed implementation steps to achieve a more energy and resource efficient future. Details of these actions are available in chapter 3.

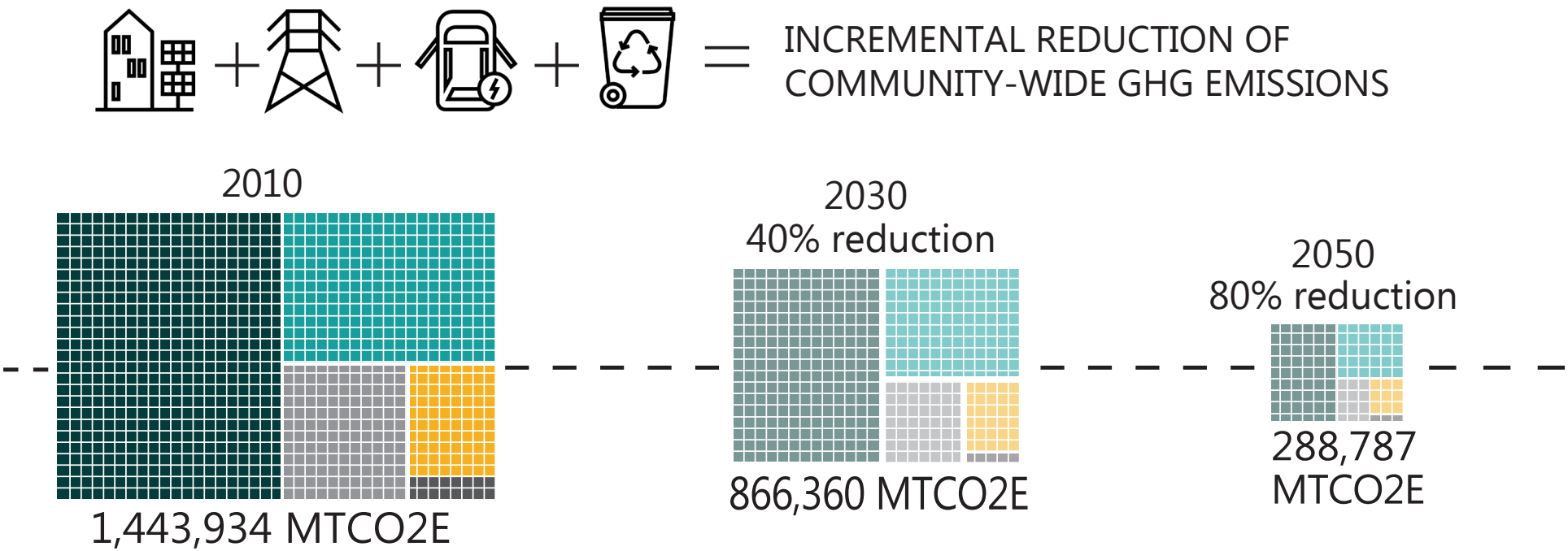
IN SCOPE:



INTRODUCTION: COMMUNITY-WIDE OUTCOMES

By tracking and aggressively addressing the four in-scope areas of the Energy Action Plan (buildings, energy supply, transportation, and waste), the City of Fayetteville will strive to achieve a community-wide reduction in greenhouse gases (GHG), measured in total metric tons of carbon dioxide equivalent emissions (MTCO2E).

These targets are derived from the goals set by the 1997 Kyoto Protocol and the 2015 Paris Agreement, at which leaders from around the globe committed to reducing greenhouse gas emissions in an effort to halt and reverse the planet's rapidly changing climate. These targets were suggested, vetted, and encouraged by community stakeholders and City staff. Further discussion of this outcome is available in chapters 2 and 3.



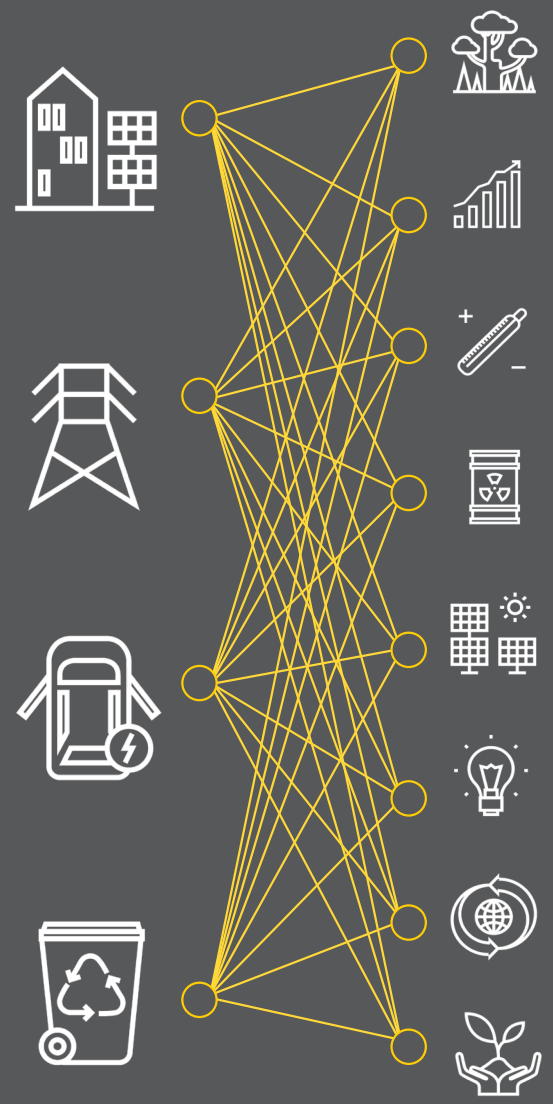
For the reduction target, a baseline year of 2010 is used as it is the first year Fayetteville conducted a comprehensive GHG inventory. Rationale, reporting procedures, and results from Fayetteville's GHG Inventories from 2010-2016 are available in Appendix B.

INTRODUCTION: SECTOR-LEVEL GOALS

The following goals were set and prioritized through community and City staff input, expert stakeholder direction, and administrative review. More in-depth discussion of each goal, strategies for reaching the goal, and implementation plans are available in Chapter 3.

CROSS-SECTOR:

- Reduce average housing and transportation costs to 45% of area median income
- Develop and expand Fayetteville's reputation as a hub for socially and economically responsible business development, entrepreneurship, and green jobs
- Build local support for national carbon emission reduction and carbon capture strategies



BUILDINGS:

- Complete periodic feasibility analyses of building energy code updates
- Achieve 3% annual reduction in overall energy usage in buildings
- Improve the health, distribution, coverage, and effectiveness of Fayetteville's urban forest

ENERGY SUPPLY:

- Achieve 100% local government clean energy by 2030
- Achieve 50% community-wide clean energy by 2030
- Achieve 100% community-wide clean energy by 2050

TRANSPORTATION:

- Reduce per capita vehicle miles traveled to 2010 levels by 2030
- Achieve 25% bike/walk/transit mode share by 2030

WASTE:

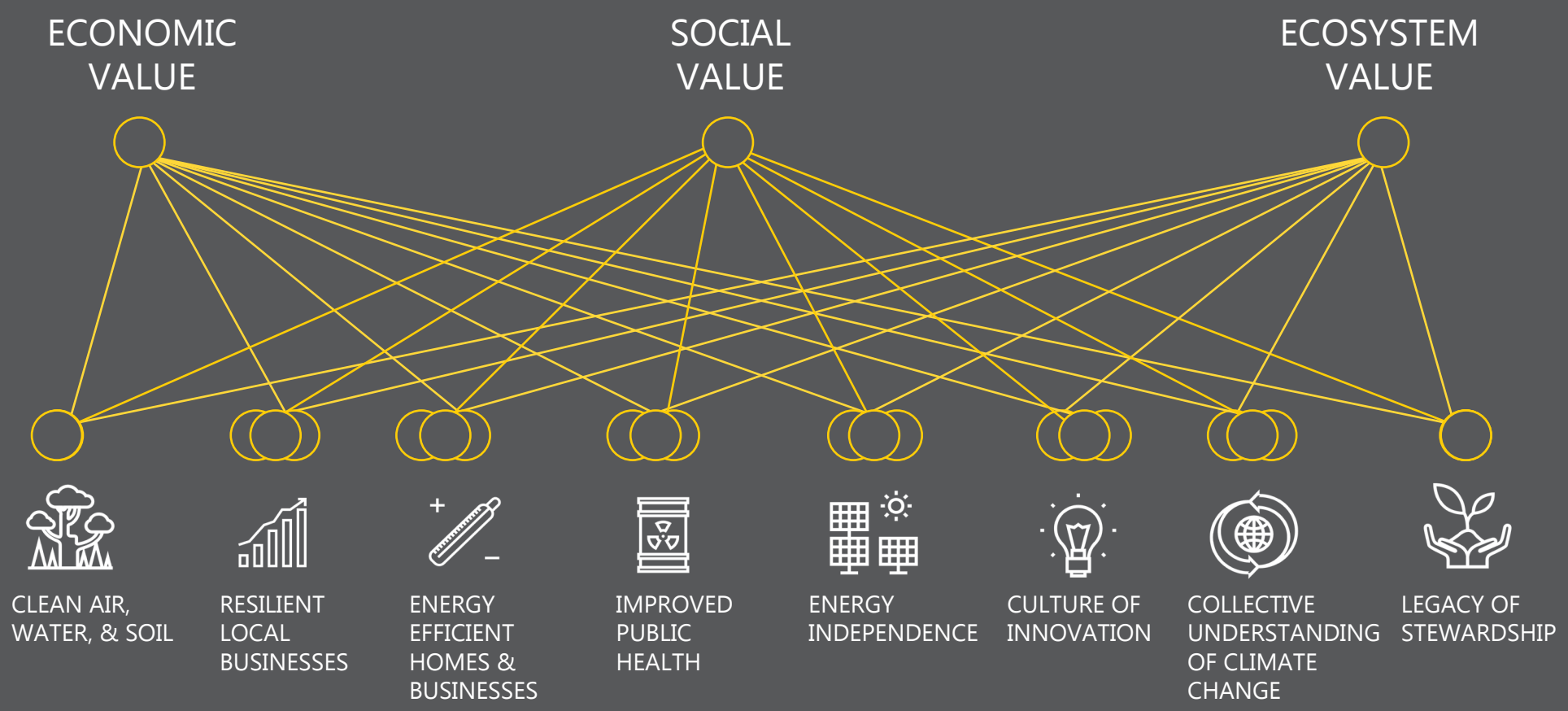
- Achieve 40% total waste diversion from the landfill by 2027

CHAPTER ONE:

THE NEED FOR ACTION

CHAPTER ONE: TRIPLE BOTTOM LINE BENEFITS OF ENERGY ACTION

There are a host of reasons to strategically and systematically pursue clean energy, energy efficiency, and reduced waste in our community. One compelling reason is the multitude of community benefits that arise from reduced energy consumption and cleaner forms of energy. These benefits are best illustrated through a triple bottom line approach. A triple bottom line approach defines success in-so-far as it furthers the environmental, economic, and social health of a community or organization. The triple bottom line approach is useful because it demonstrates that timely action in the realm of energy efficiency and energy reduction can benefit Fayetteville in a host of enduring ways. These benefits are explored in depth on the following pages.



CHAPTER ONE: ECONOMIC BENEFITS OF ENERGY ACTION

The economic benefits of energy action are varied. Benefits include the following:

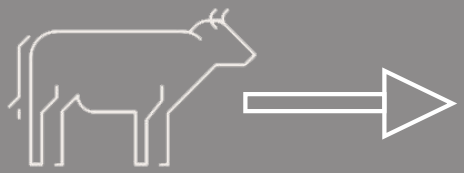
- Energy efficiency upgrades often have very quick return on investment, allowing small investments by home and business owners to realize substantial long-term savings. The average resident in Fayetteville spends 5% or more on utility bills, averaging around $2,100 per year. Energy efficiency efforts (increased insulation, duct-wrapping, tree canopy coverage) can substantially drive down these costs, freeing up hundreds of dollars for the average household.
- The market is already moving quickly to renewable and clean energy sources due to their lower overall costs of production. For instance, SWEPCO, one of Fayetteville's two electricity providers, has announced that it is partnering to build a 2,000 megawatt wind farm in the Oklahoma Panhandle, 70% of which will be transmitted to the grid in our region[1]. Due to the lack of fuel costs, the total cost of wind power is now less than traditional power sources such as coal. This project is estimated to produce $5 billion in savings for SWEPCO customers over the next decade.
- Clean energy technologies such as wind and solar encourages local job growth and skills development. One of every 50 new jobs in the U.S. in 2016 was in the realm of solar energy production, which, as an industry, has a growth rate of more than 24%. These are jobs that cannot be exported as the cost of transmissions requires relative proximity to the source of "fuel" (wind or solar energy). This growth in local, renewable energy insulates communities from volatile markets while building high wage jobs and economic stability[2]. In Arkansas, this growth is happening rapidly. Entergy Arkansas recently broke ground on an 81 megawatt solar project near Stuttgart, the largest project to date in the state[3]. This project will be able to power 19,000 homes and is projected to produce nearly $8 million in additional revenue for Arkansas County.
- Achieving energy independence reduces our vulnerability from global market shifts. By producing energy locally, we can reduce dependence on external systems or structures, improving economic stability even when global markets experience volatility.
- Reducing overall vehicle miles traveled (by switching to more public transportation, biking, and walking) cuts down on maintenance and repair costs for roads and streets. These are tax-payer funded expenses and reducing vehicle miles allows for tax dollars to be allocated to more sustainable projects.

CHAPTER ONE: ENVIRONMENTAL BENEFITS OF ENERGY ACTION

The environmental benefits of proactively advancing clean energy, energy efficiency, alternative transportation, and increased recycling are realized at all levels: locally, regionally, nationally and globally. The following is an incomplete, yet compelling, list of some of these environmental benefits:

- Clean energy produced from sources such as wind, solar, geothermal and hydro produce far fewer greenhouse gas emissions than fossil fuel sources. Switching to cleaner forms of fuel not only produces fewer air and water pollutants, but reduces the climate-changing gases and particles being released into the atmosphere[4].
- Reductions in annual vehicle miles traveled can be very beneficial to the environment by reducing ground level ozone, smog, and particle pollution. These pollutants have negative effects on air quality, causing wide-spread environmental and public health consequences[5].
- Active transportation such as walking and bicycling benefits the environment by reducing traffic congestion and air pollution. Trail corridors have the added benefit of being green spaces providing numerous ecosystem services such as stormwater quality and litter abatement while also functioning as an active transportation system linking residents with all manner of destinations.
- A diversified and green energy supply reduces water pollution, improving the quality of the waterways that are at the heart of recreational and outdoor adventure activities in Arkansas[6].
- Reduced waste and increased recycling cuts down on the need for raw material mining in a wide variety of sectors. Recycled materials such as plastics, paper, cardboard, steel, and aluminum reduce the demand for these raw resources to be extracted, clear-cut, or mined.

A plant-rich diet is one of the most impactful ways to cut down on an individual carbon footprint. An estimated 17% of total global carbon emissions come from food production, food transport, and cooking. Fruits, vegetables, and legumes are much less "carbon intense" than beef and pork. Beans have a 92% smaller carbon footprint than the same serving of beef[7]. Small everyday decisions can play an important role in building a healthy, sustainable future.



CHAPTER ONE: SOCIAL BENEFITS OF ENERGY ACTION

Planning, designing and working toward a more energy efficient future is critical for creating social stability in a rapidly changing world. We are already beginning to see social systems adapt to these coming changes. For example, the USDA Hardiness Zone Map was amended in 2012, showing that hardiness zones had shifted northward approximately 175 miles. The USDA Hardiness Zone Map estimates the minimum temperature in a region and is used by farmers and gardeners to know when and what to plant. To be successful, farmers must grow crops suited for their hardiness zone. When zones shift, substantial changes can be required in farming practices, planting and harvesting schedules, and even the types of crops one can grow.

In addition to the social impacts of climate change, there are many social benefits that can arise from a pro-active energy action strategy. The following are some social benefits that may be realized from the creation of this Energy Action Plan:

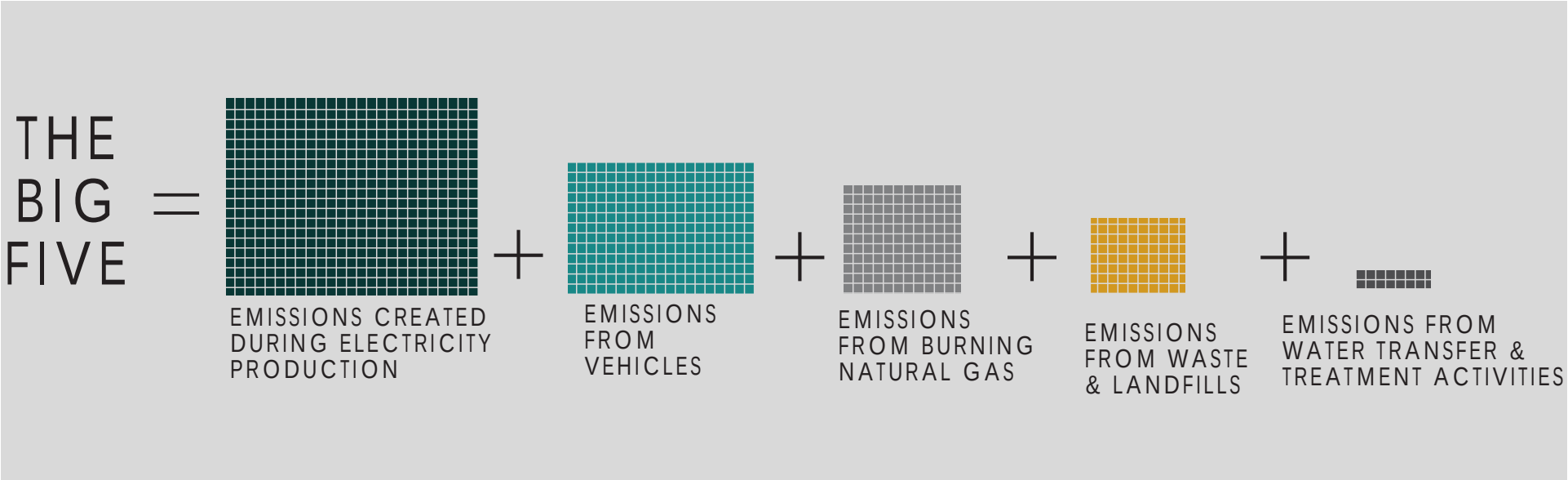
- Retrofitting existing buildings with energy efficient features provides economic, health, and social benefits for residents. Energy efficiency efforts are especially impactful for our low-to-moderate-income residents who benefit from a higher degree of physical comfort, air quality improvements, and financial savings which can go towards more important life expenses like healthcare and food. Improved occupant comfort and lower energy burden can improve equitable outcomes across a variety of social indicators.
- Active transportation provides residents with clean, healthy and equitable transportation choices. Residents with limited means are disproportionately impacted when they do not have access to a robust and in-ter-connected system of trails and sidewalks. While strong active transportation networks provide all of us a place to exercise, meet, and travel, they also provide key commuting corridors for many residents.
- The creation of clean, sustainable renewable energy sources provides redundancy in our electricity trans-mission system. Redundancy reduces stress on operations and creates reliable systems, even in the case of emergencies and natural disasters.
- Development of lower-carbon systems helps to spur innovation, creative problem solving, and economic diversification. A strong spirit of discovery is not only useful but necessary as we work to pursue a more equitable and sustainable world. By building this culture of innovation, we create a generative space for all sorts of social, economic, and environmental progress.

CHAPTER ONE: UTILIZING A FRAMEWORK OF GREENHOUSE GAS EMISSIONS REDUCTION

In order to employ a single framework for gauging economic, environmental, and social repercussions of city and community activities, this Energy Action Plan will use a lens of overall greenhouse gas (GHG) emissions reduction to set goals, establish strategies, and prioritize action items. A GHG reduction framework is used globally in the public and private sector as companies, organizations, nations, and cities look to reduce waste, improve efficiency, and embed long-term sustainability in their communities. GHG's, often referred to as carbon emissions, are created from a host of human activities including transportation, electricity production, the burning of fossil fuels, landfilling waste, and water transfer and treatment.

