MARC
MID-AMERICA REGIONAL COUNCIL

CLIMATE ACTIONKC

KC Regional

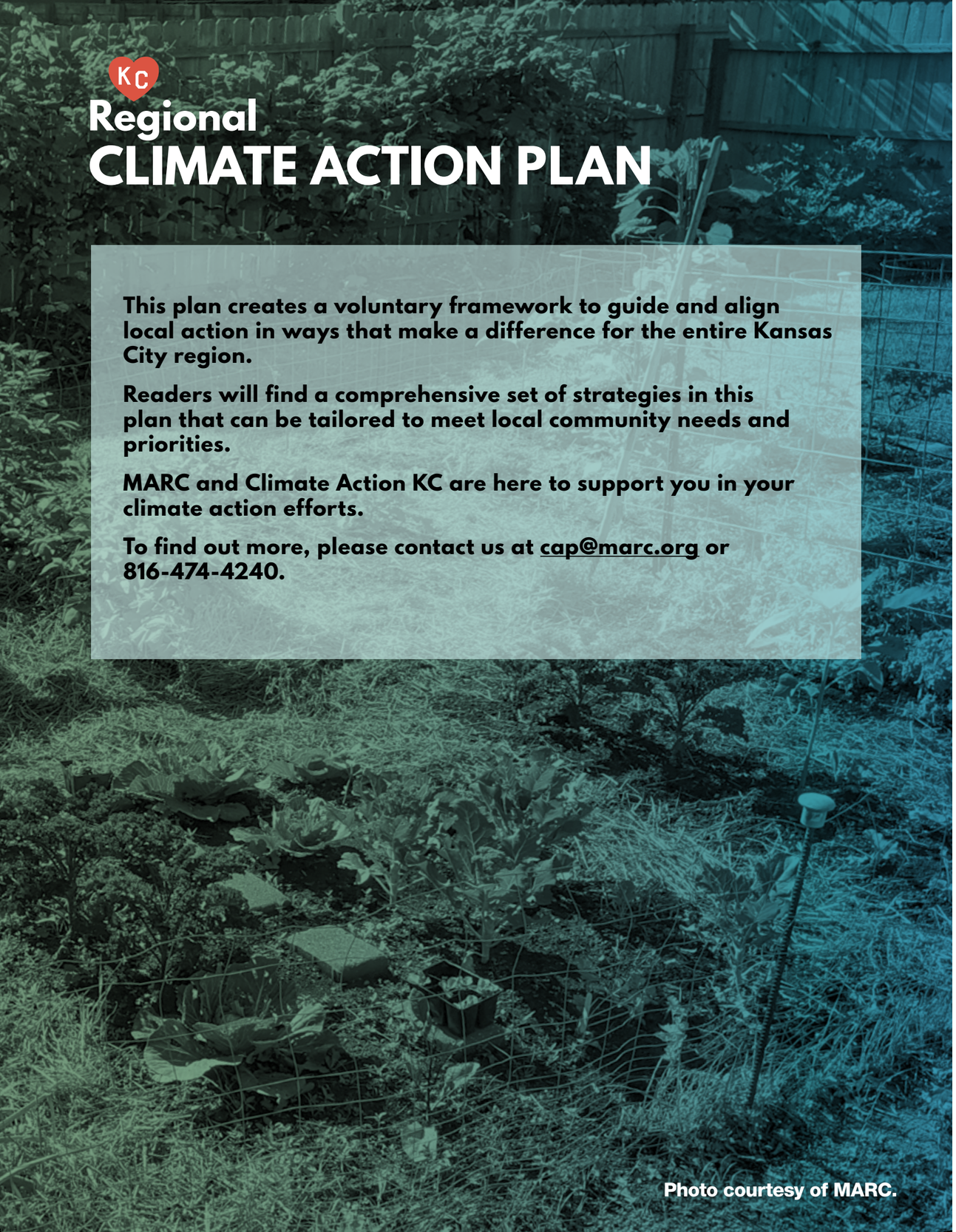
CLIMATE ACTION PLAN

Creating equitable and just climate resilience in the Kansas City region

2021

MID-AMERICA REGIONAL COUNCIL x CLIMATE ACTION KC

Regional CLIMATE ACTION PLAN



This plan creates a voluntary framework to guide and align local action in ways that make a difference for the entire Kansas City region.

Readers will find a comprehensive set of strategies in this plan that can be tailored to meet local community needs and priorities.

MARC and Climate Action KC are here to support you in your climate action efforts.

To find out more, please contact us at cap@marc.org or 816-474-4240.

Photo courtesy of MARC.

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Photo courtesy of Urban Lumber Missouri.

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Smithville Lake
Photo courtesy of Laura Gilchrist.

A Letter From the Climate Action KC Founders

The document you're now holding started, like all things do, with an idea. As newly elected officials, we knew it was necessary to tackle the existential threat of climate change.

While we may have had the ambition and naivete to believe we could have an impact, we realized that we did not have the resources, the knowledge or the vehicle to go about tackling this challenge alone.

Nor should we go it alone. In society, we enjoy life through the help of others — and in a region like Kansas City, we know that our destinies are intertwined. Many of the biggest areas of our environmental impact transcend our jurisdictional boundaries: transportation systems, food, water and air all are beyond the control of our individual cities alone. Our region encompasses ten counties, over 100 cities and a multitude of other governing bodies and oversights. To move the needle the furthest, find efficiencies and expedite action, **we have to act together**.

This plan comes from a place of love for Kansas City. As natives of the metro, we've been raised among those things that make it special: Chiefs football, fountains, Midwestern hospitality, and barbecue aromas, to name a few. We know that there is something special here, something that rises above the state line and other boundary lines between us. Bob Berkebile, a friend and mentor, refers to it as the "*heart spirit*" that overcomes differences and connects us to something greater.

We believe that spirit, that heartbeat, echoes throughout this plan.

"Plogging" event, Summer 2018. Photo courtesy of MARC.

This work would not have been possible without the tireless efforts of hundreds of volunteers, committee members, elected leaders and organizational partners. It would take a good portion of the plan to recognize them all, but a few deserve specific mention:

• Ryan Glancy and the International Urban Cooperation initiative of the European Union are key partners, and their willingness to create a pilot program ensured we had the technical support and international experience to make this plan successful.

• The Climate Action Plan committee of Climate Action KC, led by Brian Alferman and Joan Leavens, worked for more than a year to shape the direction and solutions found herein. And we appreciate the committee's ongoing work.

• To all of our leaders who shifted course during the COVID-19 pandemic and moved our engagement efforts online, we appreciate your creativity and adaptation. It may not have been how we expected to receive feedback, but hundreds of community members were able to help prioritize the solutions in this plan. We appreciate your efforts as well.

And now, the real work begins. This is a starting point. It gives us a baseline from which to work, and will need amendment in future years. We recognize that those most vulnerable to a changing climate are those who are already the most vulnerable members of our community, and more focus will be necessary on this equity challenge. But, this plan is only as good as the ways in which it translates into action, and we want it to be a springboard to progress.

Therefore, we ask that once you read the goals and solutions in this plan, please do not let it immediately find the bookshelf. Use it. Take it to your elected officials, your business leadership, your pastor or rabbi. Find ways where the knowledge herein translates into betterment for yourself and your community. We hope it inspires you as it has inspired us.

This plan is dedicated to the memory of Dennis Murphey. Those who knew Dennis will remember his generosity of time and talents, and his love for Kansas City and its environment. We miss him, and will never forget how he inspired CAKC from the start.

With gratitude,

Mike Kelly Lindsey Constance

Mike Kelly and Lindsey Constance

Climate Action KC Steering Committee

CLIMATE ACTION KC

KC

Introduction

This Climate Action Plan is a product of stunning collaboration across the Kansas City metro area, representing the views of more than 1,000 community residents and stakeholders. It provides an ambitious voluntary framework to build sustainability, resilience and social equity — all within the context of everyone helping each other to achieve our shared goals and aspirations. And while imperfect, it provides a clear starting point to initiate a range of actions that will build resilience over time.

The plan is built upon the belief that we can create transformative change that, at once, improves health and the environment, creates jobs, strengthens neighborhoods, and increases opportunity and community wealth. The plan will reduce our carbon footprint. More importantly, the plan's ultimate success will result from the creativity inherent in collaborative, creative problem solving, leaving indelible handprints.

The plan serves 10 counties, 123 municipalities in two states, with a population of 2.14 million. In Kansas, these include Douglas, Johnson, Leavenworth, Miami and Wyandotte counties; in Missouri, the planning area includes Cass, Clay, Jackson, Platte and Ray counties.

A collaborative regional approach defines this plan, unlike many other municipally focused climate plans. The reasons for this are practical. Emissions arise from regional energy and transportation systems that cross political boundaries. Collaborative solutions embrace large-scale natural, economic, social and infrastructure systems, and collaborations across city, county and state boundaries have proven to create efficiencies and synergies that are not available to communities tackling the problem alone.

This document attempts to answer many questions that commonly arise in climate discussions. What is the nature of the problem? What climate impacts do we foresee for the Kansas City region? What solutions make the most sense for our community, and where should we start? How can we share the costs and benefits of both problems and solutions in a way that uplifts all communities? What can each of us do to contribute to the solution? How do we know if we have succeeded?

The plan establishes goals, strategies and priorities across nine sectors. Implementation of the strategies and recommendations will rest upon the intersection of collaborative regional solutions with locally appropriate action. This plan, then, creates opportunities to work together at every scale to make progress everywhere and as quickly as we can.

Planning Area

The planning area for the Climate Action Plan includes 10 counties: Douglas, Johnson, Leavenworth, Miami and Wyandotte counties in Kansas, and Cass, Clay, Jackson, Platte, and Ray counties in Missouri.

click thumbnail to view the full Climate Action Playbook

In December 2019, Climate Action KC and MARC published the Climate Action Playbook. The playbook translates the **Project Drawdown** pollution reduction strategies into actions and policies that can be taken by local governments. These strategies and actions are organized into six sectors: **Buildings and Cities**, **Electricity generation**, **Food**, **Land Use**, **Materials**, and **Transportation**. Many of these strategies can be found within this plan.

While the playbook represents a local government-focused menu of actions, the Climate Action Plan presents a broader set of strategies and actions that meet an ambitious 2050 net zero greenhouse gas reduction target within an integrated systems-based understanding. Drawdown strategies are also complemented by climate adaptation goals with a strong social equity focus.

In memory of our friend

Dennis Murphey

This plan is dedicated to the memory of Dennis Murphey, who most recently served as the chief environmental officer for the city of Kansas City, Missouri, for 13 years before his retirement in 2019.

Dennis was a friend, leader and trusted colleague who generously shared his wisdom and insight. He led by example for those who worked on this Climate Action Plan, successfully reducing municipal greenhouse gases in Kansas City, Missouri, by over 40% through his efforts.

Dennis left an indelible mark on the entire region and while we miss him dearly, we intend this dedication as a means to inspire and motivate the next generation of climate action champions as Dennis did for so many of us.

Vision Statement

In 2050, the Kansas City region is a resilient, equitable and inclusive community thriving amidst the impacts of a changing climate. Regions around the world look to us as a leader in governance, innovation and sustainability. Kindness and compassion guide a prosperous green economy and a healthy natural environment.

Guiding Principles

The following principles, drawing from an extensive community and stakeholder engagement process resulting in MARC's Climate Resilience Strategy (2015), guided the development of this plan and will guide our collective commitment to climate action throughout implementation.

- So much of what we need to do, we want to do. Climate Solutions build stronger, healthier and more vibrant communities.
- Resilience builds on previous investments, from trees to transit.
- Leadership comes from all of us.
- Resilience focuses on solutions that address mitigation and adaptation at the same time.
- Solutions must catch up to the scale of the problem, and there is much that we can do to make a big difference.
- Do no harm. Doing nothing is harmful. Doing a lot is possible.
- Resilience creates economic vitality and environmental health, with an unblinking social equity lens and a commitment to public health.
- Complex linkages among sectors and disciplines require an integrated, systems-based and collaborative approach.

CAKC Equity Statement

Climate Action KC believes the success of any climate action will only be achieved if there is equitable access to the benefits among the entire population of the metropolitan area without regard to race, gender, ethnicity, religion, nationality, sexual orientation, income, age, disability or any other classification. Impacts of climate change have put a spotlight on the widening inequities of people in cities across the nation, so any vision for a sustainable, long-term transformation toward a healthier region must include a proactive approach toward equity in all aspects.

Climate Action KC is committed to ensuring everyone in the region has fair and equitable access to opportunities and solutions. This commitment will be acted on in the following ways:

Climate Action KC will consider the legacy of historical injustices and biases, as this legacy provides a critical context for relating to, and elevating, affected populations. Without this context, and resulting efforts to rectify unjust systems, those systems may be perpetuated under a false impression of equitable access to opportunity.

Climate Action KC will work at the intersection of equity and climate to approach this work in a holistic manner. Potential future injustices will also be evaluated to prevent vulnerable communities from bearing disproportionate harm because of climate change. These communities must be equipped with intentional strategies, methods and resources to successfully implement climate action.

Climate Action KC will strive not only to include diverse perspectives in its membership, but create an environment of inclusion and belonging that removes barriers to sharing and hearing those perspectives in the pursuit of equity for all.

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Timeline

The Kansas City region has a long history of working to build economic, social and environmental sustainability through leadership, planning and action. One of this plan's principles is to build from success. A brief review of some of the regional sustainability initiatives provides an understanding of how proposed future endeavors may be informed by previous successes.

1991
- MetroGreen plan completed by Kansas State University and the Prairie Gateway Chapter of the American Society of Landscape Architects

1998
- Launched Creating Quality Places initiatives

2002
- The Smart Moves Regional Transit Plan adopted with updates in 2008 and 2017

2003
- Finalized updates to stormwater management engineering standards, planning guidelines and a model stream setback ordinance

2005
- Clean Air Action Plan completed with updates in 2011 and 2018
- First Natural Resource Inventory created, with update in 2013

2008
- Regional Forestry Policy Framework
- Sustainable Solid Waste Management Plan

2010
- Completed Transportation Outlook 2040, which includes adaptive sustainability, climate change and energy use strategies.

2011
- Launched Creating Sustainable Places

2014
- U.S. Department of Energy and the White House designate a Kansas City-area consortium as a Climate Action Champion

2016
- Adopted the Regional Climate Resilience Strategy

2018
- Green Infrastructure Framework adopted

2019
- "Urban Heat Island Mitigation Assessment and Policy Development for the Kansas City Region" completed by Lawrence Berkeley National Laboratory and MARC

Regional Climate Action Plan milestones

2018
- December – Climate Solutions Workshop held with over 130 elected leaders from 30+ municipalities

2019
- March – MARC Board of Directors votes to join Global Covenant of Mayors (GCOM)
- September – Climate Action Summit held with 750 participants and 40 speakers
- October – Launched Mid-America Climate Fundamental Academies in partnership with the Association of Climate Change Officers
- October – Held two-day technical workshop with GCOM in preparation for the Greenhouse Gas Inventory and Climate Risk & Vulnerability Assessment
- December – Published Climate Action Playbook and launched at public event

2020
- April – Regional Greenhouse Gas Inventory and the Climate Risk & Vulnerability Assessment completed
- April – Launched the first phase of community engagement process for the Climate Action Plan
- May – Presented findings from the Regional Greenhouse Gas Inventory and the Climate Risk & Vulnerability Assessment
- June-August – Convened six sector working groups to refine draft climate action strategies
- November – Launched the second phase of community engagement process

2021
- February – The MARC Board of Directors and Climate Action KC Executive Committee adopts the Regional Climate Action Plan

About Us

What is MARC?

The Mid-America Regional Council (MARC) is a nonprofit association of city and county governments and the metropolitan planning organization for the bistate Kansas City region.

Governed by a Board of Directors made up of local elected officials, MARC serves nine counties and 119 cities. MARC provides a forum for the region to work together to advance social, economic and environmental progress.

What is CAKC?

Climate Action KC is a nonprofit dedicated to bringing local leaders together to reduce emissions and improve the quality of life across the Kansas City region.

The coalition is made up of more than 100 local and state elected officials, and leaders from many significant civic, nonprofit, public and corporate organizations.

Climate Action Plan team

In December 2018, a group of over 130 local and state elected leaders, community leaders and stakeholders convened on a Saturday morning at a church to learn about Project Drawdown, local climate protection planning and lessons from a peer city on successful collaborations and planning for climate action.

Building on this energy, Climate Action KC was formed. Together, Climate Action KC and the Mid-America Regional Council (MARC) assembled an ambitious work plan, which included developing a playbook of climate strategies for local governments, state legislative platforms for Missouri and Kansas, and the completion of the first regional climate action plan.

In March 2019, the MARC Board of Directors voted to join the Global Covenant of Mayors (GCoM) on behalf of the cities and counties in the region. By joining as a region, the GCoM membership also provided MARC with an opportunity to apply for a new program to support regional climate action planning. MARC was accepted, along with the Chicago, Denver, Minneapolis and Washington, D.C., regions, to receive special technical assistance to guide the greenhouse gas inventory, climate risk and vulnerability assessment, and climate action plan.

MARC vision statement

Formed at the confluence of rivers, trails and trains on the border of two states, Greater Kansas City is a place of interconnection, where people of all backgrounds are welcome and where commerce and ideas flow as freely as the rivers and streams that run through and define it.

Our people thrive here in safe, walkable and well-maintained neighborhoods. We have abundant opportunities for education and work in fulfilling jobs at businesses that can compete with any in the world.

We enjoy, protect and preserve our region's natural beauty. We care for our neighbors and our communities. We lead by example. Our region has the strength to not only bounce back from adversity, but bounce forward, confidently, into the future.

Global Covenant of Mayors

The GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 10,000 cities and local governments from six continents and 138 counties.

GCoM is an initiative of the European Union's International Urban Cooperation program.

MARC's commitments as a member of GCoM include:

- Completion of a community-scale greenhouse gas (GHG) emissions inventory, following the recommended guidance.
- Completion of an assessment of climate risks and vulnerabilities.
- Adoption of ambitious, measurable and time-bound target(s) to reduce/avoid GHG emissions.
- Adoption of ambitious climate change adaptation vision and goals, based on quantified scientific evidence when possible, to increase local resilience to climate change.
- Adoption of ambitious and just goals to improve access to secure, sustainable and affordable energy.
- Adoption of a plan addressing climate change mitigation, low emission development, climate resilience and adaptation, and access to sustainable energy.
- Regular reporting through the CDP global carbon disclosure system (www.cdp.net/en).

Community Engagement

Community engagement and participation are powerful factors in the success of a climate action plan. Before planning began, a community engagement plan was developed in partnership with stakeholders, nonprofit organizations and community volunteers. The plan included strategies focused on providing information and education as well as ways for members of the community to take part in the process from beginning to end.

The rise of the COVID-19 pandemic forced necessary changes to many aspects of the engagement plan. For instance, workshops and in-person presentations and discussions in the community were transitioned to an online format. While an online-only format was challenging in many ways, there were also many benefits. The online format allowed staff to engage many more people. And it provided flexibility for members of the community to be able to participate on their own time.

Below is a snapshot of the primary ways people were engaged in this process.

Climate Action Summit

Sept. 14, 2019

The Climate Action KC coalition hosted its first Climate Action Summit at Johnson County Community College in Overland Park, Kansas. About 485 people attended the full-day event and 725 were on hand for the afternoon keynote session, which was open to the public. The summit focused on creating awareness of the impact of climate change in the region and the importance of addressing it through regional collaboration. The summit featured a presentation by Principal Emeritus of BNIM, Bob Berkebile; as well as remarks by U.S. Representatives Sharice Davids and Emanuel Cleaver II; a discussion with Kansas City, Missouri, Mayor Quinton Lucas; and a keynote address by environmentalist and author Paul Hawken.

GCOM Climate Leadership Project Workshop

Oct. 1-2, 2019

MARC hosted a two-day workshop for stakeholders to kick off the process to develop a regional Climate Action Plan, including a Greenhouse Gas (GHG) Inventory and Climate Risk and Vulnerability Assessment (CRVA). This workshop invited stakeholders from various sectors to learn and ask questions about the technical elements and requirements of the GHG Inventory and CRVA. Feedback from participants was also collected to inform elements of the CRVA, such as the hazard impact on sectors, assets and services.

Climate Action Playbook event

Dec. 17, 2019

Climate Action KC and MARC unveiled the new Climate Action Playbook at a public event where over 250 people attended. In addition to the unveiling of this playbook, the Climate Action Plan process was launched with an exercise using interactive polling. Participants were asked which actions in each section of the playbook (buildings and cities, food, land use, etc.) they would give the most priority. They were also asked what one climate resilience action they would fund if they had $5 million.

With so much interest in the planning process, participants were also asked to fill out a survey showing their interest and expertise within several identified sectors or areas of work. The intent was to begin building out networks within each of these areas to support the planning process and implementation of the final plan.

Climate action webinar

May 14, 2020

With the Greenhouse Gas Inventory and Climate Risk and Vulnerability Assessment completed, MARC and Climate Action KC, in partnership with the GCoM, held a webinar to share the findings from both efforts. Over 250 people attended the webinar and a video recording was made available on YouTube for those who could not attend. A second similar webinar was presented to members of the Greater Kansas City Chamber of Commerce.

Online community engagement

May 14 - July 15, 2020

A large community workshop was planned for late March but was canceled due to COVID-19 stay-at-home orders in Kansas City, Missouri. Continuing to conduct community engagement was critical and so workshop activities transitioned to an online format.

A multi-week engagement series using the mobile-friendly MindMixer platform was planned to allow more time and flexibility for interested individuals to interact with the platform.

Each week of the engagement focused on a different topic area:

- Week 1: Resilience
- Week 2: Transportation & Land Use
- Week 3: Food & Land
- Week 4: Built Environment
- Week 5: Energy & Industry
- Week 6 & 7: Priorities Week

Within each week, the online community of over 275 active participants was asked questions and given surveys and polls that would help generate new ideas for climate actions and indicate priorities.

There were 56 topics in total. The weeks were moderated by volunteer experts in each of the topic areas. Once the engagement concluded, all of the ideas and priorities were synthesized for review and discussion by a set of work groups focused around each topic area.

Working groups

August - September 2020

Sector work groups were formed and met several times to help refine and develop mitigation and adaptation goals and strategies for the plan. The work groups were also charged with helping to identify important linkages across sector areas—where a strategy in one sector also provides mitigation and/or adaptation benefits in another sector.

This exercise helped to further focus in on the strongest strategies to include in the plan. There were six work groups covering the areas of transportation and land use, public health, food systems and green infrastructure, energy and buildings, innovation and finance, and waste.

Community review sessions

November 2020

MARC held 11 one-hour online community discussions to hear feedback from community members on the goals and strategies in the action plan. The strategies, along with an explainer video, was posted online for the public to review.

Community members were invited to choose one of the discussion times that best worked with their schedules. Organizations or individuals interested in providing feedback were able to request special meetings as needed or send feedback via email to staff. The community sessions had over 70 participants.

Climate Conversations

Summer 2020

Climate Conversations was a series of 14 short video interviews that was produced and promoted during the first phase of community engagement, aligning with each weekly topic to provide education and generate interest.

Each interview hosted experts and community leaders who share about the work they are involved in and what their climate action priorities are.

All Climate Conversations interviews can be found at climateactionkc.com/conversations or by clicking the thumbnail below:

Engagement of vulnerable communities

There are many organizations in the region that took part in the engagement process that directly serve vulnerable communities. Their voices were extremely powerful in conversations about equity and climate justice and how the plan should reflect these tenets. MARC and the Climate Action KC Equity Committee held several meetings with additional organizations, and this work will be continued with a focus on supporting leadership-building in the communities that are most vulnerable to the impact of a changing climate.

Local government leadership engagement

Engaging local government leaders, including elected officials, city and county management, and staff, in discussions about climate resilience is critical to the implementation of the plan. While many local government leaders took part in all phases of engagement during the plan's development, targeted efforts were made to bring in as much local leadership into the conversation as possible.

A natural point of interaction lies in the myriad of MARC committees. Many presentations were made over the course of nearly two years to these committees, including the MARC Board of Directors, Air Quality Forum, Total Transportation Policy Committee, Sustainable Places Policy Committee, Regional Transit Coordinating Council, Planners' Roundtable, Managers' Roundtable and many more. In many cases, these committees posed questions about coordination on climate issues at the city and county level, and provided a sounding board for some of the boldest ideas in the plan.

Youth Committee

Climate Action KC formed a youth committee to provide a platform for young leaders to connect to regional climate action planning and explore ways to translate that action within a school setting. Youth from schools across the region took part in this committee and offered hopes and ideas for the plan. The committee worked through a process to prioritize actions that they would like to pursue as a group as well as ways to coordinate and connect schools across the region in these efforts.

Local Impact of Climate Change

Climate change: What is it?

Climate change describes a change in the average conditions—such as temperature and rainfall—in a region over a long period of time. Global climate change refers to the average long-term changes over the entire Earth. NASA scientists have observed that Earth's surface is warming and many of the warmest years on record have happened in the past 20 years.[1]

Climate change has both natural and anthropogenic causes. Anthropogenic causes—or climate change due to human activity—has a 95% probability of being responsible for much of the observed increase in Earth's temperatures over the past 50 years.[2] Industrial activities by humans are changing the "natural greenhouse" and causing the greenhouse effect. This happens when natural and man-made heat-trapping gases from industry accumulate in the atmosphere, allowing in the short wavelengths of the sun's light (solar radiation) and trapping the long wavelengths of heat that normally would radiate away from earth into space as infrared light.

There are five greenhouse gases: carbon dioxide (CO_2), water vapor, methane, nitrous oxide and fluorinated gases. Each of these gases has a different global warming potential based on their concentration and atmospheric lifetime. Fluorinated gases are emitted in small quantities but have the high global warming potential (GWP), making it extraordinarily potent. However, it is carbon dioxide that is the primary greenhouse gas—accounting for over 81% of all U.S. greenhouse gases from human activities.[3] For the ease of measuring greenhouse gases, the standard unit of measure is metric tons of CO_2 equivalent (or $MTCO_2e$). For any quantity and type of greenhouse gas, CO_2e signifies the amount of CO_2 which would have the equivalent global warming impact.

Sources of greenhouse gases

Greenhouse Gas (Emitted)	Anthropogenic Sources[3]
Carbon dioxide (CO2)	Fossil fuel combustion, land use conversion, cement production
Methane (CH4)	Fossil fuels, decay of organic waste in landfills, livestock and other agricultural practices
Nitrous oxide (N2O)	Fertilizer, industrial processes, and combustion of fuels
Fluorinated gases	Industrial processes

Global trends

Since 1880, the global annual temperature has increased at an average rate of 0.13°F per decade and over twice that rate (+0.32°F) since 1981. With an increasing rate of global annual temperature, it makes sense that the five warmest years in the 1880–2019 record have all occurred since 2015, while nine of the 10 warmest years have occurred since 2005.[4] The year 2016 has been the warmest year on record and 2020 was the second warmest year on record.

On the next page, you'll see temperature data from National Oceanic and Atmospheric Administration (NOAA) and National Climactic Data Center (NCDC) that support this.

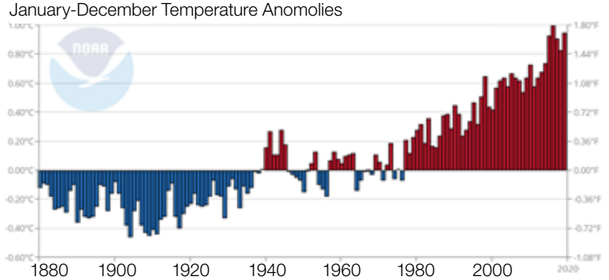
[1] https://climatekids.nasa.gov/climate-change-meaning/

[2] https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_summary-for-policymakers.pdf

[3] https://www.epa.gov/ghgemissions/overview-greenhouse-gases

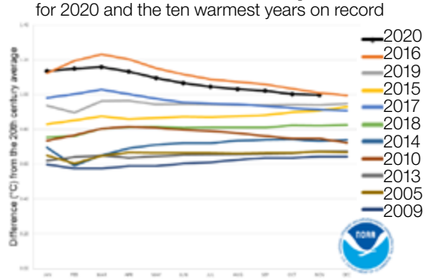
[4] https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature#:~:text=According%20to%20the%20NOAA%202019,more%20than%20twice%20as%20great

Global Land and Ocean
January-December Temperature Anomolies



Source: NOAA National Centers for Environmental information, Climate at a Glance: Global Time Series, published December 2020, retrieved on December 28, 2020 from https://www.ncdc.noaa.gov/cag/

Year-to-Date Global Temperatures
for 2020 and the ten warmest years on record

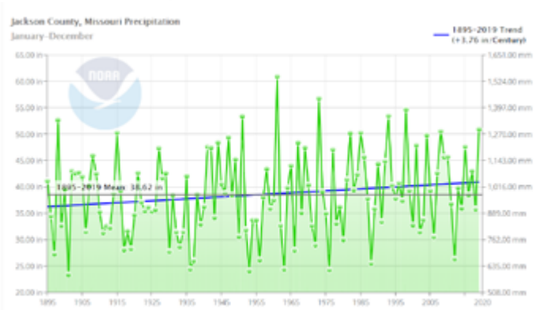


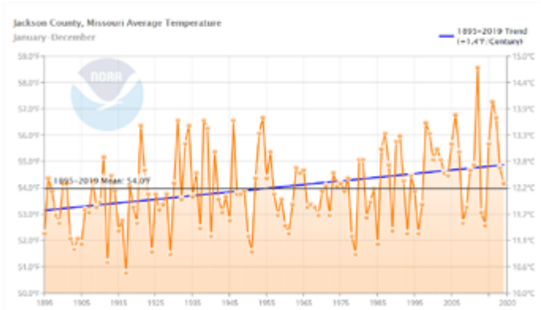
Source: NOAA National Centers for Environmental Information, State of the Climate: Global Climate Report for November 2020, published online December 2020, retrieved on Dec. 18, 2020

Local Trends

Local trend data derived from temperature and precipitation readings between 1895 and 2020 from the National Oceanic and Atmospheric Administration (NOAA) show an increase in both average annual temperature and total annual precipitation for all counties in the planning area.