While we celebrate the ingenuity, progress, and improved life outcomes that have resulted from the massive growth of industry, technology, and connectivity in the modern world, the amount of GHG's produced by human activities are impacting the Earth's climate in negative ways. These changes threaten the long-term viability of food production, public health, economic growth, and more. The climate shifts, commonly known as global warming, are creating the potential for unprecedented and large scale adverse impacts on human health, the environment, and social, natural, and economic systems.

The risks associated with climate change are prompting all levels of government to propose paradigm shifts in how they plan for the future. Fayetteville is among the many communities in the United States committed to addressing the challenges and opportunities presented by Climate Change.



CHAPTER ONE: GREENHOUSE GAS REDUCTION & CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC), a branch of the United Nations, has condensed the considerable and wide-ranging research on climate change to four distinct conclusions[8]:

- A globally changing climate is already causing substantial systematic damage around the world
- Human activities that produce greenhouse gases (i.e. carbon dioxide, methane, ozone, and fluorocarbons) contribute to this increasingly rapid climactic shifts by creating excessive heat radiation within the earth's atmosphere
- If the world community acts now, warming can still be kept below the tentatively agreed upon "safe" limit
- The ability to secure a resilient and safe climate future is not only possible but economically viable

Fayetteville's Energy Action Plan accepts the IPCC conclusions regarding changing global climate and offers an integrated response to pro-actively reduce our emissions while adapting to existing changes in climate and weather patterns.

The IPCC also states that sustainability and climate resilience can be more cost effective if communities combine energy efficiency efforts with clean energy and carbon sequestration. Through the framework of this Energy Action Plan, Fayetteville will follow this multi-strand approach by encouraging waste reduction, energy efficiency, cleaning up energy supplies, and investing in carbon sinks (such as our urban forest, timber buildings, and fertile agricultural soil).

WHAT IS RESILIENCE? HOW IS IT CONNECTED TO SUSTAINABILITY?

Sustainability is a term derived from the concept of balance and continuation in nature. In its broadest sense, sustainability explores how to improve systems so that their component functions can run continuously on their own.

Resilience is a component of sustainability and refers specifically to a system's ability to recover from difficulties or disasters. Resilience is often described as elasticity, or an object's ability to spring back to its original shape after being manipulated.

Complex, systematic problems can often be better solved if viewed through a lens of sustainability and resilience. Sustainability and resilience techniques focus on community-based solutions that are economically and environmentally equitable, inclusive, and highly implementable. A framework of sustainability and resilience can help us create long term, self-supporting solutions that can quickly and effectively respond to change.

For example, a robust local food system acts as both a sustainable and resilient feature of the complex global food system. Local food uses less fuel to transport and less plastic packaging as produce does not need to stay fresh as long. Locally produced food is often healthier, requiring fewer preservatives than food imported from great distances. Local farmers can more quickly respond to changes in weather or climate and can build relationships with customers, ensuring loyalty even if specific crops are not always available. These attributes combine to create a strong local system that is less susceptible to economic, environmental, and social disruptions. In other words, local food systems are both sustainable and resilient.

CHAPTER ONE: CITY & CORPORATE ACTION REQUIRED

Due to the immediacy of the challenges associated with climate change and the changing Federal priorities surrounding climate preparedness and adaptation, a large and growing group of local governments, states, and businesses are taking collective action.

In October of 2016, 197 countries signed on to the Paris Agreement, a voluntary action sponsored by the United Nations, to "bring all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects."[9] As of November 2017, every UN member in the world has signed the Paris Agreement. The recent decision by the U.S. federal government to withdraw from the agreement has required local governments and corporate leaders to take action.

After the U.S. government decision to pull out of the Paris Agreement, more than 2,500 governors, mayors, businesses, investors, universities, and mayors—including Fayetteville's Mayor Jordan—joined the "We Are Still In" movement, pledging to achieve the goals set in the Paris Agreement. This ever-growing group currently represents more than 127 million Americans and $6.2 trillion of the U.S. economy.

In addition, Mayor Lioneld Jordan is one of more than 1,000 signatories to the Mayors Climate Protection Agreement,[10] which commits Fayetteville to taking the following actions:

- Strive to meet or beat the Kyoto Protocol targets
- Urge state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol
- Urge the U.S. Congress to pass the bipartisan greenhouse gas reductions legislation which would establish a national emission trading system

Mayor Jordan is also one of 140 mayors nationwide who have endorsed the 'Mayors for 100% Clean Energy' Pledge, an initiative created by the Sierra Club to track and help communities transition to 100% renewable energy.

Local governments are taking leadership roles in order to reduce emissions, prepare for climate change, and maintain a livable planet. Fayetteville is proud to join other local leaders in this vital process.

"The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives. The Agreement also provides for enhanced transparency of action and support through a more robust transparency framework.[11]"

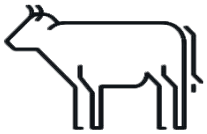
CHAPTER ONE: INCREASING LOCAL IMPACTS OF CLIMATE CHANGE

A unified response to cut our carbon emissions is needed because we are already experiencing the effects of our rapidly changing climate. Along with many national and global agencies, the Arkansas Game and Fish Commission has studied the effects of climate change in our Natural State[12]. They have concluded that we are already experiencing and will continue to experience broad effects of climate change, including:

- Increasing summer temperatures. Since 1970 the average annual temperatures in the region have increased by about 2 degrees Fahrenheit[13]. Temperatures are expected to increase an additional four to eight degrees by the end of the century. Increased heat can have adverse human health impacts due to heat-related illnesses, as well as increased ground level ozone and smog[14].

- Increasing frequency of extreme weather events and flash flooding. Disruption in normal weather patterns will cause a substantial increase in the intensity, frequency, and duration of rain events[15].

- Strained water systems due to more frequent and sustained droughts. Disruptions in normal weather patterns coupled with increased population growth is expected to impact the availability of clean water in the future[16].



- Changes in agricultural seasons and yields. The Southeastern United States is already experiencing higher temperatures, increased droughts and flooding, and increased pests. These effects of climate change are expected to intensify in coming years. These changes can negatively impact food crops and livestock production[17].

As climate change intensifies, the Fayetteville community will continue to experience disruptions in historic weather patterns. You can read more about the Fayetteville and Arkansas specific effects of climate change on the City website[18].

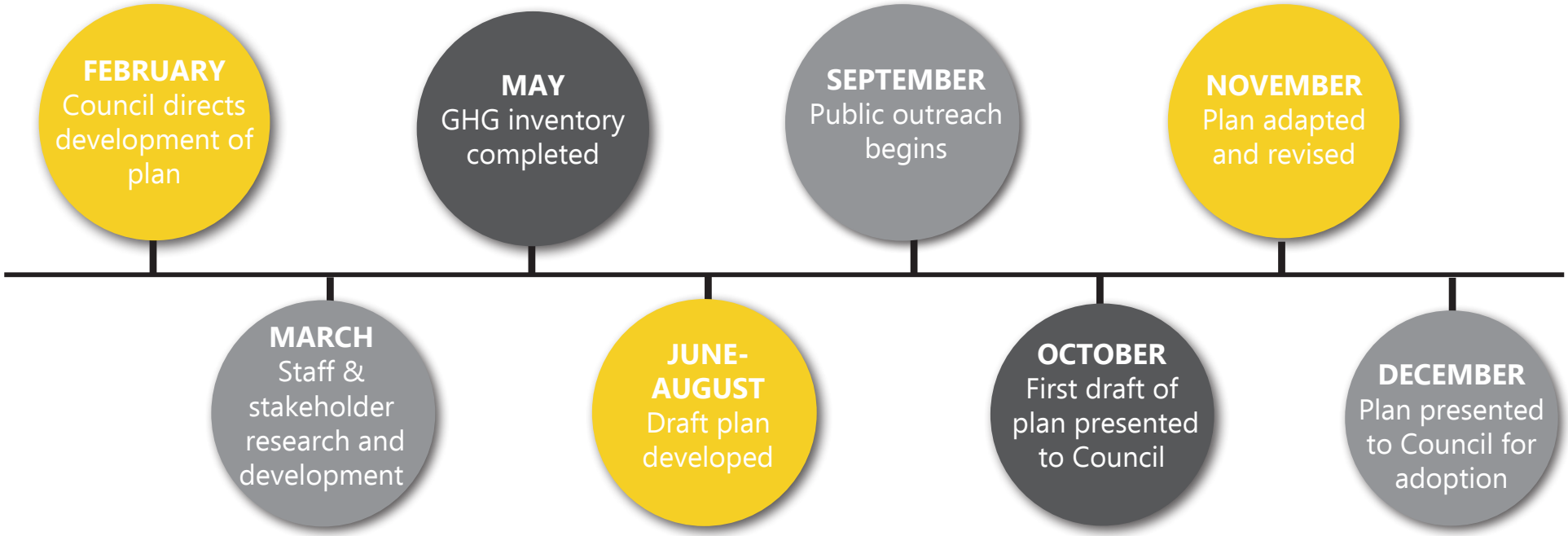
CHAPTER TWO:

A FRAMEWORK FOR ACTION

CHAPTER TWO: TIMELINE OF PLAN DEVELOPMENT

This plan was developed over the course of 2017 with the help of a great number of experts, stakeholders, community members, and City staff.

- JANUARY : Community Survey data revealed that of 1,400 Fayetteville resident respondents, more than 70% want the City to prioritize climate change planning and energy efficiency policies.
- FEBRUARY : City Council passes Resolution 45-17 expressing support for the development of an Energy Action Plan.
- MARCH - APRIL : Staff conducts peer City research and map existing conditions of local government and community-wide energy related activities. Staff convenes stakeholder group of internal and external experts.
- MAY : Greenhouse gas inventory completed for both City operations and community-wide emissions.
- JUNE - AUGUST: Draft plan developed by Sustainability Department staff
- SEPTEMBER - OCTOBER : Public outreach sessions conducted at StartUp Crawl, Farmer's Market, Public Library, and City Council Agenda Session. Online public input survey made available to the public and promoted through social and traditional media. 264 survey forms completed. 185 comments received via email and digital comment boxes.
- OCTOBER : First full draft of the Energy Action Plan completed and presented to City Council at Agenda Session.
- NOVEMBER : Plan adapted based on survey data, public comments, council feedback, and stakeholder input.
- DECEMBER : Final plan presented to City Council and Administration for adoption.



In addition to being led by the feedback and expertise represented in the internal and external stakeholder groups, staff built this plan from existing and proven models from across the globe. The frameworks include:

- Fayetteville's previously adopted plans including : City Plan 2030, the Economic Development Plan, the Recycling & Trash Master Plan, the Active Transportation Plan, and the upcoming Mobility Plan
- Peer Cities' Climate Action Plans (CAPs) including the CAPs from Fort Collins, Raleigh, Knoxville, and Louisville
- Urban Sustainability Director's Network tools including the Carbon Neutral Cities Alliance and the Equity in Sustainability capacity building program
- ICLEI – Local Governments for Sustainability, "US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions" and "Local Government Operations Protocol"
- The Global Covenant of Mayors for Climate and Energy
- The Carbon Disclosure Project
- Sustainable Tools for Assessing and Rating Communities (STAR Communities)*

The City expresses its appreciation to the organizations listed above for leading the way in climate and energy action, for sharing best practices, and for technical assistance offered to Fayetteville as this plan was developed.

* STAR Communities provided an overarching strategy for developing this Energy Action Plan. STAR Communities is a nonprofit organization that works to evaluate, provide clear comparisons, and certify sustainable communities. STAR is a guiding tool for this Energy Action Plan, as well as for Fayetteville's sustainability planning and strategic long term planning. The STAR rating system evaluation measures collectively define community scale sustainability and present a vision for how communities can become more healthy, inclusive and prosperous across seven goal areas. Fayetteville achieved the status of a 3 STAR Community in 2014.

The STAR framework integrates the economic, environmental, and social aspects of sustainability into a customizable framework that can be adjusted to address local conditions and priorities. Where possible, implementation actions in this Energy Action Plan use metrics that have been identified in the STAR framework to measure progress.

CHAPTER TWO: STAKEHOLDER INVOLVEMENT

In February of 2017, the City Council passed Resolution 45-17 that expressed the Council's support for the study and development of an Energy Action Plan. Sustainability Department staff worked throughout 2017 to conduct a greenhouse gas inventory, analyze existing conditions, and develop the resulting Energy Action Plan.

Sustainability staff enlisted a group of stakeholders to guide the development of the Energy Action Plan. Representatives were included from the fields of engineering, development, electric and gas utility management, environmental law, philosophy, economics, energy conservation, energy efficiency, solar energy design and installation, and facilities management. City staff and this stakeholder group assessed the implications, implementation options, policy repercussions, and GHG ramifications of a host of different energy-related strategies. The stakeholder group met in March and July of 2017 to discuss technical implications of implementing actions and achieving outcomes. The stakeholder group was also involved through ongoing email correspondence and feedback mechanisms including surveys and interviews. This group acted as a sounding board for decision making and the prioritization of implementable actions.

In addition to the external stakeholder group, Sustainability staff met with department representatives from across the City, including staff from Transportation, Fleet, Engineering, Planning, Community Resources, Communications, Accounting, Purchasing, Parks & Recreation, and Urban Forestry. Staff also met with the Environmental Action Committee and the Sustainability Working Group to gather expert input. Feedback and input from each department was collected and integrated into the plan. Staff focused on aligning departmental needs, working to create a plan that did not impose burdens on staff but rather enabled them to better achieve their goals while meeting the overarching goal of carbon emissions reduction.

In addition to these formal feedback groups, the City conducted an online public input survey, gave multiple TV and radio interviews on the plan, and conducted in-person outreach at a variety of events including the StartUp Crawl (where more than 1,200 individuals gathered to explore Fayetteville's booming startup community), a Saturday Farmer's Market in October (estimated 1,500 residents in attendance), a City Council Agenda Session, and a daytime event at the Fayetteville Public Library. Results are available on the following page.

CHAPTER TWO: COMMUNITY-WIDE INVOLVEMENT

This plan, from its inception, has been a product of community voices. In the 2016 Community Perceptions Survey, 78% of respondents indicated a desire for the City of Fayetteville to prioritize renewable energy and energy efficiency programs. Additionally, 62% of respondents indicated that the City should prioritize climate change preparedness. This directive from the public was at the heart of framing and developing this plan*.

To ensure that community members were aware of the plan's development, the Sustainability Department conducted a number of public outreach events, were interviewed multiple times on local TV and radio stations, collaborated on an extended local newspaper piece, and conducted social media outreach through the City and University's social media platforms. To ensure that citizens were able to not only learn about the plan but offer their opinions, ideas, and input during the development process, the Sustainability Department invited comments at outreach events and through an online survey tool that was open for one month and promoted by various groups including the Library, the University, and the Farmer's Market. The survey garnered 264 unique responses in addition to 185 public comments. Key findings included:

88% OF RESPONDENTS "AGREE" OR "STRONGLY AGREE" THAT FAYETTEVILLE SHOULD STRIVE TO REDUCE GHG EMISSIONS

92% OF RESPONDENTS "AGREE" OR "STRONGLY AGREE" THAT WE SHOULD ASSESS THE FEASIBILITY OF UPDATING BUILDING ENERGY CODES

92% OF RESPONDENTS "AGREE" OR "STRONGLY AGREE" THAT WE SHOULD STRIVE TO MAINTAIN OR EXPAND OUR URBAN TREE CANOPY

78% OF RESPONDENTS "AGREE" OR "STRONGLY AGREE" THAT FAYETTEVILLE SHOULD STRIVE TO TRANSITION TO 100% CLEAN ENERGY BY 2050

*As with any long-term, strategic process, this plan is intended to be iterative and open to changes overtime. As different actions and strategies in the plan are pursued, further public input will be gathered to ensure that the City is aligned to and led by citizen goals and ideas.

BUDGETARY FRAMEWORK

This Energy Action Plan contains strategies and actions identified to reduce greenhouse gas emissions while promoting strong economic, environmental, and social development. These individual actions have been assigned a generalized timeline (details available in Chapter 3) with identified stakeholders who will oversee the implementation of those actions.

As with all City of Fayetteville policies and programs, many of the specific actions in the plan will have a cost to implement and may have necessary budgetary impacts. Additional study and environmental, social, and financial cost/benefit analysis may be necessary to justify implementation and approval through the City's budgetary process. As the Energy Action Plan is implemented over time, staff will continually seek partnerships, grants and other funding opportunities to help offset implementation costs and advance the goals of this plan.

ALIGNING TOWN & GOWN FRAMEWORKS FOR COLLABORATIVE ACTION

The City of Fayetteville and the University of Arkansas (U of A) have a close "Town & Gown" relationship. The City and the University work together often on issues that impact the wider community, from public safety to arts and culture. This Energy Action Plan is aligned with the University's Climate Action Plan v2.0 which was also based upon the Kyoto Protocol goals. The U of A has been diligently working to reduce its greenhouse gas emission levels to 1990 levels by the year 2021.

Currently, City of Fayetteville Sustainability Staff is working with the U of A Office for Sustainability on a community-wide climate change resilience assessment. This assessment will use a resilience lens to examine potential threats and strengths inherent in the following sectors: Ecosystem Management, Physical Infrastructure, Human Health, Social Systems, and Economic Stability as they relate to probable extreme weather events such as flooding, drought, and heat stress. The Office for Sustainability is leading this resilience assessment process, and the long-term goal is to refine this process, replicate it in our region's sister cities and develop a holistic regional climate change resilience plan.

CHAPTER TWO: CONDUCTING A GREENHOUSE GAS INVENTORY

As the first step toward identifying which energy related goals, strategies, and actions were necessary, Sustainability staff completed a greenhouse gas emissions inventory of City and community-wide activities in early 2017.

For the community-wide inventory, the ICLEI US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions[19] was used, capturing the five largest emissions streams in the City: electricity, natural gas, transportation, water treatment and transfer, and landfill waste. For the City-operations inventory, the ICLEI Local Government Operations was employed[20]. These protocols are used nationwide by peer cities and are a recommended reporting tool by the Climate Disclosure Project, the Urban Sustainability Directors Network, and STAR Communities Guide.

Both inventories use a baseline year of 2010. While some data were available beginning in 2000, consistent data from all providers (utility companies, City departments, etc.) were only available after 2010. Full results of both inventories are available in the Appendix.

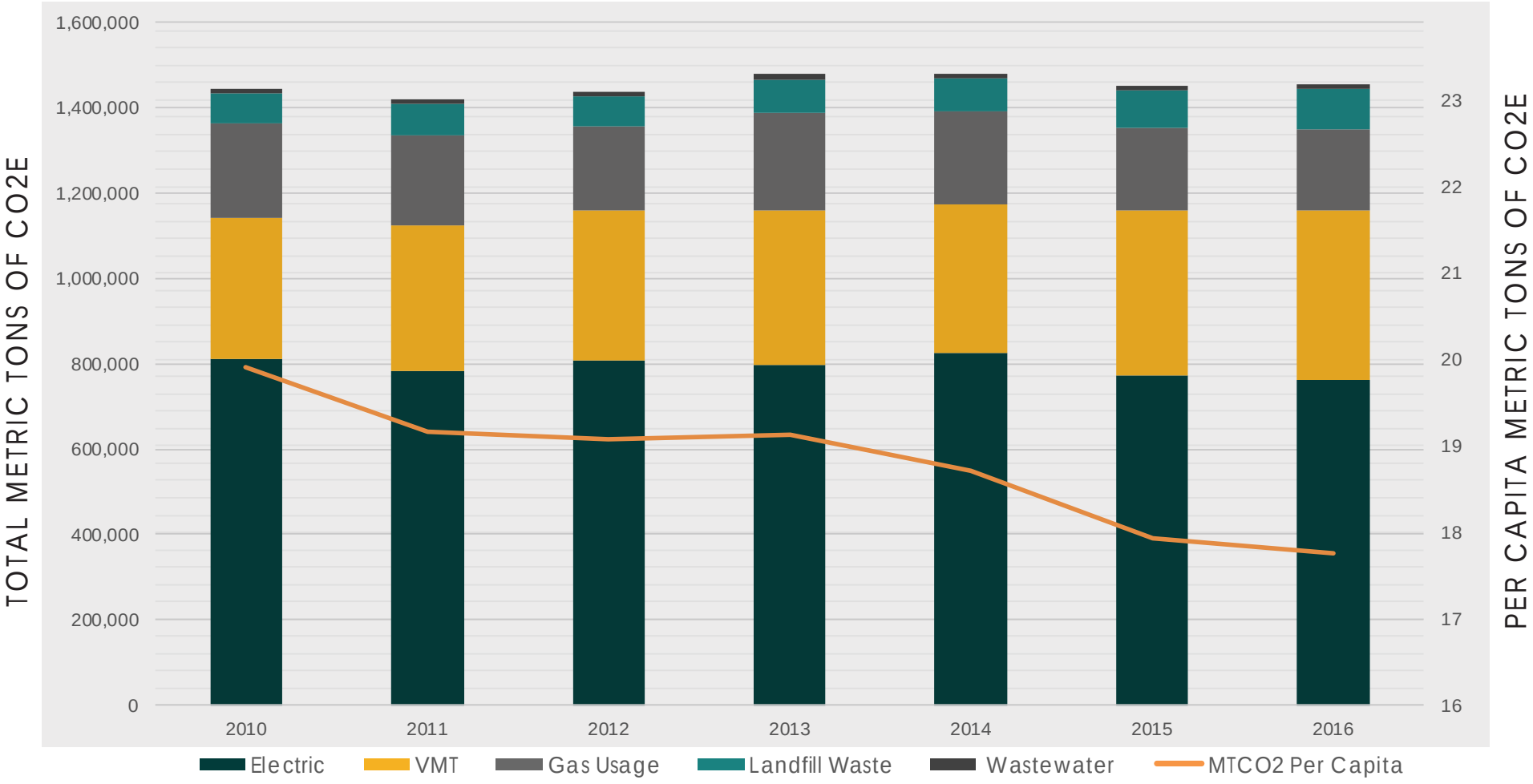
Using the established protocol and data analysis tools created for this inventory, the City plans to conduct a yearly GHG inventory to capture progress and changes in our carbon emissions.

WHAT DOES CO2E MEAN?

CO2E is shorthand for carbon-dioxide equivalent. This plan uses CO2E throughout. Calculations using CO2E do not only take into account the carbon-dioxide emissions, but other greenhouse gases with significant warming potential. These gases include Methane, (CH4), Nitrous Oxide (N2O), and Hydrofluorocarbons (HFCs). These gases, though often released at lower rates than CO2, have higher warming potential (see chart to the right). The warming potential indicates the effect, measured in comparison to carbon dioxide, of a gas' ability to warm the planet over time (in this case, 100 years).

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO2)	1
Methane (CH4)	25
Nitrous Oxide (N2O)	298
Hydrofluorocarbons (HFCs)	124 - 14,800

COMMUNITY-WIDE CO2E EMISSIONS: 2010-2016

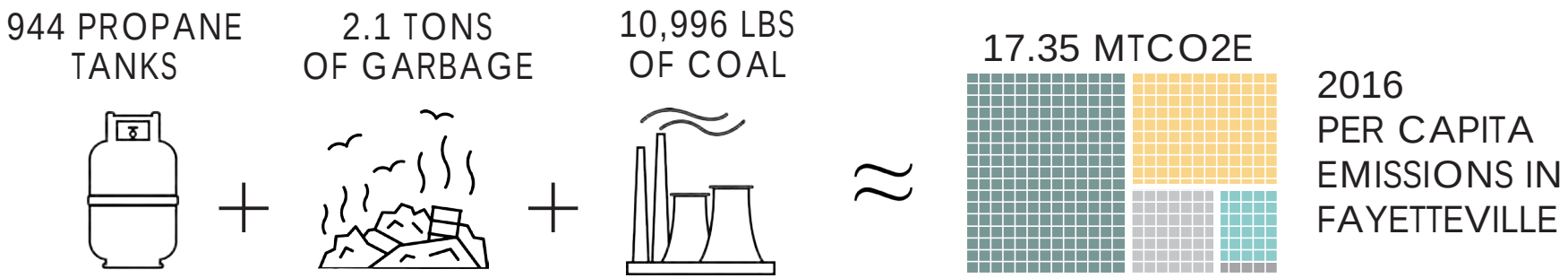


Over the seven-year period for which we have data, 2014 saw the peak of emissions production at 1,479,435 MTCO2E. While emissions in 2016 were 2% lower than in 2014, the general trend line still shows an increase over the seven year period due to population growth and rapid development[21]. See Appendix B for details and inventory methodology.

Per capita emissions have dropped since our baseline year of 2010. In 2010, per capita emissions were at 19.52 MTCO2e. By 2016, this number had dropped to 17.35 MTCO2e, a 11% decrease per capita over the seven-year period[22].

CHAPTER TWO: FAYETTEVILLE'S PER CAPITA EMISSIONS

The calculations for carbon emissions can often be difficult to understand and can sometimes disconnect us from the true extent of carbon pollution resulting from our activities. The images below use data from the EPA 'GHG Equivalencies Calculator' to help explain what 17.35 MTCO2E looks like in real world terms.

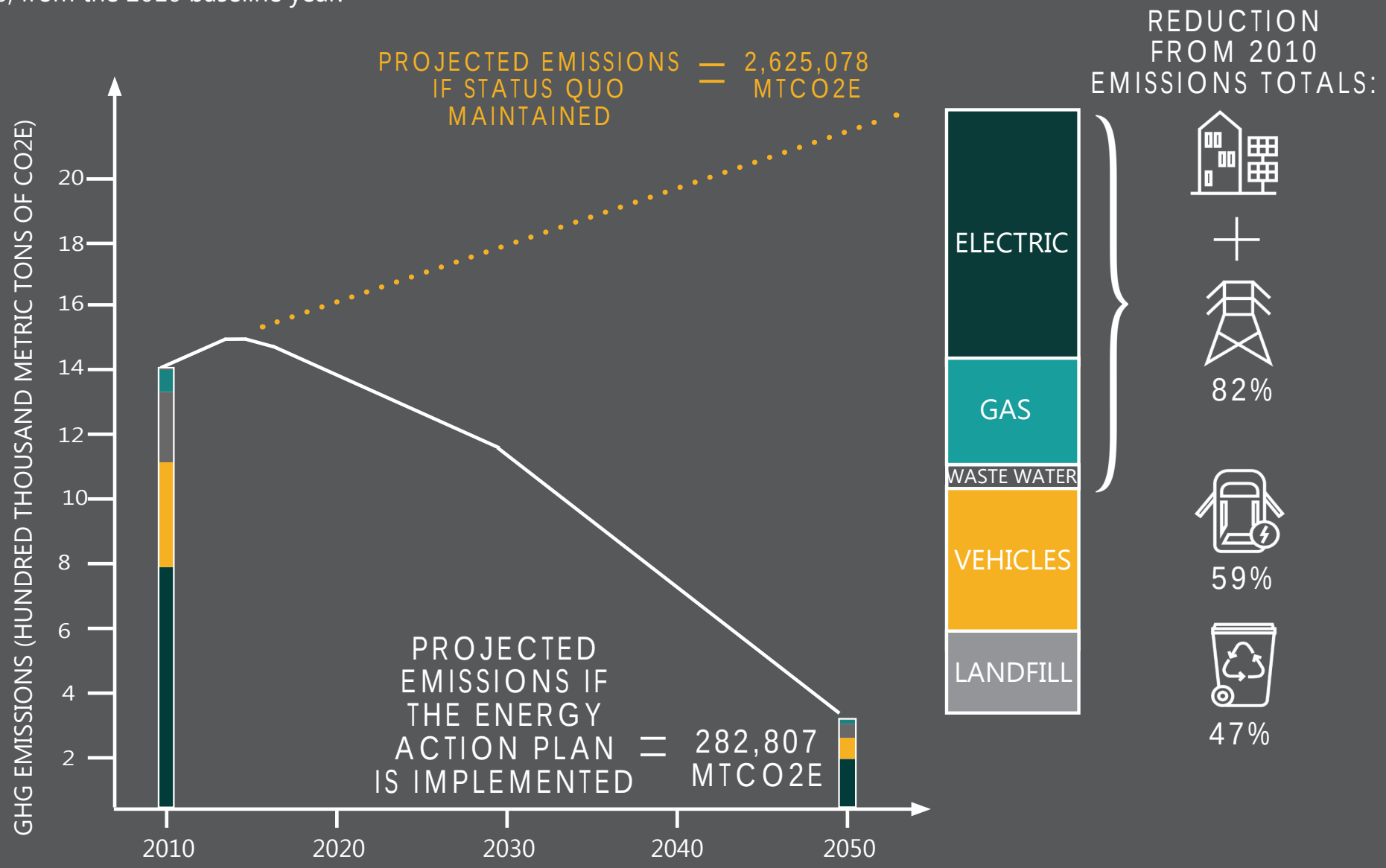


Fayetteville can be compared to other cities and countries around the world by considering our per capita (or per person) emissions. We emit less than the Arkansas average[24], slightly more than the national average, and about 3 times as much as the average global citizen[25].

It would require approximately 20.4 acres of forest to absorb the amount of carbon dioxide emissions produced by each Fayetteville resident, each year. To account for all 83,826 residents in 2016, more than 1.7 million acres of forest would be needed to absorb our yearly GHG emissions[23].

CHAPTER TWO: GHG EMISSIONS PROJECTIONS

With the baseline data analysis completed, future GHG reductions were modeled for a variety of goals, strategies, and actions. The next chapter outlines the items identified and prioritized by staff, stakeholders, and administration. These items were prioritized based on their ability to enable Fayetteville to reach an overall goal of 80% GHG emissions reduction by 2050, from the 2010 baseline year.



CHAPTER THREE:

STRATEGIES FOR ACTION

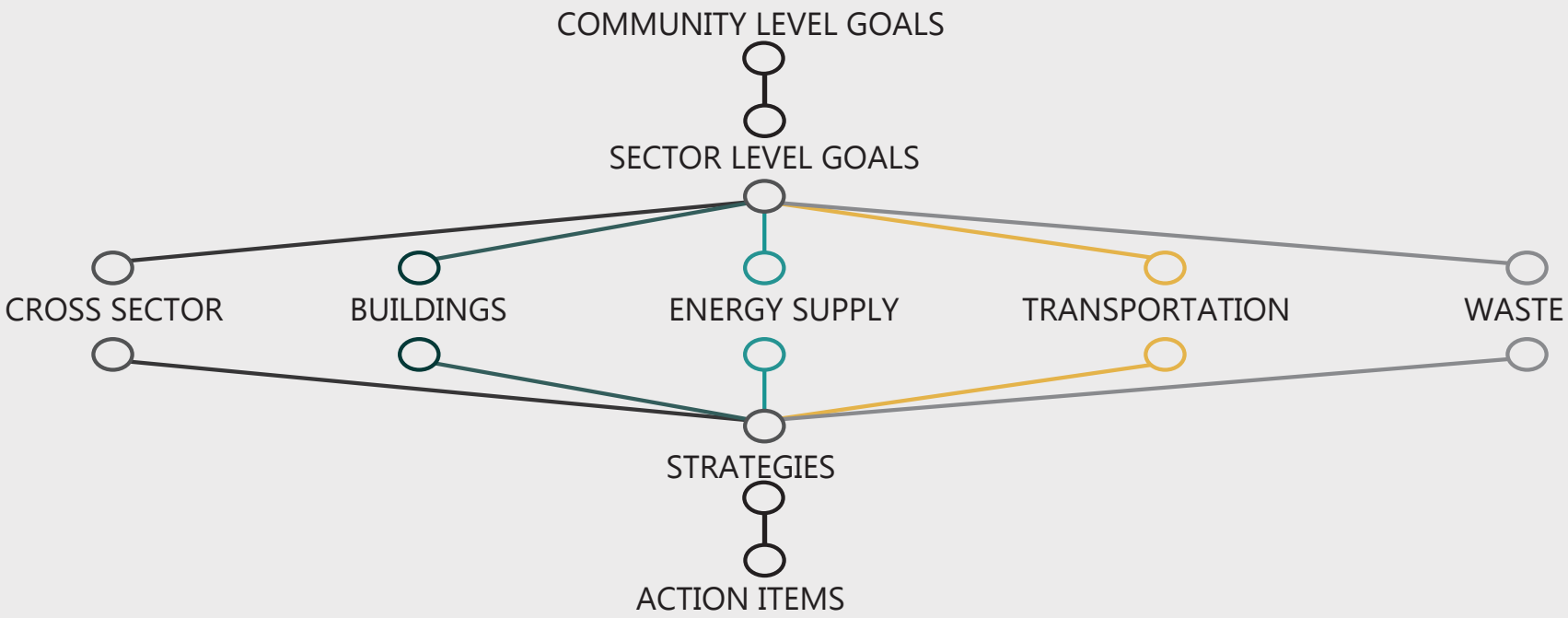
CHAPTER THREE: STRATEGIES FOR ACTION

This chapter outlines the goals, strategies, and actions developed through the frameworks and processes described in Chapter 2. These items have been organized and prioritized based on their contribution to community-wide GHG reduction as well as their substantial "co-benefits" in the realms of economic, social, and environmental sustainability.

These mitigation and adaptation strategies have been collected by internal and external stakeholder groups, were evaluated through peer city research, have been aligned with internal City of Fayetteville plans and policies, and are calibrated to align with our existing reporting platforms including STAR (Sustainable Tools for Assessing and Rating) Communities and the Carbon Disclosure Project.

These targets and timelines are subject to change as new technologies or priorities determine the best return on investment. This plan will be revisited on a five-year basis to ensure that these targets are being actively pursued and that our timelines match feasibility and City priorities. If yearly GHG inventories reveal that progress is not being achieved, the City may revisit the plan outside of the five-year timeline. If this plan is adopted at the end of 2017, the first revision will take place in 2022.

The format of the chapter 3 is as follows:

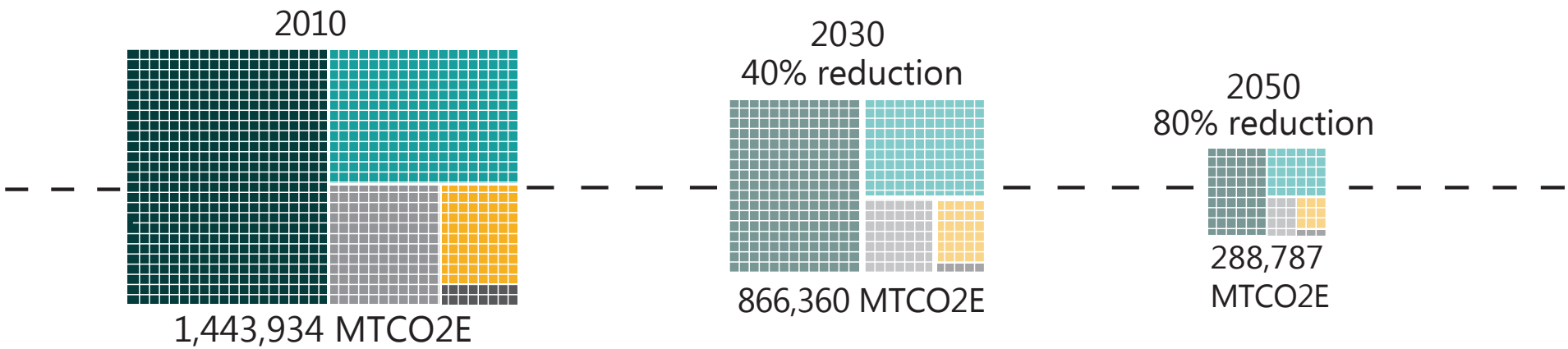


CHAPTER THREE: COMMUNITY LEVEL GOALS

In 1997, the Kyoto Protocol established a long-term target of reducing the GHG emissions of industrialized countries by 80% by 2050[26]. More than 1,000 mayors across the U.S., including Fayetteville Mayor Lioneld Jordan, have signed the U.S. Conference of Mayors' Climate Protection Agreement which commits to meeting or exceeding the Kyoto targets.

Between 2015 and 2017, every country in the world ratified the Paris Agreement which confirmed the Kyoto targets and laid a framework for global participation to keep the global temperature from rising more than 1.5 degrees Celsius in the next century[27]. As federal priorities changed under the most recent administration, Mayor Jordan was one of the thousands of business and government leaders from across the United States who pledged to uphold the Paris Agreement goals.

Following both the Paris and the Kyoto frameworks, the City of Fayetteville has the following goals for GHG emissions reduction, using 2010 as our baseline year:



In order to meet these goals, this plan addresses GHG reduction goals and strategies across four sectors:

1. Buildings – Improving efficiency, human comfort, and health
2. Energy Supply and Delivery – Transitioning to clean and renewable energy
3. Transportation – Reducing fossil fuel use in transportation activities
4. Solid Waste Reduction – Reducing emissions through reduced consumption, reuse, recycling and composting

This plan will also address cross-sectional goals and strategies, as well as operational and behavioral actions specific to City government. The remainder of this chapter will explore these strategies in depth.

CROSS-SECTOR:

- Reduce average housing and transportation costs to 45% of area median income
- Develop and expand Fayetteville's reputation as a hub for socially and economically responsible business development, entrepreneurship, and green jobs
- Build local support for national carbon emission reduction and carbon capture strategies

BUILDINGS:

- Complete periodic feasibility analyses of building energy code updates
- Achieve 3% annual reduction in overall energy usage in buildings
- Improve the health, distribution, coverage, and effectiveness of Fayetteville's urban forest

ENERGY SUPPLY:

- Achieve 100% local government clean energy by 2030
- Achieve 50% community-wide clean energy by 2030
- Achieve 100% community-wide clean energy by 2050

TRANSPORTATION:

- Reduce per capita vehicle miles traveled to 2010 levels by 2030
- Achieve 25% bike/walk/transit mode share by 2030

WASTE:

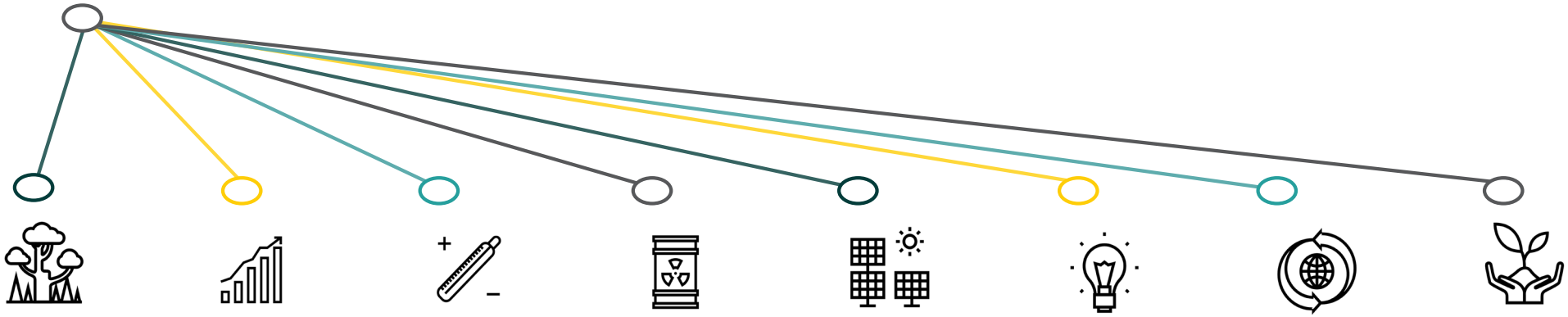
- Achieve 40% total waste diversion from the landfill by 2027

CHAPTER THREE: CROSS-SECTOR

Many of the strategies that were identified for inclusion in this Energy Action Plan did not fit neatly into one of the four identified sectors (Buildings, Energy Supply and Delivery, Transportation, and Solid Waste Reduction). The following items were identified as key economic, equity, and environmental goals and strategies by stakeholders and staff members.