Averaging these trends across the 10 counties in the planning area, annual average temperature has increased 1.25°F per century. Annual precipitation has increased 3.47 inches per century. The charts below show average annual temperature and total annual precipitation and the trendline from 1895-2020 for Jackson County, Missouri.



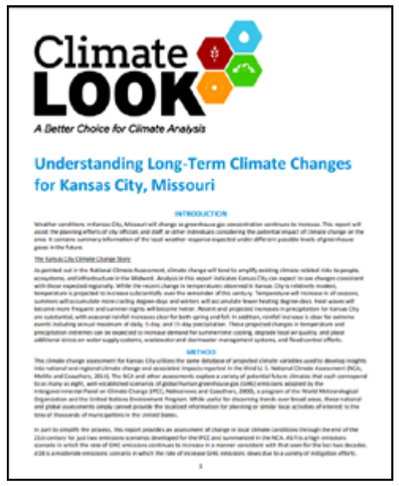


Source: NOAA National Centers for Environmental information, Climate at a Glance: County Time Series, published December 2020, retrieved on December 18, 2020 from https://www.ncdc.noaa.gov/cag/

Climate outlook for the region

The report "Understanding Long-Term Climate Changes for Kansas City, Missouri" (2016) quantifies potential changes in extreme weather in the region for 2060 and 2100 under two climate scenarios: one that projects the current trend with high greenhouse gas emission growth and a second that assumes more moderate emissions growth.

This climate change will tend to amplify existing climate-related risks to people, ecosystems and infrastructure in Kansas City and throughout the Midwest. Trends described in the report focus on expected changes in precipitation and temperature.


Climate LOOK
A Better Choice for Climate Analysis

Understanding Long-Term Climate Changes for Kansas City, Missouri

INTRODUCTION

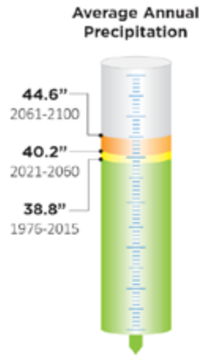
METHOD

Precipitation

Recent and projected increases in annual precipitation for the Kansas City area are substantial, with concentrated seasonal rainfall during extreme events for both spring and fall, while the length of consecutive dry days will increase substantially in summer months.

Extending current trends to 2100:

- Average annual precipitation will increase from 38.8 inches to 44.6 inches per year.
- Maximum one-day precipitation will increase from 3.4 to 4.0 inches, while 5-day and 15-day precipitation will increase from 5.5 to 7.0 inches and 7.5 to 10.4 inches, respectively.
- The number of days with more than 1.5 inches of precipitation will increase from 5.0 to 9.3.
- The maximum number of consecutive dry days will increase from 30.9 to 39.5 days/year

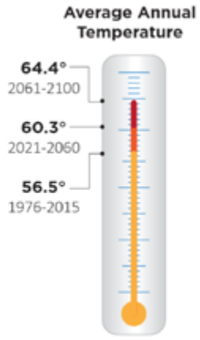


Temperature

While recent changes in temperatures observed in Kansas City have been relatively modest, temperature is projected to increase substantially in all seasons over the remainder of this century. Heat waves will become more frequent and summer overnight lows will become hotter.

If current trends continue, by 2100:

- The average annual temperature will increase from 56.5 degrees to 64.4 degrees Fahrenheit.
- The number of days/year in which the temperature exceeds 105 degrees Fahrenheit will increase from 0.7 to 21.9.
- The number of cooling degree days, a reflection of the demand for energy needed to cool a building, will nearly double. Conversely, energy demand for heating will decline by 27%.
- The last spring frost is projected to be more than two weeks earlier, whereas the first fall frost will occur about 11 days later.



Projected changes in temperature and precipitation extremes can be expected to increase demand for summertime cooling, degrade local air quality and place additional stress on water supply systems, wastewater and stormwater management systems, and flood control efforts. Near-term climate resilience efforts might be best focused on water systems than on heat adaptation because changes in rainfall are already present and expected to continue, while rising temperatures are an emergent change.

Another report, "Risky Business: The Economic Risks of Climate Change in the United States," suggests increased heat will lead to an increase of 5.3% in violent crime solely due to higher temperatures, decreased labor productivity of 2.3% and increased energy demand of 8% to 19%

Potential impacts of climate change in the region

Natural Systems	Infrastructure and Built Environment	Human Health
• Decreased air quality • Decreased water quality • More heat stress for crops and livestock • Wider spread of pests • Loss of tree canopy • Declining biodiversity and ecosystems	• Increased severe weather damages to buildings and infrastructure • Impaired performance and longevity of buildings and infrastructure • Intensified urban heat island effect • Increased pressure on urban drainage systems • Increased heating and air conditioning load • Disrupted transportation and communication networks	• Increased asthma and other respiratory diseases due to pollution • Increased respiratory allergies • Increase heat-related illness or deaths • Increase injuries and fatalities due to severe weather • Increased water-, air- and vector-borne diseases • Malnutrition • Decreased work capacity • Increased conflict and crime • Mental health and stress-related illnesses • Reduced physical activity

Firestation Rooftop Solar Panels
Photo Courtesy of Westside Housing Organization.

Climate Change, Equity and Justice

Climate change is an equity issue. Increasing temperatures and precipitation in the Kansas City metropolitan area pose a threat to all residents and infrastructure. However, these climate impacts can perpetuate and even aggregate existing social inequity, causing disadvantaged groups to suffer disproportionately more from climate impacts and exacerbating future inequality[1]. Reconciling these challenges brings climate change into the realm of climate justice, where ethical and political issues are considered alongside environmental concerns in the conversation around climate adaptation and resiliency.

Social inequity is complex and context specific. Variation persists across economic and demographic characteristics, including race, gender, ethnicity, religion, age, income, and access to political power and public resources. These inequities often also overlap with regional or spatial inequity within and across borders. Some inequity exists because of discriminatory policies and practices that have advantaged some communities while neglecting or disadvantaging others. A clear example of this is redlining—the discriminatory practice of rating neighborhoods based on their racial character and environmental conditions popularized by the Home Owners Loan Corporation (HOLC) in the 1930s.

This practice encouraged investment and development of some communities while denying others access to wealth-generation strategies like homeownership. Over time, discriminatory practices like redlining changed the landscape of communities across America, giving some communities access to the means to create intergenerational wealth, while others were left to deal with the direct and indirect consequences of intergenerational poverty. This history of discrimination and inequity is made worse by the fact that wealthy individuals and countries are disproportionately responsible for the GHG emissions that are now driving changes in average temperature and rainfall.

Like inequity, climate vulnerability and risk are unevenly distributed across the population, both within countries and across borders. In general, economically disadvantaged and socially marginalized populations are both more vulnerable to climate impacts and at higher risk of suffering negative impacts to their health and financial sustainability. There are three primary mechanisms for the persisting inequity in climate impacts[1]:

1. Disadvantaged groups are more likely to be exposed to the adverse impacts of climate change.
2. Disadvantaged groups are more susceptible to damage caused by climate change.
3. Disadvantaged groups are less able to cope with and recover from damage caused by climate disaster.

The primary determinant of exposure is location, especially proximity to high-risk areas. For disadvantaged communities who live or work in flood plains, arid regions or communities without adequate tree cover, their risk of climate-related disaster is much higher than communities situated on higher ground or those shaded by trees and other cooling assets. Disadvantaged communities are often situated in these high-risk areas because they lack the resources to move to safer areas or because they have been systematically shut out of safer areas, as was the case with redlining. This situation holds in both rural and urban settings.

Even for communities with similar levels of exposure, access to resources and political power gives advantaged communities the opportunity to rapidly

[1] https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf

adapt and become more resilient. For example, higher-quality housing stock or access to heating and cooling can alleviate the worst climate-related impacts for those with the means to acquire them. Those without the means are often left to weather the worst climate impacts.

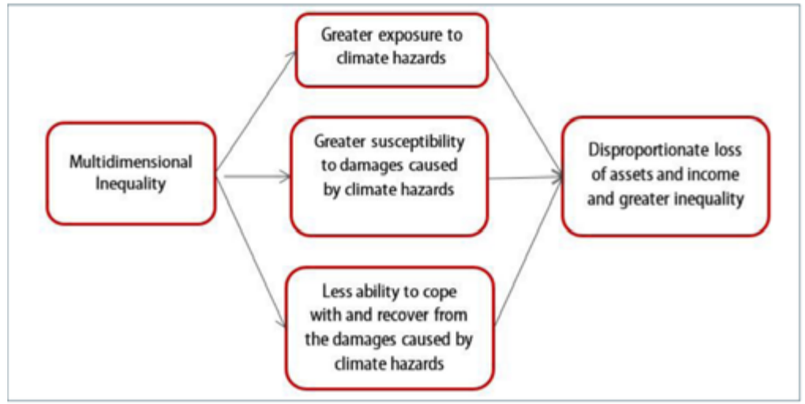
Finally, economically disadvantaged and socially marginalized communities often have less access to private, community and public resources for mitigation, response and adaptation efforts. As a result, recovery is often slow or comes at the expense of future adaptive and growth capacity[1].

These mechanisms work independently and collectively to create negative feedback loops and regressive cycles, where disadvantaged communities are more heavily impacted by climate change than wealthy communities, who often have the resources and political power to recover faster. For example, increasing precipitation, especially during high-intensity rainfall events, is expected to contribute to increased flooding in the Kansas City metropolitan area.

Disadvantaged groups located in low-lying areas will be more exposed to overland and riverine flows and will bear the brunt of the damage caused by flooding. Lower-quality housing stock may result in more damage and fewer available resources will result in a disproportionate loss of physical, human and social assets. For this reason, disrupting the regressive cycles and negative feedback loops between climate change and inequity is a necessary part of climate planning and resiliency efforts.

Climate change and the persisting challenges around social and economic inequity give us an opportunity to build back better, especially because natural disasters and emergency situations often create opportunities to try strategies that may not gain traction under normal circumstances[1]. As a result, a concerted effort is necessary to both reduce social inequity and address climate impacts. This plan aims to do just that, by recommending policy and creating more resilient systems to increase the quality of life for all Kansas City metropolitan residents.

Three effects of inequality on disadvantaged groups



Source: Islam, Nazul S. and Winkel, John. (2017) Climate Change and Social In Equality, United Nations Department of Economic and Social Affairs

[1] https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf

GHG Emissions Inventory

Regional GHG Inventory: Stationary energy, solid waste and transportation sectors

This Greenhouse Gas (GHG) Inventory represents the best estimate of regional CO2e emissions for the 10-county planning area. It includes emission estimates associated with stationary energy generation, solid waste and surface transportation.

Stationary Energy	Transportation	Waste
Natural Gas and Steam • Spire Energy Kansas Gas Service (ONE Gas) • Atmos Energy • Veolia **Electricity** • KCP&L • IP&L • Westar Energy • KCBPU • City of Gardner Through cooperation with regional energy providers, we have gained a good cross-sectional understanding of the sources contributing to the total emissions generated. Future work will entail acquiring more detailed annual data associated with closer alignment to our specific geographic area.	**Passenger vehicles, freight trucks and public transit modeled in the MARC Regional Transportation Model** Emissions from the transportation sector are limited to on-road contributions. Railroads, off-road/construction and non-vehicular airport-based emissions have not been assessed for this inventory. Waterway port emissions are also typically included within a greenhouse gas inventory. However, the water port, being re-established in the Kansas City area, received its first barge traffic in August 2015. Therefore, while the emissions associated with the port do not contribute a prominent source of GHG for the baseline inventory, this element of the transportation sector will require monitoring as traffic is quickly expanding.	**Waste disposal tons sent to in- and out-of-region landfills** Our understanding of solid waste emissions within the greater Kansas City region has been well documented for more than 10 years. Estimates for the GHG contributions related to this sector have been evaluated to account for solid waste produced locally and outside the region and disposed within the study area, and the solid waste exported from our region and disposed elsewhere.

Greenhouse gas emissions and data sources by sector

Stationary Energy:

Information about energy use, fuel mix and population served was provided by the two natural gas and the major electric utilities serving the region as well as several electric co-ops and municipal units contracting directly with larger, multi-state regional power pools.

With this rich dataset, we were able to address minor issues with geographic data gaps and slight differences in reporting dates. Residential data was separated from institutional, commercial and industrial data, but the remaining data was combined and included energy associated with both building facilities and any manufacturing processes.

Future efforts will be made to separate the non-residential cluster and isolate the energy used for manufacturing processes. As we clarify how this energy is used, more effective policies and modifications of existing processes can be identified and implemented.

Transportation:

Baseline data were estimated using the EMME transportation model with associated land use and street grid patterns for the 2015 baseline year, and the EPA MOVES 2014b modeling program was then used to determine subsequent 2015 baseline emissions. MOVES defaults were used for fuel characteristics (regional), meteorological conditions (regional), vehicle age profile (national), number of vehicles by type (bi-state regional estimate), average speed distribution (national) and vehicle age (national).

Outputs from EMME were used to define the road type distributions, and ramp fractions compared with the tri-annual 2014 EPA emissions inventory and EPA generated run specs for Kansas counties in the MARC region. The estimates we produced compared favorably with a variance of between -3.8% and 1.8%.

As an element of the 2050 long-range transportation plan, future transportation demands were modeled based upon a range of expected land use patterns, investment policies and regional infrastructure priorities. We then ran the MOVES model using those future demand estimations and the supplied 2050 default estimates for transportation sector GHG emissions.

Waste:

Regional landfills are required to regularly report information to the states on the volume of solid waste processed and the composition of the mixture of materials, as well as the location of its final disposition.

Traditionally, this detailed information has been used to monitor usage and determine estimated lifespan of facilities to plan for future regional needs. However, these data also provide a high-quality picture of the greenhouse gases generated by the sector.

While greenhouse gas monitoring was not part of the reporting structure in 2005, beginning in 2010 there was increased focus on data collection and, by 2012, facility reporting had become much more comprehensive.

Emissions by sector 2005-2015: Baseline estimate and benchmark

For clarity and confidence, we used 2015 as our benchmark year and backcasted to 2005 based on population change. This resulted in a very conservative estimate of our decrease in emissions since 2005 because the GHG emissions per capita in 2005 were undoubtedly higher than in 2015. Nonetheless, we took this approach because prior to 2010 the available data on GHG emissions are fragmented and imprecise.

Stationary energy:

Producers and distributors of both electricity and gas have been consolidated, split and rearranged multiple times in the decade between 2005-2015. This has deeply fragmented available data. In addition, data collection specific to greenhouse gas was less rigorous in QA/QC and the data were not sufficiently granular to allow data to be filtered for our region. However, by 2015, the energy providers' organizational structure had become more stable and data were being carefully reviewed and tracked.

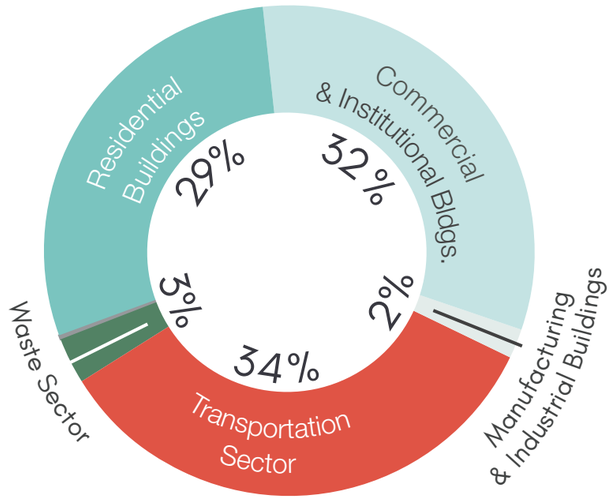
Transportation:

Prior to 2010, EPA used the MOBILE6 emissions model. It did not calculate greenhouse gases directly but provided a fuel economy number which could then be used to estimate GHG by vehicle type (EPA 420-F-05-004). This rough estimate could then be used with travel model outputs to provide a value for GHG emissions.

The first MOVES model came out of the EPA in 2010 and its update to 2010b in 2012 provided the first integrated GHG emissions modeling. Released in 2014, MOVES2014 provided an improved platform and updated default variables reflecting the latest engine standards. The estimates currently used in this plan were generated using MOVES2014. The latest EPA model, MOVES3, was released in November 2020 and will be used in future updates.

Solid waste:

Regional landfills were able to react fairly quickly to produce GHG estimates because facilities were smaller in size and scope, and they already collected data needed for calculation inputs. However, robust calculating and tracking of GHG emissions really began in earnest following the 2009 endangerment finding for greenhouse gases.



Greenhouse Gas Inventory results 2015

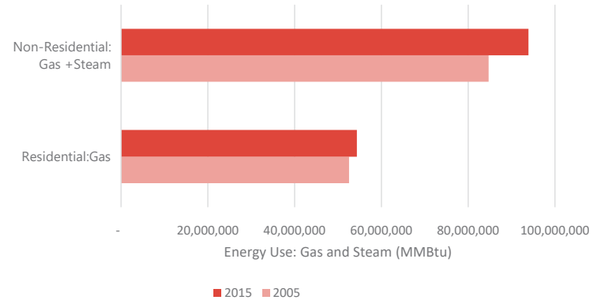
Stationary energy:

GHG emissions associated with stationary energy use are estimated to be 18,862,000 tons of carbon dioxide equivalent (CO_2e) per year, representing nearly two-thirds of the regional GHG contribution. Driven by the fuel mix used to provide this power and regional energy demand, successful reduction in these emissions will require a combination of both ongoing investment in renewable/sustainable energy and improvements in building energy efficiency.

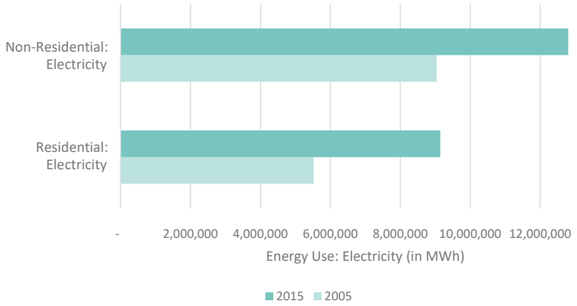
Direct combustion of coal for district heating only results in about 249,000 T-CO2e/yr and natural gas emits 4,638,000 T-CO2e/yr of GHG. In these dedicated utilities, fuel switching opportunities are limited. However, grid-based electrical power use accounts for most of the energy provided to the region with an equally large level of 13,348,000 tons CO2e/yr in emissions. Between 2005 and 2015, Evergy, the regional electric utility, has heavily invested in renewable power. Successful reduction in regional GHG will rely heavily on implementation of their Sustainable Transformation Plan. In addition, during this 10-year period, all utilities have undertaken infrastructure maintenance and replacement programs to minimize leakage and transmission losses associated with distribution of power and natural gas.

When considering the demand for energy, it becomes more useful to review the stationary energy emissions by end-user sectors. Review of the inventory shows that emissions related to commercial and institutional facilities are estimated to be 9,665,000 metric tons CO2e/yr, slightly higher than the 8,723,000 metric tons CO2e/yr for residential buildings. Emissions resulting from manufacturing and construction processes are difficult to currently ascertain with accuracy because reporting from electricity utilities combines this power use with the overall facilities and environmental controls. However, partial quantification of the emissions derived from natural gas supporting these activities indicates an initial level of about 464,000 metric tons CO2e/year. Adoption of 2012 energy codes for new building construction, promotion of Energy Star appliances, use of more efficient lighting technology and weatherization programs supported between 2010 and 2015 all contributed to a reduction in GHG emissions between 2005 and 2015. However, significant opportunities continue to exist for energy efficiency particularly with improvement of the building envelope (insulation, windows and excess leaks/ventilation). Improvement of residential structures offers a higher greater benefit than commercial structures, but they are widely understood to be more difficult to achieve. Similarly, bringing existing out-of-date structures up to code provides a greater relative reduction than an incremental improvement associated with implementing a tighter energy standard on new construction. Updating or retrofitting existing building stock is often much more challenging due to policy constraints, community support, funding and enforcement.

Gas and Steam Consumption



Electricity Consumption



Transportation:

On-road transportation produced just over one-third of the region's GHG emissions at 10,159,000 metric tons CO2e/yr. National fuel efficiency standards for passenger vehicles and heavy-duty trucks improved dramatically between 2005 and 2015 with advancement improvements accelerating after 2007. Continued reduction in transportation emissions will require both improvement in vehicle technology, fuel switching, sustainable land use and behavior change.

In the near- to mid-term, research and innovation into battery capacity, advanced engine design and other fuel efficiency refinements represent a critical part of reducing transportation emissions. However, fuel efficiency efforts will wane over time and switching to clean, renewable fuel will become much more important. Committing to low-carbon urban design, public transit investment, carpooling and shifting away from motorized transportation represent a small but resilient strategy for decreasing emissions. By 2050, design and changing transportation behavior could account for over 25% of ongoing emissions reduction.

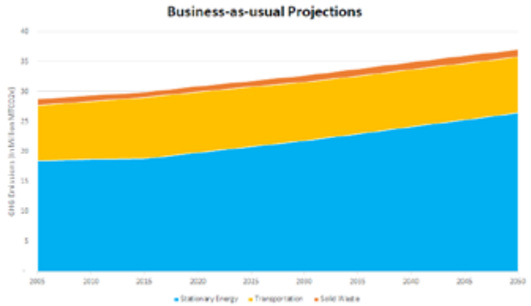
Waste:

GHG emissions due to solid waste disposal in 2015 are estimated at 886,000 metric tons CO2e/yr. In 2008, the regional solid waste district embraced a goal to achieve 80% waste diversion by 2023 using stepwise goals of 40%, 60% and 80% with a stretch goal of zero-waste by 2028. While ambitious, the region has taken strong, positive strides in this direction between 2008 and 2015. Continued efforts to divert paper and plastic, and expansion of composting collection are being made in concert with development of innovative businesses, which utilize recycled products and compost as feedstock.

Business-as-Usual Projections

A Business-as-Usual (BAU) projection uses locally specific parameters like population growth or gross domestic product (GDP) growth projections to model future emissions in the planning area. A BAU projection allows us to see what will happen to GHG emissions in the region if we do not act.

Based on this projection, GHG emissions are estimated to increase by 28% from the 2005 base year to 37 million MTCO2e by 2050 if no actions are taken. These projections are based on current population and transportation emissions forecasts for the MARC region.



Target emissions reduction

Meeting a "net zero by 2050" target means that the region will need to reduce this projected 42 million MTCO2e through reduced emissions and the drawing down of greenhouse gases already in the atmosphere through sequestration technology.

Climate Risk & Vulnerability Assessment

In addition to completing a greenhouse gas inventory, an assessment of climate risks and vulnerabilities is completed. The purpose of the Climate Risk and Vulnerability Assessment (CRVA) is to develop an understanding of the current and future climate risks facing the region to inform the inclusion of adaptation goals and actions in the Regional Climate Action Plan. The CRVA also helps to the stage for future community discussions as the goals and actions in the plan are refined and implemented.

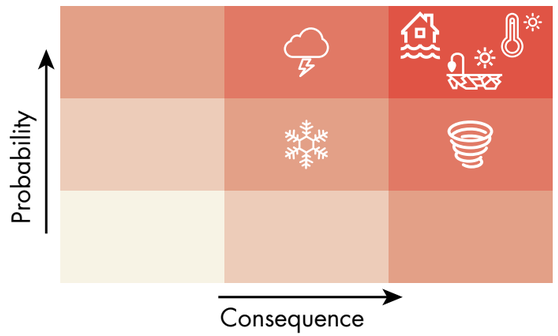
This CRVA represents a high-level regional-scale assessment of risks and vulnerabilities. It is recommended in this plan that local governments conduct more detailed assessments for their own jurisdictions.

Hazards

Understanding the natural hazards that pose the greatest risks to the Kansas City region is critical to discussions about vulnerability and how plans support the region's ability to adapt and stay resilient in the face of these hazards. In 2019, MARC began updating its Hazard Mitigation Plan for the Missouri counties in our region. **The Hazard Mitigation Plan** (2020) identifies those hazards that pose the greatest risk to our region: flooding, extreme heat (>105°F), drought, severe thunderstorms, severe winter weather, and tornadoes. The plan also includes information on the experience of the community with these hazards, local government capabilities to address or reduce the risks, and goals and actions local jurisdictions are willing to take over the next 5 years. Two additional hazard mitigation plans are available for the Kansas counties in the planning area: **Douglas County Hazard Mitigation Plan** and the **Kansas Homeland Security Region L Hazard Mitigation Plan**.

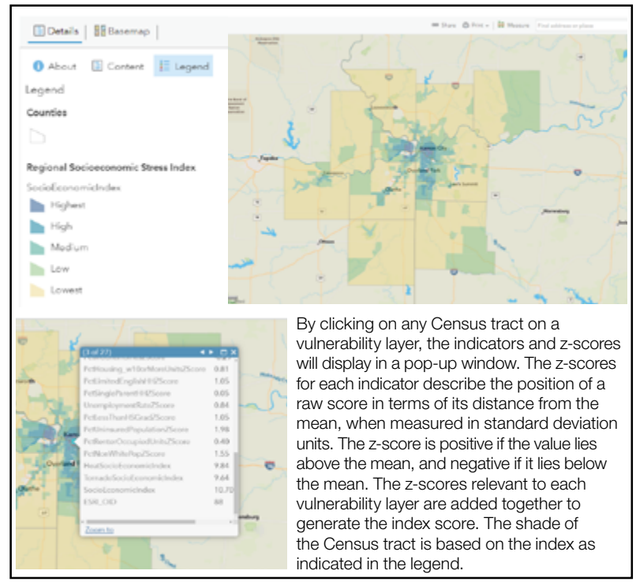
Risk matrix

The risk level assigned to each hazard informs the prioritization of the most at-risk assets, systems, and groups. Risk is determined based on the probability and consequence of a particular hazard. For each hazard, a number is assigned to both probability and consequence and multiplied to assess the risk level. The following risk matrix summarizes the risk level for each hazard and how they compare to one another. Based on this methodology and information from the 2020 Hazard Mitigation Plan, the hazards with the highest level of risk for the region are flooding, heat, and drought, with flooding considered the greater risk as the region is already experiencing increased flooding events and associated damage. Severe thunderstorms, tornadoes, and winter weather have slightly lower risk levels but still are considered significant. For the purposes of the Climate Action Plan, more focus is given to adaptation strategies for flooding, heat, and drought.



Vulnerability assessment

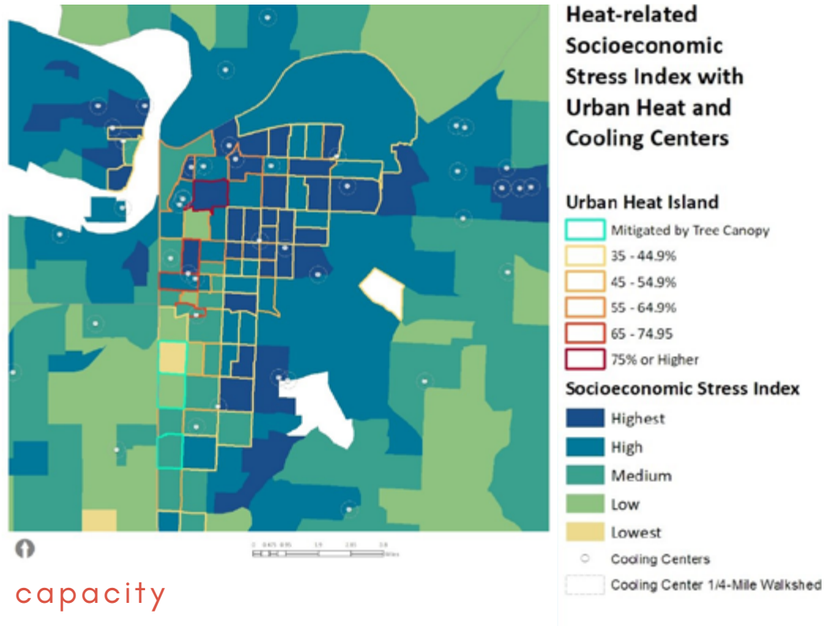
This assessment helps answer questions about where our most vulnerable communities exist in the region and the magnitude of social vulnerability, in general. The findings help inform planning, equity-focused engagement and relationship building, and where climate initiatives must be prioritized and targeted. In this assessment, several indicators are used to help pinpoint geographies of overlapping vulnerabilities related to climate change. The vulnerability maps are based on indicators specific to the priority hazards. More information about these chosen indicators can be found in the CRVA in the appendix. These maps explore social vulnerability, and vulnerability related to flooding, heat and urban heat island, and tornadoes.



By clicking on any Census tract on a vulnerability layer, the indicators and z-scores will display in a pop-up window. The z-scores for each indicator describe the position of a raw score in terms of its distance from the mean, when measured in standard deviation units. The z-score is positive if the value lies above the mean, and negative if it lies below the mean. The z-scores relevant to each vulnerability layer are added together to generate the index score. The shade of the Census tract is based on the index as indicated in the legend.

Interactive map tool

An interactive map, including the vulnerability and neighborhoods layers, was created to support local government climate resilience initiatives and can be found **here**.