GOALS:

1. Reduce average housing and transportation costs to 45% of area median income
2. Develop and expand Fayetteville's reputation as a hub for socially and economically responsible business development, entrepreneurship, and green jobs
3. Build local support for national carbon emission reduction and carbon capture strategies



STRATEGIES:

1. Integrate community resilience and adaptation considerations into City planning and policy decisions
2. Advocate for green jobs training and skills development in local educational programs and prioritize these fields in City plans and programs for workforce development
3. Continue to market the economic benefits of energy and resource efficiency and encourage retention of talent and businesses who identify with Fayetteville's sustainability brand
4. Reinvigorate the support for and momentum around Fayetteville Resolution no. 164-13 to support a national revenue-neutral carbon fee and dividend program
5. Advocate for 100% LED street lights by 2030 through collaboration with utility providers

STRATEGY 1: INTEGRATE RESILIENCE AND ADAPTATION CONSIDERATIONS INTO PLANNING AND POLICY DECISIONS

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Work with the University of Arkansas Office of Sustainability to collaboratively complete a regional resilience assessment and publish a report of findings	Short-term	Sustainability, University
Consider amending the 'Purpose and Duties of the Environmental Action Committee' to include consideration of climate mitigation and adaptation strategies	Short-term	Environmental Action Committee
Consider amending the 'Purpose and Duties of the Environmental Action Committee' to include policy recommendations regarding energy efficiency efforts and clean energy purchasing decisions	Short-term	Environmental Action Committee
Investigate the feasibility of a stormwater utility fee to improve green stormwater infrastructure	Short-term	Engineering, Legal, Finance

MITIGATION & ADAPTATION

The impacts of climate change are often framed by two potential strategies that humans may take in response to our changing climate: mitigation and adaptation.

Mitigation strategies are primarily concerned with reducing the magnitude and intensity of climate change and reducing its negative consequences.

Adaptation involves limiting a community's vulnerability, or increasing its resilience, to climate change impacts through various measures.

Both mitigation and adaptation are necessary as we look to build a sustainable future. In this Energy Action Plan, we have strategies and actions that are designed to address both climate mitigation and climate adaptation. For instance, the primary goal of this plan is to reduce our community-wide GHG emissions to 80% of our 2010 baseline year by 2050. This is a strong climate mitigation goal. Another goal is to increase our urban tree canopy cover to reduce the urban heat island effect and increase our ability to handle rapid rainfall. This is a strong climate adaptation goal. Both these goals are complementary and work together to build a sustainable and resilient future for Fayetteville.

STRATEGY 2: ADVOCATE FOR GREEN JOBS TRAINING AND SKILLS DEVELOPMENT IN LOCAL EDUCATIONAL PROGRAMS AND PRIORITIZE THESE FIELDS IN CITY PLANS AND PROGRAMS FOR WORKFORCE DEVELOPMENT

STRATEGY 3: CONTINUE TO MARKET THE ECONOMIC BENEFITS OF ENERGY AND RESOURCE EFFICIENCY AND ENCOURAGE RETENTION OF TALENT AND BUSINESSES WHO IDENTIFY WITH FAYETTEVILLE'S SUSTAINABILITY BRAND

Fayetteville is committed to creating an economic climate where established businesses are secure and new businesses can thrive. Fayetteville's recently adopted economic development plan, titled "Fayetteville First," highlights the importance of energy and climate action in a variety of ways. The plan encourages Fayetteville to purposefully build our reputation as a sustainable City, support attainable housing options, and focus on encouraging growth in targeted sectors such as technology and innovative energy solutions. The action items below build on the strategies and goals already set in the Fayetteville First Plan and further demonstrate Fayetteville's commitment to sustainable economic development:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Continue to provide recognition for local sustainability-minded businesses through programs like LEED, Bike-Friendly Businesses, and the GreeNWAay Initiative	Ongoing	Economic Vitality, Sustainability
Continue to provide support services to targeted sectors to strengthen local value chain infrastructure and develop market channels	Ongoing	Economic Vitality
Integrate Fayetteville's sustainability brand and energy action goals into future marketing and outreach efforts for business and talent retention	Short-term	Communications, Economic Vitality, Sustainability
Support ongoing regional campaigns promoting local banking, shopping, and eating and other local economic drivers	Ongoing	Communications, Economic Vitality, Sustainability

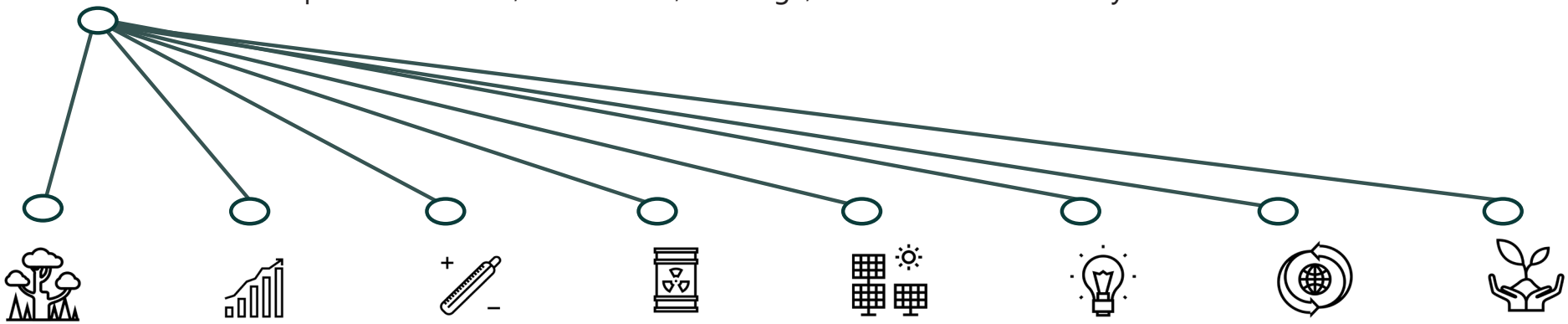
"Fayetteville is a trailblazer in city wide sustainability and conservation initiatives. Sustainability efforts are a major differentiator for Fayetteville when focusing on attracting its targeted business sectors... Organizing and capitalizing on its sustainable environment is a cornerstone in Fayetteville's future."
-Fayetteville First Plan, Adopted 2016[28]

CHAPTER THREE: BUILDINGS

The building sector is the top energy consumer and the biggest contributor to greenhouse gas emissions in Fayetteville. This can be attributed, in part, to the relatively low electricity and natural gas prices Fayetteville enjoys (compared to national averages). In general, low energy prices are not favorable for driving energy efficiency in building design. However, even with low energy prices, many lower cost energy efficiency measures have a quick return on investment. The most cost-effective energy efficiency improvements are the best place to start when the overarching goal is to reduce GHG emissions.

GOALS:

1. Complete periodic feasibility analyses of building energy code updates
2. Achieve 3% annual reduction in overall energy usage in buildings
3. Improve the health, distribution, coverage, and effectiveness of Fayetteville's urban forest



STRATEGIES:

1. Make all new buildings energy efficient from point of construction
2. Make existing single and multi-family dwellings more energy and resource efficient
3. Make existing institutional, commercial, and industrial buildings more efficient
4. Conduct a community-wide Tree Canopy Assessment and set a tree canopy coverage goal
5. Encourage heat island mitigation features across the City to lower overall energy consumption for all building types

STRATEGY 1: MAKE ALL NEW BUILDINGS ENERGY EFFICIENT FROM POINT OF CONSTRUCTION

Fayetteville has many examples of historic buildings that are still highly functional, beautiful, and well used. These structures are testaments that well designed and constructed buildings can offer long term functionality and sustainability. New construction can further improve our building stock by incorporating features of sustainable design. All new buildings in Fayetteville have the potential to be energy efficient, offer high occupant comfort, and maintain resilience from point of construction. This strategy builds upon the City's longstanding leadership in advocating for green building design through the adoption of progressive energy codes. The following actions should be explored and considered for implementation:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Adopt updated commercial and residential building energy codes on a regular schedule.	Short-term	Building Safety
Benchmark local government building and infrastructure energy use annually.	Ongoing	Facilities Management, Sustainability, IT
Partner with organizations to encourage the collection and reporting of energy use data from the commercial and industrial sectors.	Medium	Utility Companies, Sustainability
Evaluate the feasibility of creating incentives to encourage the new construction of energy efficient buildings.	Ongoing	Development Services, Economic Development, Sustainability
Utilize the existing Property Accessed Clean Energy (PACE) program to finance energy efficiency in the construction of new buildings.	Ongoing	Sustainability
Require that public infrastructure and facility managers consider energy and water consumption implications for new or upgraded infrastructure investments.	Ongoing	Facilities, Water & Sewer, Transportation

STRATEGY 2: MAKE EXISTING SINGLE-FAMILY & MULTI-FAMILY DWELLINGS MORE EFFICIENT

Single-family housing, whether owned by the occupant or occupied by renters, makes up approximately 50% of the existing dwelling units in Fayetteville. Due to its abundance, and the relatively stability of home ownership and long term rentals, this building type provides significant incentivizes for ongoing maintenance and energy efficiency upgrades. The actions below are applicable to both renters and homeowners in single family dwellings.

Multi-family residential buildings present unique challenges when it comes to incentivizing property owners to upgrade or retrofit their buildings to become more energy efficient. Despite the challenges, there are programs and policies that can provide economic and environmental benefits to both property owners and those living in the units.

The actions below are designed to encourage energy efficiency in single and multi-family units:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Adopt new energy codes to ensure that renovated buildings are more energy efficient.	Short-term	Development Services
Partner with utility providers to create an education and outreach campaign to connect homeowners and renters to existing energy efficient programs provided by utility companies.	Ongoing	Sustainability, Community Resources, Communications, Non-profits, Utility Companies
Create a program to connect low-income renters and homeowners with utility-sponsored programs to reduce their energy costs.	Short-term	Sustainability, Community Resources, Communications, Non-profits, Utility Companies
Explore opportunities to utilize Community Development Block Grants (CDBG) to compound existing utility-sponsored energy efficiency programs for low to moderate income households.	Short-term	Community Resources, Sustainability Utility Companies
Encourage local utility providers to offer energy commissioning programs.	Medium-term	Sustainability, Utility Companies
Encourage heat island mitigation features to help lower utility costs for residents and businesses.	Medium-term	Urban Forestry, Sustainability
Encourage tree planting, green roofs, and other energy-saving techniques across the City through education, outreach, and tree give-aways.	Short-term	Urban Forestry

STRATEGY 3: MAKE EXISTING INSTITUTIONAL, COMMERCIAL, AND INDUSTRIAL BUILDINGS MORE EFFICIENT

The wide variety of buildings and uses in the institutional, commercial, and industrial sectors require a mixture of innovative energy efficiency policies, programs, and implementation actions.

The institutional land-use sector includes schools, libraries, government buildings, and churches. Institutional buildings are typically constructed for long life spans and energy efficiency upgrades may be justified with a cost-benefit analysis as equipment is replaced. Institutional buildings such as government facilities and churches are often financially stable over the long term, making them ideal for energy efficiency improvements spread over multiple years.

Commercial and industrial structures may have a more limited life span; however, it is possible to realize significant energy savings through simple and low-cost improvements such as optimizing HVAC efficiency, improving insulation, and upgrading lighting systems.

The actions below are designed to encourage energy efficiency in a wide range of building types and uses.

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Identify high energy use City facilities and develop an energy efficiency and renewable energy innovation agenda to realize long-term savings and demonstrate the financial impact of energy improvements.	Short-term	Facilities, Water & Sewer, Sustainability
Prioritize leak prevention and water-related energy efficiency measures, both City and community-wide.	Ongoing	Facilities, Water & Sewer, Sustainability
Encourage increased sub-metering on institutional, commercial, and industrial buildings to collect data and identify opportunities for energy efficiency upgrades.	Ongoing	Facilities, Sustainability, Utilities
Adopt updated commercial energy codes to ensure that renovated buildings are more energy efficient.	Short-term	Development Services
Analyze the feasibility of an energy use disclosure ordinance that requires energy users to disclose consumption levels.	Long-term	Sustainability
Publish local government energy benchmarking reports and maintain a web based interface to provide local government energy data to the public.	Ongoing	IT, Sustainability, Facilities

STRATEGY 4: CONDUCT A COMMUNITY-WIDE TREE CANOPY ASSESSMENT AND SET A TREE CANOPY COVERAGE PERCENTAGE GOAL

A robust urban forest is vital for a community's well-being. Urban trees provide numerous ecological, economic and social benefits. They capture and clean stormwater, provide shade, remove CO2 and pollution from the air, provide wildlife habitat, increase property values, and promote human health. A tree canopy study conducted in 2012 estimates that the City's overall tree canopy comprises 35% of the city's land area. Ongoing canopy assessments will provide the City with reliable tree data with which to set an urban tree canopy coverage goal. The following actions should be completed to meet an aspirational and accomplishable tree canopy goal:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Target areas in need of additional tree canopy by creating a tree canopy map layer.	Short-term	Urban Forestry, GIS
Explore a strategy and funding mechanism to increase the permanent preservation of lands identified as the "Enduring Green Network" in the City's Future Land Use Plan and Map. These lands may be City-owned or preserved through land trusts, tree preservation easements, or other mechanisms.	Medium-term	Planning, Finance, Sustainability, Legal
Increase awareness of utility-focused "Right Tree, Right Place" program through joint outreach campaigns.	Medium-term	Urban Forestry, Utilities
Explore options to develop a tree planting program partnering with residents, business owners, and institutions for the planting of trees in right-of-way, on easements, or on private properties.	Short-term	Urban Forestry, Sustainability, Facilities
Evaluate the feasibility of modifying existing tree preservation minimums and mitigation rates in the City's Tree Preservation Code to improve the long-term ecological outcomes of urban development.	Short-term	Urban Forestry, Development Services
Conduct a community-wide tree canopy assessment every five years.	Ongoing	Urban Forestry, GIS

STRATEGY 5: ENCOURAGE HEAT ISLAND MITIGATION FEATURES ACROSS THE CITY TO LOWER OVERALL ENERGY CONSUMPTION FOR ALL BUILDING TYPES

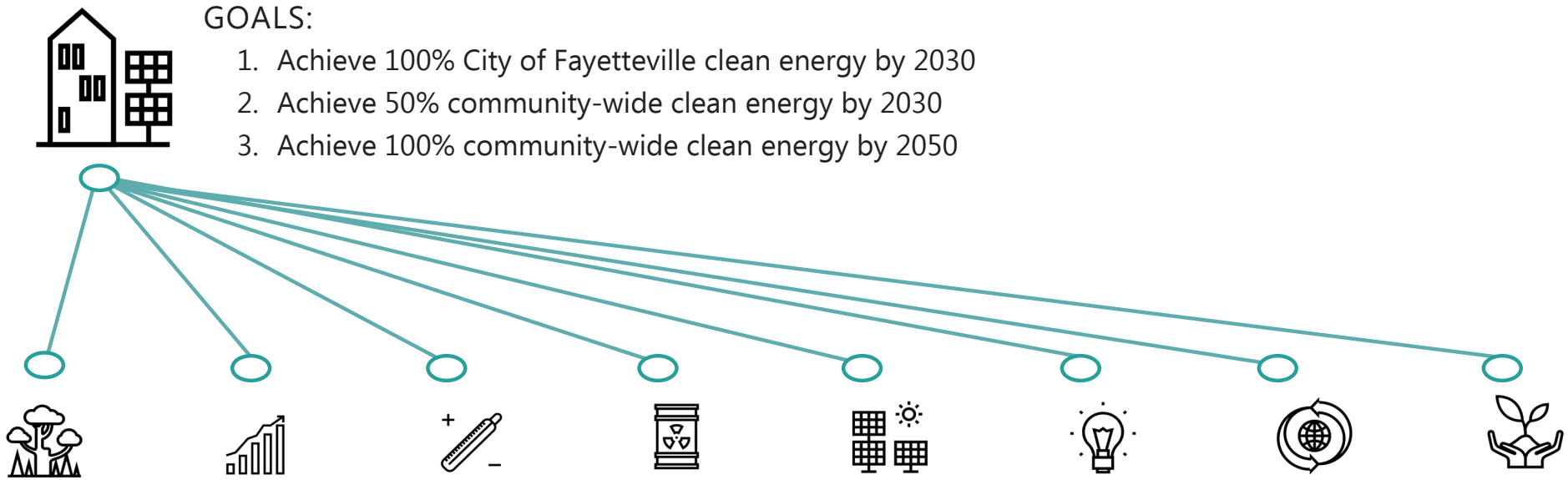
The term "heat island" describes urban areas that are significantly warmer than the surrounding rural areas. Heat islands are created through the removal of vegetation and the development of heat absorbing surfaces such as asphalt, concrete, and roof surfaces. Heat islands can impact communities by increasing summertime peak energy demand, air conditioning costs, air pollution, greenhouse gas emissions, and heat related illness and mortality. Urban heat islands may be mitigated by preserving or replacing trees and landscaping during development, installing green and reflective roof surfaces, and integrating green stormwater and paving techniques such as vegetated infiltration basins and grass pavers. Actions for addressing the impacts of the urban heat island effect should include:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Conduct an assessment to determine heat island mitigation feature distribution across the City to identify locations with disproportionate heat island effects	Short-term	GIS, Urban Forestry
Use the Parks and Recreation Master Plan process to identify and develop a network of pocket parks and urban open spaces in areas of the city that are identified as impacted by urban heat islands.	Short-term	Parks & Recreation, Urban Forestry, Planning
Conduct an assessment to discover if there is a parkland or natural space within a 10-minute walk of all residents.	Short-term	Parks & Recreation, Sustainability, GIS
Promote the use of cooling and light colored roofing materials and coatings for both new and existing building stock.	Medium-term	Development Services, Urban Forestry
Encourage green roofs on new and existing buildings and consider the feasibility of incentivizing green roofs through a mechanism like a storm water utility fee	Medium-term	Development Services

CHAPTER THREE: ENERGY SUPPLY

A transition to clean energy is critical in order for Fayetteville to reduce GHG emissions in an impactful way. Nationwide, opportunities for renewable electricity generation from sources such as wind, solar, hydroelectric, and biomass are increasingly cost competitive and plentiful. Our region is located in close proximity to major sources of wind energy produced in Oklahoma and Texas. Southwest Electric Power Company (SWEPCO) is a member of the Southwest Power Pool, which encompasses much of the central plains, and they are increasingly purchasing wind power as part of their energy portfolio.

Locally, our region is also well situated for the development of solar photo-voltaic (PV) energy production. Fayetteville can demonstrate leadership by investing in localized solar energy resources and by supporting, and encouraging, our local utility providers to increase the percentage of clean energy in their electricity portfolios.



GOALS:

1. Achieve 100% City of Fayetteville clean energy by 2030
2. Achieve 50% community-wide clean energy by 2030
3. Achieve 100% community-wide clean energy by 2050

STRATEGIES:

1. Advocate to increase utility companies renewable energy portfolio
2. Increase the number of local solar PV installations
3. Prioritize the purchase or installation of clean energy to run City operations

STRATEGY 1: ADVOCATE TO INCREASE UTILITY COMPANY'S RENEWABLE ENERGY PORTFOLIO

Fayetteville is served by two electricity providers: Ozarks Electric Cooperative and Southwestern Electric Power Company (AEP SWEPCO). Ozarks Electric primarily services the perimeter area of the City, providing approximately 25% of the total electricity used by residents; AEP SWEPCO primarily services the central area of the City, providing approximately 75% of total electric supply.

Both SWEPCO and Ozarks Electric are increasingly shifting towards a clean energy mix, with a growing proportion coming from wind, solar, hydro, and natural gas instead of coal. SWEPCO has recently announced they are partnering to build a 2,000 megawatt wind farm in the Oklahoma Panhandle, 70% of which will be transmitted to the grid in our region[29]. This project is estimated to produce $5 billion in savings for SWEPCO customers over the next decade. Ozarks Electric already produces over 6% of the City of Fayetteville's power needs through a one-megawatt solar facility located in Springdale, Arkansas. The City applauds the efforts of both electric providers in this shift towards economically viable, environmentally responsible power production. The following actions should be explored and considered for implementation in order to accelerate the transition to clean energy across the region:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Continue to advocate for increasing SWEPCO and Ozarks Electric clean energy portfolio as a percentage of the electric energy produced.	Ongoing	Sustainability
Work with local utilities to implement energy commissioning programs.	Medium-term	Sustainability, Utility Companies
Procure clean energy from utilities or other generators when feasible.	Ongoing	Sustainability
Create a policy to ensure that the local government's energy supplies increasingly come from renewable sources and/or enter into direct purchase agreement with utility companies for clean energy sources.	Short-term	Sustainability, Purchasing
Publish yearly reports on the City's and the overall communities energy mix.	Ongoing	Sustainability
Investigate the feasibility of becoming a Green Power Community to encourage businesses, institutions, and individuals to collectively use more clean power.	Long-term	Economic Development, Sustainability

STRATEGY 2: ADVOCATE TO INCREASE LOCAL RENEWABLE INSTALLATIONS

Fayetteville can become a regional leader in advocating for small scale and community-scale, privately owned solar installations. Small scale solar refers to individual homeowners and businesses installing solar to off-set their own electricity needs. Solar arrays can be easily designed into new structures and retrofitted into existing ones. The City can incentivize small scale solar by reducing regulatory barriers and creating a fast track approval process. Community-scaled solar refers to larger solar installations that allow customers to invest by buying shares in the project to off-set their power needs.

The following actions are designed to encourage and incentivize the development of small and community scale clean energy generation:

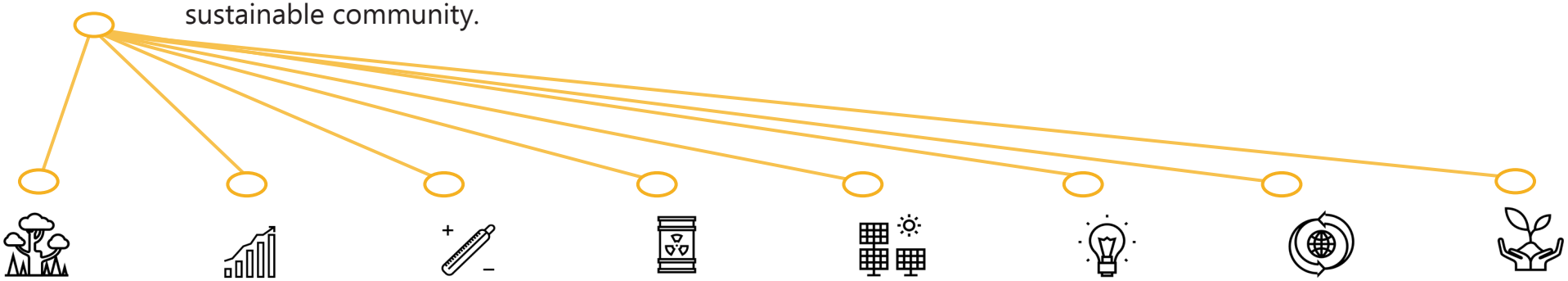
ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Investigate community shared solar or community wind to encourage procurement of renewable energy supplies. Community sharing programs allow residents to buy or lease a portion of a shared alternative energy system.	Ongoing	Sustainability
Assess if regulatory restrictions or undue burden exists for the development of residential and small businesses renewable energy installations.	Short-term	Building Safety, IT Sustainability
Earn recognition as a Solar-Ready community.	Short-term	Building Safety, Sustainability, IT
Explore incentives to support the development of renewable energy.	Long-term	Sustainability, Finance
Encourage the development of residential and small business renewable energy sources using the existing net-metering program.	Short-term	Sustainability
Build the necessary distribution or storage infrastructure to support further investment in clean energy sources.	Long-term	Sustainability, Utilities
Integrate clean power job skills training into local job development activities or plans	Short-term	Economic Development, Sustainability
Evaluate the feasibility of leasing public land for renewable energy	Short-term	Sustainability, Legal, Finance

CHAPTER THREE: TRANSPORTATION

Currently, transportation accounts for 27% of Fayetteville's GHG emissions. Reducing transportation related emissions is a complicated process that involves infrastructure decisions, individual behavior changes, local economic strength, and many other factors. Recognizing the complexity of this issue, the City has chosen to measure two primary goals to promote overall success and GHG reduction in our transportation network:

- Reduce the per capita vehicle miles traveled (VMT) to 2010 levels by 2030
- Achieve 25% bike/walk/transit mode share (percentage of people not commuting by single occupancy vehicle) by 2030

VMT represents the vehicle miles traveled in a particular set of streets and roadways in a set time. In 2016, Fayetteville had a daily VMT count of 26.68 miles per person. In 2010, daily VMT was 24.9. This represents a 6% increase in vehicle miles traveled per person, per day over the six-year period. This data was compiled by the Arkansas Department of Transportation and is specific to the Fayetteville street network. As Fayetteville strives to be a walkable, bikeable community, this trend towards more vehicle miles can cause a host of problems including traffic congestion, additional accidents, air pollution from vehicle emissions, higher rates of obesity and heart disease, and lost productivity due to commute times. Reducing the vehicle miles traveled, while not a perfect metric to represent GHG emissions reduction, is still crucial for building a long-term sustainable community.



STRATEGIES:

1. Increase the percentage of fuel efficiency and alternative fuel vehicles
2. Support the expansion of alternative and active transportation options
3. Encourage compact, complete, and connected land development and street infrastructure

STRATEGY 1: INCREASE THE PERCENTAGE OF FUEL EFFICIENT AND ALTERNATIVE FUEL VEHICLES

Fuel efficient and alternative fuel vehicles are quickly becoming a significant portion of the new vehicle market. The federal government's mandate to increase vehicle fuel efficiency is driving innovation within the automobile manufacturing sector. The City of Fayetteville and local businesses have also stepped up the installation of Electric Vehicle (EV) charging stations around town, with approximately one per ten thousand people. Although the push for fuel efficient and alternative vehicles is being made primarily at the state and federal level, there are local strategies that can accelerate their presence in the market:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Adopt alternative fuel guidelines and/or targets for City of Fayetteville owned vehicles.	Short-term	Fleet, Sustainability
Partner with private businesses to ensure that more electric vehicle charging stations become available at workplaces, residential developments, and other frequently visited locations. Install public alternative fueling stations on City-owned properties.	Short-term	Sustainability, Fleet, Facilities Management
Offer local government employees incentives to commute by modes other than single-occupancy vehicles.	Medium-term	Sustainability, Human Resources, Finance
Install public use electric vehicle fueling stations on city owned properties and encourage public-use alternative charging stations at publicly accessible locations across the City.	Ongoing	Sustainability, Fleet, Facilities Management
Establish partnerships between fleet managers, alternative fuel suppliers, and consumers to elevate alternative fuel options within the community.	Ongoing	Sustainability, Fleet
Develop an internal Green Cities Initiative that prescribes a fleet purchasing policy that encourages divisions and departments to choose right-sized, alternative fuel, and/or more fuel efficient options when replacing vehicles. Additional infrastructure such as vehicle charging stations or natural gas fueling stations may be necessary to support the transition to a green fleet.	Short-term	Fleet, Purchasing, Sustainability

STRATEGY 2: SUPPORT THE EXPANSION OF ALTERNATIVE AND ACTIVE TRANSPORTATION OPTIONS

Transportation mode share refers to the make-up of the transportation types that are utilized primarily for commuting. The most common transportation modes include: vehicles, transit/buses, bicyclists and pedestrians. Increases in alternative transportation modes such as buses, bicyclists, and pedestrians removes additional vehicles from the street system thereby reducing congestion, pollution and overall annual vehicle miles traveled. Support for multi-modal transportation options takes on many forms. For instance, the City constructs many linear feet of sidewalk, trail, and bike lanes each year. The City also provides financial support to Ozark Regional Transit and Razorback transit. The following action steps will help to support the expansion of alternative and active transportation:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Continue to work towards the Active Transportation Plan goal of having a trail connection with ½ mile of 97% of residences by 2040.	Medium-term	Engineering, Sustainability, Transportation
Continue to support Ozark Regional Transit, Razorbak Transit, and Regional Planning in pursuit of transit solutions for the Northwest Arkansas region	Ongoing	Planning, Transportation
Continue to explore opportunities for adding bus shelters along transit lines	Ongoing	University, Transportation, Engineering, Sustainability
Establish a community-wide public bike-share program.	Short-term	University, Sustainability
Construct or retrofit transportation infrastructure to meet the access standards in the Americans with Disabilities Act (ADA).	Ongoing	Engineering, Transportation
Continue to utilize the Active Transportation Advisory Committee to identify and prioritize projects that fill missing links in trail and sidewalk networks.	Ongoing	Engineering, Transportation
Make street intersections and trail crossings safer and easier for pedestrians through signage, medians, colored pavement markings, and signalization.	Ongoing	Engineering, Transportation
Continue to expand the on-street bicycle network. Promote buffered, protected, and separated on-street bicycle infrastructure whenever possible.	Ongoing	Engineering, Transportation
Encourage the expansion of carsharing programs across the City and region	Ongoing	Parking Management, University, Sustainability

STRATEGY 3: ENCOURAGE COMPACT, COMPLETE, AND CONNECTED LAND DEVELOPMENT AND STREET INFRASTRUCTURE

Transportation is a critical component of many of the City's long-range development and planning processes. It is addressed in City-Plan 2030, the Active Transportation Plan, and the upcoming Mobility Master Plan. Each plan prioritizes sidewalks, bike lanes, trails and pedestrian intersection improvements that make walking and bicycling safer, easier and more enjoyable.

To emphasize the importance of compact, complete, and connected land development, a number of key items from CityPlan 2030 are explored in depth on the following page.

By consistently following the goals and objectives laid out in previous plans, the City can influence the pattern of development to encourage a more efficient and sustainable transportation network. The following strategies can have a direct influence on reducing the City's annual vehicle miles traveled and ultimately our greenhouse gas emissions:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
*Make appropriate infill and revitalization our highest priority.	Ongoing	Planning
*Discourage suburban sprawl development.	Ongoing	Planning
*Grow a livable transportation network.	Ongoing	Planning, Transportation
*Create an enduring green network.	Ongoing	Planning, Parks, Transportation
Actively pursue the goals laid out it in CityPlan 2030 and the upcoming Mobility Master Plan.	Ongoing	Planning, Transportation, Engineering
Continue to implement the City's complete streets policy and street cross-sections for all street projects.	Ongoing	Planning, Transportation, Engineering
Continue to implement the City's Active Transportation Plan recommendations.	Ongoing	Planning, Transportation, Engineering
Increase the mileage of sidewalks, particularly on arterial or collector streets, that connect people with destinations.	Ongoing	Planning, Transportation, Engineering

* Details on following page

STRATEGY 3: ENCOURAGE COMPACT, COMPLETE, AND CONNECTED LAND DEVELOPMENT AND STREET INFRASTRUCTURE (CONTINUED)

For the City, compact, complete, and connected land development may be the most effective way to meet our cultural, economic, environmental, and equity goals. The following explanations from CityPlan 2030 help frame why these actions items are at the heart of this and other City plans[30].

We will make appropriate infill and revitalization our highest priorities. Infill development typically occurs along streets that already exist. This is inherently more sustainable than adding new street, water and sewer infrastructure for new development. Infill and revitalization is often driven by local government investments in streets and trail corridors. Infill also helps to strengthen the core of the City by placing peoples' homes near the places they work, learn, shop and play. This is sometimes referred to a jobs/housing balance and it is often measured through a housing and transportation analysis. A housing and transportation analysis for Northwest Arkansas was completed by the Center for Neighborhood Technology in 2011.

We will discourage suburban sprawl. Sprawl development is fundamentally inefficient. Sprawl is defined as low density development located on the periphery of the city. From a city infrastructure perspective, it is less financially sustainable than infill development. Low density sprawl costs more to serve with fire and police and hard infrastructure such as streets, water, and sewer have a very low tax base return per linear foot. The long-term maintenance of street infrastructure for low-density development on the urban fringe far exceeds its capacity to pay for itself through revenue generation. Sprawl is fundamentally auto-oriented; people are reliant on a car to travel to work, school, and other destinations. This auto-oriented lifestyle is energy intensive and directly impacts the city or region's vehicle miles traveled (VMT) numbers.

We will grow a livable transportation network. Livable transportation refers to complete streets that provide safe and reliable access to all transportation modes including cars, trucks, buses, pedestrians, and cyclists. A well-designed livable transportation network is vital to providing economic stability in a community. Opportunities for people to use active transportation to commute, shop, or recreate are fundamentally sustainable and provide for a high quality of life.

We will create an enduring green network. CityPlan 2030 imagines Fayetteville retaining much of the natural beauty provided by the hills, streams, and open areas that currently exist. Publicly-owned areas like parks and trail corridors are envisioned to connect via an Enduring Green Network to other destinations like the U of A, Downtown, Uptown, etc. This network will act as a hub and spoke system that will provide essential active transportation linkages between destinations with trails, bike lanes, and sidewalks.

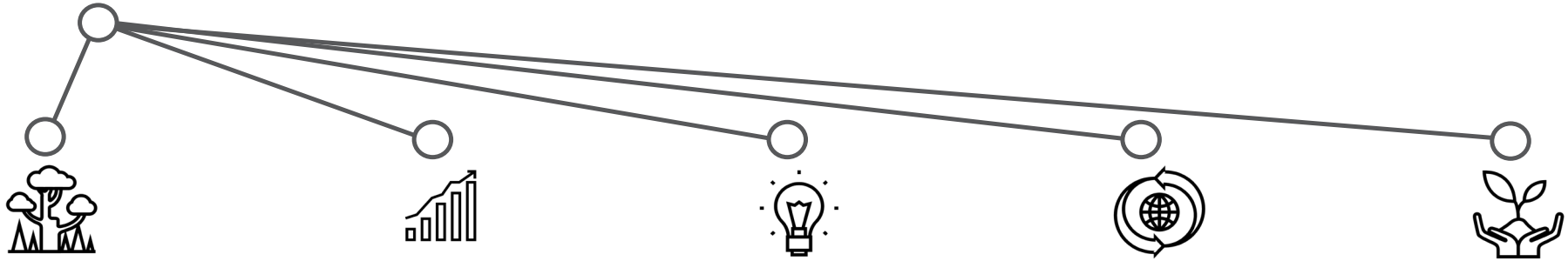
CHAPTER THREE: WASTE

The Solid Waste Reduction, Diversion, and Recycling Plan is founded on the principle of sustainable materials management. Sustainable materials management involves all stages of a products' life-cycle and it is based on the "triple bottom line" approach to sustainable business practices. The triple bottom line incorporates three areas of business performance: social, environmental, and financial. Often referred to as the three P's – people, planet, and profits. Additionally, sustainable material management strategies are often categorized as upstream, midstream, and downstream.

- Upstream strategies address resource extraction and packaging manufacturing. The objective is to utilize fewer resources in the making of a product and its packaging to reduce the need for recycling these materials downstream.
- Midstream strategies address the longevity of a product and include reuse, repair, donations, sharing, and durable design.
- Downstream strategies strive to maximize the recovery of resources from the items we discard. These strategies include recycling, composting, and various other recovery technologies. The City has the greatest ability to positively influence the effectiveness of downstream strategies in order to increase our solid waste diversion rate.

The Energy Action Plan addresses upstream, midstream, and downstream strategies.

In February 2017, Fayetteville adopted an amended version of the proposed 2016 Solid Waste Reduction, Diversion, and Recycling Master Plan. The main goal of the plan is to divert 40% of waste sent to the landfill by 2027. The Energy Action Plan reinforces the City's commitment to this goal through the following strategies and actions.



STRATEGIES:

1. Increase the percentage of households, businesses, and institutions participating in recycling programs
2. Expand access to commercial food compost program and increase the number of home composters
3. Develop and implement a construction and demolition debris program

STRATEGY 1: INCREASE THE PERCENTAGE OF HOUSEHOLDS, BUSINESSES, AND INSTITUTIONS PARTICIPATING IN RECYCLING PROGRAMS

The Recycling and Trash Collection Division manages municipal recycling programs for City customers, operates two drop-off centers, and collaborates with other organizations offering specialty programs. Of the households with curbside recycling included in their municipal utility plan, the division determined the 2014 participation rate was 56%. A variety of dumpsters, bins, and carts for recycling is offered to commercial and institutional customers. With the options listed above, Fayetteville currently diverts approximately 18% of waste from the landfill.

To achieve our goal of 40% diversion, increased participation and increased capture of recyclable materials is vital. The following actions are recommended:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Modify City development codes to require new commercial, institutional, and multi-family developments to provide adequate space and access for recycling and organics recovery.	Short-term	Recycling and Trash, Planning
Continue to develop communications plans about the city's commitment to waste diversion and to solicit buy-in for new initiatives.	Short-term	Recycling and Trash, Communications
Develop a technical assistance program to inform businesses, institutions, and multi-family complexes of the City's waste diversion commitment and help them prepare for new recycling initiatives.	Short-term	Recycling and Trash, Communications
Continue to pursue a commercial and institutional outreach program to encourage businesses and institutions to participate in existing recycling programs.	Ongoing	Recycling and Trash, Communications
Explore the potential for a program to address the collection of recyclable materials from multifamily apartment complexes.	Short-term	Recycling and Trash
Explore options for curbside recycling at small multifamily complexes or complexes that make curbside collection feasible.	Short-term	Recycling and Trash
Support regional partnerships that seek to increase waste diversion rates	Medium-term	Recycling and Trash, Sustainability

STRATEGY TWO: EXPAND ACCESS TO COMMERCIAL FOOD COMPOST PROGRAM AND INCREASE THE NUMBER OF HOME COMPOSTERS

According to the waste audit completed by Kessler Consulting in January of 2015, 18% of the City's landfill waste is comprised of food waste. This amount is in line with national numbers on food waste generated. Residents who have the space should be encouraged to compost their food waste. Commercial, institutional, and multi-family residential must have the ability to compost as well and therefore initiatives to encourage this activity should be considered in land use strategies. The EPA estimates that food scraps and yard trimmings account for 27% of generated waste ending up in landfills. If food waste is captured, composted, and reused, it will:

- Reduce the tonnage of food waste going to the landfill which ends up producing methane gas – a very harmful gas that has devastating climate change impacts,
- Reduce the landfill tipping fees due to reduced weight – food waste is heavy as it is comprised mostly of water,
- Reduce the organic load from garbage disposals which is expensive to treat at the wastewater treatment plants, and
- Produce a rich compost product that can be marketed to recover some of the cost incurred with the food waste collection and composting process.

The following action steps, compiled from Kessler Consulting and staff recommendations, will help to guide the City to increase composting rates and food recovery:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Develop a detailed plan and schedule to initiate a voluntary organics recovery program focused initially on large food waste generators like schools, grocery stores, and institutions.	Short-term	Recycling and Trash, Communications
Develop a new education and community outreach plan to announce the City's commitment to waste diversion and to build community buy-in for new initiatives.	Ongoing	Recycling and Trash, Communications
Modify building codes to require new commercial developments that are expected to generate substantial quantities of food waste to provide adequate space and access for food waste collection containers.	Short-term	Recycling and Trash, Planning
Require private food waste haulers waste to enter into franchise agreements with the City so that these quantities can be reported for the City's diversion rate.	Short-term	Recycling and Trash, Legal

STRATEGY 3: DEVELOP AND IMPLEMENT A CONSTRUCTION AND DEMOLITION DEBRIS PROGRAM

According to the waste audit completed by Kessler Consulting in January 2015, construction and demolition (C&D) debris comprised 22% of the waste stream. This amounts to approximately 15,000 tons of material, 70% of which was recyclable based upon a visual audit. The City continues to see increasing urban development which gives reason to believe that this tonnage may remain at this level or continue to increase. Additional C&D waste collected by private companies franchised by the City may not be accurately accounted for.

The C&D material recovery industry is evolving in the NWA region and although no C&D material recycling facility is currently operating, permits are pending for two privately-owned facilities. The increasing use of LEED building certification is helping to drive the demand for a regional C&D processing facility. The adopted Solid Waste Reduction, Diversion, and Recycling Master Plan calls for C&D program development in 2019, but only after changes have been implemented for residential and commercial recycling programs and a food waste compost program has been fully developed.