Adaptive capacity

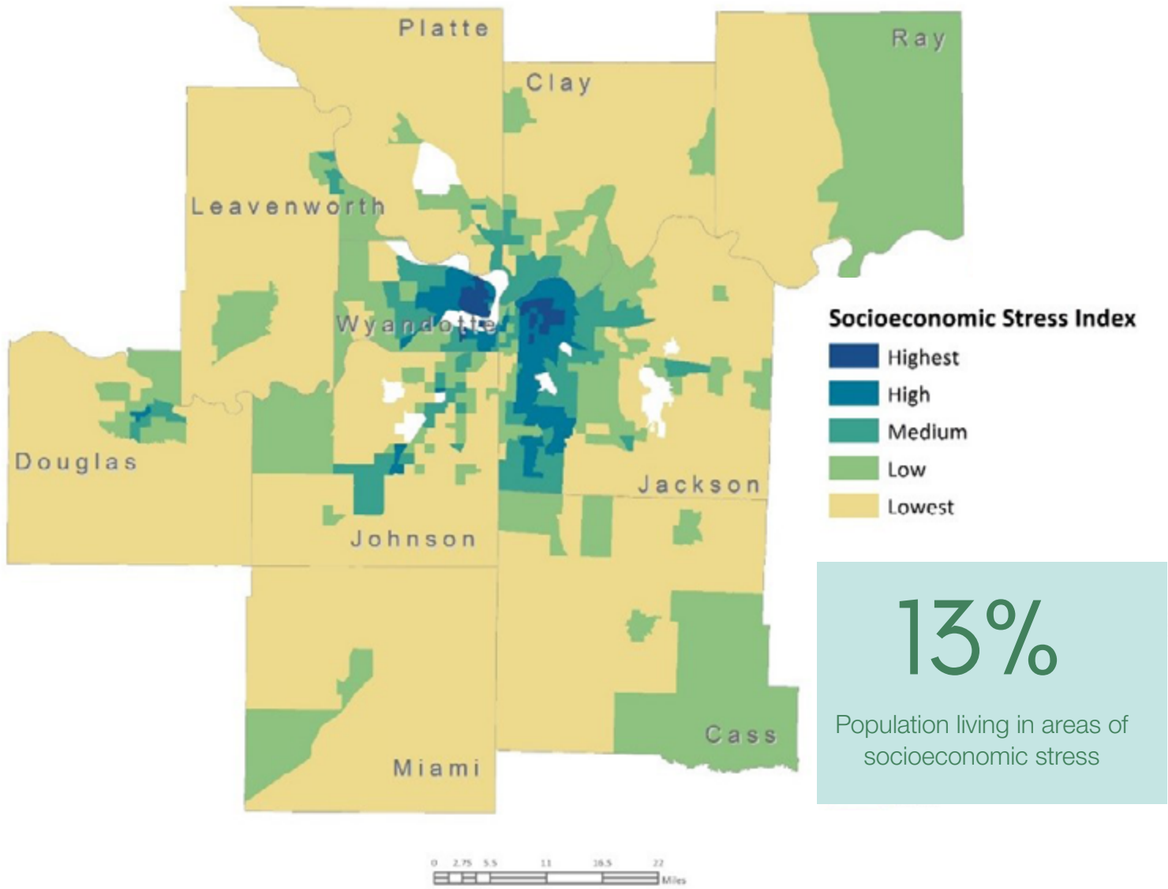
A high-level adaptive capacity assessment was conducted to identify certain factors that may pose as challenges to adaptation. The different factors are divided into six categories: built environment, economy, environment, government capacity, inequity and public health. The assessment of the factors within each category was informed in part by community feedback, as well as qualitative research.

The factors with the highest degree of challenge included infrastructure condition and maintenance, housing, land use and development, access to education, budgetary capacity and poverty/income. There are many factors that are ranked "moderate" in terms of degree of challenge in this assessment that may warrant further research.

Regional socioeconomic stress

Areas of socioeconomic stress were determined by factoring five vulnerability indicators into an index: non-white population, population below 200% of poverty, population under age 5, population over age 65, and renter-occupied housing. While there are many indicators of socioeconomic stress, this set of indicators is commonly used in vulnerability assessments and provides a solid foundation for understanding socioeconomic stress at a regional level. Local governments may want to add additional indicators based on local context.

Within the planning area, 13% of the total population lives within census tracts that are considered "highest" or "high" in terms of socioeconomic stress. These census tracts are primarily located in the urban cores of Kansas City, Kansas, and Kansas City, Missouri. However, there are portions of Shawnee, Kansas, and Lenexa, Kansas, along the I-35 corridor and Olathe, Kansas, and Lawrence, Kansas, that have socioeconomically stressed areas, as well.

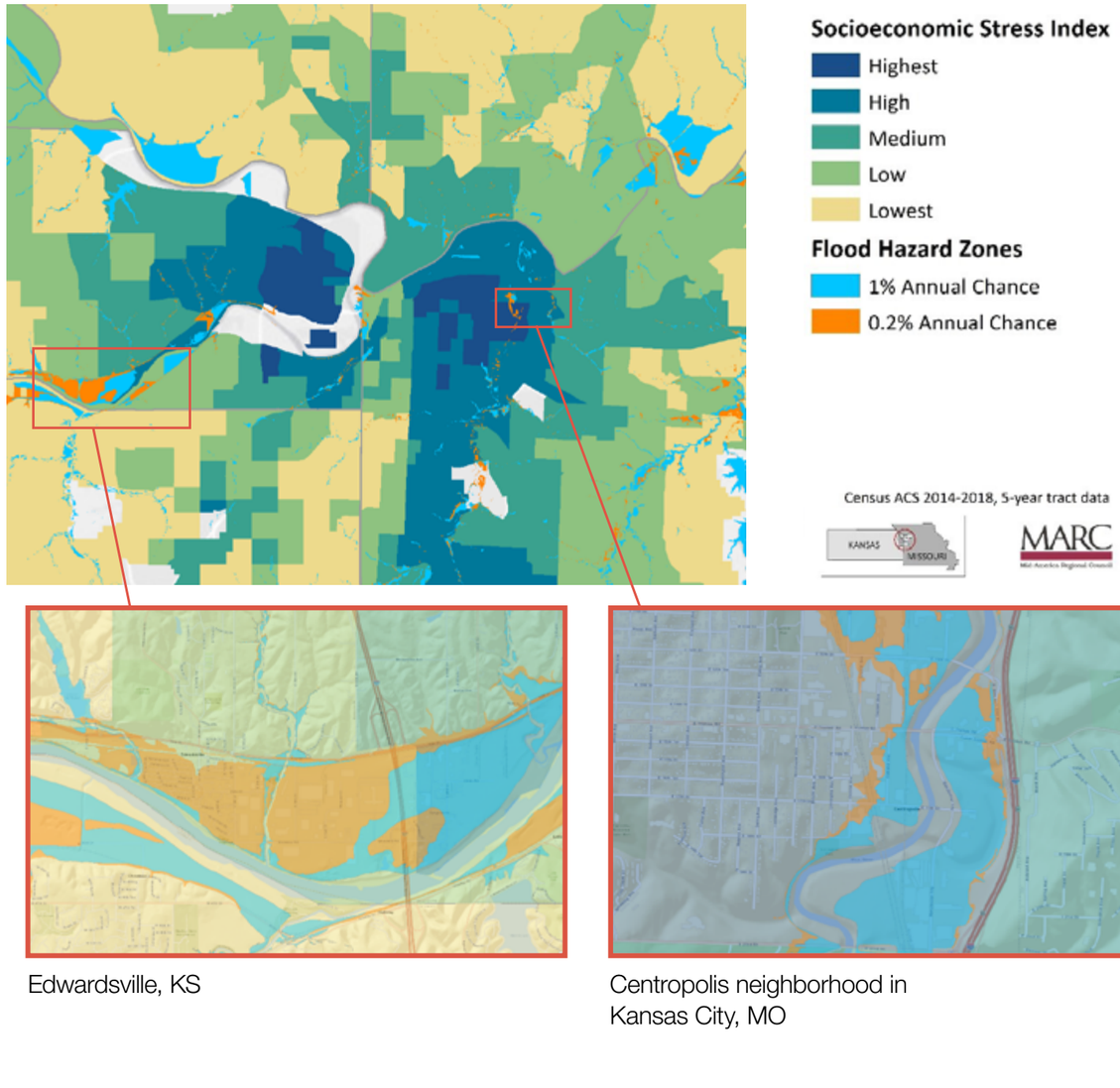


13%

Population living in areas of socioeconomic stress

Flooding and socioeconomic stress

Comparing the 100- and 500-year floodplains to areas of high socioeconomic stress can highlight flood vulnerabilities and significant needs for intervention. There are few areas where socio-economically stressed areas intersect floodplains. However, these areas still warrant further exploration. In the snapshots below, the Centropolis neighborhood in Kansas City, Missouri, which is highly socioeconomically stressed, shows the 500-year floodplain (orange area) encroaching on residential housing. In the snapshot showing the City of Edwardsville, Kansas, while considered low for socioeconomic stress, has significant vulnerabilities to 100- and 500-year flooding.



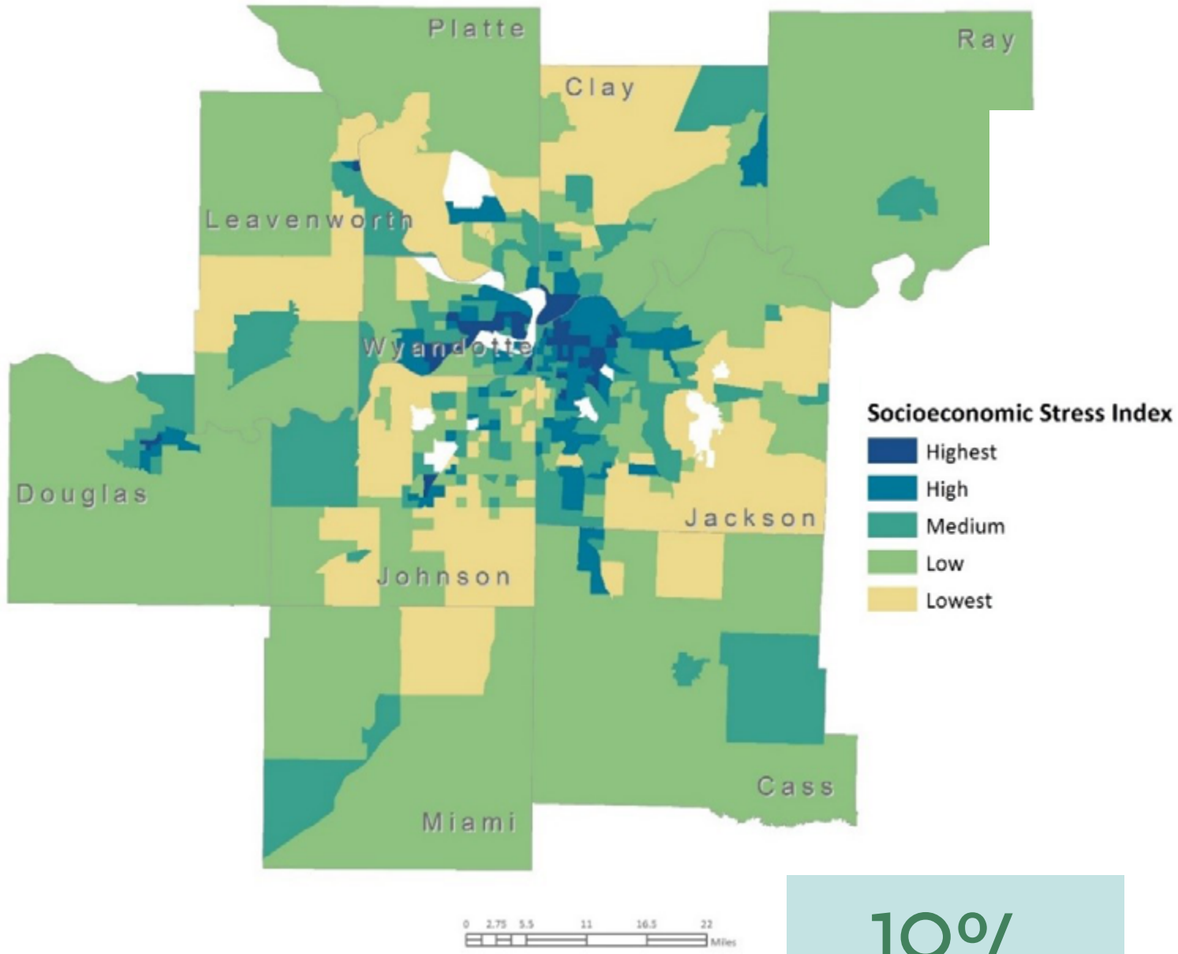
Edwardsville, KS

Centropolis neighborhood in Kansas City, MO

Tornado-related socioeconomic stress

Tornado vulnerability indicators focus on accessibility, housing density and protection, language and socio-demographics. Due to the distribution of multi-family housing, disabilities and older adults, tornado vulnerability is more widespread throughout the region.

However, visually, it is apparent that tornado vulnerability is concentrated in the urban cores of Kansas City, Kansas, and Kansas City, Missouri. About 19% of the population lives in census tracts that are considered “highest” or “high” socio-economically stressed.



19%

Population living in areas of tornado vulnerability

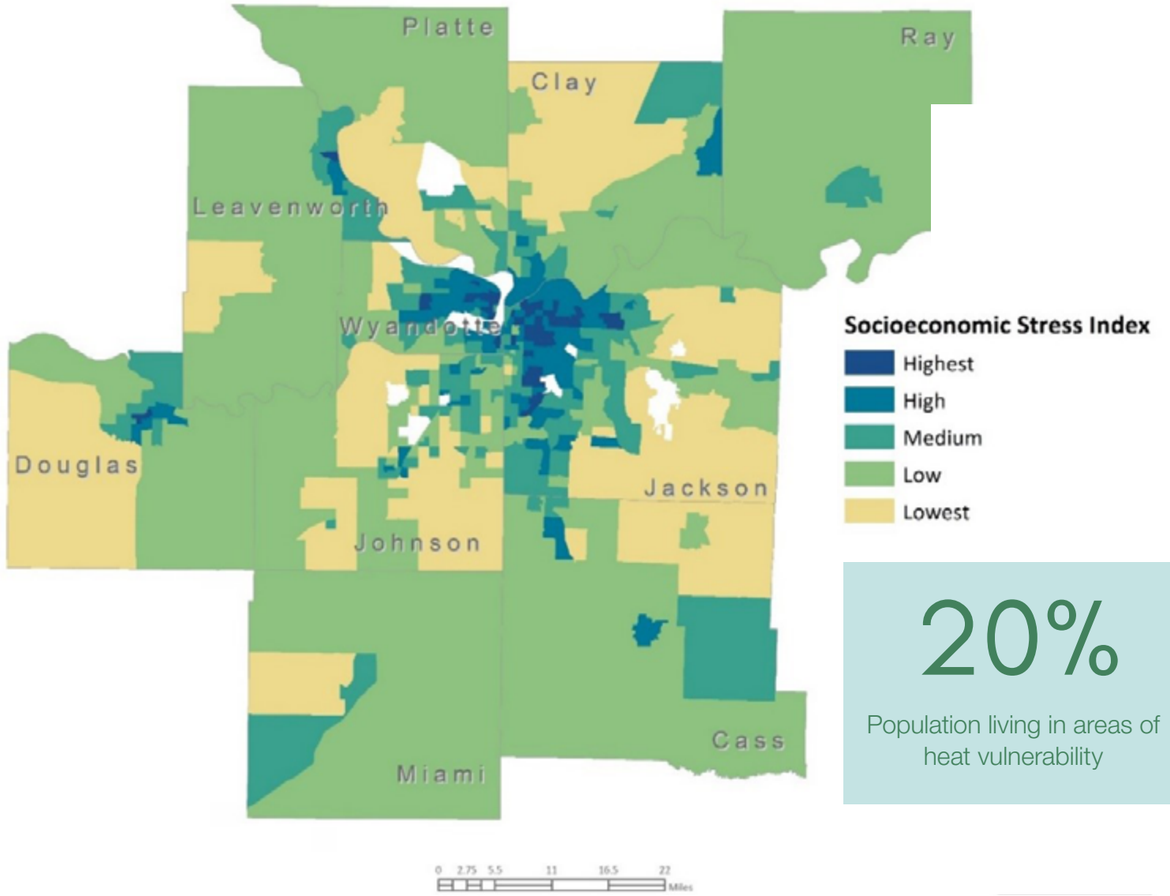
Heat-related socioeconomic stress

Heat vulnerability is concentrated in older, developed areas of the region where poverty tends to be highest—namely the urban cores of Kansas City, Kansas, and Kansas City, Missouri. Every county within the planning area has a least one census tract that is rated “medium” or higher for heat vulnerability. The percentage of the population living in highly vulnerable areas (highest and high) is approximately 20%.

In addition to spatially identifying heat-vulnerable areas, it is important to look at areas that may experience the added vulnerability of urban heat island effects. Urban heat islands have a tendency for higher air temperatures persisting in urban areas as a result of impervious, heat-absorbing infrastructure (e.g. buildings and asphalt) and less tree canopy coverage, tending to make cities warmer than the surrounding countryside.

In addition to heat-related socioeconomic stress, the second map identifies census tracts that have landcover that is 35% or more impervious surfacing plus mitigating tree canopy coverage (40% or greater in tree landcover).

Vulnerability to urban heat is only highlighted in Kansas City, Kansas, and Kansas City, Missouri. The areas of both highest heat-related socioeconomic stress and urban heat vulnerability exist on the Main Street corridor in Kansas City, Missouri. While the Main Street corridor does not intersect with areas of high socioeconomic vulnerability, the corridor is the economic center of the region and used for recreation, shopping, medical services, transit connections and more.



20%

Population living in areas of heat vulnerability

Summary of findings and recommendations

Key findings:

- Flooding and extreme heat will pose the greatest risks to the Kansas City region in the near term.
- Urban heat island impacts are concentrated in the downtown/urban core of Kansas City, Missouri. Urban heat could significantly impact the health of individuals who have higher exposure to heat and households in low-income communities, especially where substandard housing is prevalent and tree canopy is minimal.
- Race and poverty are dominant indicators of socioeconomic stress and overall climate vulnerability. Racial and economically concentrated areas of poverty are prevalent in the urban core of the region.
- Our regional adaptive capacity will rely on large-scale, system-wide transformation that positively impacts the built environment, access to opportunities and quality of life.

Adaptation Priorities:

1. Focus on adaptation efforts in areas that support greater resilience for vulnerable communities.
2. Address contributing factors to the urban heat island effect and expand comfort resources for residents, such as cooling centers, shade structures, trees and native vegetation.
3. Encourage localized assessments of 500-year flood risks and identify mitigation strategies as required.

Recommendations for next steps:

1. Map critical assets (transportation systems, electric grid, hospitals, etc.) across the region in relation to areas where hazards may pose the greatest risk.
2. Refine vulnerability indicators by integrating regional health data and resource accessibility (e.g. proximity to cooling centers, food, health care, etc.).
3. Communicate about risks and preparedness needs to support resilience.
4. Integrate climate action into emergency preparedness.
5. Encourage local jurisdictions to evaluate climate risks, critical infrastructure and localized socio-economical vulnerability within a local context.
6. Update the CRVA by 2024.

GHG Target

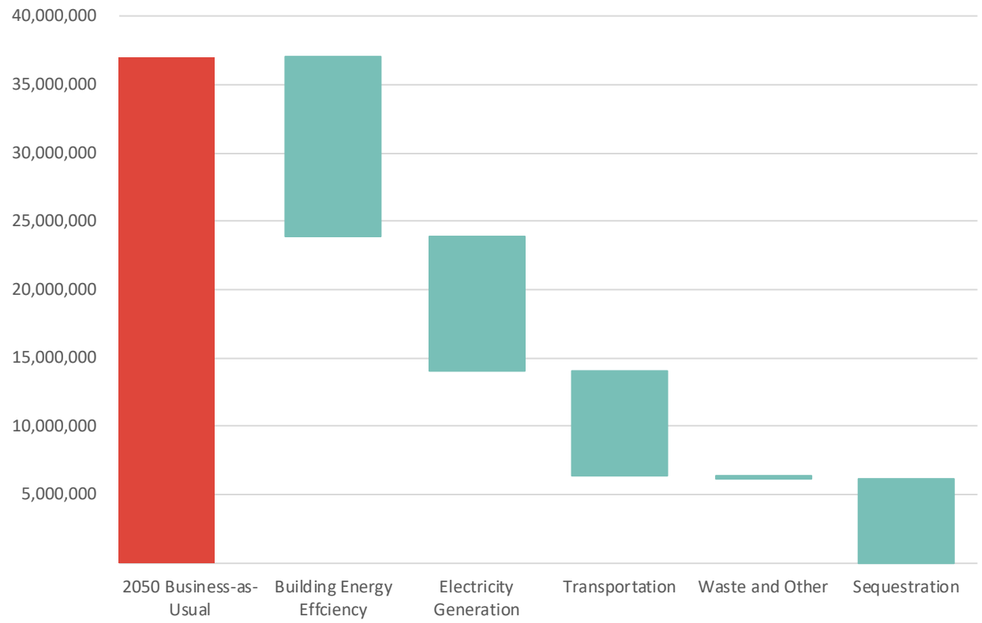
NET ZERO BY 2050

- Net zero GHG emissions for local government operations by 2030
- Net zero GHG emissions for energy generation by 2035
- Net zero GHG emissions from homes and buildings by 2040

How will we meet our target?

1. De-carbonizing the electric power grid.
2. Transitioning to electric vehicles, mode shift and sustainable development.
3. Optimizing the energy performance and health of buildings and homes.
4. Diverting food and landscaping waste from the landfill.
5. Sequestering carbon in the soil through green infrastructure conservation and restoration.

Breakdown of CO_2e reduction by action area



System Linkages

Energy. Water. Food. Ecosystems. Transportation. Public health. Entrepreneurship and innovation. Waste. Governance.

The Climate Action Plan takes an integrated, systems-based approach to addressing climate change. The complexity of climate change requires an understanding of interrelationships across sectors. Ideally, every proposed solution will elegantly solve more than one problem at a time, creating a long list of cobenefits for people, nature and the economy.

We might start with an aphorism. Eat healthy and exercise. Our plan builds from common sense and then asks how to scale up and connect. Many examples illustrate this thinking.

- Walkable, bicycle-friendly neighborhoods improve public health and social cohesion, while also decreasing emissions in a way that explicitly benefits residents who do not own vehicles. As walkability increases, often along treed streets, the need for surface parking is reduced. As impervious areas shrink (and green infrastructure is restored), so too do the effects of stormwater runoff and urban heat islands.
- Composting reduces landfill methane emissions. At the same time, it creates significantly more jobs than traditional solid waste management practices. Using compost in local gardens and orchards can support more food production and improve food access, security and nutrition. The application of compost to land restoration efforts increases carbon sequestration in the soil. It also turns the soil into a sponge, reducing flood risks and protecting water quality.
- Using nature-based solutions provides a long list of potential cobenefits. Trees shade our homes, conserving up to 25% of the energy needed for heating and cooling. They make our streets more comfortable and walkable, reducing car traffic. Trees absorb ground-level ozone and help infiltrate water into the ground. Moreover, trees increase property values, provide wildlife habitat and improve overall quality of life.

This plan is guided by a bias toward action. As a community, we already work on many of the solutions proposed here. Collaboration among experts from public health and entrepreneurship to urban design and ecology will enable more system-level connections to guide strategic investment. Ultimately, our community will become healthier and more resilient as we learn more about how to make system-level change.

How is the Action Plan Organized?

Action Sections

The action plan is divided into nine sections:

- Governance and leadership
- Community resilience
- Energy generation
- Energy efficiency
- Transportation and land use
- Urban greening
- Food and agriculture
- Solid waste
- Finance and innovation

For each section, a narrative provides an overview of the topic. For relevant sections, a summary of greenhouse gas reductions impact is provided.

GOALS

1 Additionally, each section outlines several overarching goals, followed by a set of strategies and specific actions.

"Quotes in each section come from individuals who participated in community engagement on the MindMixer platform."

Goals: For each goal, there are a set of cobenefits and plan linkages identified

COBENEFITS

Cobenefits are the added benefits that arise when combating climate change in addition to reductions in greenhouse gas emissions. While there are many more cobenefits that can result from climate action, the **nine** cobenefits listed below were identified as the most important and relevant by stakeholders during the plan development process. Each goal in the Climate Action Plan achieves multiple cobenefits. By drawing connections between goals and cobenefits, this plan elevates focus on opportunities to fully maximize the impact of our investments in climate action.

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

The linkages indicate other sections of the action plan that are relevant in some way to the goal. Along with cobenefits, these linkages are meant to be considered both in planning and implementation so that mutual benefits can be gained through new partnerships and collaborations, information sharing, cost-sharing of initiatives, etc.

Strategies under each goal provide the following:

Mitigation OR Adaptation

Each strategy serves mitigation, adaption or both climate resilience goals. Mitigation is the reduction of greenhouses gases, whereas adaptation focuses on anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage they can cause.

Potential to reduce GHG	Status/Time frame	Scale
Low, Moderate, High or Indirect	**Underway/1/3/5/10/10+**	**Neighborhood, local government, regional, state**

This indicator gives the relative potential for GHG reductions for each strategy.

For some strategies, the reduction potential is indirect, meaning that the strategy itself does not reduce GHG, but it supports other strategies that do reduce GHG.

This indicates by when the strategy is to be initiated.

Scale indicates the geographic extent for which this strategy is typically implemented.

More than one scale can apply.

Partners

A list of potential partners that would likely be involved in implementing this strategy. The list provides a starting point and is not meant to be exhaustive.

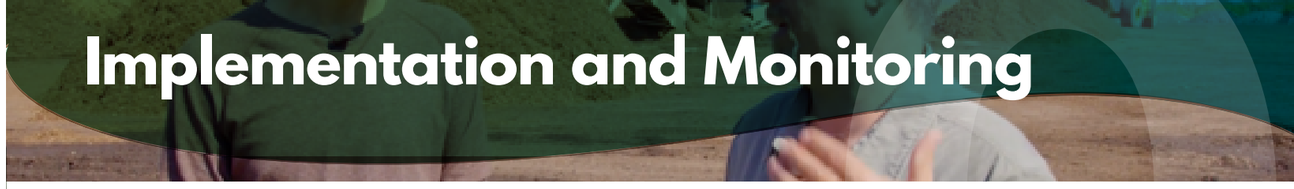
Equity considerations/opportunities

This section highlights potential issues, guidance and/or opportunities to consider to bring equity to the implementation of the strategy.

Examples

- Where possible for each strategy, examples are provided that show success in implementing this strategy in other regions or cities, nationally or internationally.

Action
Several actions are listed under each strategy.
These actions are considered near-term actions or next steps.



Implementation and Monitoring

MARC and Climate Action KC will jointly form a Regional Climate Action and Policy Forum in early 2021. This group will develop detailed one- and three-year work plans. A preliminary work plan based on a review of plan priorities and opportunities is described below.

One-year work plan for 2021

Plan adoption and rollout:

- Establish a regional climate and action policy committee.
- Deepen equity-focused community engagement.
- Refine plan performance metrics and targets.
- Launch leadership development and capacity-building initiatives.
- Create a regional education, outreach and communications plan.
- Seek funding to support from public, philanthropic and corporate partners.
- Seek endorsement from (and preliminary plan implementation by) local communities.
- Host regional climate summit.

Launch or expand existing implementation efforts:

- Buildings and energy: Launch Regional Building Energy Exchange; form a collaborative regional energy working group to focus on renewable energy and energy efficiency.
- Green infrastructure: Promote adoption of model tree protections/native landscaping ordinances; launch update to stormwater engineering standards/planning guidelines; strengthen efforts related to Blue River restoration, urban forestry, native landscaping and watershed planning.
- Transportation: Continue to advance regional/local efforts related to bikes, trails, walkability, public transportation, sustainable places and alternative fuels.
- Innovation: Host at least one innovation and design challenge per year.
- Food/waste: Expand markets for compost applications; scale (or increase) local food from urban agricultural production and recovery of excess food; form urban-rural partnerships to incentivize carbon sequestration.
- Public health: Explore opportunities for collaborative partnerships to accelerate community resilience projects within the public health sector.

Three-year work plan for 2021-2023

The three-year work plan will be refined during the course of year one. Activities described below will build upon the one-year work plan.

Planning:

- Coordinate plan implementation through the Regional Climate Action and Policy Forum.
- Deepen equity engagement, capacity building, networking and action in vulnerable communities.
- Manage working groups to facilitate action and community engagement in each sector.
- Secure at least $10 million in funding from strategic new funding strategies.
- Develop regional public and private sector recognition program to celebrate progress; host leadership, capacity-building and technical trainings.

Actions:

- Develop and adopt new suite of local government energy policies.
- Implement building improvements for at least 300 residences in vulnerable communities and 75 schools/community centers/libraries/universities.
- Formulate accelerated strategy to retrofit 100% of homes in the lowest quintile of socioeconomic vulnerability.
- Identify top 10 mobility hubs for planning, design and construction.
- Plant and maintain at least 50,000 trees; create regional Conservation Corps.
- Expand implementation of sustainable food production, forestry and green infrastructure initiatives.
- Host at least one innovation design challenge per year, with a focus on new job and business creation for vulnerable communities.
- Implement regional outreach, communications and education plans as part of efforts to create the resilience web.

Proposed targets by Sector

Goal: complete by September 2021

A series of targets will enable the Kansas City region to mark and measure progress toward plan goals. By 2050, the Kansas City region will have a net zero carbon economy. Renewable energy and energy efficiency will provide the largest initial greenhouse gas (GHG) reductions, leading to net zero energy in homes and buildings. In the transportation sector, reductions will be slower to manifest and are anticipated to approach 80%.

After other emissions reductions are achieved, carbon sequestration through landscape stewardship and restoration will enable the region to achieve net zero status. While the emissions inventory for this plan does not account for significant GHG reductions resulting from waste and food systems, advances in those sectors will make meaningful contributions.

The following targets are illustrative in nature, and will be set through a process that is inclusive of key stakeholders and responsive to community needs in each area. The goal is to complete this process of setting targets by end of 2021.

Renewable Energy

- Electricity used by area municipalities will be powered through 100% renewable energy by 2035.
- Area electric utilities will be net-zero carbon by 2035.
- Establish five community solar programs by 2030.

Local Water

- Install water conservation/efficiency devices in 100% of vulnerable households by 2025, in 50% of all households by 2035 and 100% of households by 2050.

Clean and Healthy Buildings

- All new buildings will be net zero carbon by 2030 and 100% of buildings will be net zero carbon by 2040

Housing & Development

- Proportion of area residents living within ½ mile of a park, greenway, open space or natural area is at least 50% by 2030, 75% by 2040 and 95% by 2050 (MetroGreen).

Mobility and Public Transit

- Establish graduated VMT reduction and mode shift (the percentage of all trips made by walking, biking, micro-mobility/ matched rides or transit) goals by December 2021 for the years 2025, 2030, 2040 and 2050.
- Build out all planned Destination, Junction, and Gateway mobility hubs by 2050.

Zero-Emission Vehicles

- Increase the percentage of zero-emission vehicles in the region to 5% by 2025, 50% by 2035 and 75% by 2050.
- Electrify 75% of RideKC buses by 2040.

Industrial Emissions and Air Quality Monitoring

- Achieve zero days/year of unhealthy air quality due to ground-level ozone by 2030.

Waste and Resource Recovery

- Increase landfill diversion rate to 50% by 2030, 75% by 2035 and 100% by 2050.
- Reduce municipal solid waste generation per capita by at least 15% by 2030; reduce organic waste going to landfill by 30% by 2030.
- Increase regional compost production from 20,000 tons/year in 2020 to 50,000 tons/year in 2025, 100,000 tons/year in 2030 and 350,000 tons/year in 2050.
- Increase proportion of waste products and recyclables productively reused and/or re-purposed to at least 25% by 2035 and 50% by 2050.

Food Systems

- Fresh, nutritious food within ½ mile of low-income residents by 2030.
- Facilitate 20 large institutions to adopt food-sourcing policies.
- Increase urban agricultural production by 50% by 2030.

Urban Ecosystems and Resilience

- Increase tree canopy in most vulnerable areas by at least 50% by 2030; plant a tree on the southwest corner of every house by 2030; achieve 40% canopy coverage in three transit corridors and 10 mobility hubs by 2035, in six corridors and 20 mobility hubs by 2040, and in all planned mobility hubs by 2050.
- Increase connected, healthy riparian habitat by 50% by 2030; restore 75% of region's riparian habitat by 2040 and 90% by 2050.
- Plant 243,000 acres of native landscapes by 2030 (Clean Air Action Plan).
- Identify goal to reduce urban/rural temperature differential for vulnerable communities by 2023.

Prosperity and Green Jobs

- Increase the number of green jobs by 10% by 2035 and by 25% by 2050.
- Host at least one human-centered design sprint per year between 2021 – 2026.

Lead by Example

- Achieve net zero greenhouse gas emissions for all city/county operations by 2030; convert all city/county fleet vehicles to zero emission where technically feasible by 2035.
- Champion policies aimed towards all new municipally-owned buildings and major renovations being net zero.
- Provide resilience-focused leadership training for all public, nonprofit and corporate resilience officers by 2025.

Snowball Hill Prairie, Harrisonville, MO.
Photo Courtesy of MARC.

Policy recommendations for local government

Energy

- Adopt solar-ready ordinances.
- Adopt energy-benchmarking ordinances.
- Adopt building performance requirements.
- Adopt IECC 2021.
- Require energy disclosure at time of sale or rent.
- Link economic incentives to building performance.

Transportation, land use and housing

- Revise zoning codes to allow for and encourage accessory dwelling units (ADUs), parking maximums and shared parking, housing unit size, height, setbacks, etc.; implement inclusionary zoning.
- Adopt, implement and evaluate complete and green streets policies.
- Revise zoning and other policies to create transit-supportive environments around existing and planned transit.

Urban Greening

- Adopt tree, native landscaping and strengthened stream buffer ordinances.
- Update planning/zoning regulations and engineering standards for stormwater management.
- Include green infrastructure in capital improvement and asset management plans.

Food Systems

- Amend agricultural zoning to include smaller acreages used for agriculture/ food production.

Solid Waste

- Develop strategies/policies to enable recycling in multi-family residential buildings.
- Develop policies to enable compost collection.
- Update purchasing policies to include specifications for materials reuse, durability, packaging, embodied energy, recycled content and locally manufactured products.

Photo courtesy of MARC.

Collaboration and Leadership

GOALS

1. Create new patterns of regional collaboration that guide and connect actions and facilitate equity and transparency.
2. Empower communities to lead

"The hard work of resilience is both about top-down solutions as well as bottom-up ideas and momentum."

JEREMY K.

Photo courtesy of MARC.

Implementation of the regional climate action plan requires strong levels of coordination, collaboration, partnership and engagement at all levels. Leadership development and capacity building across communities, organizations and businesses is fundamental to achieving the level of change required to attain planning goals.

A range of public, nonprofit and private sector organizations are involved in climate action across the community, among them the Mid-America Regional Council and Climate Action KC. Each of these organizations, in turn, participate in expansive networks with leaders and organizations across the community.

Creating new organizational structures will help achieve planning goals in several ways. First, with the variety and number of interested organizations and stakeholders, there is a clear need for stronger coordination. Second, stronger coordination will catalyze stronger leadership and action, and build increased levels of accountability.

Climate action initiatives will be configured to build leadership and capacity across the community, with a strong emphasis on social equity, linking community-based organizations with policy leadership and decision-making at all levels.

Leading by example:

1. Climate Action KC
2. MARC Air Quality Forum
3. Regional Transit Coordinating Council

Goal 1: Create new patterns of regional collaboration that guide and connect actions and facilitate equity and transparency

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CL-1.1: Create a regional climate policy and action committee to guide plan implementation

Mitigation ■ | Adaptation ■

A new forum to guide implementation of the plan and foster partnerships and linkages among key actors in the Kansas City region is imperative. The forum would reflect a strong commitment to diversity, equity and inclusion to ensure that ensuing work is responsive to the needs of vulnerable communities.

Representation from key sectors (i.e. transportation, water, green infrastructure, food, public health, energy, buildings) and multiple disciplines (i.e. architecture, planning, ecology, landscape architecture, engineering, community development, business, economic and workforce development, youth) will help drive actions among local governments in the metro and within diverse organizations, businesses and communities.

The forum would meet regularly, working under the direction of the MARC Board of Directors and the Executive Committee of Climate Action KC. It would seek to integrate climate actions within a broad cross section of regional efforts. A variety of working groups may form to address specific issues or challenges as they arise. The forum would also develop processes and project pipelines to accelerate collaborative action at multiple scales.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**1-year**	**Regional**

Partners

Climate Action KC, local governments, neighborhood and community leaders, and sector-based leaders.

Equity considerations/opportunities

Just, diverse, inclusive and equitable representation is a fundamental element of committee structure and composition.

Examples

- Climate Action KC working groups and committees
- LA Regional Collaborative for Climate Action and Sustainability
- Southeast Floriday Regional Climate Change Compact

Action
Launch an inclusive process to define role, structure and composition.
Establish a Regional Climate Policy and Action Forum, with one- and three-year work plans.
Develop project and policy development processes to accelerate adoption and implementation.

Photo courtesy of MARC.

CL-1.2: Measure and track performance towards reaching goals and targets

Mitigation ■ | Adaptation ■

The plan proposes a set of preliminary quantitative goals and targets. By joining the Global Covenant of Mayors for Climate and Energy, this plan seeks to achieve GHG reductions of at least 26-28% by 2025; net zero emissions from local government operations by 2030; net zero emissions from energy generation by 2035; net zero emissions from buildings by 2040; and become a net zero regional economy by 2050.

At the same time, the plan seeks to achieve adaptation goals relative to food security, energy and water affordability, mobility, public health, safety, infrastructure durability and resilience, among other issues. More detailed performance metrics and targets related to job creation, equity benefits and other factors remain to be developed.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**Underway**	**Regional**

Partners

Partner stakeholders and organizations, subcommittees of the Regional Climate Policy and Action Forum, MARC committees

Equity considerations/opportunities

Metrics will include explicit measures with equity benefits.

Examples

- pLAn – Los Angeles Climate Plan
- MARC Communities for All Ages Recognition Program
- Climate Indicators: Southeast Florida Climate Compact
- Climate and Energy Progress Dashboard: Metropolitan Washington Council of Governments

Action
Present plan to local jurisdictions for consideration, adoption and implementation.
Develop performance metrics, a data management strategy and performance communications tools.
Develop a recognition program for local governments and other community organizations to track progress on plan implementation.

Goal 2: Empower communities to lead

COBENEFITS

health & well-being | environmental quality | accessibility | affordability | cost savings

green job development | energy security | economic growth | resilience

LINKAGES

CL-2.1: Develop a network of climate leaders and ambassadors at all levels

Mitigation ☐ | Adaptation ■

A broad range of community stakeholders participated in the development of this plan. Moving from plan development to implementation will require the identification and cultivation of leaders and champions across the community. Local governments, local businesses, neighborhoods, schools, universities, hospitals and others will need to identify points of leadership for implementation.

Climate Action KC leadership provides a strong starting point for community champions and ambassadors. Deepening this leadership among local governments and community groups, especially in frontline communities, will be pivotal to the plan's success.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Indirect	3 year	Regional	MARC

Partners

Climate Action KC, local governments, businesses, neighborhood organizations, nonprofits, trade associations, business districts, universities

Equity considerations/opportunities

Leadership is viewed in an inclusive manner. The initiative views leadership potential throughout the community—at multiple scales and positions, with diverse networks creating opportunities for leverage, partnership, collaboration, synergy and efficiency. Leadership development strategies can be tailored based on interest and need.

Examples

- Association of Climate Change Officers

Action
Encourage public- and private-sector organizations to hire, designate or share resilience officers. The Building Energy Exchange concierge service may be of particular assistance to smaller communities.
Provide training and certification to support leadership development and organizational capacity.

Volunteer at recycling event
Photo courtesy of Bridging The Gap.

Transportation

GOALS

1. Reduce vehicle miles traveled (VMT) per capita
2. Shift the regional fleet to low- and no-emission vehicles
3. Shift trips to affordable, equitable and safe mobility options
4. Improve the transportation system so it is resilient to the shocks and stresses of climate change

"Resiliency for me means an emphasis on multimodal transportation. This isn't necessarily anti-car, so much as it is pro-environment ... The communities that are thriving right now and that will emerge faster and stronger than others are the ones that have found ways to quickly and meaningfully support transportation options for the most vulnerable, who must walk and bike to get to key destinations."

MICHAEL K.

The way we move and how we develop our communities plays a critical role in the amount of greenhouse gases (GHGs) we emit.

Reducing the amount we travel and using fuel sources that produce fewer GHG emission are ways to reduce emissions from sources in the transportation sector.

To reduce the amount mileage we drive collectively, we can drive alone less and expand the use of other transportation modes, like biking, public transit and carpool. Remote working could play a major role in reducing single-occupancy vehicle trips, especially in the Kansas City region where so many people commute alone in their own cars. Now that the COVID-19 pandemic has forced many people to work from home, more and more companies are expanding their telework policies.

Another way to reduce the amount we drive, especially alone in our own cars, is to make it possible for the average household to fulfill everyday needs closer to home. We do this by focusing investment in centers and corridors, allowing more people in our region to live, work and play without driving long distances.

The Kansas City region, like all metropolitan areas, contains major roadways that attract development. In our region, six main corridors were identified through the Creating Sustainable Places initiative. Directing resources to redevelop and incentivizing a mix of uses—commercial and residential—around these corridors and other activity centers is key to making our region more vibrant, connected and green.

The other primary way we can reduce GHG emissions is to shift from petroleum fuel to existing low-emission alternative fuels or no-emission vehicles. Electrification of our vehicle fleet will greatly reduce GHG emissions. If 75% of the vehicles on our roadways are electric, emissions will go down by 35% from 2015 levels. If other strategies are added, such as compact land use around centers and corridors, our models indicate that emissions can be reduced 61% from 2015 levels, putting the Kansas City region in the relative range of reductions needed to mitigate major climate change impacts.

GHG Reduction:

Reductions from BAU* emissions in 2025

Reductions from BAU* emissions in 2030

Reductions from BAU* emissions in 2050

*Business-as-usual (BAU) emissions are projected GHG emissions if no action is taken.

Leading by example:

1. Main street corridor (streetcar), KCI bus electrification
2. Gilham Road cycle track
3. Downtown Overland Park redevelopment
4. City of Olathe CNG trash tuck fleet
5. City of Shawnee green street classification
6. City of Olathe compressed natural gas sanitation trucks

Top reduction strategies:

1. Fuel switching (electrification)
2. Shifting trips to bus, bike, walking or shared mobility
3. Fuel efficiency
4. Low carbon/sustainable urban development

Goal 1: Reduce vehicle miles traveled (VMT) per capita

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

T-LU 1.1: Increase and target sustainable, mixed-use and mixed-income development at key activity centers and corridors where infrastructure is already in place.

Mitigation ■ | Adaptation ☐

By increasing the number of housing units and types as well as encouraging a mix of uses around existing activity centers and corridors, residents and workers will naturally reduce the mileage they drive. This is not only because distances to get to jobs, grocery stores and other amenities will be reduced, but because sustainable development lends itself to other forms of transportation, like walking, biking, transit and scooters. By developing these types of high-intensity centers and corridors where infrastructure already exists, we will realize several cobenefits such as reduced land consumption and improved opportunities for communities to gather and interact in common spaces.

Potential to reduce GHG	Status/Time frame	Scale
High	Underway	Neighborhood, Local Government, Regional

Partners

Local governments, BikeWalkKC, transit agencies, RideKC Development Corporation, existing businesses, neighborhoods

Equity considerations/opportunities

When implementing this strategy, priority should be given to existing environmental justice (EJ) areas that include activity centers and corridors. Equity opportunities and benefits include jobs access, economic development/workforce development and housing affordability.

Examples

- Downtown Overland Park redevelopment
- Redevelopment at key nodes along Prospect Max (31st St., etc.)

Action
Prioritize funding for projects in activity centers and along corridors, and ensure funding is fairly and justly distributed.
Work with economic development organizations and local governments to incentivize and create favorable conditions for housing and job opportunities and a mix of other uses (including green infrastructure) around centers and corridors.
Examine housing unit size, height and setback requirements and allow for and encourage accessory dwelling units (ADUs).
Encourage implementation of inclusionary zoning, especially in activity centers, to facilitate the creation of affordable housing.

T-LU 1.2: Establish 15-minute neighborhoods

Mitigation ■ | Adaptation ■

The 15-minute neighborhood concept imagines neighborhoods where residents can reach most of their daily needs within a 15-minute walk of their homes. This includes access to goods and services like grocery stores, schools and healthcare. Many residents of 15-minute neighborhoods would also be able to reach their jobs within this 15-minute walkshed, thanks to incentives for small- to medium-sized employers. For a 15-minute neighborhood to be truly sustainable, it would need to contain housing opportunities for a range of income levels, thus allowing a variety of workers to live, work and play within its boundaries. To work towards implementing 15-minute neighborhoods, it is crucial that planners work closely with neighborhood leaders and residents to fine-tune the concept to the particular community.

Potential to reduce GHG	Status/Time frame	Scale
High	1-3-year	Neighborhood, Local Government

Partners

Local governments, economic development organizations, BikeWalkKC, transit agencies, RideKC Development Corporation, neighborhoods, existing businesses

Equity considerations/opportunities

While 15-minute neighborhoods have the potential to increase opportunities for lower-income households, especially those that do not own a car, gentrification leading to the displacement of existing residents is a possible side effect of this strategy. Therefore, local governments should work to increase incentives for affordable housing and work to diversify employment in partnership with local neighborhood associations.

Examples

- Paris
- Houston
- Ottawa

Action
Provide educational opportunities to learn more about 15-minute neighborhood initiatives around the country.
Integrate 15-minute neighborhood elements into the evaluation criteria for the Planning Sustainable Places program.
Examine 15-minute neighborhood components when creating long-range plans for areas and cities.

Armour Road Complete Streets
Photo courtesy of MARC.

T-LU 1.3: Increase complete and green streets throughout the region

Mitigation ■ | Adaptation ■

Complete and green streets provide comfortable places for people to walk, roll, bike and drive while managing stormwater with vegetation and permeable surfaces.

While all streets cannot accommodate all users, most can be retrofitted to allow for the comfortable and safe travel of all users.

In the Kansas City region and across the country, many streets can undergo a “road diet,” replacing pavement previously only designated for motor vehicles with transit facilities, bike lanes, sidewalks, multi-use paths or other public space.

Furthermore, green elements can provide additional benefits such as beatification, place making, providing shade and urban heat reduction, and decreased flooding through better water retention.

By increasing complete and green streets throughout the region, local governments will facilitate a mode shift from driving to walking and biking, thereby reducing VMT, while mitigating the effects of climate change.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Neighborhoods, Local Government**

Partners

BikeWalkKC, transit agencies, local governments, neighborhood associations

Equity considerations/opportunities

Complete streets by their nature provide a more equitable transportation system because they are designed more for people than single-occupant vehicles. Still, changes to streets are not always viewed by the neighborhood in a positive light. All communities should be engaged in changes to the built environment that affect them, and planners should make a concerted effort to engage nearby neighborhoods as early as possible during the planning process to gather input.

Examples

- Armour Road, North Kansas City
- Gillham Road, Kansas City, Missouri
- River Market
- Lenexa City Center

Action
When resurfacing streets, local governments are encouraged to examine local and regional plans, restriping with bike lanes and adding trees or other green infrastructure measures.
Encourage adoption and evaluation of complete and green streets policies.
Encourage development of local plans for complete streets implementation, including extensive community engagement.

Goal 2: Shift the regional fleet to low- and no-emission vehicles

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

T-LU 2.1: Expand electric vehicle charging infrastructure throughout the region

Mitigation ■ | Adaptation ☐

While we know that more concentrated, mixed land use is critical to reducing vehicle-related emissions, electric vehicle technology has the potential to greatly reduce emissions produced by the transportation sector. Modelling work MARC has done indicates that electrification of 75% of our fleet would reduce greenhouse gas emissions by 35% (from 2015 levels).

In order to support the efficient electrification of our vehicle fleet, charging infrastructure needs to be deployed effectively throughout the region. The large portion of the Kansas City region covered by Evergy has an extensive network of electric vehicle chargers, while some areas not covered by Evergy either have sparse coverage or no electric vehicle charging infrastructure at all.

For the most part, there is less charging infrastructure in lower-income areas. Expanding access will enable vulnerable communities to enjoy the benefits, like cleaner air.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Neighborhood, Local Government, Regional**

Partners

Electric utilities (Evergy), local engineering firms, state and local governments, Metropolitan Energy Center, U.S. Department of Energy, National Renewable Energy Laboratory, charging station providers

Equity considerations/opportunities

Incentives for used EVs or EV carsharing to expand EV charging would benefit low-income communities. Expanding charging infrastructure to underserved communities should be prioritized after extensive neighborhood education, outreach and input.

Examples

- Evergy Clean Charge network

Action
Identify and prioritize EV charging station opportunities and potential funding sources.
Support direct incentives for electric vehicles on the local, state and federal level.

T-LU 2.2: Implement EV car-sharing in low-income communities

Mitigation ■ | Adaptation ☐

Many individuals and households in low-income communities do not have access to their own vehicle. Transit ridership and rates of walking and biking are often higher in these communities as a result.

Still, having access to a vehicle is important and often necessary, especially in a car-dependent environment. While car-sharing programs in general provide a mobility option to those who do not own their own vehicle, EV car-sharing has the added benefit of zero tailpipe emissions. Given that low-income communities often have higher rates of asthma and other respiratory conditions, EV car-sharing in these communities could achieve multiple benefits.

EV car-sharing in neighborhoods with existing transit has also been shown to delay or reduce the need to purchase a vehicle—a cost savings benefit to lower-income communities.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Low	**5-year**	**Neighborhood, Local Government, Regional**	**Local**

Partners

Car-sharing companies, community-based organizations, neighborhoods, local governments

Equity considerations/opportunities

This is an equity-focused strategy. It is meant to supplement the provision of effective transit and mobility options in lower-income communities and communities of color.

Examples

- LA's BlueLA carshare program

Action
Research EV car-sharing programs and business models that operate in low-income communities.
Conduct a feasibility study of developing this type of program including potential car-share locations.

T-LU 2.3: Electrify municipal, transit agency and other public fleets

Mitigation ■ | Adaptation ☐

Local governments and public agencies have a significant opportunity to lead the transition away from gas-powered vehicles.

As fleet vehicles are replaced, local governments can make use of federal funds and cooperative procurements to decrease overall costs or minimize additional costs. Local governments and public agencies should also consider the source of the electricity from an overall emissions standpoint. Pairing fleet transitions with opting into renewable energy sources will help further reduce emissions.

Furthermore, electrifying public fleets, such as transit vehicles, will also help reduce ground-level emissions in communities that already experience higher rates of asthma and other respiratory conditions.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Local Government, Regional**

Partners

Transit agencies, local governments, MEC, EV providers, EPA, DOE, NREL, environmental advocacy groups, electric utilities (Evergy)

Equity considerations/opportunities

Electric vehicles not only eliminate GHG tailpipe emissions but also reduce pollutants that affect respiratory health conditions like asthma. As a result, transit agencies and local governments should work to replace fleet vehicles that operate or are used in vulnerable communities.

Examples

- Kansas City, MO
- Minneapolis, MN
- City of Atlanta
- City of Los Angeles
- MTA (New York) electric bus conversion

Action
Educate public agencies about existing funding opportunities for alternative fuel vehicle purchasing; encourage submissions of applications for this funding.
Provide information to local governments about purchasing electric vehicles through the Kansas City Regional Purchasing Cooperative (KCRPC).

Goal 3: Shift trips to affordable, equitable and safe mobility options

COBENEFITS

- health & well-being
- environmental quality
- accessibility
- affordability
- cost savings
- green job development
- energy security
- economic growth
- resilience

LINKAGES

T-LU 3.1: Create more protected and connected bike lanes, greenways, sidewalks and electric bike and scooter share systems

Mitigation ■ | Adaptation ■

Research shows that when safe pedestrian and bicycle infrastructure is built, more people feel comfortable walking and biking to get to where they need to go.

Paired with the distribution of shared bikes and scooters, a connected and well-maintained system provides mobility choices that have zero tailpipe emissions and provide residents with a way to integrate physical activity into their daily lives.

Expanding these modes of transportation complements expanded public transit by providing options for first- and last-mile travel to complete a full trip. This is essential for improved connectivity within a multi-modal system and job accessibility.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Medium	**Underway**	**Local Government, Regional**	**Local/MARC**

Partners

Local governments, mobility service providers, BikeWalkKC, RideKC, scooter providers

Equity considerations/opportunities

Priority should be given to improving pedestrian and bicycle infrastructure as well as expanding shared bike and scooter fleets in underserved communities, which are more impacted by both mobility and air quality issues.

Examples

- BikeWalkKC's Bikeshare for All initiative

Action
Consider implementation of city- and county-wide plans for trails and protected bike facilities, including bike sharing.
Work with providers to bring electric bikeshare and scooter programs to activity centers and mobility hubs, especially in underserved areas.

Photo courtesy of RideKC.

T-LU 3.2: Build out the Smart Moves transit and mobility system, including the network of mobility hubs

Mitigation ■ | Adaptation ■

In 2017, the Smart Moves 3.0: Regional Transit and Mobility Plan was adopted. Smart Moves provides for increased and expanded fixed route transit service, a network of mobility hubs where different moves come together, and the expansion of supportive land use and mobility services across the Kansas City region. The Smart Moves 3.0 plan also places an emphasis on using transit and mobility services to increase the accessibility of employment opportunities.

Smart Moves contains plans to improve the regional transit system over a 20-year time horizon. These improvements include increasing the number of fast and frequent routes, and addressing the current deficit in east-west connectivity and low service levels during the evening and on weekends. These strategies will allow more people to count on transit as a reliable, safe and enjoyable transportation option.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway**	**Local Government, Regional**	**Local/MARC**

Partners

Local governments, transit agencies, mobility service providers

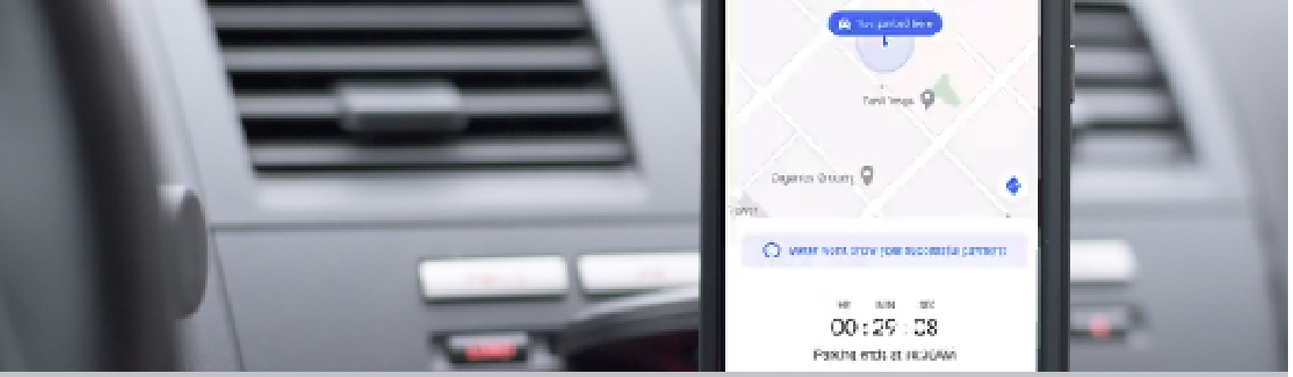
Equity considerations/opportunities

Priority should be given to improving and expanding service in low-income communities and communities of color, which are more impacted by jobs access and environmental quality issues.

Examples

- Prospect MAX
- Main Street Streetcar expansion
- East Village Transit Center

Action
Encourage implementation of Smart Moves transit and mobility hub recommendations.
Evaluate transit service provision and/or mobility hub creation through Planning Sustainable Places program.
Consider zoning and other policies to create transit-supportive environments around existing and planning transit.



T-LU 3.3: Encourage a shift to other modes of transportation through parking policy

Mitigation ■ | Adaptation ☐

Parking policies have the power to impact how much people choose to drive alone versus use other modes like transit, biking, walking, carpool/vanpool and scooter/bikeshare programs. If people do choose to drive, smart parking technologies can provide drivers with information on parking availability and reduce circulation in a district—and therefore greenhouse gas emissions.

Additionally, parking is expensive for developers to provide. Surface parking spots cost between $5,000 and $10,000 to construct and a spot in a parking structure generally costs over $20,000 to build. Allowing developers near fast and frequent transit to decrease or eliminate the amount of parking they build serves as both a development incentive and facilitates the creation of more affordable housing units.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway**	**Local Government**	**Local**

Partners

Developers, local governments

Equity considerations/opportunities

Reducing the area for parking increases the viability of public transit, makes streets more walkable and reduces heat islands and stormwater runoff.

Examples

- Prospect MAX
- Main Street Streetcar expansion
- East Village Transit Center

Action
Consider elimination off-street parking requirements for multi-family and commercial development in activity centers and around transit routes and mobility hubs.
Explore elimination of parking minimums, especially around fast and frequent transit.
Encourage parking maximums and work with businesses to share their parking resources to reduce the need for parking.

Goal 4: Increase the resilience of the transportation system to shocks and stresses of climate changes

COBENEFITS

health & well-being	**environmental quality**	accessibility	affordability	**cost savings**
green job development	energy security	economic growth	**resilience**	

LINKAGES

T-LU 4.1: Redesign and upgrade critical and vulnerable infrastructure

Mitigation ■ | Adaptation ■

The Kansas City region, like many other areas, is already experiencing the effects of climate change. Key local threats focus on extreme heat, drought and flooding. Cities, counties and states would benefit from assessing and reducing risks and vulnerabilities when building new or retrofitting existing transportation facilities.

Local assessments would help prioritize infrastructure retrofit or construction in ways that reduce risks and vulnerabilities. Planning and design processes may consider broader transportation system dynamics to facilitate implementation of sustainability upgrades ahead of worsening impacts.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Indirect	**Underway**	**Local Government, State**	**Local/State**

Partners

American Public Works Association, KDOT/MODOT, watershed managers

Equity considerations/opportunities

Priority should be given to retrofitting existing and adding new infrastructure that is designed to mitigate the effects of climate change in vulnerable communities. Benefits include workforce development and jobs access.

Examples

- Blue River Watershed Resiliece Study, Kansas State University

Action
Gather data and map where transportation infrastructure is particularly at-risk to flooding and potentially other hazards.
Support inclusion of green infrastructure when designing or retrofitting roadways, prioritizing areas where vulnerable populations are concentrated—green infrastructure may include restoration of impacted streams and stream corridors.
Provide educational opportunities for local governments on how to redesign and upgrade transportation infrastructure for climate resiliency.

Photo courtesy of Operation Green Light.

T-LU 4.2: Use technology to monitor integrity of transportation infrastructure and relay real-time data to ensure responsiveness and limit disruptions to users

Mitigation ■ | Adaptation ■

Intelligent Transportation System (ITS) technology helps monitor roadways and transportation equipment at intersections for disruptions.

In Kansas City, this includes alerting KC Scout, Operation Green Light and local agency staff about systems that are malfunctioning so they can be fixed. It also includes alerting appropriate personnel about congestion due to an accident, roadwork, weather or other special event so the appropriate response can be taken, including diverting traffic to other roadways.

This type of technology helps to mitigate the potential impacts of flooding and other extreme weather on our transportation systems. By managing congestion, it also helps to reduce emissions from backed-up vehicles. Emerging smart city technology may enable new sustainability applications, as well.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway**	**Regional**	**MARC**

Partners

Local governments, DOTs

Equity considerations/opportunities

Technology can be used to inform and alert communities about hazards and incidents that will affect travel and safety. Consideration should be given to how alerts and other communications can most effectively reach different segments of the community, especially individuals who may be hard to reach through traditional communications methods.