The following implementation steps should be taken to increase C&D recycling in Fayetteville:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Release a Request for Proposal (RFP) to secure a contract with a processor for the recovery and recycling of construction and demolition material in 2018-2019.	Short-term	Recycling and Trash, Purchasing, Finance, Legal
Explore opportunities to partner with trade programs, re-use facilities, or other innovative programs with the C&D facility.	Medium-term	Recycling and Trash
Explore end markets for recyclable materials to promote economic growth and recapture of waste.	Ongoing	Recycling and Trash

CHAPTER FOUR:

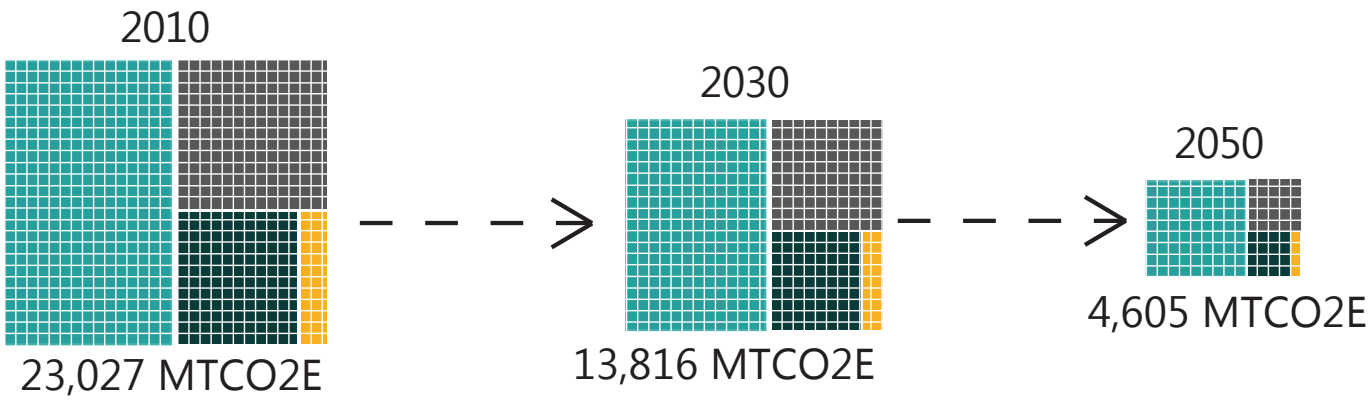
CITY GOVERNMENT ACTIONS TO DRIVE CHANGE

CHAPTER FOUR: CITY GOVERNMENT GHG REDUCTION STRATEGIES

The City of Fayetteville believes that community-wide actions and strategies explored in Chapter 3 will be most effective if the City leads the way in implementation. Through tackling the following goals, strategies, and actions, the City will show leadership in our own operations while demonstrating the economic and operational viability of the proposed actions.

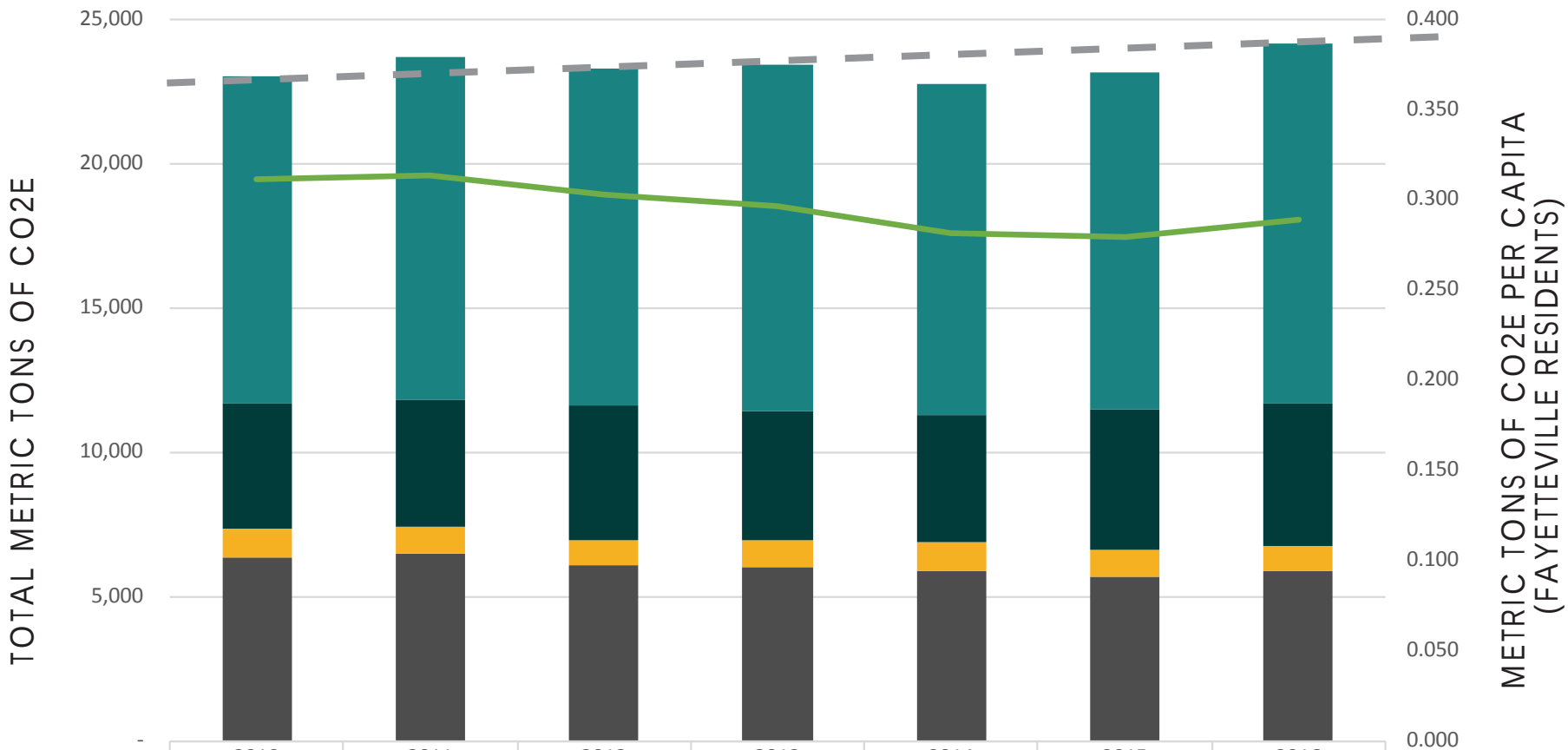
CITY OPERATIONAL GOALS :

1. Achieve 40% reduction in GHG emissions from baseline year 2010 by the year 2030
2. Achieve 80% reduction in GHG emissions from baseline year 2010 by the year 2050
3. Achieve 100% clean energy by 2030
4. Achieve 3% annual energy use reduction in City facilities



STRATEGIES:

1. Conduct baseline data analysis and benchmark City operations
2. Make all new and existing city-owned facilities and assets more energy efficient
3. Prioritize the purchase or installation of clean energy to run City operations
4. Create a Green Fleet City Policy
5. Ensure that the City provides exemplary leadership in waste reduction, reuse, and recycling
6. Implement the Green City initiative adopted in the Solid Waste Master Plan
7. Improve transparency and accountability through expanded reporting



	2010	2011	2012	2013	2014	2015	2016
Waste Water	11,327	11,882	11,644	11,981	11,523	11,658	12,495
Fleet Fuel	4,343	4,343	4,699	4,473	4,348	4,898	4,941
Gas Usage	1,003.82	959.40	819.04	984.65	1,010.63	926.59	888.26
Electric	6,353.75	6,481.06	6,102.78	5,983.49	5,885.60	5,672.88	5,840.13
MTCO2 Per Capita	0.311	0.313	0.302	0.297	0.282	0.280	0.288

Electric | Gas Usage | Fleet Fuel | Waste Water | MTCO2 Per Capita | Trendline

This GHG inventory was completed using the ICLEI Local Communities Protocol. See Appendix B for details.

CHAPTER FOUR: CITY GOVERNMENT STRATEGIES

The City of Fayetteville, as a local government, provides myriad services and has a wide variety of administrative and operational assets in locations across the City. These assets range in type and use and include operational and office buildings, parks and recreation facilities, infrastructure for water and sewer, lighting, and more. The age and condition of these assets also vary greatly and many have had some energy efficiency upgrades performed already.

Energy efficiency improvements for city-owned assets are prioritized and completed based on a cost/benefit analysis that considers existing condition/efficiency, energy efficiency upgrades savings and payback time, utility company incentives or other grant opportunities, and budget. The City believes that it is important to lead by example and energy efficiency upgrades are identified annually in the Capital Improvement Program (CIP) budget. The 2015-2019 CIP budget included $85,000 for energy efficiency improvements and equipment replacement. Additionally, new buildings constructed for City owned and operated facilities greater than 5,000 square feet are required by a City Resolution to be LEED Silver Certified when constructed. This ensures that new building assets are energy efficient from the start.

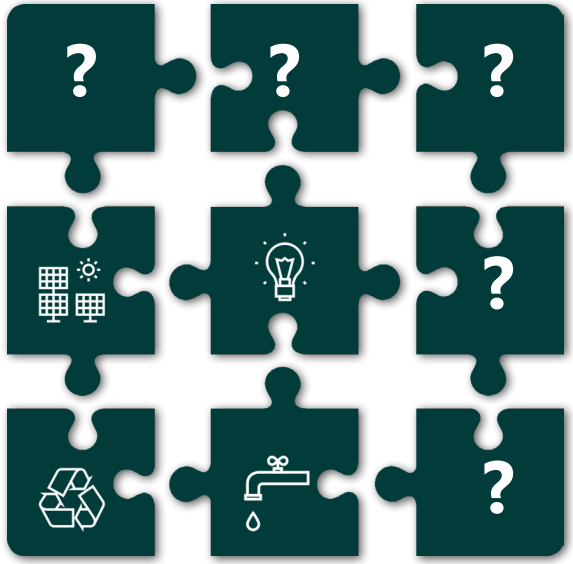
The City will adopt the strategies and actions on the following page to ensure all City assets are energy and resource efficient.

COMMUNITY VOICES:

"Reducing greenhouse gas emissions will provide a higher quality of life for the residents of Fayetteville. It will also help with the increasing efficiency of electricity use in the city by mitigating losses in the electric grid within the city. Using such examples and raising awareness will help the city achieve it's 2050 goal." - Online survey respondent

"I'm particularly passionate about active transport, because I think it addresses so many problems: people are healthier, it's good for the environment, people take greater pride and pleasure in their communities and also meet others who live near them. I could go on! I'm also a huge supporter of good public transit, however: many people live far from work or can't otherwise get around without a vehicle. Time spent in public transit is, for me, better used than time spent driving." - Survey respondent at the StartUp Crawl

STRATEGY 1: CONDUCT BASELINE DATA ANALYSES AND BENCHMARK CITY OPERATIONS



The overall goal of this Energy Action Plan is to reduce greenhouse gas emissions, and just like the larger community, the City of Fayetteville operations have some specific actions that are identified to measure, monitor, and reduce internal greenhouse gas emissions.

The City currently makes a number of reports available to the public including a yearly Sustainability Report Card and yearly Energy Efficiency project reports, but not all data is easily accessible or consistently reported. The following actions will ensure that the City has good data for future decision-making and that we maintain transparency and accountability regarding building and energy use:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Conduct a local city government greenhouse gas inventory at least every five years.	Ongoing	Sustainability
Benchmark local city government building and infrastructure energy use annually.	Ongoing	Sustainability, Facilities
Establish a water baseline for local government facilities and infrastructure and conduct a regular review of water use data against the baseline.	Short-term	Sustainability, Facilities
Require public infrastructure and facility managers consider energy and water consumption implications for new or upgraded infrastructure investments.	Ongoing	Sustainability, Facilities, Finance
Increase sub-metering to collect better information on energy and water use.	Medium-term	Sustainability, Facilities
Utilize baseline analysis to identify high energy use facilities and develop an energy efficiency and renewable energy innovation agenda to realize long-term savings.	Short-term	Sustainability, Facilities, Utilities Department, Finance

STRATEGY 2: MAKE ALL NEW AND EXISTING CITY-OWNED FACILITIES AND ASSETS MORE ENERGY EFFICIENT

The City's Facilities Management Division identifies, prioritizes, and installs energy efficiency upgrades to City facilities as funds are available. While we are proud of how effective staff is at improving efficiencies and reducing tax dollars spent on utility costs, the City can do more to drive cost and energy savings. The City will take action in the following ways to prioritize energy efficiency in new and existing City facilities and assets:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Consider creating a policy to formalize the City's energy efficiency efforts.	Short-term	Sustainability
Make retrofits and upgrades to local government buildings and/or infrastructure systems that will increase energy and water efficiency.	Ongoing	Sustainability, Facilities
Explore a strategy and funding mechanism to increase the permanent preservation of lands identified as the "Enduring Green Network" in the City's Future Land Use Plan and Map. These lands may be City-owned or preserved through land trusts, tree preservation easements or other legal mechanisms.	Medium-term	Sustainability, Urban Forestry, Parks & Recreation, Planning, Finance
Use the Parks and Recreation Master Plan process to identify and develop a network of pocket parks and urban open spaces in areas of the City that are impacted by extensive urban development such as downtown.	Medium-term	Parks & Recreation, Parking, Planning
Investigate the feasibility of Energy Performance Contracting or other financial mechanisms to reduce overall City energy costs.	Short-term	Sustainability, Finance
Install native landscaping to provide relief from the urban heat island effect and reduce cooling costs in summer months.	Ongoing	Parks & Recreation, Parking, Urban Forestry
Continue to prioritize tree planting at existing and new facilities to provide shade, infiltrate stormwater, improve air quality, and generally enhance our urban ecosystem functions .	Ongoing	Parks & Recreation, Urban Forestry, Facilities

STRATEGY 3: PRIORITIZE THE PURCHASE OR INSTALLATION OF CLEAN ENERGY TO RUN CITY OPERATIONS

The City of Fayetteville consumes a great deal of energy in order to offer consistent and timely services to all internal and external customers. In 2016, the City used 8.6 million kilowatts of electricity for all our regular operations and 18.5 million kilowatts to run our two wastewater treatment plants. The City should complete the following actions to offset the cost of electric power in our facilities:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Create a policy to ensure that the City's energy supplies increasingly come from renewable sources and/or enter direct purchase agreement with utility companies for clean energy sources.	Short-term	Purchasing, Sustainability
Explore opportunities to install renewable energy generation technologies at the two wastewater treatment plants to offset the high cost of electricity for water treatment.	Ongoing	Water & Sewer, Sustainability
Consider the feasibility of Energy Performance Contracting as a financing mechanism to reduce overall City energy costs and increase our clean energy portfolio.	Short-term	Sustainability, Finance

COMMUNITY VOICES:

"[Pursue these goals] as long as the clean energy is market viable and economically make sense over the life of the energy producing mechanism. The government should not be subsidizing clean energy to make it viable." - Survey respondent at Fayetteville Public Library

"I know that my family would switch to 100% clean energy if we could afford it, so having help from Fayetteville would make a big difference in many people's lives!" - Survey respondent at Fayetteville Public Library

"Reduce energy consumption through efficiency while working toward clean energy." - Online survey respondent

STRATEGY 4: CREATE A GREEN FLEET CITY POLICY

The City of Fayetteville has a large fleet of vehicles that are utilized to perform a variety of tasks. The City's fleet contains a myriad of vehicles such as: passenger cars, trucks, SUV's, police patrol vehicles, fire trucks, trash and recycling trucks, dump trucks, backhoes, graders, etc. The Fleet Division is charged with maintaining these vehicles and prioritizing the timing and replacement of worn-out vehicles. Vehicles of all classes and types are continually becoming more fuel efficient or designed for alternative fuel sources. Therefore, the transportation sector provides numerous opportunities for the City to become more cost and energy efficient. The following strategies lay out a plan for ensuring that new vehicles are identified, prioritized, and purchased based upon the task they are designed for and the efficiency with which they operate.

The City's highly varied fleet of vehicles calls for a variety of strategies to both right-size and right-fuel vehicles. Certain fleet vehicles, such as Police Patrol vehicles, will require unique targets and guidelines. These variations will be taken into consideration as the following policies are established. The following actions will help the City to choose the most efficient vehicle to do the task:

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Adopt alternative fuel guidelines and/or targets for City of Fayetteville owned vehicles.	Short-term	Fleet, Purchasing, Sustainability
Develop an internal Green Cities Initiative that prescribes a fleet purchasing policy encouraging divisions and departments to choose right-sized alternative fuel and/or more fuel efficient options when replacing vehicles. Additional infrastructure such as vehicle charging stations and natural gas or propane fueling stations may be necessary.	Short-term	Fleet, Transportation, Purchasing
Install alternative fueling stations for City vehicles as alternative fuel vehicles are increasingly added to the fleet. This may include electric vehicle charging stations, propane, biodiesel, etc.	Medium-term	Fleet, Transportation

STRATEGY 5: ENSURE THAT THE CITY PROVIDES EXEMPLARY LEADERSHIP IN WASTE REDUCTION, REUSE, AND RECYCLING

The City's Recycling and Trash Collection Division presents numerous opportunities for City operations to become more sustainable, increase efficiencies, and save taxpayer's money.

Recyclable material that is landfilled represents embedded energy that is disposed of at a significant environmental and economic cost. The City is committed to aggressively pursuing policies and actions that reduce the amount of recyclable and organic materials going to the landfill.

To be a leader in waste reduction efforts and to demonstrate the importance of the "Reduce, Reuse, Recycle" mantra, the City should establish the internal Green City Initiative proposed in the Solid Waste & Recycling Master Plan. This Green City Initiative would establish comprehensive recycling in City facilities, organics recovery, and environmentally preferable purchasing policies and programs in all City-owned facilities. It would also promote reporting and tracking measures to ensure resource efficiency and full life-cycle costs are being considered in City decision making.

COMMUNITY VOICES:

"Since the city has no wheeled recycle bins and I can't lift mine at the curb, I no longer recycle." - Online survey respondent

"I've noticed it's difficult to get recycling in apartment complexes, but there is a ton of trash flow there, if there was any access to recycling there it would be great" - Online survey respondent

"Complying with market requirements for recycled products is as important as the recycling program itself. The Reduce, Reuse, Recycle mantra is the order in which we should attack the problem. Reduce first, then Reuse, and recycle what slips through." - StartUp Crawl Commenter

STRATEGY 6: EXPAND TRANSPARENCY AND ACCOUNTABILITY ACROSS THE CITY THROUGH CONSISTENT REPORTING AND DATA ACCESSIBILITY

In order to maintain citizen trust and encourage understanding of City operations, the City strives to offer accessible, accurate, and user-friendly information about our policies, operations, and finances. As we move towards a more energy and resource efficient future, the City will be offering expanded reporting and data accessibility for both citizens and internal stakeholders.

Current reports on the City's Sustainability efforts can be found at:

http://www.fayetteville-ar.gov/253/Sustainability-Resilience

ACTION ITEMS:	TIMELINE	PRIMARY STAKEHOLDERS
Continue yearly Sustainability Report Card and promote broadly to the community.	Ongoing	Sustainability, Communications
Continue yearly Energy Efficiency Reporting and promote to the community.	Ongoing	Sustainability, Communications
Explore the feasibility of 'Sustainable Fayetteville' social media platforms to increase citizen awareness of existing programs and ongoing opportunities for energy and resource efficiency improvements.	Short-term	Sustainability, Communications
Increase access to facility energy data for internal users.	Short-term	Sustainability, Facilities, Finance, IT
Increase public access to facility energy data through a public facing dashboard.	Short-term	Sustainability, IT, Communications
Update the Environmental Purchasing Policy and publish yearly reports.	Short-term	Purchasing, Sustainability
Expand IT governance over digitizing efforts, resource efficiency, and internal reporting.	Short-term	IT, Communications , Purchasing

APPENDICES:

A. ENDNOTES

B. GREEN HOUSE GAS INVENTORY

C. GREEN HOUSE GAS MODELS AND PROJECTIONS

D. ACTION ITEM IMPLEMENTATION

APPENDIX A: ENDNOTES

1. Wind Catcher Energy Project, Southwestern Electric Power Company, "SWEPCO ANNOUNCES MAJOR PROJECT TO SECURE LOW-COST, RENEWABLE ENERGY FOR CUSTOMERS" (July 16 2017) http://www.swepco.com/info/projects/windcatcher/
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APPENDIX B: GREENHOUSE GAS INVENTORY

STAR Communities guidance led us to use the ICLEI U.S. Community Protocol to calculate emissions for the community-wide inventory and the Local Government Operations Protocol for City operations. Based on data availability, we chose to use the ICLEI 5 Basic Emissions Generating Activities list, which includes: electricity, natural gas, vehicle travel, energy used to treat and move wastewater, and solid waste disposal (City operations protocol does not include solid waste disposal). While this is not an exhaustive inventory and does not capture every emissions source or carbon capture activity, this protocol is used by municipalities around the country to build a baseline understanding of GHG emissions. The City believes this method allows for a good representation of Fayetteville's current emissions, for both the community and local government operations. Methodology for calculating emissions are explained in the following pages and can be explored in depth on the ICLEI website.