Examples

- KC Scout
- Operation Greenlight

Action
Explore use of intelligent transportation systems to adjust traffic signals and provide information about disruptions due to weather and other special events.
Expand technology to monitor integrity of transportation infrastructure and technologies.
Update traffic signal systems long-term to most efficiently move traffic based on changes to traffic patterns and demand.

Photo courtesy of MARC.

T-LU 4.3: Integrate water resource and transportation system planning, design and management

Mitigation ■ | Adaptation ☐

Transportation and watershed system planning, design and management should be fundamentally integrated. While transportation infrastructure serves as the region's largest source of impervious area, stormwater management on transportation facilities typically neglects to address watershed dynamics, water quality or impacts on receiving streams or waterways.

Future opportunities include both designing transportation facilities to reduce vulnerability from flash flooding and to reduce transportation-created urban heat islands.

Green infrastructure, employed as part of integrated watershed management efforts, will help capture the assets inherent in water and minimize the amount of disruption to transportation facilities from flooding.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Indirect	**1-3-year**	**Local Government, Regional**	**Local/MARC**

Partners

Local governments, DOTs

Equity considerations/opportunities

Focus resources on efforts that affect transportation infrastructure and water systems in underserved communities. Underserved communities are more likely to be impacted by extreme weather impacts of climate change, such as flooding. Resilience measures will likely produce a range of community development and public health cobenefits.

Examples

- MARC Eco-Logical: Linking Transportation and Conservation Planning
- MARC Green Infrastructure Framework

Action
Facilitate design of transportation facilities to absorb or detain stormwater and decrease runoff.
Support policies and best management practices to link transportation, stormwater and green infrastructure systems.

Energy Generation

GOALS

1. Scale up utility-scale investment in renewable energy
2. Diversify the energy supply
3. Reduce disruptions to the energy supply

"Carbon-neutral electricity is our only hope of meeting the Paris goal of 90% reduction (relative to 2010) in green house glass emissions by 2050. Ultimately, clean electricity, a positive in itself, also enables clean transportation and clean buildings. So, getting the carbon out of electricity is essential."

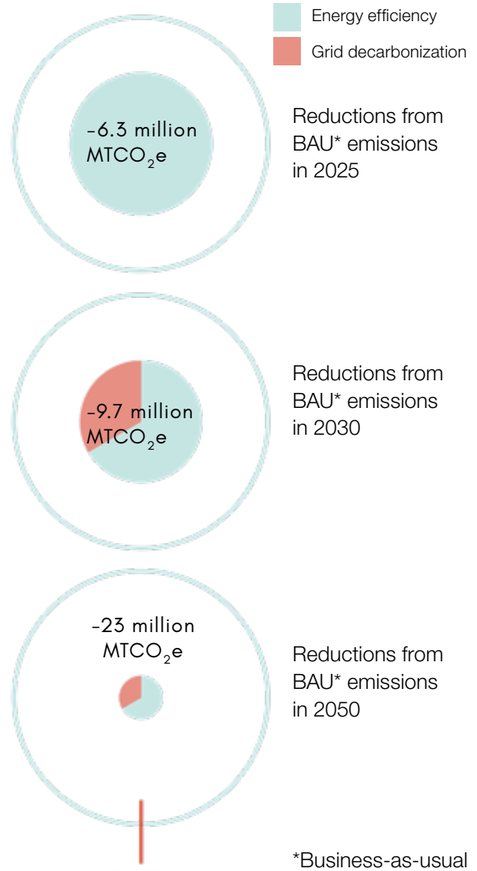
STEPHEN M.

Energy powers modern life. It runs our cities, our economies, our homes and our schools. The burning of fossil fuels has served as our core energy source for hundreds of years and is the leading cause of greenhouse gas emissions. Replacing fossil fuels with unlimited, renewable and clean alternatives like wind and solar is an essential step toward mitigating the impacts of climate change. Renewables are on the rise as the cost of clean energy sources continues to fall, while fossil fuels have become an increasingly insecure investment. Clean energy is a key driver of economic development, fostering job growth, project investments and significant tax revenue to the benefit of local communities.

The Kansas City area is well-positioned for renewable energy production, with access to enough wind and solar resources to replace the use of fossil fuels completely. Wind is an already-affordable core energy source and the state of Kansas is a national leader in wind energy production. In 2019, about 41% of the state of Kansas' energy came from wind, surpassing all other energy sources. On the other side of the state line, Missouri is ranked fourth in the nation for potential solar energy generation. Partnerships among utilities, private developers and local governments will continue to play a key role in propelling renewables forward in both Kansas and Missouri.

Utility-scale wind and solar farms are just one piece of the renewable puzzle. A clean energy transition will require a more diverse, distributed, flexible and technology-forward system. Local governments can establish policies and processes that foster energy generation and storage. A healthy and diverse local clean energy economy reduces the burden on the grid, enabling utilities to avoid the cost of additional power plants. Solutions like grid flexibility and energy storage, as well as coal plant retirement solutions like securitization, will align our broader energy system to support a renewable transition.

GHG Reduction:



87%
Sector GHG reduction

*Business-as-usual (BAU) emissions are projected GHG emissions if no action is taken.

Leading by example:

1. NextEra development in Kansas would be one of the largest solar plus storage projects in the nation.
2. Westside Housing's solar program provides another example of leadership.
3. Platte-Clay Electric Coop Community Solar project was the first community solar project in Missouri.

Top reduction strategies:

1. Grid decarbonization through renewable energy

NOTE: These reductions only reflect grid decarbonization strategies. Pairing these reductions with building energy efficiencies strategies results in a total GHG reduction of 87%.

Goal 1: Scale up utility investment in renewable energy

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

EG-1.1: Expand wind energy production

Mitigation ■ | Adaptation ■

Harnessing the momentum of wind energy in Kansas and Missouri is one of the most impactful ways to reduce greenhouse gas emissions in our region. Utility-scale wind farms, which can be seen across Kansas and Missouri, are typically large, multi-turbine developments that can produce a similar amount of energy to conventional power plants. In addition to Kansas' national leadership in wind, the northern and western parts of Missouri have high wind speeds and productive wind energy conditions.

The state of Kansas alone has seen roughly $11.4 billion in capital investments boosting jobs, tax revenue and community development while cutting energy costs for customers. Two noted obstacles in wind development include resistance from some local communities and elected officials, and the need to develop or expand transmission lines like the Grain Belt Express. Statewide carbon reduction goals, subsidies, loans, grants and other incentives are also key avenues to encourage and enforce wind adoption.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, Federal**

Partners

Utilities, wind developers, state/local government, Departments of Commerce, Climate + Energy Project, RenewMO, Environment MO, economic development agencies, wind developers and investors

Equity considerations/opportunities

Rural landowners and farmers receive income from leasing land to wind developments, providing additional sources of revenue and economic stability. Wind pilot projects may also include community benefits, such as building and expanding on schools, community centers, and more. Assessments of ratepayer impacts and a focus on coal plant retirement strategies like securitization would decrease or eliminate potential cost burdens to consumers.

Examples

- A Colorado wind farm helped a local utility reach the state's renewable energy standard
- Grain Belt Express

Action
Develop state-level and county-specific outreach strategies to elected officials and local governments in Kansas and Missouri.
Track and analyze existing and upcoming wind projects. Study policies and incentives for wind projects for developers/ investors, utilities, landowners and governments.

EG-1.2: Expand utility-owned solar farms

Mitigation ■ | Adaptation ■

Utility-owned solar photovoltaic (PV) farms contain large arrays of hundreds or thousands of panels and have substantial energy-generating capacity. Both Kansas and Missouri have great potential to become leaders in solar power due to high numbers of sunny days, but currently less than 1% of Missouri and Kansas' electricity comes from solar energy.

While the cost of solar has continued to fall, especially for larger-scale developments, financial incentives are still necessary to encourage sufficient investment in solar projects. Tax incentives, subsidies, loans, grants and other fiscal incentives can encourage utility-scale solar development.

Growth can also be spurred by establishing statewide carbon reduction goals, as these standards translate into investment opportunities for solar developers. In addition, policymakers should guarantee and encourage the connection and access of PV plants to the grid to ensure the viability of large solar projects.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway**	**Local Government, State, Federal**	**State/local govt., utilities, private solar/storage developers, nonprofit orgs**

Partners

Utilities, solar/storage developers and investors, Climate + Energy Project, RenewMO, Sierra Club, Environment MO, economic development agencies, state and local chambers of commerce, conservation and natural resources organizations, solar/storage developers and investors, utilities

Equity considerations/opportunities

Utilizing financing options and coal plant retirement strategies (like debt buyouts by ratepayers on non-economic coal plants) can ameliorate the cost to utilities, preventing impacts on ratepayers. Scaling renewables also fosters local jobs growth and workforce development opportunities.

Examples

- The Nixa Solar Farm is the largest solar installation in the state of Missouri, allowing the town of Nixa to get 20% of its energy from solar energy.
- Large-scale solar projects in the Midwest: https://pv-magazine-usa.com/2019/04/09/supersized-solar-in-the-midwest/

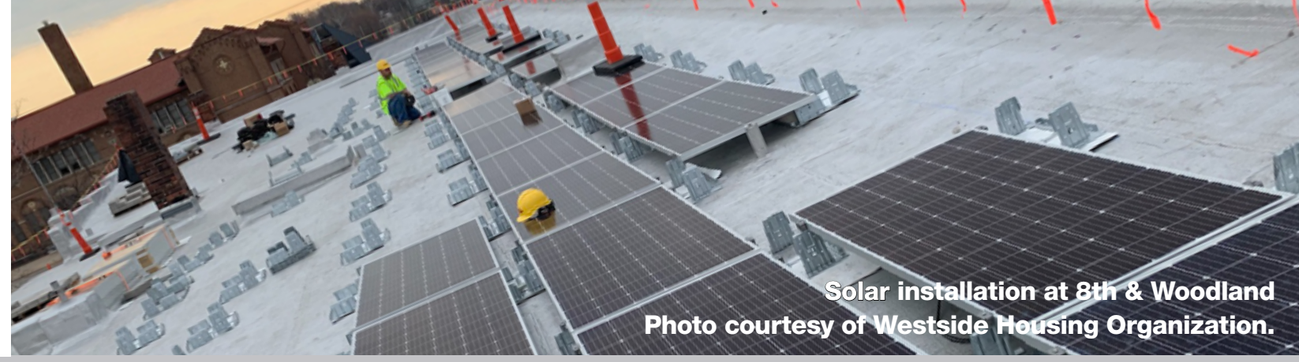
Action
Develop county-specific outreach/education to elected officials and local governments.
Develop county-specific general public outreach around solar farms.
Study policies and incentives for utility-scale solar, coal plant retirement strategies and securitization. Track and analyze existing and upcoming solar projects.

Goal 2: Diversify the energy supply

COBENEFITS

- health & well-being
- environmental quality
- accessibility
- affordability
- cost savings
- green job development
- energy security
- economic growth
- resilience

LINKAGES



Solar installation at 8th & Woodland
Photo courtesy of Westside Housing Organization.

EG-2.1: Build sustainable community and neighborhood energy generation

Mitigation | Adaptation

Many residents and small businesses lack the resources or property to finance and install their own solar panels. Community solar gives individuals and institutions subscription-based access to larger, offsite area solar facilities without having to install them and credits users for their share of the solar energy used. This localized solution provides a more affordable and accessible option, giving homeowners, renters, multifamily housing residents and businesses equitable access to the economic and environmental benefits of solar.

Community and neighborhood-based solar is a critical equity strategy, empowering underserved communities to enter the clean energy economy, decentralizing electricity and boosting grid resilience, and allowing communities to build wealth by using local solar power.

Comprehensive virtual net metering policies are essential to the feasibility of community, neighborhood and multifamily solar.

In addition, group purchasing programs can help increase affordability and accessibility.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway/1-3-year**	**Neighborhood, Local Government, State, and/or Federal**	**State/local govt., utilities, neighborhood associations, private solar developers**

Partners

Private solar installers, developers and investors; property managers/multi-family landlords and tenants; utilities; Climate + Energy Project, Renew MO, Environment MO, neighborhood associations, community and economic development corporations

Equity considerations/opportunities

Policies that disincentivize community solar by adding cost to the consumer should be addressed. Policies like virtual net metering would enable individuals and institutions to take full advantage of community solar options. Community solar should be pursued and encouraged as an equitable and accessible option, empowering low-income communities, tenants and multifamily housing projects to democratize the creation and control of their power and giving them access to renewable energy revenue.

Examples

- Minnesota is a national leader in community solar. This success can be attributed to a focus on making community solar viable and eliminating the cap on community solar projects.
- The Denver Housing Authority's Community Solar Program

Action
Expand community outreach about solar options, with a focus on low-income housing/communities.
Study virtual net metering strategies, financing and economic incentives, and barriers for community solar.
Craft policy solutions related to virtual metering with a focus on disincentives that add additional cost to consumers.

EG-2.2: Expand corporate, industrial and institutional solar energy generation

Mitigation | Adaptation

Commercial solar panels bring the financial and climate mitigation benefits of solar to businesses, local governments, schools and farms, allowing them to generate their own power to lower overhead and increase profits.

Energy makes up a significant portion of many institutions' operating costs, and the rapidly falling cost of solar makes it more financially appealing.

Commercial solar generation boosts local economies, diversifies energy supply, promotes grid resilience and is a critical component to promoting renewable energy.

Virtual net metering plays a crucial role in the viability of institutional solar development.

Eliminating barriers to a diverse and competitive solar economy is key to incentivizing solar adoption for local businesses, governments and schools.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Neighborhood, Local Government, State, Federal**

Partners

Chambers of commerce, departments of commerce, economic development organizations, utilities, Climate + Energy Project, Renew MO, solar companies and investors

Equity considerations/opportunities

Ramping up renewable energy production is a key workforce development/jobs creation opportunity. Programming should be developed to support to local, small businesses or BIPOC-owned businesses that could utilize solar to reduce operational costs.

Examples

- IKEA's Merriam, KS, location is the state of Kansas' largest rooftop solar array
- Boulevard Brewery's rooftop solar

Action
Conduct business-to-business outreach.
Educate local businesses, schools, governments, etc. about solar options.
Study virtual net metering strategies, improvement of existing net metering statutes, financing/incentives and barriers for commercial solar.
Promote use of increased Property Assessed Clean Energy (PACE) financing.

EG-2.3: Increase incentives and eliminate barriers for residential solar energy production

Mitigation ■ | Adaptation ■

Growth in residential solar energy production is an essential component of transitioning toward 100% renewable energy. And rooftop solar has become an increasingly affordable option for homeowners.

Residential solar gives many consumers the power to generate their own electricity, promoting a more resilient grid and diverse energy supply. Strategies like net metering enable homeowners to save on utility bills and be compensated by the utility for any excess energy created.

Municipalities play a key role in cultivating local solar markets by streamlining the permitting and interconnection processes and eliminating prohibitive zoning codes and restrictions.

Widespread residential adoption would benefit from evaluation of demand charges, grid access fees and homeowner association rules. In addition, fiscal incentives like tax breaks, utility rebates and loans, as well as diverse financing options, help make solar more affordable.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, and/or Federal**

Partners

Solar energy distributors/installers/developers, utilities, state/local governments, Renew MO, Climate + Energy Project, Environment MO, Sierra Club, chambers of commerce and EDCs, neighborhood associations and homeowners associations, Climate Action KC

Equity considerations/opportunities

As municipalities take steps to become more solar-ready, community members should be engaged early on for feedback and buy-in. Homeownership and affordability are barriers to widespread and equitable adoption. PACE programs should be evaluated for accessibility and equity, and should be well-regulated to establish safe lending and consumer protection standards. Community solar options and incentives for landlords can help tenants access the residential solar economy.

Examples

- Roeland Park's Solar-Ready Roofs Ordinance
- SolSmart

Action

Develop or share model ordinances and processes among municipalities and utilities for streamlining the permitting and interconnection for both solar panels and for storage.

Educate the general public about solar options, utility programs and financing opportunities.

Study improvement of net metering statutes, solutions for low- and middle-income homeowners/renters, financing/economic incentives, and PACE consumer protections.

Goal 3: Reduce disruption to the energy supply

COBENEFITS

health & well-being	environmental quality	**accessibility**	affordability	cost savings
green job development	**energy security**	**economic growth**	**resilience**	

LINKAGES

EG-3.1: Implement grid flexibility and smart grid strategies

Mitigation ■ | Adaptation ■

In order to transition from fossil fuels to renewable energy sources, we also must transform our grid. A vast network for electricity production, transmission, storage and distribution, the grid is currently built to support constant, centralized sources of electricity like coal.

Renewable energy sources like wind and solar create electricity intermittently throughout the day, depending on the amount of wind or sun available; the grid is not structured to support such variable, decentralized sources.

Utilities and local governments must determine how the grid can match rapidly changing electricity supply and consumer demand both affordably and without disruptions.

Interconnected power systems, monitoring technology, demand-response technology and advanced metering infrastructure are just a few of the solutions that can help bridge gaps in renewably sourced energy.

Policymakers and utilities should work to discover the best mix of grid flexibility measures for our region's resources and demand.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**Underway**	**Local Government, Regional, State, Federal**

Partners

Local engineering firms, state and local governments, utilities

Equity considerations/opportunities

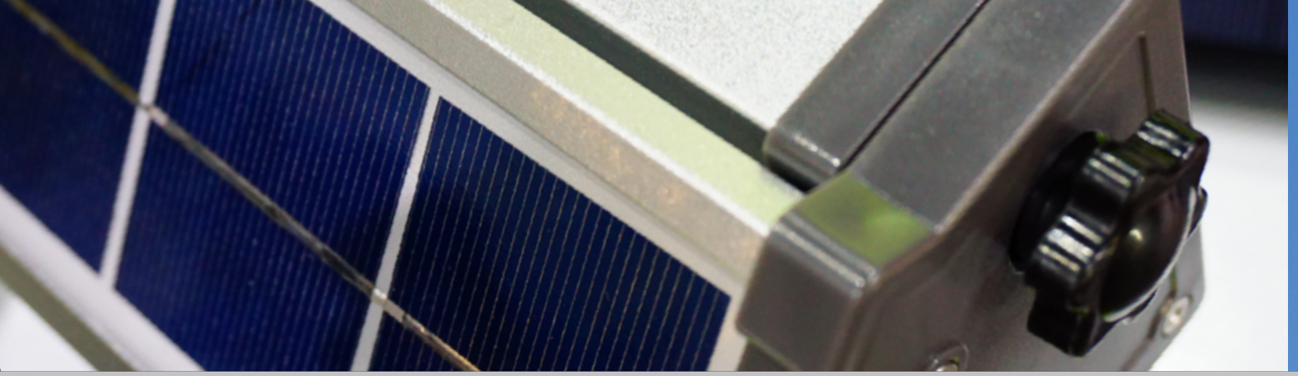
A resilient and efficient grid would help underserved populations avoid the worst impacts of energy insecurity, reduce outages and enable transition to renewable energy.

Examples

- New York's $15 million "Future Grid Challenge"
- Spain's interconnected power systems

Action

Study and advance priority grid technology and modernization strategies for the region.



EG-3.2: Utility-scale and distributed energy storage

Mitigation ■ | Adaptation ■

The traditional function of utilities has been to meet demand for power in real-time, leading to potential inefficiencies and occasional disruptions in energy supply. Energy storage would not only help during outages, but is also essential to supporting the transition to variable renewable energy sources like wind and solar.

On especially windy or sunny days, peaks in energy production generate a surplus of energy that can be stored and used later, bridging the gaps where at times there may be less wind or sun, or helping utilities meet demand during peak hours. Grid-scale battery storage projects like solar plus storage allow utilities to charge and discharge battery power to meet demand.

For distributed energy solutions like residential, commercial or community solar, onsite distributed energy storage can enable consumers to rely on renewables, while also avoiding peak demand charges.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**Underway**	**Neighborhood, Local Government, State, and/or Federal**

Partners

Solar and storage technology companies and distributors, utilities, local and state governments, engineering firms, Renew MO, Climate+Energy Project, Sierra Club, Environment MO, chambers of commerce, EDCs, departments of commerce

Equity considerations/opportunities

Robust battery storage would aid in utility-scale clean energy transition, allowing for more widespread access to renewable energy. In addition, energy storage solutions would reduce or eliminate disruptions in energy supply that would impact underserved and at-risk populations. Distributed energy storage solutions are still cost-prohibitive and incentives could increase affordability and decrease prices.

Examples

- NextEra Garder Solar Energy and Storage Project

Action

Study the feasibility of various utility-scale energy storage solutions, financing and economic incentives to increase affordability and attract investors.

EG-3.3: Increase power outage resilience

Mitigation ☐ | Adaptation ■

More climate-induced extreme weather will require measures to minimize power outages. Loss of electricity is not just inconvenient—it can be life-threatening for many at-risk populations. The Kansas City region is particularly vulnerable to extreme storms and flooding, with trees compromising powerlines. Buried at-risk powerlines can help minimize outages related to severe weather and advanced monitoring/metering technology can help utilities rapidly identify impacted areas to reduce disruptions.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**Underway**	**Local Government**

Partners

Utilities, local governments, MARC, Climate Action KC

Equity considerations/opportunities

People with lower incomes, as well as those with disabilities and older adults, are most impacted by power outages. In addition, individuals with specific health risks may experience life-threatening danger from outages. Backup power is not affordable for many low- and middle-income residents.

Examples

- Commonwealth Edison Advanced Metering for Outage Management: https://www.greentechmedia.com/articles/read/how-utilities-are-transforming-outage-management-into-rapid-recovery
- KCP&L (Evergy), WestStar Advanced Metering: https://www.tdworld.com/smart-utility/metering/article/20972121/kcpl-westar-expand-advanced-metering
- Evergy - Plant the Right Tree in the Right Place
- Resiliency centers in Baltimore, Maryland, led by Power52

Action

Study expanding advanced metering and monitoring technologies to better track outages and vulnerabilities, and additional grid resilience solutions.

Analyze costs and benefits of strategically focused regional buried powerline projects.

Identify community centers that could be developed into resilience centers/shelters to improve emergency preparedness and resilience. Engage surrounding communities to equip centers appropriately.

Finance & Innovation

GOALS

1. Fund climate action
2. Leverage green economy through jobs training and the innovation ecosystem to accelerate climate action
3. Provide high speed digital access to underserved communities

"Seek out, encourage, and seed the green economy. Look for...creative approaches and make sure they're supported by the innovation ecosystem..."

KAREN R.

Climate action is rooted in creating a more equitable, just and healthy environment for all. However, there is often not equitable access to programs and initiatives that are set up to address climate inequities.

Finance and innovation around climate action goals and strategies are necessary to create an environment that increases and encourages participation, access and impact.

But, as with all things, there is no one solution that will work in a silo. These actions are intended to be mutually supportive to one another and to the strategies in other sections of this plan.

The Kansas City region is well-known for its philanthropic community, but philanthropy alone will not get us to the ambitious goals this plan lays out to move the region forward from a financial standpoint.

The global markets have continued to evolve to support climate action policies and the Kansas City region through the support of public, private and nonprofit organizations. We are well-positioned to make the most of existing and emerging tools to increase financial investment and innovation to support climate action.

Leading by example:

1. Connecting for Good
2. Carbon Fund

Goal 1: Fund climate action

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

FI-1.1: Develop innovative financing solutions to support local climate initiatives/green bank

Mitigation ■ | Adaptation ■

A variety of funding mechanisms are being explored around the country to support resilience initiatives. For example, voluntary carbon offset programs can provide the funds necessary to support other local climate initiatives and financing opportunities to help mitigate the impact of those emissions on the local environment.

Community funding districts, such as transportation development districts (TDDs) or community improvement districts (CIDs), can be set up to fund specific projects within areas to improve access for alternative transportation, provide green infrastructure and make other improvements that can impact greenhouse gas emissions.

Increasing access to equity can also be achieved through green banks like the Regional Building Energy Exchange as outlined in the energy efficiency section of this plan.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**3/10/30-year**	**Neighborhood, Local Government, Regional, State, and/or Federal**

Partners

Economic development organizations, financial institutions, chambers of commerce

Equity considerations/opportunities

Particular consideration should be given to increasing financial equity to communities with higher energy burdens and lower existing investment.

Examples

- National Climate Bank Nonprofit
- New York City Energy Efficiency Corporation

Action
Develop, review and analyze existing TDDs, CIDs and similar funding structures in the region and the applicability to funding community climate action projects.
Work with chambers of commerce, CDFIs and economic development organizations to determine appropriate actions for the local market.

FI-1.2: Actively conduct business development and marketing to utilize existing financial tools and incentives

Mitigation ■ | Adaptation ■

Specific, investible ideas to address impacts of climate change are key elements of this plan. The success of business development efforts relies not only on sufficiently marketing the existing tools and incentives but also creatively identifying new opportunities to leverage investments.

Mechanisms such as project pipelines can help increase awareness of available opportunities. Connecting these projects with tools and incentives could play a pivotal role in accelerating investment in priority resilience strategies.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway/1-3-year**	**Neighborhood, Local gov, regional, state/fed**

Partners

Community and neighborhood associations, homeowner associations, local financial institutions, utilities, Building Energy Exchange, Metropolitan Energy Center

Equity considerations/opportunities

Taking advantage of existing financial incentives, such as rebates, requires a level of initial capital that can be difficult to come by.

Examples

- Metropolitan Energy Center

Action
Develop community-based marketing plans for existing financial incentives, starting with the Regional Building Energy Exchange.
Evaluate the impacts of existing and potential new incentives for commercial and residential uses.

Goal 2: Leverage green economy through jobs training and the innovation ecosystem to accelerate climate action

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

FI-2.1: Support and scale up existing green workforce programs, identify gaps for new programs

Mitigation ■ | Adaptation ■

The renewable energy sector is increasingly one of the largest employers in a previously oil-and-gas driven economy. There is significant opportunity to engage with climate action through existing workforce and training efforts that could use a boost. There are also potential gaps where new programs are appropriate and necessary to provide green workforce opportunities to new generations.

Engaging trade organizations to help develop updated training for members on new methods and approaches to energy efficiency and reduction of greenhouse gas emissions may also prove useful in filling identified training and workforce gaps.

Potential to reduce GHG	Status/Time frame	Scale
Low/Indirect	Underway/1-3-year	Local Government, Regional, State, and/or Federal

Partners

Workforce development programs, trade organizations, community colleges, Climate Action KC

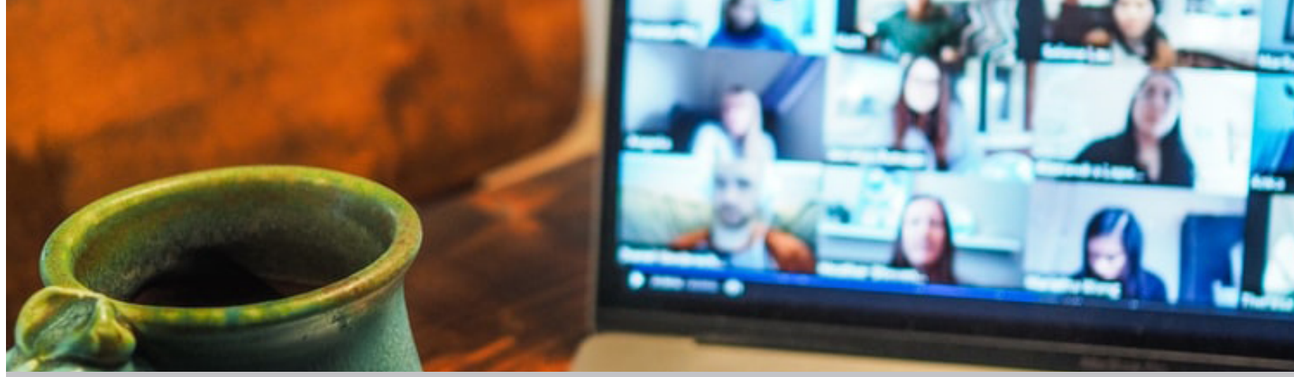
Equity considerations/opportunities

Retraining/reskilling could provide green collar job opportunities for unemployed or underemployed individuals

Examples

- Green Collar Jobs initiative
- Johnson County Community College – sustainability in specific degree program

Action
Identify existing training that could be increased in scale; evaluate gaps in current programs. Evaluate the creation of a contractor accelerator program.
Develop a long-term training and workforce development strategy for the region.



FI-2.2: Tie climate action to existing accelerators and incubators

Mitigation ■ | Adaptation ■

The Kansas City region is rich in entrepreneurship activity, with many existing and upcoming business accelerators and innovation incubators.

By working with the existing startup and entrepreneurship community, we can leverage the established assets and encourage climate considerations in startup activities wherever possible.

This may also attract new or different startups to the local accelerators for a focus on climate-sensitive solutions to problems.

Emphasis should be placed on providing equity to and incubation of minority-owned businesses and other communities with historical underinvestment.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	Underway/1-3-year	Regional, State, and/or Federal

Partners

Innovation organizations, entrepreneurship support organizations, local corporations with innovation and entrepreneurship programs

Equity considerations/opportunities

Emphasis on minority-owned businesses and underinvested communities should be a priority when looking at business incubation. Since entrepreneurial acceleration is needed to drive climate-sensitive solutions, minority-owned startups and startups originated in traditionally underserved neighborhoods can address the disproportionately negative impacts that business as usual can have on their community.

Examples

- Accelerators tackling climate change
- Power52 in Baltimore

Action
Identify and engage existing incubators and accelerators in region.
Create climate-focused cohorts in two to three accelerators.

FI-2.3: Launch innovation and design challenges

Mitigation ■ | Adaptation ■

When devising climate action strategies, it can be easy to plan for scenarios without fully considering the direct impact on all residents of the region. Human-centered innovation and design challenges require the focus to be on the people impacted by these policies, strategies and goals. This ensures that new methods and approaches developed consider all impacts, positive and negative, on the residents of the Kansas City region.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**1-3-year**	**Neighborhood/Regional**

Partners

Design and facilitation professionals, community engagement strategists, Climate Action KC, MARC

Equity considerations/opportunities

One of the underlying principles of design thinking is to ensure consideration of people-centered outcomes, which have the opportunity to be a direct link to increased equity in implementation of all climate planning strategies.

Examples

- UX Collective
- Amati & Associates

Action
Develop design sprint methodology focused on climate action implementation.
Conduct one to three design sprints per year to supplement implementation of climate action plan goals.

Goal 3: Provide high-speed digital access to underserved communities

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

FI-3.1: Support incentives for wireline connections to all homes in region with access to low-cost options for connectivity

Mitigation ■ | Adaptation ■

Most climate action and energy efficiency programs require online connections to the home in order to participate in and benefit from the savings associated with the program.

Additionally, engagement and information is often handled, at least in part, in online platforms and through online requests for feedback.

By ensuring that all homes have wired high-speed internet access, we can increase access to and participation in consumer-level climate action strategies.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway/1-3-year/ 10-year**	**Neighborhood, Local Government, Regional, State, and/or Federal**

Partners

Utilities, telecom companies, local governments

Equity considerations/opportunities

Internet access is quickly becoming as much a basic need as electricity and water. Prioritizing communities with no connections will increase access to basic savings programs.

Examples

- KC Digital Drive
- MO Broadband Resource Rail

Action
Support existing local, state and federal initiatives to increase home-based internet access.
Encourage inclusion of climate and equity considerations into programs that provide home-based internet access.

Urban Greening

GOALS

1. Create resilient, ecologically healthy landscapes
2. Reduce urban heat islands
3. Sequester carbon through land stewardship
4. Develop and adopt facilitative policies

"Our region….needs to plant millions of trees in the urban core and to restore our floodplain forests and stream corridors. A comprehensive and systematic urban community reforestation program would provide many climate mitigation and adaptation benefits."

SCOTT S.

Green infrastructure—from trees and rain gardens to prairies, wetlands and forests—is the low-hanging fruit of climate adaptation, providing a long list of benefits, such as clean air and water, reduced flood risk, energy conservation, habitat, recreation, carbon sequestration and improved public health.

Nature-based solutions present meaningful, scalable opportunities to mitigate for greenhouse gas emissions at large and small landscape scales, while helping with adaptation and resilience toward key climate threats of heat and flooding.

Prairie, forest or wetland restoration nested within parks and open space protection provide watershed-scale benefits. Alternatively, resilient site-scale opportunities abound, including tree planting at bus stops, native landscaping along streetscapes or orchards and gardens at schools and community centers.

MARC estimates that current riparian forests sequester approximately 600,000 tons CO2e/year. Area forests, prairies and savannahs are estimated to sequester approximately 1.5, 3-5, and 5-7 t/year, respectively. Doubling well-managed riparian habitat would double carbon sequestration.

Large landscape conservation practices, from grassland and wetland restoration to cover cropping and regenerative agriculture, create opportunities to scale up mitigation efforts by an order of magnitude. Sequestration opportunities will allow the region to achieve net zero reductions after energy generation, energy efficiency and transportation measures are implemented.

GHG Reduction:

37 million $MTCO_2e$

Total emissions in 2050 (all sectors)

-30.8 million $MTCO_2e$

Reductions by 2050 (all sectors)

17%

(6.1 million $MTCO_2e$)

Required reduction by sequestration to meet net zero target

Leading by example:

1. City of Lenexa Rain to Recreation Program
2. Johnson County Parks and Recreation prairie restoration project
3. Bridging The Gap's Heartland Tree Alliance

Top reduction strategies:

1. Soil carbon sinks (landscape-scale regenerative agriculture and ecosystem restoration)
2. Riparian and urban forest restoration
3. Native landscapes

Goal 1: Create resilient, ecologically healthy landscapes

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CR-1.1: Conserve and restore the region's urban forests

Mitigation ■ | Adaptation ■

Recent studies show that urban forests across the metro are in decline due to insects and disease, lack of care, urbanization and insufficient replanting after mortality.

Substantial, multi-benefit tree planting opportunities exist throughout the region. Four specific opportunities include planting around private homes; along streets, parking lots and mobility hubs; in parks; and along area streamways.

Urban forestry—from tree care and forest protection to tree planting—provides many climate mitigation, adaptation and resilience benefits. Importantly, trees cool the city, while reducing flood risks, simultaneously addressing two of the key climate threats facing the Kansas City region. Growing employment demand, from nursery production to skilled arborists, provides a compelling cobenefit. Additional cobenefits from urban forest management include place-making, increased property values and beautification.

Potential to reduce GHG	Status/Time frame	Scale
Medium/Low	**1/3/5/10-year**	**Local Government, Regional**

Partners

Local governments, Heartland Tree Alliance, Groundworks NRG, Greenworks KC

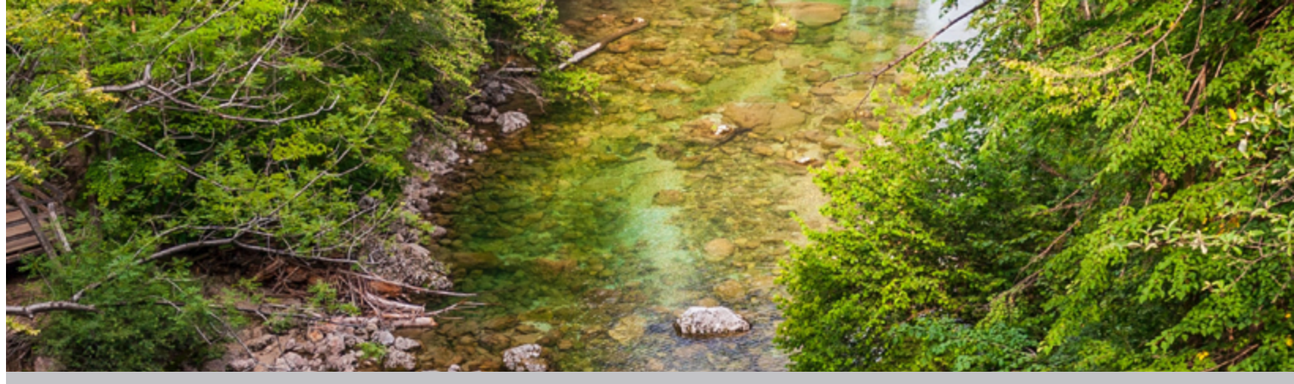
Equity considerations/opportunities

Tree planting in underserved neighborhoods can reduce energy burdens, improve public health and beautify neighborhoods.

Examples

- Heartland Tree Alliance

Action
Expand public, private and nonprofit partnerships to facilitate tree planning and nature-based solutions.
Facilitate development of urban forestry plans by local governments.
Strengthen and create youth and workforce development programs, including a regional Conservation Corps.
Conduct cooperative procurement of trees for regional planting.



CR-1.2: Conserve and restore the region's riparian (or streamside) corridors

Mitigation ■ | Adaptation ■

Many area jurisdictions adopted stream protection ordinances about 10-15 years ago. While these policies restricted development along streamways (thereby reducing risk to public safety, property and infrastructure), they are not sufficient to mitigate against increased risks of flooding or to enhance ecosystem health along area streams.

Restoring streamside or riparian habitat enables communities to stack multiple benefits from a single investment.

The restoration of connected riparian habitat, according to a recent Kansas State University study, is one of the most important measures to reduce peak flows during storm events while reducing risks of stream channel erosion.

Additional benefits provide for recreation, public health, habitat and biodiversity, and improved air and water quality.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Neighborhood, Local Government, Regional, State, and/or Federal**

Partners

Public works/planning/parks/stormwater directors, University of Missouri Center for Agroforestry, The Nature Conservancy, The Conservation Fund, Heartland Conservation Alliance, Bridging The Gap

Equity considerations/opportunities

Multi-benefit stream restoration opportunities can mitigate climate risks in vulnerable communities while building community wealth through jobs and business creation.

Examples

- Stream Corridor Protection and Adaptive Management Manual
- Riparian buffers – National Center for Agroforestry

Action
Develop a pilot interjurisdictional stream/riparian corridor management plan.
Create a project pipeline linked to voluntary carbon offsets to expedite project implementation.
Support use of agroforestry strategies to link food security with natural resource stewardship.

Goal 2: Reduce urban heat islands

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CR-2.1: Implement heat island mitigation strategies

Mitigation ☐ | Adaptation ■

Three leading strategies identified to mitigate urban heat islands include tree planting, cool (white or green) roofs and planning and zoning amendments to reduce the size of impervious areas like streets and parking lots. Similar to trees, green roofs provide multiple benefits related to water resource management, energy conservation and urban habitat creation. Planning and zoning strategies are in turn connected to 15-minute neighborhoods and the viability of transit-oriented development.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Indirect	3 Years	Regional	MARC

Partners

Climate Action KC, utilities, planning and zoning departments, Heartland Tree Alliance

Equity considerations/opportunities

The effects of urban heat islands disproportionately impact those living in inefficient or substandard housing, those who work outside or those who rely on active transportation. Mitigation opportunities will focus first on those most vulnerable to excess heat.

Examples

- MARC Heat Island Mitigation Assessment
- National Integrated Heat Health Information System (NIHHIS - NOAA)

Action
Catalyze an increase in tree canopy coverage in heat-vulnerable communities, with trees planted at the southwest corner of every home.
Facilitate reduction of heat-absorbing, impervious infrastructure through parking maximums and green/complete streets.
Continue to explore utility support for heat island mitigation programs focused on trees and cool roofs.

Goal 3: Sequester carbon through land stewardship

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CR 3.1: Become a net zero community through urban- and landscape-scale sequestration projects

Mitigation ■ | Adaptation ■

Carbon sequestration draws down atmospheric carbon, storing it instead in the soil and vegetation. Land stewardship practices, whether in agriculture or forestry, parks, stream corridors or rights of way, have astounding potential to sequester carbon, restore soil, retain water and improve ecosystem health. To become a net zero community, urban- and landscape-scale sequestration projects will complement mitigation measures related to energy generation, buildings and transportation.

Potential to reduce GHG	Status/Time frame	Scale	Lead
Indirect	10 Years	Regional	MARC

Partners

Parks managers, farm bureaus and university extensions, Climate Action KC, master naturalists, transportation and stormwater system managers, Deep Roots

Equity considerations/opportunities

Land stewardship will contribute to community resilience, the productivity of urban agriculture and orchards, and community beautification.

Examples

- Green Stewards Program
- Kansas City, Missouri
- Bridging The Gap

Action
Create and expand regenerative agriculture and soil restoration initiatives in urban and rural areas.
Facilitate the conservation, restoration and management of natural and engineered green infrastructure systems.
Expand use of third-party certification by such organizations as the Institute for Sustainable Infrastructure (Envision) or Sustainable Sites Initiative (SITES) by local governments.

Goal 4: Develop and adopt facilitative policies

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CR 4.1: Incentivize use of green development practices

Mitigation ☐ | Adaptation ■

Local government policies have the potential to either incentivize the use of green infrastructure practices, or to remove barriers to their application. Policies related to land use, stormwater management, stream protection, tree protection and native landscaping have potential to significantly enhance community resilience associated with green infrastructure applications.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	3 years	Regional

Partners

Climate Action KC, local governments

Equity considerations/opportunities

Green infrastructure has been shown to have enormous potential to catalyze sustainable redevelopment across metro Kansas City, and nationally.

Examples

- Model MARC tree protection and native landscaping ordinances

Action
Facilitate development and adoption of tree, native landscaping and strengthened stream buffer ordinances.
Consider updates to planning/zoning regulations and engineering standards to remove barriers to and create incentives for green infrastructure implementation.
Integrate green infrastructure elements in cross-sector applications and plans.

Volunteers at tree planting event
Photo courtesy of Bridging The Gap.

Healthy & Resilient Homes and Buildings

GOALS

1. Increase whole building performance and health for commercial, institutional and industrial buildings
2. Improve whole home performance and health
3. Develop and implement state and local policies to facilitate energy conservation

"I'd love to see the region's government, nonprofit and business leaders come together on a home energy improvement hub that would hold homeowners' hands in improving their homes. Help us get started, help us figure out whether to do something ourselves or hire help. Help us figure out who to hire and how long it will take our investent to pay off."

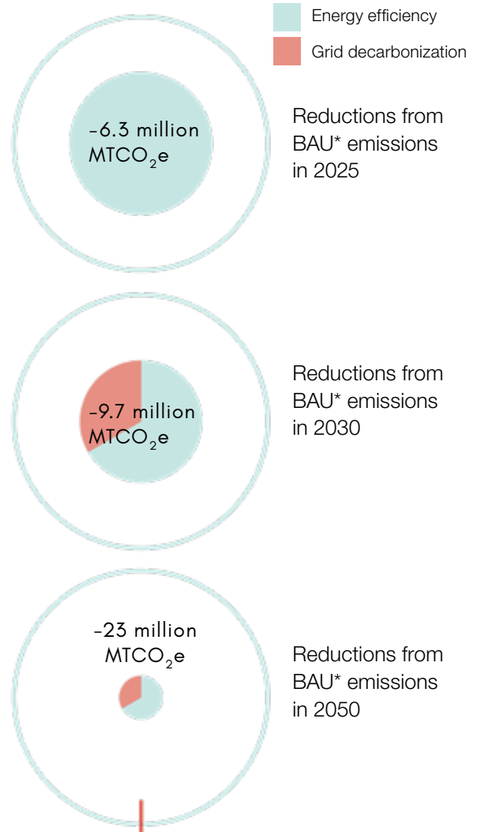
MELISSA C.

An array of housing units, commercial and industrial structures, community centers and schools make our communities vibrant and livable. This robust built environment comes at a cost, however, generating 63% of our region's GHG emissions. Basic energy conservation measures like efficient windows, insulation, lighting, and heating/cooling will cut back on emissions from energy usage; however, a more holistic whole-building approach that evaluates broader building systems, facilities, and how they interact with the grid can lead to deeper savings. Energy efficiency regulations and incentives have become one of the most popular emissions reduction strategies because they prevent the construction of new power plants, reduce grid infrastructure costs, and create green jobs, all while improving public health and generating cost savings for businesses and homes.

While new buildings can take advantage of more efficient design and construction standards, modifying existing buildings has the greatest potential for energy savings. Retrofitting aging buildings enables businesses, institutions, and residents to reduce energy use, shrink their carbon footprint, and cut costs while also extending the life of the building and raising property values.

Kansas City residents, especially low-income Black and Latino households, bear some of the greatest financial burden in the country related to utility bills, highlighting the importance of government and utility weatherization programs and performance standards that directly address issues of affordability, health, and safety for our most vulnerable populations. State and local policy is particularly important in providing necessary programs, regulations, and cost-saving measures.

GHG Reduction:



87%
Sector GHG reduction

*Business-as-usual (BAU) emissions are projected GHG emissions if no action is taken.

Leading by example:

1. Second + Delaware Passive House in the River Market
2. Postycards
3. Johnson County Community College's campus-wide energy conservation and renewable energy program

Top reduction strategies:

1. Improvements to existing residential buildings
2. Improvements to existing commercial/ industrial/municipal buildings
3. Improvements to new residential buildings
4. Improvements to new commercial/ industrial/municipal buildings
5. Home repairs and building envelope repairs (for heating with natural gas)
   a. Insulation and windows
   b. Efficient furnaces

Goal 1: Increase whole building performance and health for commercial, institutional and industrial buildings

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

BE-1.1: Develop and employ a building performance standard beginning with energy benchmarking, and adopt commercial energy efficiency programming and incentives.

Mitigation ■ | Adaptation ■

A combination of energy conservation regulations and incentives will help set an environmentally healthy baseline for businesses, as well as encourage the adoption of efficiency measures. Municipal building performance standards require building owners to take direct action to meet specific city-mandated performance improvements for their property.

Cities establish long-term higher performance standards with manageable targets in between, and built-in flexibility for business owners to choose the energy efficiency strategies that make the most sense for their needs.

Guidance from the International Code Council provides a framework for local governments in establishing and adopting building standards.

These standards require robust benchmarking to assess and monitor individual property goals, and data can be used to create programs, technical assistance, resources and incentives. State and local governments and utilities should collaborate to expand financial incentives like rebates and loans, program management solutions, and code enforcement strategies.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, Regional, State, and Federal**

Partners

Climate Action KC, local governments, utilities, Midwest Energy Efficiency Alliance, USGBC, Metropolitan Energy Center, Urban Land Institute, Elevate Energy, architecture and engineering firms, local departments of commerce

Equity considerations/opportunities

Building performance standards will increase momentum toward energy efficiency goals, promoting building performance and green jobs.

Examples

- DC Building Performance Standards
- Building Energy Performance Standard - City of St. Louis
- Kansas Facility Conservation Improvement Program (FCIP)

Action
Facilitate development of appropriate benchmarking and building performance standards for municipalities around the region linked to supportive utility incentives programs.
Promote PACE, Regional Building Energy Exchange and other inclusive financing options. Study feasibility of other financial incentives for commercial energy efficiency in Kansas and Missouri.
Promote retrocommissioning and other commercial building management strategies.

BE-1.2: Certify every public building for Energy Star or LEED

Mitigation ■ | Adaptation ■

Green building certifications signal a commitment to sustainability, which is especially important for public agencies. The EPA's Energy Star program for Commercial Buildings is a robust network of resources, benchmarking data, certification and support, making it an invaluable tool to help organizations reach their energy efficiency goals.

The U.S. Green Buildings Council's Leadership in Energy & Environmental Design (LEED) program takes a more holistic approach to building performance, and providing recognition and certification to building owners who meet their standards. The U.S. Green Buildings Council's new Arc platform also helps organizations track and score building performance in accordance with LEED or Energy Star goals. Third-party certifications like Energy Star and LEED would enable public institutions to demonstrate exemplary environmental stewardship.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, Federal**

Partners

Local governments, public agencies, utilities, Midwest Energy Efficiency Alliance, Climate + Energy Project, U.S. Green Building Council, Metropolitan Energy Center, Bridging The Gap, Renew MO, chambers of commerce, architecture and engineering firms

Equity considerations/opportunities

Energy efficiency investments in public buildings would promote green jobs in the energy efficiency sector. Building upgrades provide healthy environments for public institutions and agencies that serve underserved populations.

Examples

- Johnson County Courthouse – LEED Gold
- Johnson County Sunset Office Building – LEED Gold
- Kansas City, Missouri, LEED Building Ordinance

Action
Support implementation of third-party certification for energy efficiency or green building measures in public sector buildings.

BE-1.3: Implement energy efficiency and renewable energy strategies at schools, universities, nonprofit organizations and libraries

Mitigation ■ | Adaptation ■

Energy savings are crucial for civic institutions like schools, nonprofit organizations and libraries. Reducing energy burden will increase resources available for essential services and community development efforts.

Utilities can develop programming that provides nonprofits and libraries with complementary facility assessments and energy efficiency solutions to help lower operating costs.

In addition, Energy Star provides helpful resources and services for universities and schools. Utility incentives and rebates, and Building Exchange loans may support nonprofit and public agency efforts. Energy Star and/or LEED certification may signal community commitment to sustainability and healthy community spaces.

Building energy improvements will enable community resources to also serve as affordable cooling centers during periods of extreme heat.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, Federal**

Partners

Schools, universities, nonprofit organizations, libraries, utilities, Climate Action KC, USGBC, Metropolitan Energy Center, Elevate Energy, utilities, architecture and engineering firms

Equity considerations/opportunities

Reduced energy spending for public service institutions can lead to a greater investment in community services and programming. Increased investment in energy efficiency investments also cultivates green jobs.

Examples

- ComEd Nonprofit Energy Efficiency Program
- ComEd Library Energy Efficiency Program
- University of Kansas Energy Conservation Program

Action
Facilitate development of financial incentives and resources.
Promote EnergyStar and LEED Certification.

Goal 2: Improve whole home performance and health

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

BE 2.1: Leverage the Climate Action KC Regional Building Energy Exchange

Mitigation ■ | Adaptation ■

Climate Action KC launched the Regional Building Energy Exchange with the aim of achieving net zero emissions for all buildings. The Exchange will serve as a one-stop hub for innovative solutions and emerging trends in the built environment. The program will assist renters, homeowners and building owners with technical assistance, managing contractors, accessing utility incentives and financing options. Its initial focus will be to provide resources and services to low-income households, renters and public housing developments in order to address urgent livability issues, relieve burdensome utility bills and reduce energy waste.

This centralized regional resource will aid with new construction and building improvement projects to help achieve net-zero emissions, especially in low- and moderate-income communities. It will also support governmental entities and municipalities with policy development and increase access to critical data and tools. The Building Energy Exchange will ultimately encompass both residential and commercial building performance to help the region meet ambitious climate goals, create jobs, accelerate innovation and grow the economy.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, Utility**

Partners

Climate Action KC, LISC, Elevate Energy, New York Energy Efficiency Corporation, local governments, public health agencies, hospitals, utilities, Metropolitan Energy Center, MARC

Equity considerations/opportunities

Weatherization is a critical way to address the most immediate impacts of climate change in frontline populations, establishing fundamentally safer, healthier and more resilient communities. Housing advocates, tenants, low-income communities and communities of color will be engaged in program design and implementation.

Examples

- New York Green Bank
- Building Innovation Hub, Washington DC

Action
Identify priority communities and building types, design appropriate strategies, and set targets, with emphasis on low-income populations and tenants.
Engage underserved community members and leaders in developing the Exchange's energy efficiency programming.
Link energy efficiency improvements to healthy homes and affordable housing initiatives, beginning with cross-sector dialogue.

BE 2.2: Maximize savings through energy efficiency and healthy home programs

Mitigation ■ | Adaptation ■

A healthy home is an energy efficient home, and residential energy programs will address the intersections of environmental quality, health, building integrity and energy. Governments and utilities can incentivize residential energy conservation through a combination of programs aimed at providing weatherization services and resources, along with fiscal incentives, financing options and relief.

Local governments can encourage builders to pursue green building practices through various discounts and allowances, but issues with whole-home health are primarily found in existing housing stock. Roughly half of Kansas City residents are renters. Tenants, low-income populations and communities of color disproportionately struggle with poor indoor environmental quality, disrepair and costly energy bills.

Healthy home programs provide environmental health education, resources and services, and can operate in tangent with energy efficiency programs for renters and low-income households to address core livability and affordability concerns. Substandard housing has become a hallmark impact of historic redlining, but a robust expansion of these programs addresses urgent basic needs while mitigating the impacts of climate change.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, Utility**

Partners

Climate Action KC, utilities, state and local governments, public health and environment agencies and advocacy groups, hospitals, utilities, Metropolitan Energy Center, MARC, KC Tenants, Missouri Energy Efficiency For All, Midwest Energy Efficiency Alliance, Community Action Network

Equity considerations/opportunities

Weatherization addresses the most immediate impacts of climate change in frontline populations, establishing fundamentally safer, healthier and more resilient homes. Housing advocates, tenants, low-income communities and communities of color will be engaged throughout the process.

Examples

- Kansas City Healthy Homes Rental Inspection Program
- California Hub for Energy Efficiency Financing

Action
Identify and facilitate implementation of residential energy efficiency and healthy home programs, incentives and appropriate local government enforcement strategies with emphasis on low-income populations and tenants.
Engage underserved community members and leaders in planning and deployment of energy efficiency measures.
Convene partnership among area utilities, housing advocates, public health agencies, designers and other stakeholders to discuss barriers and solutions.

BE 2.3: Embed energy efficiency and durability in affordable housing efforts

Mitigation ■ | Adaptation ■

Residential energy conservation programs simultaneously address urgent housing and climate issues. Public housing authorities across the country have struggled with fiscal constraints leading to environmentally hazardous, inefficient and unsafe living environments for tenants.

Affordable housing residents frequently cope with faulty electrical, appliances, plumbing, heating and cooling systems. A deep weatherization and retrofit program specifically targeted toward affordable housing properties would both save energy and mitigate climate risks while helping housing authorities address deferred maintenance costs.

Deep retrofits could help buildings save nearly 30% on water usage and up to 70% on energy bills, leading to long-term cost savings and affordability benefits. Getting public housing up to the standard of safety and livability using energy and healthy home retrofits would promote stronger, healthier, equitable and more resilient communities.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Neighborhood, Local Government, State, Federal**

Partners

Local governments, affordable housing organizations, public health agencies groups, Climate Action KC, hospitals, utilities, Metropolitan Energy Center, MARC, KC Tenants

Equity considerations/opportunities

Retrofitting affordable housing is a critical way to address the most immediate impacts of climate change in frontline populations, establishing fundamentally safer, healthier and more resilient communities. Housing advocates, tenants/tenant unions and public housing communities will be engaged throughout the process.

Examples

- Massachusetts' Green Retrofit Initiative
- Massachusetts' Low Income Multi Family Energy Retrofit Program
- San Antonio Housing Authority has retrofitted or built over one million square feet of "Build San Antonio Green"-certified housing
- HUD Sustainable Housing Initiative

Action
Evaluate policies and programs to retrofit all public housing developments.
Build coalition with housing agencies and advocates to discuss and advocate for sustainable public housing solutions.
Engage underserved community members and leaders in planning and advocacy work around energy efficiency measures.

BE 2.4: Adopt building health and performance standards and local government enforcement strategies, including IECC and National Healthy Housing Standard

Mitigation ■ | Adaptation ■

Housing standards and regulations are essential tools to ensure healthy, safe, well-maintained and efficient housing. The National Center for Healthy Housing National Healthy Housing Standard focuses primarily on improving the conditions of existing buildings that may not be up to current health and safety standards.

The International Code Council's comprehensive construction, fire, energy and property maintenance codes all affect healthy housing. Municipalities in the region should align building codes with these standards and explore enforcement solutions to improve the overall performance of the region's housing stock.

Energy and environmental disclosure programs within healthy, efficient housing ordinances would empower tenants and potential homeowners with information about the environmental health and energy affordability of a property before they move in. Establishing and enforcing housing codes is critical to providing a higher basic standard for housing.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Neighborhood, Local Government, State, Federal**

Partners

Local governments, public health agencies, utilities, Climate Action KC, Metropolitan Energy Center, MARC, KC Tenants

Equity considerations/opportunities

Codes adoption and enforcement should focus particularly on existing properties that typically have more health and safety issues, and are primarily occupied by vulnerable populations. Underserved communities are most impacted by unhealthy homes and often lack the means to relocate, and neighborhood leaders and community members should be engaged throughout the process of developing and enforcing code. Community education about basic housing standards together with healthy home programming and resources will help tenants to report and resolve violations.

Examples

- The City of Dallas worked in collaboration with the National Center for Healthy Housing on a Neighborhood Revitalization Plan for the city, culminating in the passage of a healthy housing ordinance in 2016.
- City of Memphis strategic housing code enforcement
- Minneapolis's Residential Energy Disclosure ordinance

Action
Facilitate evaluation of housing codes and standards with cities to determine policy alternatives and improvements.
Study equitable and transparent reporting and local government enforcement strategies.
Consider adoption of healthy housing codes and enforcement processes with emphasis on underserved neighborhoods, low-income housing and rentals.

BE 2.5: Expand water use efficiency programs

Mitigation ■ | Adaptation ■

Using water at home requires energy to be cleaned, transported and heated. Hot water is responsible for nearly a quarter of residential energy use worldwide, and conservation measures inside and outside the home can help homeowners save money on both water and energy bills.

Local standards that require water-efficient plumbing are particularly effective. Utilities and local governments may link regulations with incentives, such as rebates on efficient appliances. In addition, promotion and education around water conservation programs like EPA's WaterSense program can help residents make informed decisions about their water habits, plumbing and appliances.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Local Government, State, and/or Federal**

Partners

Bridging The Gap, MARC, utilities, KC Water

Equity considerations/opportunities

Access to clean, affordable water is a fundamental equity issue. Community engagement throughout will communicate the impact of water conservation incentives, regulations and resources.

Examples

- Bridging The Gap's water conservation program
- CALGreen California Green Building Code includes aggressive water efficiency and conservation standards

Action
Facilitate development of utility and local government strategies for water conservation and assistance programs, particularly geared toward low-income residents.
Provide robust outreach and education for water conservation as well as demand reduction strategies, such as EPA's WaterSense program.
Support adoption of water conservation codes, such as the IECC's Water Conservation Codes.

Goal 3: Develop and implement state and local policies to facilitate energy conservation

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

BE 3.1: Pay-As-You-Save (PAYS)

Mitigation ■ | **Adaptation** ■

Utility Pay-As-You-Save (PAYS) financing options eliminate the barrier of upfront costs for energy efficiency upgrades, especially for tenants in multifamily residential units.

Customers pay nothing upfront for their energy efficiency updates, and instead the utility adds a fixed charge to the customer's monthly bill to cover the cost. The added on-bill cost is still less than the estimated savings incurred by the update, so ratepayers can immediately enjoy the benefit of cost-savings. PAYS allows low-income families to add energy efficiency upgrades that might otherwise be unaffordable, offering an accessible and equitable financing option. The program would be particularly impactful because it opens the energy efficiency market up to all consumers, and the immediate savings is a key incentive that would increase demand for both commercial and residential energy efficiency projects. State and local regulators should encourage PAYS adoption across all area utilities.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, Utility**

Partners

Climate Action KC, state and local governments, utilities, public health and environment agencies, Climate+Energy Project, RenewMO, Metropolitan Energy Center, Sierra Club, Environment MO, MARC, KC Tenants, Empower MO, Missouri Energy Efficiency for All, Midwest Energy Efficiency Alliance, Community Action Network

Equity considerations/opportunities

Providing affordable financing options for efficiency upgrades is a critical way to establish fundamentally safer, healthier and more resilient communities while enabling residents to reduce their energy burden.