COMMUNITY-WIDE 2010-2016 GREENHOUSE GAS INVENTORY

Year	Electric (MTCO2E)	VMT (MTCO2E)	Natural Gas (MTCO2E)	Landfill Waste (MTCO2E)	Wastewater (MTCO2E)	Total MTCO2E	Population	MTCO2E Per Capita
2010	811,184	330,110	222,731	68,582	11,327	1,443,934	73,970	19.52
2011	781,556	341,026	213,022	71,191	11,882	1,418,677	75,586	18.77
2012	808,454	349,423	197,373	71,757	11,644	1,438,651	77,003	18.68
2013	797,094	360,796	229,954	78,506	11,981	1,478,331	78,929	18.73
2014	825,907	346,869	218,867	76,270	11,523	1,479,435	80,822	18.30
2015	773,037	384,457	194,348	88,913	11,658	1,452,414	82,830	17.53
2016	762,391	394,986	192,976	91,932	12,495	1,454,781	83,826	17.35

CITY GOVERNMENT OPERATIONS 2010-2016 GREENHOUSE GAS INVENTORY

Year	Electric	Fleet Fuel	Natural Gas	Wastewater	Total MTCO2E
2010	6,353.75	4,343	1,003.82	11,327	23,027.34
2011	6,481.06	4,343	959.40	11,882	23,665.28
2012	6,102.78	4,699	819.04	11,644	23,264.80
2013	5,983.49	4,473	984.65	11,981	23,421.82
2014	5,885.60	4,348	1,010.63	11,523	22,767.14
2015	5,672.88	4,898	926.59	11,658	23,156.19
2016	5,840.13	4,941	888.26	12,495	24,164.04

"MTCO2E" = Metric tons of carbon-dioxide equivalent. Using MTCO2E allows for the inclusion of different types of gases, including methane, nitrous oxide, and hydrofluroucarbons. More information available on page 24.

ELECTRICITY

From the ICLEI U.S. Community Protocol Appendix C - "Built Environment Accounting methods: Generally, recommended methods for measuring emissions from energy used in buildings rely on activity data for fuels combusted, electricity used, or use of other forms of energy. These data are multiplied by emissions factors for each energy source. Third-party verified utility-specific emissions factors are recommended. However, if utility-specific emission factors are not available, US EPA eGRID regional emission factors may be used.[31]"

While the total megawatt hours (MWh) consumed in Fayetteville has fluctuated, total emissions from electricity have declined due to a lower ratio of CO2E per MWh. This decline is primarily due to decreasing coal-powered electricity generation, replaced by natural gas, wind, and solar.

The data below captures all electricity usage in the community except for wastewater treatment and conveyance. That usage is captured in the wastewater category on the following page.

Year	AEP SWEPCO (kWh)	Ozarks Electric (kWh)	Total (kWh)	Total MWh	Lbs of CO2E per MWH*	Lbs of CO2E	Metric Tons of CO2E
2010	896,940,438	229,545,953	1,126,486,391	1,126,486	1,587.55	1,788,353,470	811,184.45
2011	894,202,739	191,136,513	1,085,339,252	1,085,339	1,587.55	1,723,034,779	781,556.36
2012	890,923,223	262,453,458	1,153,376,681	1,153,377	1,545.32	1,782,333,299	808,453.75
2013	874,802,152	262,368,438	1,137,170,590	1,137,171	1,545.32	1,757,289,741	797,094.17
2014	959,247,618	267,052,122	1,226,299,740	1,226,300	1,484.80	1,820,811,080	825,907.00
2015	875,593,636	272,204,896	1,147,798,532	1,147,799	1,484.80	1,704,252,408	773,036.81
2016	852,911,957	279,080,368	1,131,992,325	1,131,992	1,484.80	1,680,783,336	762,391.40

*The pounds of CO2E per megawatt hour (MWh) is derived from the regional emissions factor for the Southwest Power Pool South (SPSO), the power pool in which Fayetteville is located. As we did not have utility-specific emissions factors at the time of the inventory, the SPSO emissions factor was used. The emissions factor is determined by the EPA's eGRID program which develops a semi-annual CO2 equivalent for each subregion of power pools. The 2016 SPSO ratio has not yet been released, so the 2014 ratio was applied to 2014-2016. Best practices for calculating and applying emission ratios are supplied by the EPA eGRID program[32].

WASTEWATER

The ICLEI U.S. Community Protocol Appendix F - Wastewater and Water Emissions Activities and Sources WW.14 "Energy related Emissions Associated with Water Delivery and Treatment" was used to determine wastewater related emissions. Energy used for water treatment, conveyance, and distribution are the primary emissions elements in this protocol. According to the protocol, extraction and end-use consumption are excluded as these are already calculated in the Electricity and Natural Gas emissions categories (see pages 68 adn 70).[33]

Total energy needed to treat and convey water has increased significantly over the past 7 years, in direct correlation to our population growth. Simultaneously, the ratio of CO2E per MWh for wastewater treatment in our power pool has declined, keeping our total MTCO2E from this emissions category relatively stable.

Year	Energy used to treat and convey wastewater (kWh)	Total MWh	Lbs of CO2E per MWh for Wastewater treatment*	Lbs of CO2E	Metric Tons of CO2E
2010	15,729,428	15,729	1,587.55	24,971,253	11,327
2011	16,500,308	16,500	1,587.55	26,195,132	11,882
2012	16,612,223	16,612	1,545.32	25,671,161	11,644
2013	17,092,515	17,093	1,545.32	26,413,364	11,981
2014	17,108,918	17,109	1,484.80	25,403,339	11,523
2015	17,310,265	17,310	1,484.80	25,702,299	11,658
2016	18,551,974	18,552	1,484.80	27,545,990	12,495

*As with general electrical consumption (calculated on the previous page), the pounds of CO2E per megawatt hour (MWh) is derived from the regional emissions factor for the Southwest Power Pool South (SPSO), where Fayetteville is located. The emissions factor is determined by the EPA's eGRID program. The 2016 SPSO ratio has not yet been released, so the 2014 ratio was applied to 2014-2016. Best practices for calculating and applying emission ratios are supplied by the EPA eGRID program.

NATURAL GAS

The emissions from natural gas consumption were derived using ICLEI U.S. Community Protocol, Appendix C "BE.1 Emissions from Stationary Fuel Consumption"[34]. The data on total CCF was provided by Black Hills, Fayetteville's natural gas provider. As the protocol explains, "obtaining complete data at the community scale will be challenging for most fuels. You should complete this method for each fuel type and sector for which you can obtain or reasonably estimate total fuel usage in your inventory year"[36]. Staff were able to fully capture natural gas consumption but were unable to capture additional fuels (such as propane) as distribution and sale of such fuels are not consolidated.

Year	Total CCF	Population	CCF Per Capita	MCF	MMBTU	kg of CO2E per MMBTU	kg CO2E	MTCO2E
2010	40,706,299	73,970	550	4,070,629	4,200,890	53.02	222,731,190	222,731
2011	38,931,790	75,586	515	3,893,179	4,017,760	53.02	213,021,673	213,021
2012	36,071,782	77,003	468	3,607,178	3,722,607	53.02	197,372,670	197,372
2013	42,026,287	78,929	532	4,202,628	4,337,112	53.02	229,953,721	229,953
2014	40,000,000	80,822	495	4,000,000	4,128,000	53.02	218,866,560	218,866
2015	35,519,075	82,830	429	3,551,907	3,665,568	53.02	194,348,443	194,348
2016	35,268,303	83,826	421	3,526,830	3,639,688	53.02	192,976,303	192,976

Calculating emissions from stationary combustion using fuel use activity data and default emission factors by fuel type involves the following steps:

1. Determine annual use of each fuel combusted (total CCF)
2. Convert to MMBTU (million metric British thermal units)
3. Determine the appropriate emission factors for each fuel (U.S. weighted average Natural Gas = 53.02 kg Co2E per MMBTU)
4. Multiple emissions factor by MMBTU to determine total emissions in MTCO2E

VEHICLES

The emissions from vehicles were derived using ICLEI U.S. Community Protocol, Appendix D, Transportation and Other Mobile Emissions Actives and Sources, TR.1.B and TR.2.A[36]. The following steps were necessary to determine emissions from vehicles in Fayetteville:

1. Determine DVMT for all in-community road segments. Total daily vehicle miles traveled (DVMT) was compiled by the Arkansas Department of Transportation (ARDOT) and shared with the City of Fayetteville upon request. The ARDOT totals include all vehicles miles traveled each day on each road segment within Fayetteville.

2. Considering vehicle types, percent of vehicle types present in Fayetteville, average MPG per vehicle type, and average miles per vehicle type, convert VMT into emissions data using the following equation:

CO_2 (kg) = (Annual VMT * % of vehicle miles by vehicle type / Average MPG of vehicle type) * emissions factor for vehicle type

Percent of Vehicles by Miles Traveled
(ICLEI Table TR.1.3 Default Vehicle Mix values)

Fuel	Vehicle Type	Default Percentage
Gasoline	Light Trucks	32.4
Gasoline	Passenger Cars	60.6
Diesel	Heavy Trucks	5.4
Diesel	Light Trucks	1.3
Diesel	Passenger Cars	0.3

Average MPG by vehicle type
(U.S. DOE, 2013 Energy Outlook)

Vehicle Type	Average MPG
Light trucks	17.4
Passenger cars	23.8
Heavy trucks (diesel)	6.06
Light trucks (diesel)	13.8
Passenger cars (diesel)	13.8

Emissions Factors by Vehicle Types
(ICLEI Table TR.1.6)

Vehicle Type	Emissions Factor
Light trucks	0.00878
Passenger cars	0.00878
Heavy trucks (diesel)	0.0102
Light trucks (diesel)	0.0102
Passenger cars (diesel)	0.0102

Detailed calculations for each year are available on the following pages.

VEHICLES: 2010 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
674,017,395.00	Light trucks	32%	17.4	218,381,635.98	12,550,668.73	0.00878	110,194.87
674,017,395.00	Passenger cars	61%	23.8	408,454,541.37	17,161,955.52	0.00878	150,681.97
674,017,395.00	Heavy trucks (diesel)	5%	6.06	36,396,939.33	6,006,095.60	0.0102	61,262.18
674,017,395.00	Light trucks (diesel)	1%	13.8	8,762,226.14	634,943.92	0.0102	6,476.43
674,017,395.00	Passenger cars (diesel)	0%	13.8	2,022,052.19	146,525.52	0.0102	1,494.56
	TOTALS:	100%		674,017,395.00	36,500,189.30		330,110.00

VEHICLES: 2011 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
696,306,568.95	Light trucks	32%	17.4	225,603,328.34	12,965,708.53	0.00878	113,838.92
696,306,568.95	Passenger cars	61%	23.8	421,961,780.78	17,729,486.59	0.00878	155,664.89
696,306,568.95	Heavy trucks (diesel)	5%	6.06	37,600,554.72	6,204,712.00	0.0102	63,288.06
696,306,568.95	Light trucks (diesel)	1%	13.8	9,051,985.40	655,940.97	0.0102	6,690.60
696,306,568.95	Passenger cars (diesel)	0%	13.8	2,088,919.71	151,370.99	0.0102	1,543.98
	TOTALS:	100%		696,306,568.95	37,707,219.08		341,026.46

VEHICLES: 2012 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
713,450,655.45	Light trucks	32%	17.4	231,158,012.37	13,284,943.24	0.00878	116,641.80
713,450,655.45	Passenger cars	61%	23.8	432,351,097.20	18,166,012.49	0.00878	159,497.59
713,450,655.45	Heavy trucks (diesel)	5%	6.06	38,526,335.39	6,357,481.09	0.0102	64,846.31
713,450,655.45	Light trucks (diesel)	1%	13.8	9,274,858.52	672,091.20	0.0102	6,855.33
713,450,655.45	Passenger cars (diesel)	0%	13.8	2,140,351.97	155,097.97	0.0102	1,582.00
	TOTALS:	100%		713,450,655.45	38,635,625.98		349,423.03

VEHICLES: 2013 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
736,671,495.55	Light trucks	32%	17.4	238,681,564.56	13,717,331.30	0.00878	120,438.17
736,671,495.55	Passenger cars	61%	23.8	446,422,926.30	18,757,265.81	0.00878	164,688.79
736,671,495.55	Heavy trucks (diesel)	5%	6.06	39,780,260.76	6,564,399.47	0.0102	66,956.87
736,671,495.55	Light trucks (diesel)	1%	13.8	9,576,729.44	693,965.90	0.0102	7,078.45
736,671,495.55	Passenger cars (diesel)	0%	13.8	2,210,014.49	160,145.98	0.0102	1,633.49
	TOTALS:	100%		736,671,495.55	39,893,108.45		360,795.78

VEHICLES: 2014 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
708,235,947.90	Light trucks	32%	17.4	229,468,447.12	13,187,841.79	0.00878	115,789.25
708,235,947.90	Passenger cars	61%	23.8	429,190,984.43	18,033,234.64	0.00878	158,331.80
708,235,947.90	Heavy trucks (diesel)	5%	6.06	38,244,741.19	6,311,013.40	0.0102	64,372.34
708,235,947.90	Light trucks (diesel)	1%	13.8	9,207,067.32	667,178.79	0.0102	6,805.22
708,235,947.90	Passenger cars (diesel)	0%	13.8	2,124,707.84	153,964.34	0.0102	1,570.44
	TOTALS:	100%		708,235,947.90	38,353,232.95		346,869.05

VEHICLES: 2015 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
784,982,939.35	Light trucks	32%	17.4	254,334,472.35	14,616,923.70	0.00878	128,336.59
784,982,939.35	Passenger cars	61%	23.8	475,699,661.25	19,987,380.72	0.00878	175,489.20
784,982,939.35	Heavy trucks (diesel)	5%	6.06	42,389,078.72	6,994,897.48	0.0102	71,347.95
784,982,939.35	Light trucks (diesel)	1%	13.8	10,204,778.21	739,476.68	0.0102	7,542.66
784,982,939.35	Passenger cars (diesel)	0%	13.8	2,354,948.82	170,648.47	0.0102	1,740.61
	TOTALS:	100%		784,982,939.35	42,509,327.05		384,457.02

VEHICLES: 2016 EMISSIONS CALCULATIONS

Annual VMT	Vehicle Type	% Vehicle Type	Average MPG	Miles per Vehicle Type	Gallons used	Emissions factor for vehicle type	Total CO2E
806,481,370.00	Light trucks	32%	17.4	261,299,963.88	15,017,239.30	0.00878	131,851.36
806,481,370.00	Passenger cars	61%	23.8	488,727,710.22	20,534,777.74	0.00878	180,295.35
806,481,370.00	Heavy trucks (diesel)	5%	6.06	43,549,993.98	7,186,467.65	0.0102	73,301.97
806,481,370.00	Light trucks (diesel)	1%	13.8	10,484,257.81	759,728.83	0.0102	7,749.23
806,481,370.00	Passenger cars (diesel)	0%	13.8	2,419,444.11	175,322.04	0.0102	1,788.28
	TOTALS:	100%		806,481,370.00	43,673,535.56		394,986.20

2010-2016: SUMMARY OF EMISSIONS FROM VEHICLES

Year	Total DVMT	Population	VMT per capita	Total MTCO2 per year
2010	1,846,623.00	73,970	24.90	330,110.00
2011	1,907,689.23	75,586	25.24	341,026.46
2012	1,954,659.33	77,003	25.38	349,423.03
2013	2,018,278.07	78,929	25.57	360,795.78
2014	1,940,372.46	80,822	24.01	346,869.05
2015	2,150,638.19	82,830	25.96	384,457.02
2016	2,209,538.00	83,826	26.36	394,986.20

SOLID WASTE

Emissions from solid waste (landfilled waste) were calculated using the ICLEI U.S. Community Protocol, Appendix E: "Solid Waste Emissions Activities and Sources." As Fayetteville does not operate a landfill within City limits, the protocol (SW4) used calculates emissions from community-generated waste sent to outside landfills. The protocol states that communities are "required to estimate the emissions that result from waste disposed by the community, regardless of whether or not the receiving landfill or landfills are located inside or outside of the community boundary."[37]

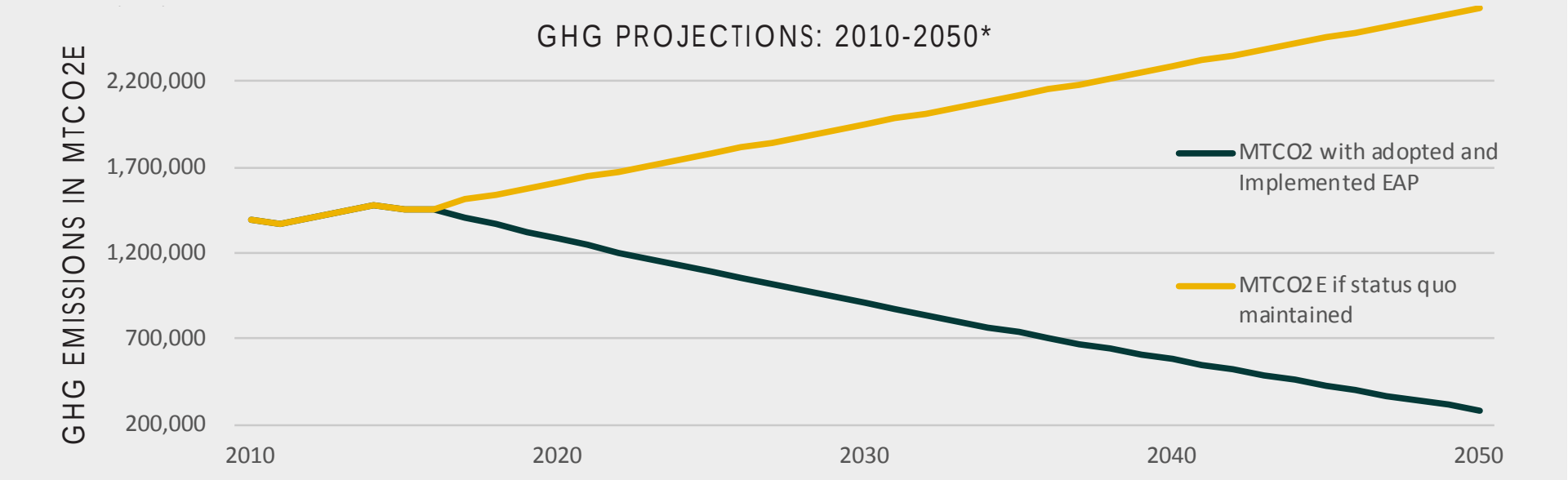
The following steps are necessary to determine GHG emissions from solid waste generated in a community:

1. Calculate total waste (in wet short tons) entering landfill per year (retrieved from the Recycling & Trash Collection Division)
2. Determine the waste characteristics of the total waste or, if the data is not consistently available, use the Mixed Solid Waste Factor (Fayetteville used the mixed solid waste estimate of .060, derived by the EPA, offered by ICLEI in table SW.5)
3. Use the following equation to calculate CH4 emissions as MTCO2E: = CH4 GWP * (1-CE) * (1-OX) * M * EF
   - CH4 GWP = CH4 Global Warming Potential, (currently 28 according to EPA Sustainable Materials Management[38])
   - CE = LFG collection efficiency (value of zero entered as Tontitown landfill LFG collection efficiency is unknown)
   - OX = oxidation rate (take .1 as stated value from ICLEI, table SW.4.1)
   - M = total mass of waste in wet short tons
   - EF = the emissions factor for specific materials (.060 as identified in table SW.5)

Year	Total Waste	Landfilled Waste (tons)	Population	Tons to landfill/ capita	Tons total waste/ capita	MTCO2E	Diversion Rate
2010	54,262	45,358	73,970	0.613	0.733	68,581.60	16%
2011	56,209	47,084	75,586	0.622	0.743	71,190.51	16%
2012	57,527	47,458	77,003	0.616	0.747	71,757.22	18%
2013	63,919	51,922	78,929	0.657	0.809	78,506.37	19%
2014	63,182	50,443	80,822	0.624	0.781	76,269.77	20%
2015	71,653	58,805	82,830	0.709	0.865	88,913.39	18%
2016	67,138	60,802	83,826	0.725	0.80	91,932.41	18%

APPENDIX C: GHG PROJECTIONS

Long term projections are a notoriously complicated art. To determine the projected impacts of the goals and actions in this plan, the City used standards set by ICLEI, the EPA, and STAR Communities. The projections on the following pages show best case scenario if Fayetteville is able to achieve each sector-level goal in this plan.



Year	Electric	Natural Gas	Wastewater	Vehicle Emissions	Waste	Projected MTCO2E (if EAP implemented)	Projected MTCO2E if status quo maintained
2010	811,184	222,731	11,327	330,110	68,582	1,443,934	1,390,700
2020	646,192	183,729	9,760	360,233	84,622	1,284,536	1,644,417
2030	389,603	159,248	4,798	273,350	80,968	907,968	1,948,760
2040	176,176	134,955	1,769	201,575	64,845	579,320	2,286,919
2050	1	112,440	1	134,014	36,352	282,807	2,625,078

*To calculate projected emissions if the status quo is maintained, the average MTCO2E per capita for 2010 through 2016 was calculated. This average emissions rate (17.6 MTCO2E per capita) was multiplied by the population estimates agreed upon in City Plan 2030. This projection was extrapolated from 2010 until 2050.

APPENDIX C: GHG PROJECTIONS

Year	Electric	Natural Gas	Wastewater	Vehicle Emissions	Waste	Projected MTCO2E (if EAP implemented)	Projected Population	MTCO2E per capita	Status Quo MTCO2E
2010	811,184	222,731	11,327	330,110	68,582	1,443,934	73,970	19.5	1,390,700
2011	781,556	213,022	11,882	341,026	71,191	1,418,677	75,586	18.7	1,367,322
2012	808,454	197,373	11,644	349,423	71,757	1,438,651	77,003	18.6	1,406,535
2013	797,094	229,954	11,981	360,796	78,506	1,478,331	78,929	18.7	1,446,647
2014	825,907	218,867	11,523	346,869	76,270	1,479,435	80,822	18.3	1,479,435
2015	773,037	194,348	11,658	384,457	88,913	1,452,414	82,830	17.5	1,452,414
2016	762,391	192,976	12,495	394,986	91,932	1,454,781	83,826	17.3	1,454,781
2017	732,569	190,718	11,763	386,298	82,522	1,403,869	85,747	16.4	1,509,153
2018	703,266	188,421	11,065	377,610	83,554	1,363,915	87,669	15.6	1,542,969
2019	674,476	186,090	10,397	368,921	84,595	1,324,480	89,590	14.8	1,576,785
2020	646,192	183,729	9,760	360,233	84,622	1,284,536	91,511	14.0	1,610,601
2021	618,405	181,343	9,152	351,545	85,059	1,245,504	93,433	13.3	1,644,417
2022	591,110	178,934	8,571	342,857	84,045	1,205,517	95,354	12.6	1,678,233
2023	564,299	176,507	8,017	334,168	83,922	1,166,914	97,276	12.0	1,712,049
2024	537,965	174,065	7,488	325,480	83,898	1,128,897	99,197	11.4	1,745,865
2025	512,102	171,610	6,984	316,792	83,697	1,091,185	101,118	10.8	1,779,681
2026	486,702	169,145	6,504	308,103	83,290	1,053,744	103,040	10.2	1,813,496
2027	461,758	166,674	6,046	299,415	82,811	1,016,705	104,961	9.7	1,847,312
2028	437,265	164,200	5,610	290,727	82,181	979,982	106,882	9.2	1,881,128
2029	413,215	161,723	5,194	282,039	81,612	943,783	108,804	8.7	1,914,944
2030	389,603	159,248	4,798	273,350	80,968	907,968	110,725	8.2	1,948,760

Year	Electric	Natural Gas	Wastewater	Vehicle Emissions	Waste	Projected MTCO2E (if EAP implemented)	Projected Population	MTCO2E per capita	Status Quo MTCO2E
2031	366,422	156,775	4,422	265,150	79,764	872,533	112,646	7.7	1,982,576
2032	343,665	154,307	4,063	257,195	78,455	837,686	114,568	7.3	2,016,392
2033	321,327	151,847	3,722	249,479	77,059	803,434	116,489	6.9	2,050,208
2034	299,401	149,395	3,398	241,995	75,575	769,765	118,410	6.5	2,084,024
2035	277,882	146,954	3,090	234,735	74,016	736,677	120,332	6.1	2,117,839
2036	256,763	144,524	2,798	227,693	72,364	704,142	122,253	5.8	2,151,655
2037	236,039	142,108	2,520	220,862	70,618	672,147	124,175	5.4	2,185,471
2038	215,703	139,707	2,256	214,236	68,782	640,685	126,096	5.1	2,219,287
2039	195,751	137,323	2,006	207,809	66,857	609,746	128,017	4.8	2,253,103
2040	176,176	134,955	1,769	201,575	64,845	579,320	129,939	4.5	2,286,919
2041	156,973	132,606	1,544	193,512	62,744	547,380	131,860	4.2	2,320,735
2042	138,136	130,277	1,332	185,772	60,553	516,070	133,781	3.9	2,354,551
2043	119,661	127,967	1,130	178,341	58,273	485,372	135,703	3.6	2,388,367
2044	101,541	125,680	940	171,207	55,903	455,271	137,624	3.3	2,422,182
2045	83,772	123,414	760	164,359	53,445	425,748	139,545	3.1	2,455,998
2046	66,347	121,171	589	157,784	50,897	396,789	141,467	2.8	2,489,814
2047	49,263	118,952	429	151,473	48,260	368,377	143,388	2.6	2,523,630
2048	32,514	116,756	277	145,414	45,534	340,496	145,309	2.3	2,557,446
2049	16,095	114,586	135	139,598	42,718	313,131	147,231	2.1	2,591,262
2050	1	112,440	0	134,014	36,352	282,807	149,152	1.9	2,625,078

APPENDIX D: ACTION ITEM IMPLEMENTATION

This table compiles all actions listed in the chapters above into a single, timeline-oriented view.

In this timeline, 'ongoing' items may already be in the works, may be immediately implementable, or may require ongoing attention over a series of years. 'Short-term' implies 1-3 years, 'medium-term' implies 3-5 years, and 'long-term' implies 5-10 years. As with other City master plan processes, the timeline described here is subject to change as staff, resources, and budget allows.

Potential GHG impact (in terms of total MTCO2E reduction) is estimated in the final column. This estimated reduction impact is based on a variety of sources included stakeholder input, STAR Communities guidance, the ICLEI U.S. Community Protocol, and the projections released in "Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming," edited by Paul Hawken.

Sector	Action Item	Timeline	Primary Stakeholders	GHG Impact
Buildings	Conduct a community-wide tree canopy assessment every five years.	Ongoing	Urban Forestry, GIS	Low
Buildings	Encourage increased sub-metering on institutional, commercial and industrial buildings to collect data and identify opportunities for energy efficiency upgrades.	Ongoing	Facilities, Sustainability, Utilities	Low
Buildings	Partner with utility providers to create an education and outreach campaign to connect homeowners and renters to existing energy efficient programs provided by utility companies.	Ongoing	Sustainability, Community Resources, Communications, Non-profits	High
Buildings	Prioritize leak prevention and water-related energy efficiency measures, both City and community-wide.	Ongoing	Facilities, Water & Sewer, Sustainability	Low
Buildings	Publish local government energy benchmarking reports and maintain a web based interface to provide local government energy data to the public.	Ongoing	Sustainability, IT, Facilities Management	Low
Buildings	Require that public infrastructure and facility managers consider energy and water consumption implications for new or upgraded infrastructure investments.	Ongoing	Facilities, Water & Sewer, Transportation	Medium

Buildings	Utilize the existing Property Accessed Clean Energy (PACE) program to finance energy efficiency in the construction of new buildings.	Ongoing	Sustainability	High
Cross-sector	Continue to provide recognition for local sustainability-minded businesses through programs like LEED, Bike-Friendly Businesses and the GreeNWAay Initiative.	Ongoing	Economic Vitality, Sustainability	Low
Cross-sector	Continue to provide support services to targeted sectors to strengthen local value chain infrastructure and develop market channels.	Ongoing	Economic Vitality	Medium
Cross-sector	Support ongoing regional campaigns promoting local banking, shopping, and eating and other local economic drivers.	Ongoing	Communications, Economic Vitality, Sustainability	Low
Energy	Continue to advocate for increasing SWEPCO and Ozarks Electric clean energy portfolio as a percentage of the electric energy produced.	Ongoing	Sustainability	High
Energy	Investigate community shared solar or community wind to encourage procurement of renewable energy supplies. Community sharing programs allow residents to buy or lease a portion of a shared alternative energy system.	Ongoing	Sustainability	High
Energy	Procure clean energy from utilities or other generators when feasible.	Ongoing	Sustainability	High
Transportation	Establish partnerships between fleet managers, alternative fuel suppliers, and consumers to elevate alternative fuel options within the community.	Ongoing	Sustainability, Fleet	Low
Transportation	Continue to support Ozark Regional Transit, Razorbak Transit, and Regional Planning in pursuit of transit solutions for the Northwest Arkansas region.	Ongoing	Planning, Transportation	High
Transportation	Continue to explore opportunities for adding bus shelters along transit lines.	Ongoing	University, Transportation, Engineering, Sustainability	Medium

Transportation	Construct or retrofit transportation infrastructure to meet the access standards in the Americans with Disabilities Act (ADA).	Ongoing	Engineering, Transportation	Low
Transportation	Continue to utilize the Active Transportation Advisory Committee to identify and prioritize projects that fill missing links in trail and sidewalk networks.	Ongoing	Engineering, Transportation	Medium
Transportation	Make street intersections and trail crossings safer and easier for pedestrians through signage, medians, colored pavement markings, and signalization.	Ongoing	Engineering, Transportation	Medium
Transportation	Continue to expand the on-street bicycle network. Promote the use of buffered, protected and separated on-street bicycle infrastructure whenever possible.	Ongoing	Engineering, Transportation	High
Transportation	Make appropriate infill and revitalization our highest priority.	Ongoing	Planning	High
Transportation	Discourage suburban sprawl development.	Ongoing	Planning	High
Transportation	Grow a livable transportation network.	Ongoing	Planning, Transportation	High
Transportation	Create an enduring green network.	Ongoing	Planning, Transportation, Engineering	High
Transportation	Actively pursue the goals laid out it in City Plan 2030 and the upcoming Mobility Master Plan.	Ongoing	Planning, Transportation, Engineering	High
Transportation	Continue to implement the City's complete streets policy and street cross-sections for all street projects.	Ongoing	Planning, Transportation, Engineering	High
Transportation	Increase the mileage of sidewalks, particularly on arterial or collector streets, that connect people with destinations.	Ongoing	Planning, Transportation, Engineering	Medium
Transportation	Install public use electric vehicle fueling stations on city owned properties and encourage public-use alternative charging stations at publicly accessible locations across the City.	Ongoing	Sustainability, Fleet, Facilities Management	Medium
Transportation	Encourage the expansion of carsharing programs across the City and region.	Ongoing	Parking Management, Univeristy, Sustainability	Low

Waste	Continue to pursue a commercial and institutional outreach program to encourage businesses and institutions to participate in existing recycling programs.	Ongoing	Recycling and Trash, Communications	Low
Waste	Develop a new education and community outreach plan to announce the city's commitment to waste diversion and to build community buy-in for new initiatives.	Ongoing	Recycling and Trash, Communications	Medium
Waste	Explore end markets for recyclable materials to promote economic growth and recapture of waste.	Ongoing	Recycling and Trash	Low
Buildings	Adopt updated commercial and residential building energy codes on a regular schedule.	Short-term	Building Safety	High
Buildings	Benchmark local government building and infrastructure energy use annually.	Short-term	Facilities Management, Sustainability, IT	Low
Buildings	Conduct an assessment to determine heat island mitigation feature distribution across the City to identify locations with disproportionate heat island effects.	Short-term	GIS, Urban Forestry	Low
Buildings	Conduct an assessment to discover if there is a parkland or natural space within a 10-minute walk of all residents.	Short-term	Parks and Recreation, Sustainability, GIS	Low
Buildings	Create a program to connect low-income renters and homeowners with utility-sponsored programs to reduce their energy costs.	Short-term	Sustainability, Community Resources, Communications, Non-profits, Utilities	Medium
Buildings	Encourage tree planting, green roofs, and other energy-saving techniques across the City through education, outreach, and tree giveaways.	Short-term	Urban Forestry	Low
Buildings	Evaluate the feasibility of modifying existing tree preservation minimums and mitigation rates in the City's Tree Preservation Code to improve the long-term ecological outcomes of urban development.	Short-term	Urban Forestry, Development Services	Medium

Buildings	Explore opportunities to utilize Community Development Block Grants (CDBG) to compound existing utility-sponsored energy efficiency programs for low to moderate income households.	Short-term	Community Resources, Sustainability Utility Companies	Medium
Buildings	Explore options to develop a tree planting program partnering with residents, business owners, and institutions for the planting of trees in right-of-way, on easements, or on private properties.	Short-term	Urban Forestry, Sustainability, Facilities	Medium
Buildings	Identify high energy use City facilities and develop an energy efficiency and renewable energy innovation agenda to realize long-term savings and demonstrate the financial impact of energy improvements.	Short-term	Facilities, Water & Sewer, Sustainability	Medium
Buildings	Target areas in need of additional tree canopy by creating a tree canopy map layer.	Short-term	Urban Forestry, GIS	Low
Buildings	Use the Parks and Recreation Master Plan process to identify and develop a network of pocket parks and urban open spaces in areas of the city that are identified as impacted by urban heat islands.	Short-term	Parks and Recreation, Urban Forestry, Planning	Medium
Cross-sector	Work with the University of Arkansas Office of Sustainability to collaboratively complete a regional resilience assessment and publish a report of findings.	Short-term	Sustainability, University	Low
Cross-sector	Consider amending the 'Purpose and Duties of the Environmental Action Committee' to include consideration of climate mitigation and adaptation strategies.	Short-term	Environmental Action Committee	Low
Cross-sector	Consider amending the 'Purpose and Duties of the Environmental Action Committee' to include policy recommendations regarding energy efficiency efforts and clean energy purchasing decisions.	Short-term	Environmental Action Committee	Low
Cross-sector	Investigate the feasibility of a stormwater utility fee to improve green stormwater infrastructure.	Short-term	Engineering, Legal, Finance	Medium
Cross-sector	Integrate Fayetteville's sustainability brand and energy action goals into future marketing and outreach efforts for business and talent retention.	Short-term	Communications, Economic Vitality, Sustainability	Medium

Energy	Assess if regulatory restrictions or undue burden exists for the development of residential and small businesses renewable energy installations.	Short-term	Building Safety, Sustainability, IT	Medium
Energy	Create a policy to ensure that the local government's energy supplies increasingly come from renewable sources and/or enter into direct purchase agreement with utility companies for clean energy sources.	Short-term	Sustainability, Purchasing	High
Energy	Earn recognition as a Solar-Ready community.	Short-term	Building Safety, Sustainability, IT	Medium
Energy	Integrate clean power job skills training into local job development activities or plans.	Short-term	Economic Development, Sustainability	Medium
Energy	Encourage the development of residential and small business renewable energy sources using the existing net-metering program.	Short-term	Sustainability	Medium
Energy	Evaluate the feasibility of leasing public land for renewable energy.	Short-term	Sustainability, Legal, Finance	High
Transportation	Adopt alternative fuel guidelines and/or targets for City of Fayetteville owned vehicles.	Short-term	Fleet, Sustainability	Medium
Transportation	Partner with private businesses to ensure that more electric vehicle charging stations become available at workplaces, residential developments, and other frequently visited locations. Install public alternative fueling stations on City-owned properties.	Short-term	Sustainability, Fleet, Facilities Management	Medium
Transportation	Establish a community-wide bike-share program.	Short-term	University, Sustainability	Medium
Transportation	Develop an internal Green Cities Initiative that prescribes a fleet purchasing policy that encourages divisions and departments to choose right-sized, alternative fuel, and/or more fuel efficient options when replacing vehicles. Additional infrastructure such as vehicle charging stations or natural gas fueling stations may be necessary to support the transition to a green fleet.	Short-term	Fleet, Purchasing, Sustainability	Medium

Waste	Modify City development codes to require new commercial, institutional, and multi-family developments to provide adequate space and access for recycling and organics recovery.	Short-term	Recycling and Trash, Planning	Medium
Waste	Continue to develop communications plans about the city's commitment to waste diversion and to solicit buy-in for new initiatives.	Short-term	Recycling and Trash, Communications	Low
Waste	Develop a technical assistance program to inform businesses, institutions, and multi-family complexes of the City's waste diversion commitment and help them prepare for new recycling initiatives.	Short-term	Recycling and Trash, Communications	Low
Waste	Explore options for curbside recycling at small multi-family complexes or complexes that make curbside collection feasible.	Short-term	Recycling and Trash	Medium
Waste	Develop a detailed plan and schedule to initiate a voluntary organics recovery program focused initially on large food waste generators like schools, grocery stores, and institutions.	Short-term	Recycling and Trash, Communications	High
Waste	Modify building codes to require new commercial developments that are expected to generate substantial quantities of food waste to provide adequate space and access for food waste collection containers.	Short-term	Recycling and Trash, Planning	Medium
Waste	Require private haulers of food waste to enter into franchise agreements with the City so that these quantities can be reported for the City's diversion rate.	Short-term	Recycling and Trash, Legal	Low
Waste	Release a Request for Proposal (RFP) to secure a contract with a processor for the recovery and recycling of construction and demolition material in 2018-2019.	Short-term	Recycling and Trash, Purchasing, Finance, Legal	Medium
Buildings	Encourage green roofs on new and existing buildings and consider the feasibility of incentivizing green roofs through a mechanism like a storm water utility fee.	Medium-term	Development Services	Medium
Buildings	Encourage heat island mitigation features to help lower utility costs for residents and businesses.	Medium-term	Urban Forestry, Sustainability	Medium

Buildings	Encourage local utility providers to offer energy commissioning programs.	Medium-term	Sustainability, Utility Companies	Medium
Buildings	Evaluate the feasibility of creating incentives to encourage the new construction of energy efficient buildings.	Medium-term	Development Services, Economic Development, Sustainability	High
Buildings	Explore a strategy and funding mechanism to increase the permanent preservation of lands identified as the "Enduring Green Network" in the City's Future Land Use Plan and Map. These lands may be City-owned or preserved through land trusts, tree preservation easements, or other mechanisms.	Medium-term	Planning, Finance, Sustainability, Legal	Low
Buildings	Increase awareness of utility-focused "Right Tree, Right Place" program through joint outreach campaigns.	Medium-term	Urban Forestry, Utilities	Low
Buildings	Partner with organizations to encourage the collection and reporting of energy use data from the commercial and industrial sectors.	Medium-term	Utility Companies, Sustainability	Medium
Buildings	Promote the use of cooling and light colored roofing materials and coatings for both new and existing building stock.	Medium-term	Development Services, Urban Forestry	Medium
Cross-sector	Reinvigorate the support for and momentum around Fayetteville Resolution no. 164-13 to support a national revenue-neutral carbon fee and dividend program.	Medium-term	Sustainability	High
Cross-sector	Advocate for 100% LED street lights by 2030 through collaboration with utility providers.	Medium-term	Sustainability, Utility Companies	Medium
Transportation	Offer local government employees incentives to commute by modes other than single-occupancy vehicles.	Medium-term	Sustainability, Human Resources, Finance	Low
Transportation	Continue to work towards the Active Transportation Plan goal of having a trail connection with ½ mile of 97% of residences by 2040.	Medium-term	Engineering, Sustainability, Transportation	High
Waste	Explore opportunities to partner with trade programs, re-use facilities, or other innovative programs with the C&D facility.	Medium-term	Recycling and Trash	Medium

Waste	Support regional partnerships that seek to increase waste diversion rates	Medium-term	Recycling and Trash, Sustainability	Medium
Buildings	Analyze the feasibility of an energy use disclosure ordinance that requires energy users to disclose consumption levels.	Long-term	Sustainability	Low
Energy	Build the necessary distribution or storage infrastructure to support further investment in clean energy sources.	Long-term	Sustainability, Utilities	High
Energy	Explore incentives to support the development of renewable energy.	Long-term	Sustainability, Finance	Medium
Energy	Investigate the feasibility of becoming a Green Power Community to encourage businesses, institutions, and individuals to collectively use more clean power.	Long-term	Economic Development, Sustainability	Medium

CITY OF
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