Examples

- Missouri-based Ameren has proposed a pay-as-you-save program
- Kansas utility Midwest Energy's PAYS program: How $mart

Action
Support adoption of PAYS programs region-wide.
Engage underserved community members and leaders in planning and advocacy work around energy efficiency measures.

BE 3.2: Implement MEEIA and KEEIA

Mitigation ■ | **Adaptation** ■

Enacted in 2009, the Missouri Energy Efficiency Investment Act paved the way for significant growth in utility energy efficiency programs. The legislation enables utilities to recoup the cost of energy efficiency programs and losses in profits from consumer energy conservation.

MEEIA has been a win-win for utilities consumers, who see substantial benefits. Transparent utility data sharing may encourage improvements to MEEIA, including ongoing assessments regarding the equitable distribution of program costs and benefits across all residential and commercial customers.

Implementation of a companion bill in Kansas, KEEIA, would enable the successes and lessons learned from MEEIA to accelerate energy efficiency investments on the Kansas side of the region.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Local Government, State, Utility**

Partners

State and local governments, Climate Action KC, public health and environment agencies, utilities, Climate+Energy Project, RenewMO, Metropolitan Energy Center, Sierra Club, Environment MO, MARC, Missouri Energy Efficiency for All, chambers of commerce

Equity considerations/opportunities

Residential consumers, and especially low-income consumers, should not bear disproportionate cost burden for programs, and should have equitable access to energy-saving benefits. Data sharing is essential to monitor the equity of existing programs and policies.

Examples

- Missouri Energy Efficiency Investment Act

Action
Assess equity impacts and benefits of MEEIA; advance KEEIA solutions.
Engage and collaborate in state-level energy plans in Kansas and Missouri.
Engage underserved community members and leaders in planning and implementation of energy efficiency measures.

BE 3.3: Adopt an Energy Efficiency Resource Standard (EERS)

Mitigation ■ | Adaptation ■

State-level programs are critical to fund services, provide affordable financing options, and establish regulations and energy conservation goals. More than half of U.S. states have adopted an Energy Efficiency Resource Standard, but Kansas and Missouri currently lack these policies.

Energy Efficiency Resource Standards serve as long-term, quantitative and mandatory energy savings targets for utilities in the state, and have led to substantial contributions to nationwide energy savings.

States that have adopted an EERS see the steepest reductions in energy use, and the policies have spurred complimentary programs to help consumers and utilities pursue further savings.

EERS programs typically contain multiple challenging but manageable mandatory targets along the way to an aggressive new energy conservation standard, giving utilities and local governments the ability to implement innovative new programs. Sufficient funding should be included in the passage of the standard to aid in program development.

Potential to reduce GHG	Status/Time frame	Scale
High	**3-year**	**Local Government, State, Utility**

Partners

State and local governments, utilities, Climate Action KC, public health and environment agencies, utilities, Climate+Energy Project, RenewMO, Metropolitan Energy Center, Sierra Club, Environment MO, MARC, Missouri Energy Efficiency For All, Community Action Network, chambers of commerce

Equity considerations/opportunities

An EERS would incentivize more widespread energy efficiency and retrofit programming, benefiting energy-burdened lower income households and renters.

Examples

- Texas's EERS currently requires utilities to avoid 30% demand growth.
- California's Public Utilities Commission's multi-year targets for electric and natural gas utilities

Action
Study feasibility of statewide EERS programs, barriers and solutions.

BE 3.4: Expand implementation of PACE projects

Mitigation ■ | Adaptation ■

Property-Assessed Clean Energy (PACE) Programs enable local governments to raise money to fund energy efficiency and clean energy projects for property owners. Property owners can finance energy efficiency updates or renewable energy installations via financing districts that add a special property tax assessment to their property tax bills.

Missouri's PACE program was enacted in 2010, providing affordable financing options that can eliminate upfront out-of-pocket costs and lower rates. Adoption of PACE legislation in Kansas will provide another way to reduce the cost burden of energy efficiency upgrades on consumers.

Potential to reduce GHG	Status/Time frame	Scale	Lead
High	**Underway**	**Local Government, State, Federal, Utility**	**Local/Public Health Agencies and Hospitals/Utilities/State/Fed**

Partners

State and local governments, Climate Action KC, public health and environment agencies, utilities, Climate+Energy Project, Metropolitan Energy Center, Sierra Club, Environment MO, MARC, chambers of commerce

Equity considerations/opportunities

PACE programs should be evaluated for accessibility and equity. The programs should be well regulated to establish safe lending and consumer protection standards.

Examples

- City of Milwaukee's PACE program
- PACE Lending Standards and Consumer Protection Concerns

Action
Study solutions and barriers for PACE in Kansas and Missouri, as well as relevant consumer protection measures.
Engage underserved community members and leaders in planning and advocacy work around energy efficiency measures.

Food Systems

GOALS

1. Reduce GHG emissions and increase carbon sequestration within the regional food and agriculture sector
2. Develop a regional food system providing access and security to mitigate supply chain interruptions caused by climate change

"By making food visible - growing in the front yard, growing on vacant lots, helping friends grow on balconies - it normalizes the idea of food production as part of daily life and creates opportunities to build relationships and to share knowledge and resources. Those relationships, to me, are at the heart of community resilience."

AMI F.

The impact of food and agriculture on our climate crisis cannot be ignored. While the CAP Greenhouse Gas Inventory did not include agriculture and land use in this initial iteration, GHG emissions resulting from these sectors on a national level are about 10% of total emissions. Agricultural land, whether it's small urban or big family farms and ranches, uses 57% of the total land within the planning area and generates nearly $550 million in total commodities.

With over 80% of our region's population living (and eating) in cities, metropolitan areas have significant power to reduce greenhouse gas emissions by taking action to support and advocate for food and agriculture advancements that will reduce GHG emissions, improve the livelihoods of the people who get food to our table and biomass into our fuel, and ensure that all of our residents have access to affordable, quality food.

Local and sustainable food production —and supporting demand and access to that food —is a key way to reduce greenhouse gas emissions and better nourish our communities. Bringing food production closer to consumers decreases the distance and length of time the food must travel, preserving nutritive value and food quality. GHG emissions can be reduced by preventing food, as food waste or excess food, from going to landfills where organic matter anaerobically breaks down and produces methane, one of the most potent greenhouse gases.

Sequestration—or the drawing down and storage of carbon in plants and soil—is an essential strategy within the food system landscape. Farmers and ranchers can use regenerative agriculture practices, such as cover-cropping, zero tillage, agroforestry, intercropping, grazing management, and other livestock management practices. These practices consider the farm and surrounding ecology holistically and better place farmers to sequester more carbon, while also reversing negative environmental impacts. Regenerative agricultural practices achieve this through soil fertility, biodiversity, watershed restoration and conservation practices. Farms that employ these practices can be more productive over conventional agriculture practices and are often more resilient in the face of weather extremes.

Climate change poses a significant threat to food security, and not only in places around the world with food scarcity due to drought, flooding, or harsh economic environments. Climate change can impact food supply chains and exacerbate food insecurities that already exist, even in economically vital urban areas like Kansas City.

This plan emphasizes the opportunity and need to transform the local food system to better serve the environment, public health, and the economy. The COVID-19 pandemic focused attention on the vulnerabilities of our food supply chains and sparked interest in local food production as a means of building resilience, and also shined a brighter light on food insecurity and health inequities in our community. A local food system is nimbler and can more easily adapt to rapidly changing environments and markets.

The Kansas City region has a strong network of institutions, organizations and individuals that support food policy, local agricultural, food security and equity. The goals and strategies in this section support and build upon the work already underway.

Leading by example:

1. Advent Health (food waste)
2. Shawnee Mission School District Composting
3. Boy's Grow

GHG Reduction:

Food and agriculture were not included in the Greenhouse Gas Inventory and strategies were not modeled for reduction potential.

However, the following strategies related to this sector offer a high potential for GHG reduction.

Top reduction strategies:

1. Increase productivity per acre
2. Reduce livestock emissions
3. Reduce emissions from fertilizer use
4. Support on-farm renewable energy and energy efficiency
5. Soil carbon sinks (regenerative agriculture and use of compost)
6. Reduce food waste and loss

Goal 1: Reduce GHG emissions and increase carbon sequestration within the regional food and agriculture sector

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

FA 1.1: Redirect quality, edible food to local food recovery programs

Mitigation ■ | Adaptation ■

Food recovery — or the gleaning of edible food from farms, markets, restaurants and other sources — can help further prevent food waste which might otherwise end up in landfills and add to GHG emissions.

Food recovery supports food insecure individuals and families by providing nutritious food. Many organizations help bring this excess food to tables.

Growth in the local food economy will require additional capacity for food recovery and programs that connect this food to organizations that help reduce food insecurity.

To scale up food recovery efforts, existing programs will need increased financial support from a variety of sources. Additionally, communities around the country are embracing smart phone apps and community-powered networks to facilitate the logistics of getting even more recovered food to its final destinations.

Potential to reduce GHG	Status/Time frame	Scale
Low	**5-year**	**Regional**

Partners

After the Harvest, Harvesters, Greater Kansas City Food Policy Coalition, Climate Action KC, Cultivate KC

Equity considerations/opportunities

Recovered food should be accessible to food insecure individuals and families, which may require reducing the transportation burden. Consideration of a diversity of outlets, food delivery options and connectivity to transit, bike facilities and sidewalks is important.

Examples

- 412 Food Rescue (Pittsburgh) / Food Rescue Hero
- Hunger Network of Greater Cleveland

Action
Provide financial and technical support to new and existing food security programs so they can scale-up and/or better manage food rescue and rescued food distribution.
Explore and implement tech-based solutions to connect recovered food to programs that serve food insecure communities.

FA 1.2: Implement a voluntary carbon offset pilot program to incentivize carbon sequestration on farms and ranches in our region

Mitigation ■ | Adaptation ■

Project Drawdown suggests significant returns on investments made on regenerative agricultural farming practices. However, the transition from conventional to regenerative agricultural has initial costs that can be sticking points for many food producers.

One solution to this problem is carbon offset programs. These programs — which can be operated by nonprofits, public benefits corporations, governments or for-profit businesses — focus on directing carbon credit purchases from companies with sustainability targets toward farmers and ranchers to help them in the transition to practices that meet verified carbon standards.

Carbon offset programs may also support landscape-scale green infrastructure or watershed restoration efforts.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**3-year**	**Regional, State**

Partners

Climate Action KC, MARC, agricultural and environmental stakeholders

Equity considerations/opportunities

Enrollment efforts should be inclusive of minority farmers, with deliberate outreach programs to ensure participation and that service providers and educational/support activities are inclusive of and staffed by people who reflect the full diversity of our community. Programs should include entry points specifically targeting smaller farms and ranches.

Examples

- Montana Grassland Carbon Initiative - Western Sustainability Exchange, NativeEnergy

Action
Inventory number of farms and acres using good carbon and GHG management practices.
Identify potential partnerships to determine appropriate carbon monitoring and prediction methodologies as a first step toward participating in future carbon markets.
Leverage existing soil and water conservation programs with focused outreach, education and watershed planning.

FA 1.3: Support farmers and ranchers with resources to ease the transition to agriculture practices that provide environmental services and that slow/prevent climate change

Mitigation ■ | Adaptation ■

Risk aversion to a lesser understood set of practices may be a barrier to expanding regenerative agriculture, especially for less experienced farmers and ranchers. Providing educational resources and programming focused on the benefits and techniques associated with regenerative agriculture will support this growing movement.

Additionally, supporting existing mentorship and networking programs for farmers can help sustain growth and development for farmers and ranchers who are already in the beginning stages of transitioning their agricultural practices.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**1-year**	**Regional, State**

Partners

KC Food Hub, UM Center for Agroforestry, Cultivate KC, Missouri Organic Recycling, university extensions, Deep Roots KC, Nature Conservancy, Land Institute

Equity considerations/opportunities

Healthy food and sustainable land stewardship are inextricably linked to enduring social equity issues such as food security, nutrition and public health.

Examples

- CultivateKC

Action

Provide financial and technical support for programs that educate farmers and ranchers on agricultural practices that increase carbon sequestration and reduce GHG emissions.

Goal ❷: Develop a regional food system that provides access and security to mitigate supply chain interruptions caused by climate change

COBENEFITS

health & well-being	environmental quality	**accessibility**	affordability	cost savings
green job development	energy security	economic growth	**resilience**	

LINKAGES

FA 2.1: Expand market demand for local food

Mitigation ■ | Adaptation ■

Growing the demand for local food is an important part of expanding the local food system into one that provides increased regional food supply chain resilience and security. The biggest impact will come from focusing first on institutions with significant purchasing power and those that demand a supply of steady, consistent and high quality of food.

Cities, school districts, hospitals and other institutions can adopt local food purchasing policies that value local economies, a safe and healthy workforce, environmental sustainability, nutrition and animal welfare.

Expanding the demand for fresh, local food can also be achieved by scaling up promotions and campaigns that support purchasing from direct-to-consumer outlets, like farmers markets and Community Supported Agriculture (CSA) programs.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**3-year**	**Local Government, Regional, State**

Partners

KC Healthy Kids, Greater Kansas City Food Policy Coalition

Equity considerations/opportunities

Programs that seek to address this goal should fully reflect the racial, ethnic, gender, cultural and economic diversity of our community in their leadership, staffing and program participation.

Examples

- KC Healthy Kids Farm to School Academy
- Cincinnati Public Schools' Good Food Purchasing Policy
- Morrison Healthcare | The Impact of Buying Food Locally

Action

Increase local food purchasing through promoting existing institutional purchasing and farm-to-school programs.

Expand the market for local food through promoting farmers markets, CSA programs and other direct-to-consumer outlets.

Fair Share Farm, Kearney, MO
Photo courtesy of Fair Share Farm.

FA-2.2: Scale up local food production to respond to increasing demand for local food

Mitigation ■ | Adaptation ■

As demand increases for locally produced food, growers will need support to scale up food production and increased access to the market. To scale up, local food producers can access one of the many resources in the region that provides support for beginning and established farms, including technical assistance, mentorship and farmer-to-buyer matching.

To connect local food producers with mainstream grocery and institutional outlets, the local food system can make use of functions in the industrial food system, such as aggregation, processing, distribution and marketing, all of which provide economic and logistical efficiencies. There are many models for regional-scale food aggregation and distribution. Important first steps to connect food producers with a broader regional market include conducting an inventory of the capacity of existing aggregation and distribution sites as well as transportation and logistics then assessing gaps.

Once gaps are identified, growers and entrepreneurs can pool resources to further develop their capacities to meet the growth goals of local producers.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**3-year**	**Regional**

Partners

KC Food Hub, Growing Growers Kansas City, KC Healthy Kids, Kansas State Research and Extension, University of Missouri Extension, Cultivate KC, Kansas Rural Center, Kansas City Food Circle

Equity considerations/opportunities

Programs that seek to address this goal should fully reflect the racial, ethnic, gender, cultural and economic diversity of our community in their leadership, staffing and program participation.

Examples

- Growing Growers
- KC Food Hub

Action
Assess and map existing and excess capacity within the food supply chain.
Survey existing producers to determine growth goals to identify gaps and barriers.
Develop new or expand existing programs to support increased local production.
Increase financial support for educational programming for new and experienced farmers and ranchers.

FA-2.3: Increase the number of neighborhood urban farms, gardens and orchards

Mitigation ■ | Adaptation ■

Urban farms, gardens and community orchards sequester carbon and reduce food transportation costs. Urban gardens are gathering places and help build community identity and pride. They contribute to food security and public and ecological health. Larger gardens and orchards can also contribute to job creation and economic opportunities for a community.

Promoting urban agriculture opportunities with grant funding and removing barriers to urban agriculture helps to pave the way for more urban farms, gardens and orchards. In areas with existing community gardens, educational assistance about how to maintain gardens and increase their productivity can help sustain the garden's broad set of community benefits for years to come.

Potential to reduce GHG	Status/Time frame	Scale
Low	**3-year**	**Local Government, Regional, State**

Partners

KC Healthy Kids, Greater Kansas City Food Policy Coalition, The Giving Grove, Kansas City Community Garden

Equity considerations/opportunities

Grant funding could be targeted to areas where there are few community gardens serving areas of high food insecurity, and areas where urban heat islands are more prevalent.

Examples

- Cultivate KC | Get Farming Mini Grants
- Giving Grove

Action
Provide grants for local producers and organizations and educational institutions promoting and supporting urban agriculture.
Consider amendments to existing parameters for agricultural zoning to include smaller acreages that are used for agriculture and food production.

Chicken Tunnel, Fair Share Farm
Photo courtesy of Fair Share Farm.

FA-2.4: Facilitate updates to zoning codes, building codes and animal regulations to allow for urban agriculture

Mitigation ■ | Adaptation ■

Urban agriculture — which can include farms with retail sales, community-supported agriculture programs, community garden plots, orchards and even home gardens — can benefit all communities in the region. Yet in some cities, urban agriculture is not well supported by existing policies and zoning ordinances.

Urban agriculture can be tailored to the vision of residents and appropriate planning and zoning ordinances can help balance varied interests while still yielding the benefits of urban agriculture. Local governments can directly support urban agriculture by creating community garden space in parks or on other public properties and providing compost.

Potential to reduce GHG	Status/Time frame	Scale
Low	**3-year**	**Local Government**

Partners

KC Healthy Kids, Greater Kansas City Food Policy Coalition, Climate Action KC, MARC

Equity considerations/opportunities

Climate change will cause disruptions in our food supply and increase the price we pay for food. These changing realities will impact low- and moderate-income community members the most, resulting in greater levels of food insecurity. Programs that address the economic costs of food will need to be expanded and strengthened. Geographic and transportation barriers to accessing food may be exacerbated and will need to be addressed. If our regional food production grows as a percentage of the total food we eat in the metro area (as a food source we have more direct control over), we will need to ensure that all people will be able to access that food through a variety of methods (home/community gardening, connecting producers directly to low-income consumers, urban farms and others).

Examples

- Kansas City, Missouri

Action
Work with advocacy organizations and community leaders to evaluate and revise codes and regulations.
Provide education and technical resources to city/county staff on food- and agriculture-friendly codes and regulations.
Consider amendments to existing parameters for agricultural zoning to include smaller acreages that are used for agriculture and food production.

Bonner Springs Farmers Market
Photo courtesy of MARC/Double Up Food Bucks.

FA-2.5: Expand participation in programs that increase local food access for low- and moderate-income people

Mitigation ☐ | Adaptation ■

In order for the benefits of local food to be realized in an equitable way, there needs to be increased access for people who may benefit from local food most. Financial access to local food is a priority as the cost of local food can be higher than mass-produced retail food.

There are several programs that make it easier for low-income families and individuals to afford fresh fruits and vegetables while supporting family farmers and local economies. Additional funding for these programs will allow them to offer more nutritional benefits to more people, supporting healthy bodies and minds and building personal resilience.

Bringing on new local food outlets as partners, such as farmers markets and grocery stores that sell local produce, can help reduce transportation-based access challenges and reduce food desert areas.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**3-year**	**Regional**

Partners

Double Up Heartland Collaborative, MARC, Cultivate KC, Kansas State University Research and Extension, West Central Missouri Community Action Agency, Greater Wichita YMCA, University of Kansas Medical Center

Equity considerations/opportunities

The SNAP program has high turnover and people who are new to the benefits may not be fully aware of the Double Up Food Bucks program. Outlets need to be significantly expanded, with a focus on locations serving climate-vulnerable areas and that have multimodal transportation access.

Examples

- Double Up Food Bucks
- Missouri Department of Agriculture: Seniors Farmers Market Nutrition Program

Action
Expand education and outreach efforts to eligible recipients and social service organizations that support vulnerable communities.
Provide financial, promotional and technical support to new and existing programs that address economic barriers to local food purchasing.

Industry & Resource Management

GOALS

1. Increase waste diversion
2. Reduce methane emissions from landfills

"For most people, organic food waste is talked about/treated as just another kind of trash. We need to change that perception so that people understand how valuable a resource it actually is."

KAREN R.

After recycling and composting, the region sends more than 2.5 million tons of trash annually to regional landfills. On average, this equals more than 7 pounds per person per day. Of the waste that ends up at the landfill, studies indicate that about half is recyclable (mostly construction debris and paper) or compostable (primarily food scraps). Waste diversion programs are designed to reduce the amount of waste sent to landfills, which will in turn reduce the generation of regional GHG emissions due to decomposition of waste.

Waste buried in local landfills represents a small fraction of the overall waste associated with the products we use. For example, wastes are generated during resource extraction, product manufacturing and transportation. It has been estimated that more than 70 tons of waste is generated upstream from consumers for every ton of waste that is landfilled locally. Much of this upstream waste, and the associated GHG emissions, is generated outside of the Kansas City metro and was produced in other states or nations.

Our economy is based on the linear model of "extract, consume, and discard." Discarding waste in landfills means more raw materials must be extracted and processed to create new products. Reducing waste and keeping resources in use for as long as possible through recycling and composting (a circular economy), can reduce the waste and GHG emissions that occur both inside and outside of the Kansas City metro.

The first goal of increasing waste diversion is broad and includes the following strategies enumerated in the waste management hierarchy of reduce/reuse, recycle and compost. It also includes separate strategies, such as education, procurement policies and food waste reduction, that encompass all levels of the hierarchy.

The second goal in this sector is to capture the methane that is generated from the decomposition of solid waste sent to landfills for disposal. Capture of landfill gas is accomplished through a series of wells and a blower/flare (or vacuum) system. This system directs the collected gas to a central point where it can be processed and treated depending upon the ultimate use for the gas. From this point, the gas can be flared or beneficially used in an energy project.

Leading by example:

1. Johnson County June 2009 Mandatory Recycling & Composting Ordinance requires all Johnson County residents to separate recyclables, compostable yard waste and trash to be landfilled.

2. The MARC Solid Waste Management District coordinates a robust waste reduction and recycling education and outreach programs including:
   - RecycleSpot.org the region's one-stop-spot for recycling information.
   - A recycling information hotline.
   - Social media including Facebook, Twitter, Instagram and blog.
   - Annual outreach campaign that uses multiple platforms to promote recycling and waste reduction throughout the district.
   - Recycle More At Work, a program designed specifically to help businesses and organizations start or expand their recycling programs.

3. Private sector landfills for GHG emissions reductions through methane flaring and beneficial reuse

GHG Reduction:

Reductions from Business-as-usual (BAU) emissions in 2025

Reductions from BAU emissions in 2030

Reductions from BAU emissions in 2050

15%
Sector GHG reduction

Top reduction strategies:

1. Waste incineration
2. Adding nitrogen capture to water treatment plants
3. Water conveyance pump efficiency for water treatment system
4. Water delivery loss reduction
5. Landfill fugitive emission capture
6. Recycling*

*NOTE: GHG emission reduction do not reflect any benefits from recycling.
However, it is understood that those upstream benefits (benefits from upstream manufacturing, transport, etc.) are significant.

Goal 1: Increase waste diversion

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

IR-1.1: Reduce waste

Mitigation ■ | Adaptation ☐

Because GHG emissions start when products are manufactured and then continue with shipping, storage, use and end-of-life management, the primary way to reduce these emissions is not to create waste in the first place. For example, waste reduction occurs when a consumer decides to borrow an item rather than making a purchase or decides that the item isn't necessary.

In contrast to recycling, reuse means using an object or material again and again for the same purpose or different purpose without altering the form of the product. Donating and purchasing clothing from a thrift store or reusing a glass jar for storage are examples of reuse.

Reuse keeps items out of landfills by extending the useful life of the items and conserves the embodied energy and other resources that were used during production. Keeping products and materials in use avoids producing the GHG emissions associated with new material production and end-of-life management. The more an item is reused, the more GHG emissions reductions can be achieved.

In addition to environmental benefits, reuse has social benefits as well. Many unwanted but usable items are donated to charitable organizations that provide beneficial services to our region. Reuse also creates local business opportunities through resale, such as consignment shops, and through repair.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway, Some Long-term**	**Neighborhood, Local Government, Regional, State, and Federal**

Partners

Goodwill, Salvation Army, Habitat ReStore, Scraps KC

Equity considerations/opportunities

Opportunities include economic diversity, new business models, innovation, reuse/repair sector job creation and charitable giving.

Examples

- Reuse Sector Report - New York City, 2017
- Sustainable City Plan - Los Angeles, 2015
- The Sharing Economy - Toronto, 2017
- Greenest City: 2020 Action Plan - Vancouver, 2015

Action
Reduce consumption through education focused on consuming fewer products, purchasing higher quality, repairing items, and encouraging a sharing economy.
Develop strategies and policies that support local enterprises that repair products and goods and provide reuse and sharing opportunities.
Establish tools that make it easier for residents and businesses to find reuse opportunities.

Recycling barrel at Penguin Park, Northland KCMO
Photo courtesy of MARC/RecycleSpot.

IR-1.2: Increase recycling

Mitigation ■ | Adaptation ☐

Over 50% of what we send to a landfill for disposal can be recycled through curbside and other types of collection. Increasing the flow of recyclable material through the region's recycling and materials recovery infrastructure can significantly reduce GHG emissions from landfill disposal and provide economic benefits. Recycling has been proven to spur more economic growth than other options for the management of waste.

Recycling offers the opportunity to decrease GHG emissions from the mining, manufacturing, forestry, transportation and electricity sectors while also reducing methane emissions from landfills. This is because recycling materials into new ("secondary") products can displace production of "primary" products that can require significant inputs of energy and virgin materials. In addition, manufacturing products from recycled materials typically requires less energy than making products from virgin materials.

Changes in the global commodity markets means that the region will have to recycle more materials domestically. The purity and quality of collected recyclables strongly influences the domestic market demand and the types of new products that can be produced from the materials.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway, plus 1-year, 3-year, 10-year and Long-term**	**Local Government, Regional**

Partners

Local governments, Waste Management, Waste Corporation of America (WCA)

Equity considerations/opportunities

Provide equitable access to services, location of recycling facilities and drop-off centers.

Examples

- Zero Waste and Recology - San Francisco
- The Opportunity to Recycle Act and Youth Education - Portland
- Universal Zero Waste Ordinance - Boulder
- City Recycling and Demolition Debris Deposit Ordinances - San Diego
- Solid Waste Integrated Resources Plan - Los Angeles
- Region-Wide Recycling - Phoenix

Action
Develop the secondary materials market for recyclables.
Provide incentives that create and sustain locally based recycling jobs.
Expand recycling collection for multifamily residential, small businesses and rural areas, and for additional materials.

Compost Receptical at pro football stadium
Photo courtesy of MARC/RecycleSpot.

IR-1.3: Divert organic waste from landfill disposal through composting

Mitigation ■ | Adaptation ☐

Even though landfill disposal of yard waste is prohibited in Missouri and in Johnson County, a significant amount of organic material is still sent to landfills. When this organic material decomposes in landfills, it generates methane in the anaerobic conditions. Composting is one method to reduce methane emissions from organic waste. It is an aerobic process that reduces or prevents the release of methane during organic matter breakdown, unlike anaerobic decomposition in a landfill.

The material remaining after composting is a value-added product. Soil amendments made from compost can conserve water, reduce erosion and runoff-related damage, build healthy soil, and reduce the need for energy intensive fertilizers and pesticides.

Additionally, composted material indirectly increases carbon sequestration through increased biomass of plant root systems.

Local composting programs typically accept yard waste and food waste from restaurants, schools and businesses. These locally generated organics are composted within regional boundaries, making the GHG reduction benefits greater because it avoids emissions associated with the transportation of products and materials.

Home composting can also reduce organics sent to landfills. However, large-scale composting is necessary to meaningfully reduce greenhouse gas emissions.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Regional**

Partners

Missouri Organic, St. Louis Composting, Waste Management, KC Can Compost, Compost Collective, Food Cycle KC, urban farmers

Equity considerations/opportunities

Provide equitable access to services, location of composting facilities, cost of equipment and time necessary to compost at home.

Examples

Cities that are leaders in promoting city-scale composting services include San Francisco and Seattle. These programs rely on local ordinances that either offer incentives or require restaurants and other large food waste sources to compost food waste instead of sending it to landfills. The state of Vermont recently banned food scraps from the trash.

Action
Support home composting and consider revisions to ordinances that prohibit it.
Increase the availability of composting services and infrastructure for residents and businesses.
Support compost markets by using it in public infrastructure projects and refining compost standards and specifications.

Photo courtesy of Missouri Organics.

IR-1.4: Reduce food waste from landfill disposal

Mitigation ■ | Adaptation ■

Wasted food is a growing problem in our modern society and is a significant contributor to climate change. Food accounts for nearly 15% of the material we send to local landfills. This means that approximately 350,000 tons of food waste is sent to landfills annually from the region.

Of the amount thrown away, studies show that 70% was edible (intended for human consumption) before it was thrown away. The remaining 30% is considered inedible food or components that are not typically consumed (e.g., peels, rinds, bones).

Food waste produces more methane than any other organic material. Reduction of food waste and subsequent landfill disposal can significantly reduce GHG emissions. Food waste can be used for producing compost.

Potential to reduce GHG	Status/Time frame	Scale
High	**3-year**	**Neighborhood, Local Government, Regional**

Partners

County health departments, school districts, restaurants and institutions

Equity considerations/opportunities

Wasted food means wasted dollars. Education to use food more wisely can preserve income.

Examples

- King County, Washington
- Iowa City, Iowa

Action
Develop a tool kit for restaurants and institutions on options for food waste management.
Expand collection infrastructure for residential food waste.

Photo courtesy of Urban Lumber.

IR-1.5: Green the supply chain using recycled and other environmentally preferable products and services

Mitigation ■ | Adaptation ☐

As major employers and service providers, city and county governments are also major consumers. The purchase, use and disposal of goods by government agencies are associated with significant GHG emissions. These emissions can occur at all stages of a product's life cycle — from resource extraction, farming, manufacturing, processing, transportation, sale, use and disposal.

Environmentally preferable purchasing policies can provide government personnel with information and technical assistance to help them identify, evaluate and purchase economical and effective environmentally preferable products and services. This strategy aims to leverage the purchasing power of government agencies to create opportunities and markets for products made from recycled content and for products that are resource efficient and are more durable.

This strategy can also be extended to include contractors and consultants retained through local government contracts. It also encourages government agencies to require interdepartmental sharing of goods to reduce duplicate purchases.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**3-year**	**Local Government, Regional**

Partners

Local governments, Kansas City Regional Purchasing Cooperative, MARC, Climate Action KC

Equity considerations/opportunities

This strategy can create additional opportunities for locally owned businesses to provide goods and services.

Examples

- King County, Washington

Action
Update purchasing policies to include specifications for materials reuse, durability, packaging, embodied energy, recycled content and locally manufactured products.
Encourage requirements for contractors and consultants to use recycled and other environmentally preferable products and services.
Use sustainable product and services standards, certifications and labeling.
Encourage organizational departments to share materials and products.

Omega Psi Phi volunteers at recycling event
Photo courtesy of Bridging The Gap.

IR-1.6: Promote recycling education and advocacy programs

Mitigation ■ | Adaptation ☐

Getting residents to understand recycling is critical to the success of recycling programs. People need to know what they can and can't recycle, where to recycle and how to recycle.

Education is also a tool to address problem areas and misunderstandings about particular aspects of recycling programs. Lack of clear education, combined with programs that have transitioned to automated collection trucks, have led to the presence of unwanted material, such as plastic bags, clothing and garden hoses at local materials recovery facilities.

Comprehensive education results in higher recycling participation and makes people better recyclers.

It is critical to provide clear and consistent recycling messages. Education should also address the full spectrum of recyclers — from novice to experienced. Repetition is essential and people need to hear recycling messages about what to recycle and how to recycle on numerous occasions and through multiple platforms for it to become second nature.

Education should extend beyond residents. Businesses can educate each other through networking and sharing challenges and opportunities. Decision makers can be included in educational efforts to advocate for policies that can increase diversion opportunities and ultimately reduce GHG emissions.

Potential to reduce GHG	Status/Time frame	Scale
Medium	**Underway**	**Neighborhood, Local Government, Regional, State, and/or Federal**

Partners

Johnson County DHE, City of Kansas City, Missouri, Bridging The Gap, waste management, Waste Corporation of America

Equity considerations/opportunities

Assure education is equally available in various formats across diverse channels to all residents.

Examples

- Recyclespot.org
- Recycle More at Work

Action
Develop and strengthen partnerships among local businesses and industries about supply chain management.
Expand outreach and education campaigns to increase regionwide reuse, recycling, food waste and composting.
Educate state decision-makers about policies regarding extended producer responsibility, single-use packaging and right-to-repair.

Goal 2: Reduce methane emissions from landfills

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

IR-2.1: Install, expand and maintain landfill gas collection systems

Mitigation ■ | Adaptation ☐

Landfill gas is the by-product of the decomposition of solid waste in landfills and is comprised primarily of carbon dioxide and methane. Most GHG emissions from landfills occur from landfill gas that escapes to the atmosphere through uncapped areas of the landfill.

Instead of allowing landfill gas to escape into the air, the gas can be captured, converted and used as an energy resource.

The primary action for reducing GHG emissions at landfills is to expand and improve methane collection systems. Landfill gas collection systems are typically installed in phases as landfill operations progress and areas become filled with waste. Ongoing landfill operations constrain installation of collection systems and do not allow for complete collection of gas until after the landfill is closed and capped.

All of the region's open landfills and most of its closed landfills have methane recovery systems in place. Once captured, the methane is either destroyed through flaring or it is beneficially reused as an energy source.

Potential to reduce GHG	Status/Time frame	Scale
High	**Ongoing and Long-term**	**Regional**

Partners

Waste management, Republic Services, City of Lee's Summit, Kansas Department of Health and Environment, Missouri Department of Natural Resources, U.S. EPA

Equity considerations/opportunities

N/A

Examples

- Johnson County Landfill
- Courtney Ridge Landfill
- Rumble
- Lee's Summit Landfill

Action

Evaluate and monitor landfill gas generation.

Install, maintain and expand systems as appropriate.

Deffenbaugh Landfill
Photo courtesy of MARC/RecycleSpot.

IR-2.2: Beneficially reuse landfill gas

Mitigation ☐ | Adaptation ■

Once captured, methane-containing landfill gas (a medium-Btu gas) is either destroyed through flaring or it is beneficially reused as an energy source. The destruction option chosen by a landfill is ultimately dependent on quantity and quality of landfill gas.

Landfill gas can be used directly to offset the use of another fuel (for example, natural gas, coal or fuel oil) in a boiler, dryer, kiln, greenhouse or other thermal application. In these projects, the gas is piped directly to a nearby customer for use in combustion equipment. The Courtney Ridge Landfill pipes landfill gas directly to a cement kiln as an offset for traditional fuel.

Landfill gas also can be converted to electricity by using reciprocating internal combustion engines, turbines, microturbines and fuel cells. The Central Missouri Landfill, located in Sedalia, uses reciprocating engines to generate electricity.

Landfill gas can also be upgraded to a high-Btu gas through treatment processes that increase its methane content. The Johnson County Landfill converts landfill gas to high-Btu gas by reducing its carbon dioxide, nitrogen and oxygen content. After conversion, the high-Btu gas is injected into a natural gas pipeline.

Potential to reduce GHG	Status/Time frame	Scale
High	**Underway**	**Regional**

Partners

Waste management, Republic Services, City of Lee's Summit, Kansas Department of Health and Environment, Missouri Department of Natural Resources, U.S. EPA

Equity considerations/opportunities

N/A

Examples

- Johnson County Landfill
- Courtney Ridge Landfill
- Rumble
- Lee's Summit Landfill

Action

Evaluate quantity and quality of landfill gas, and implement reuse options.

Community Resilience

GOALS

1. Proactively engage vulnerable communities in climate action
2. Educate the public around climate vulnerability, resilience, and action
3. Support a dense and robust network of resilience resources in partnership with existing organizations and programs
4. Prepare for climate risks and stresses

> "A resilient community looks like a forest, where trees may bend in the wind but together they have a better chance of staying firmly rooted and able to grow. In a forest, every waste product becomes an opportunity. In a resilient community, waste is minimized or transitioned to resources. Social networks provide a solid foundation for interaction and growth. People work together for the health and well-being of the entire community."
>
> KELLY D.

Air Quality Community Engagement Event at Raytown High School
Photo courtesy of MARC.

Community resilience is defined as the sustained ability to use resources to respond to, withstand, recover and bounce forward from adverse situations. Community resilience is only as strong as the networks, relationships and resources that are available to support individual and community well-being and quality of life. Community resilience also requires planning and emergency preparedness to mitigate the shocks and stresses brought on by climate change.

Climate change will impact regional communities in different ways. Based on differences in land geography, socio-demographic characteristics, health or housing quality, some communities may have significantly higher vulnerabilities and less capacity to be resilient.

Black, brown and other frontline communities are, by definition, disproportionately impacted by climate change, experiencing these impacts first and worst. Where existing inequality lies, disaster tends to have a more devastating effect.

An understanding of current levels of community resilience will provide a platform for developing community-driven or local government-led strategies that strengthen this resilience over time. Resilience cannot be fully understood from data and mapping alone. Engaging with and listening to vulnerable communities that face the greatest threats will tell a more complete story. In support of this, providing neighborhoods with educational programming, as well as community engagement toolkits and guidance will be essential.

Building and sustaining relationships with community leaders, organizations serving vulnerability communities, and actively bringing new and diverse voices into the fold is a cornerstone of this community resilience work ahead of all of us.

Leading by example:

1. United Way 211: United Way of Greater Kansas City
2. Marlborough Community Coalition: Marlborough Neighborhood, Kansas City, Mo.
3. Link for Care: University of Kansas Medical Center

Goal 1: Proactively engage vulnerable communities in climate action

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	**cost savings**
green job development	energy security	economic growth	resilience	

LINKAGES

CR-1.1: Develop an engagement strategy

Mitigation ■ | Adaptation ■

This plan serves as a framework for deeper and broader engagement with a focus on how climate action is realized throughout the region. Engagement of vulnerable communities will be a proactive and ongoing process as climate action planning is refined, implemented and evaluated.

Each community's needs and vision are unique, and the response should be developed in a way that supports this vision and builds social capital, agency, equity, inclusiveness, empowerment and new climate leadership.

Whole-community, participatory processes that focus on equity will bring about climate action that illuminates and resolves unintended consequence, reaps multiple cobenefits and uplifts communities.

An engagement strategy will be created as a framework for deeper community-driven engagement developed by leaders in vulnerable communities, in partnership with broader community leadership.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**1-year**	**Regional**

Partners

Neighborhood and community development organizations focused on the intersection of health, education, job creation, equity and environment; Climate Action KC, MARC

Equity considerations/opportunities

In order to ensure full accessibility for all and adapt to the culture and traditions of neighborhoods within different communities, the engagement strategy will need to include flexibility in the types of communication channels and engagement techniques it uses. Trusted leaders in vulnerable communities will develop the engagement plan or program in partnership with the Climate Action KC Equity and Engagement committee and MARC.

Examples

- Accelerate Climate Action - Denver

Action
Convene equity partners, active neighborhood leaders and nonprofit partners to develop an engagement strategy.
Develop an engagement resource team and identify funding to assist communities with holding climate action conversations, developing hyper-local climate strategies and connecting to regional policy development.

Goal 2: Educate the public about climate vulnerability, resilience and action

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	**resilience**	

LINKAGES

CR-2.1: Develop a strategy for climate resilience communications, outreach and education

Mitigation □ | Adaptation ■

To support work that advances community resilience, a strategy for communications, outreach and education will need to be developed for several key audiences. This includes vulnerable neighborhoods, local government leaders, businesses, community organizations and students. The core objectives will be to expand collective knowledge about the future impacts of climate change as they relate to the region, convey climate action strategies, develop a clear strategy for ongoing and emergency communications, and track the success of plan implementation. The communication strategies will inform and intersect with other plan strategies, including the Regional Building Energy Exchange (BE-Ex).

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**1-year**	**Regional**

Partners

KCEEN, Climate Action KC, MARC Emergency Management, healthcare providers, health departments, neighborhood associations, city and county public information officers

Equity considerations/opportunities

Information will need to be accessible to everyone, including those without access to the internet and smart devices, those with limited English proficiency, and those with cognitive and physical disabilities. Leaders from underserved communities should be part of the planning work.

Examples

- Caltrans: Climate Change Communication Guide
- Path to Positive Utah

Action
Develop a comprehensive communication, outreach, education and engagement strategy.
Identify and/or develop climate resilience curriculum and programs to support youth education and leadership building.

Goal 3: Support a dense and robust network of resilience resources in partnership with existing organizations and programs

COBENEFITS

- health & well-being
- environmental quality
- accessibility
- affordability
- cost savings
- green job development
- energy security
- economic growth
- resilience

LINKAGES

CR-3.1: Support the development of a virtual hub for climate change education and resilience resources

Mitigation ☐ | Adaptation ■

A virtual resilience hub would bring together myriad existing resources and resilience support. This hub would be one central place where individuals could access information about organizations that can provide solutions to immediate needs, such as where to find temporary housing for families displaced by flooding, or resources that support resilience-building, like how to start a backyard vegetable garden. A virtual hub accessed online could also be supported by existing call centers, such as United Way's 211, and provide regular communications about new resources and opportunities to interested individuals.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**3-year**	**Regional**

Partners

Climate Action KC, United Way 211, MARC

Equity considerations/opportunities:

Information will need to be accessible to everyone, including those without access to the internet and smart devices, those with limited English proficiency, and those with cognitive and physical disabilities. Individuals from vulnerable communities should be included in the design and testing of this resource to ensure that it is accessible and useful.

Examples

- RVA Green 2050 Resilience Hub - City of Richmond

Action
Design and launch a public-facing hub of resources to support climate action and resiliency.
Design and launch a hub focused on providing resources to local government, social service organizations, hospitals, teachers, emergency managers, etc.

CR-3.2: Build collaborative relationships with public and private healthcare organizations to better educate and serve residents

Mitigation ■ | Adaptation ■

Climate change is a public health emergency. Changes in regional climate will amplify health threats including poor air quality, increased food insecurity, increased heat-related deaths, increased allergens, and increased vector-, water-, and food-borne diseases. Developing partnerships with healthcare organizations will be essential to managing these health threats and providing resources to individuals and families who need them. Partnerships with hospitals can also help drive new and innovative solutions that build community resilience, create better health outcomes for vulnerable communities and help move the needle on greenhouse gases.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	**5-year**	**Regional**

Partners

Climate Action KC, public health organizations, hospitals

Equity considerations/opportunities

Information will need to be accessible to everyone, including those without access to the internet and smart devices, those with limited English proficiency, and those with cognitive and physical disabilities. Individuals from vulnerable communities should be included in the design and testing of this resource.

Examples

- Evergreen Cooperatives of Cleveland

Action
Collaborate with health care leadership to identify resilience solutions that also improve health outcomes, including adding climate-related health indicators in hospitals' Community Health Needs Assessments.
Include public health representatives in climate governance bodies and work groups to promote cross-sector collaboration and sustainable system transformation.

Goal 4: Prepare for climate risks and stresses

COBENEFITS

health & well-being	environmental quality	accessibility	affordability	cost savings
green job development	energy security	economic growth	resilience	

LINKAGES

CR-4.1: Incorporate resilient infrastructure design into emergency planning and preparedness

Mitigation ☐ | Adaptation ■

Our region is well-prepared to respond to many different types of emergencies with mitigation plans and strategies in place to reduce the impacts of potential hazards. However, changing climate and weather patterns are bringing a new sense of urgency to disaster preparedness. Some communities may be more prepared than others. For communities that have yet to work through pre-disaster planning exercises based on "the new normal" of serious climate-related threats, engagement opportunities and resources should be available to help them get started. Further, existing resources — such as the three hazard mitigation plans that cover the region, and emergency management guides, etc. — should be evaluated for opportunities to better integrate the myriad of climate adaptation solutions included in this plan.

Potential to reduce GHG	Status/Time frame	Scale
Indirect	3-year	Regional

Partners

MARC, MARC Emergency Management, local governments, FEMA, vulnerable communities

Equity considerations/opportunities

Ensuring vulnerable communities are at the table in pre-disaster planning and preparedness initiatives will be essential. Outcomes must be equitable and just.

Examples

- Planning the Northhampton Resilience Hub - Northhampton, MA

Action
Conduct an audit of urban heat-vulnerable neighborhoods and identify opportunities to offer protective shading and green infrastructure elements in the public realm, including along major active transportation corridors.
Focus building improvements on existing and new community cooling centers and community resource sites.
Integrate climate change planning and solutions into emergency planning and preparedness, with a focus on heat and flooding.

"Eco Elvis" at America Recycles Day event
Photo courtesy of MARC/RecycleSpot.

Appendix

Click to access Greenhouse Gas (GHG) Inventory on marc.org

Greenhouse Gas Inventory for the Kansas City Region

2015 Baseline

Regional GHG Inventory: stationary energy, waste and transportation sectors.

This Greenhouse Gas (GHG) Inventory represents the best estimate of regional CO_2e emissions for the 10-county planning area. It includes emission estimates associated with stationary energy generation, solid waste and surface transportation. The purpose of the inventory is to assess a region's carbon footprint and identify the areas of largest impact. The results of the inventory inform the development of GHG strategies for the Climate Action Plan.

Stationary Energy. Through cooperation with regional energy providers, we have gained a good cross-sectional understanding of the sources contributing to the total emissions generated. Future work will entail acquiring more detailed annual data associated with closer alignment to our specific geographic area.

Solid Waste. Our understanding of solid waste emissions within the greater Kansas City region has been well documented for more than 10 years. Estimates for the GHG contributions related to this sector have been evaluated to account for solid waste produced locally and outside the region and disposed within the study area, and the solid waste exported from our region and disposed elsewhere.

What is CO_2e?

Not all greenhouse gases have the same global warming potential. In fact, of all of the greenhouse gases (carbon dioxide, methane, nitrous oxide, and fluorinated gases), fluorinated gases trap substantially more heat than the other gases. However, carbon dioxide (CO_2) is the most prevalent greenhouse gas, so for the ease of measuring total greenhouse gases, CO_2 *equivalent* (CO_2e) is used. For any quantity and type of greenhouse gas, CO_2e signifies the amount of CO_2 which would have the equivalent global warming impact.

Transportation. Emissions from the transportation sector are limited to on-road contributions. Railroads, off-road/construction and non-vehicular airport-based emissions have not been assessed for this inventory. Waterway port emissions are also typically included within a greenhouse gas inventory. However, the water port, being re-established in the Kansas City area, received its first barge traffic in August 2015. Therefore, while the emissions associated with the port do not contribute a prominent source of GHG for the baseline inventory, this element of the transportation sector will require monitoring as traffic is quickly expanding.

Greenhouse Gas Emissions and Data Sources by Sector

Stationary Energy Generation. Information about energy use, fuel mix and population served was provided by the two natural gas and the major electric utilities serving the region as well as several electric co-ops and municipal units contracting directly with larger, multi-state regional power pools. With this rich dataset, we were able to address minor issues with geographic data gaps and slight differences in reporting dates. Residential data was separated from institutional, commercial and industrial data, but the remaining data was combined and included energy associated with both building facilities and any manufacturing processes. Future efforts will be made to separate the non-residential

Click to access Climate Risk & Vulnerability Assessment (CRVA) Inventory on marc.org

Climate Risk & Vulnerability Assessment

Introduction

From flooding to drought, tornados, ice storms, and extreme heat, the Kansas City region has a long history of confronting natural hazards. Understanding how climate change might exacerbate the region's risks and vulnerabilities to extreme weather is fundamental to formulating strategic priorities to achieve our vision of health, resilience and sustainability. This Climate Risk and Vulnerability Assessment (CRVA) sets the stage for community discussions about how these issues may be addressed in the future.

A downscaled climate model for the Kansas City region, published in 2016, forecasts how climate change may affect our region. The metro area can reasonably anticipate changes to heat and precipitation patterns in the coming years. Changes in precipitation are projected to lead to increased frequency, intensity and duration of storm events, causing anticipated impacts such as flooding, stream bank erosion and weakened water quality. Extended periods of rain-free days in the summer months are anticipated to accompany a more than twentyfold increase in the number of extremely hot days **(> 105°F).**

The impacts and implications of climate change are diverse. Changes in precipitation patterns — be it flood or drought — cause increased risks to infrastructure and property. More extreme heat and flooding also impact public safety. The structure, dynamics and productivity of agricultural and natural systems will be subject to changes in temperature and precipitation regimes. Extreme heat, air and water quality impairments, and increased allergens all pose significant public health challenges, with the greatest burden placed on frontline communities; economic impacts are anticipated to affect vulnerable communities in a disproportionate manner.

Key Definitions

Hazard: The potential occurrence of a natural or human-induced physical event or trend, or their physical impacts, that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. The term hazard usually refers to climate-related physical events or trends or their physical impacts (GCoM, 2019).

Exposure: The presence of people; livelihoods; species or ecosystems; environmental functions; services; resources; infrastructure; or economic, social or cultural assets in places and settings that could be adversely affected (GCoM, 2019).

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (GCoM, 2019).

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (GCoM, 2019).

Adaptive Capacity: The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences (GCoM, 2019).

Plan Resources

Collaboration and Leadership

RESOURCES:

1. Adams, Steve. 2019. Regional Collaboratives for Climate Change: the State of the Art. Institute for Sustainable Communities.

Transportation

RESOURCES:

1. Smart Moves 3.0: Transit and Mobility Plan
2. Kansas City Regional Bikeway Plan
3. Regional Pedestrian Policy Plan
4. Planning Sustainable Places Program
5. Safe Commute Guide: Provides a how-to for employer-based TDM programs and alternate modes during COVID
6. Metropolitan Energy Center
7. Evergy
8. Connected KC 2050
9. DOE Electric Vehicle Solution Center
10. DOE Alternative Fuels Data Center – EVs
11. Smart Moves 3.0
12. Connected KC 2050
13. BikeWalkKC
14. Connected KC 2050
15. Operation Greenlight
16. KC Scout

Photo courtesy of BikeWalkKC.

Energy Generation

RESOURCES:

1. WINDExchange - Department of Energy, Office of Energy Efficiency and Renewable Energy
2. Toolbox for Renew able Energy Project Development - EPA
3. Utility Scale PV Power Plants: A Project Developers Guide - International Finance Corporation
4. Securitization: Structured Finance Solutions - Deloitte
5. A Guide To Community Solar: Utility, Private, and Non-Profit Project Development. NREL
6. Solar Ready KC. Mid-America Regional Council
7. National Community Solar Partnership - Department of Energy
8. Midscale Commercial Solar Market Research - NREL
9. SolSmart Designation and Resources for Municipalities
10. Tools for Local Energy Action - Institute for Local Self-Reliance
11. Designing Solar Programs that Promote Racial and Economic Equality - Institute for Local Self-Reliance, Cleveland Owns, Cooperative Energy Futures.
12. Solarize Collective Purchasing
13. NREL Electric Sector Integration Analysis
14. How Climate Change Puts Our Electricity At Risk – Union of Concerned Scientists
15. Department of Energy - Climate Resilience in the Electricity Sector
16. NREL Grid-scale battery storage information

Finance & Innovation

RESOURCES:

1. Community Improvement Districts
2. Carbon offset explainer
3. Green Collar Workers: An Emerging Workforce in the Environmental Sector

Urban Greening

RESOURCES:

1. MARC i-tree Eco study
2. MARC Green Infrastructure Framework
3. KCMO Tree Protection Plan

Healthy & Resilient Homes and Buildings

RESOURCES:

1. US Green Building Council's LEED Rating System
2. International Living Future Institute's zero-energy Living Buildings Challenge
3. Energy Star Commercial Buildings
4. https://www.ase.org/systemsefficiency Systems Efficiency
5. Building Performance Standard Basics: https://www.imt.org/wp-content/uploads/2019/10/IMT-Building-Performance-Standard-Basics-2-PG.pdf
6. International Energy Conservation Code: https://www.iccsafe.org/advocacy/international-energy-conservation-code-resource-page/
7. Energy Star for Universities: https://www.energystar.gov/buildings/owners_and_managers/existing_buildings/resources_your_property_type/make_college_univ_sustainable
8. Energy Smart Guide for Campus Cost Savings: https://www.nrel.gov/docs/fy03osti/34291.pdf
9. MEC Energy Solutions Hub: https://metroenergy.org/programs/energy-efficient-buildings/projects/energy-solutions-hub/
10. **Reducing energy burden on low income families. ACEEE:** https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf
11. **EPA's WaterSense Program:** https://www.epa.gov/watersense
12. **IECC International Property Maintenance Code:** https://codes.iccsafe.org/content/IPMC2018/preface
13. **National Healthy Housing Standard:** https://nchh.org/tools-and-data/housing-code-tools/national-healthy-housing-standard/
14. **Residential Energy Disclosure Toolkit, ACEEE:** https://www.energy.gov/sites/prod/files/2019/02/f59/aceee-residential-energy-use-disclosure.pdf
15. **DOE State/Local Benchmarking and Energy Disclosure Policy:** https://www.energy.gov/eere/slsc/state-and-local-energy-benchmarking-and-disclosure-policy
16. **Local Residential Energy Efficiency – DOE:** https://www.epa.gov/statelocalenergy/local-residential-energy-efficiency
17. **Building better EE programs for low income households – ACEE:** https://www.aceee.org/sites/default/files/publications/researchreports/a1601.pdf
18. **City of Kansas City, MO Benchmarking Ordinance:** https://www.kcmo.gov/programs-initiatives/energy-and-water-benchmarking
19. **Energy Efficiency Resource Standards – ACEEE:** https://www.aceee.org/sites/default/files/publications/researchreports/u1403.pdf
20. **On-Bill Financing 101:** https://www.mwalliance.org/sites/default/files/meea-research/on-bill-fact-sheet-11.5.18.pdf
21. **Energy Efficiency Policies and Programs:** https://www.energy.gov/eere/slsc/energy-efficiency-policies-and-programs
22. **Show Me PACE:** http://www.showmepace.org/
23. **ACEEE Policy Database:** https://database.aceee.org/

Food Systems

RESOURCES:

1. Center for Good Food Purchasing
2. Urban School Food Alliance
3. Greater Kansas City Food Policy Coalition
4. Johnson County Food Policy Council
5. US Climate Resilience Toolkit | Better Soil, Better Climate

Industry & Resource Management

RESOURCES:

1. Sustainable Solid Waste Management Study - MARC Solid Waste Management District
2. Solid Waste Management Plan - Johnson County, Kansas
3. Long-Term Solid Waste Management Strategic Plan - Kansas City, Missouri
4. U.S. EPA Landfill Methane Outreach Program

Community Resilience

RESOURCES:

1. Climate Risk and Vulnerability Assessment
2. Regional Vulnerability Assessment Maps
3. Climate Action KC – Equity Assessment Questions
4. GHG Emission Inventory
5. Yale Program in Climate Communication
6. CDC Climate and Health
7. Practice Green Health
8. In the Eye of the Storm - NAACP
9. Climate and Health Communications - American Public Health

Equity Guide

Climate Action KC Equity Committee created a guide to assist businesses, organizations, and municipalities in ensuring that climate action plans and investments identify and protect the most vulnerable populations. This guide can be used alongside any decision-making process to improve equitable outcomes.

Climate Action KC Equity Statement

Climate Action KC believes the success of any climate action will only be achieved if there is equitable access to the benefits among the entire population of the metropolitan area without regard to race, gender, ethnicity, religion, nationality, sexual orientation, income, age, disability, or any other classification. Impacts of climate change have put a spotlight on the widening inequities of people in cities across the nation, so any vision for a sustainable, long-term transformation toward a healthier region must include a proactive approach toward equity in all aspects.

Climate Action KC is committed to ensuring everyone in the region has fair and equitable access to opportunities and solutions. This commitment will be acted on in the following ways:

Climate Action KC will consider the legacy of historical injustices and biases, as this legacy provides a critical context for relating to, and elevating, affected populations. Without this context, and resulting efforts to rectify unjust systems, those systems may be perpetuated under a false impression of equitable access to opportunity.

Climate Action KC will work at the intersection of equity and climate to approach this work in a holistic manner. Potential future injustices will also be evaluated to prevent vulnerable communities from bearing disproportionate harm because of climate change. These communities must be equipped with intentional strategies, methods and resources to successfully implement climate action.

Climate Action KC will strive, not only to include diverse perspectives in its membership, but create an environment of inclusion and belonging that removes barriers to sharing and hearing of those perspectives in the pursuit of equity for all.

Equity Checklist

The questions on this checklist are designed to help focus climate planning and discussions on potential impacts, both adverse and beneficial, to vulnerable populations.

- ✓ How are vulnerable communities affected by this strategy/goal/recommendation?
- ✓ Which vulnerable populations may be impacted by or could benefit from your policy, initiative, program or budget?
- ✓ Have you identified these populations based on population characteristics, location, or both?
- ✓ What are the existing barriers to access and implementation?
- ✓ Will your proposed action (e.g. policy, design, program) create or remove barriers to access and implementation?
- ✓ How may the policy, initiative, program or budget increase racial equity?
- ✓ What mechanisms will you use to assure particular benefit to low-income or otherwise vulnerable populations?

  For example:
  - Provide extra financial incentives, investments, or resources
  - Provide higher levels of service
  - Provide capacity building or training
  - Provide jobs
- ✓ What unintended consequences may result for vulnerable populations and how will you address them?
- ✓ How will you evaluate the equity impact of your program or policies?
- ✓ How will you communicate progress to all stakeholders?

Vulnerable Populations

The following information provides descriptions of how some populations are more vulnerable to the impacts of climate change than others. While it is not an exhaustive list, the published evidence suggests that these groups of people face existing inequities and tend to suffer worse outcomes associated with climate-related events.

Who is most impacted?

There is a broad array of chronic health conditions which could be exacerbated due to climate change, including asthma, autoimmune disorders, diabetes, obesity, heart disease or cardiovascular diseases. People who have such chronic conditions and who meet one or more of the criteria below may be at an increased risk of health impacts from climate change:

- Elderly individuals of 65 years or older
- Individuals without access to stable and reliable healthcare
- Individuals with multiple health conditions or disabilities
- Elderly women, low socioeconomic status, or of African American race.

Social Vulnerability Index

Socioeconomic Status	Household Composition and Disability
• Below Poverty • Unemployed • Income • No High School Diploma	• Aged 65 or Older • Aged 17 or Younger • Older than Age 5 with Disability • Single-Parent Households
Minority and Language Status	**Housing Type and Transportation**
• Racial or ethnic minority • Women • Speaks English "Less than Well"	• Multi-Unit Structures • Mobile Homes • Crowding • No Vehicle • Group Quarters

Source: Center for Disease Control and Prevention

Definition of Impacts on Vulnerable Populations

The glossary and definitions below were developed by members of the Climate Action KC Equity Committee. An overview of common terms and concepts regarding vulnerable populations and social equity is intended to deepen community discourse and understanding about the equity-focused strategies in this plan.

Children: Injury, death, infectious 'diseases, malnutrition, and posttraumatic stress are more common in children than adults after extreme weather events. Children are especially vulnerable to the impacts of climate change because of (1) their growing bodies; (2) their unique behaviors and interactions with the world around them; and (3) their dependency on caregivers.

Health Insurance: Excessive heat exposure, elevated levels of air pollutants, and extreme weather conditions are expected to cause direct and indirect health impacts, particularly for vulnerable populations with limited or no access to health services. Health insurance enables access to care by connecting people to health care providers and by protecting persons against the high and often unexpected costs of medical care.

Older Adults: Older adults are vulnerable to climate change-related impacts for several reasons. One reason is that normal changes in the body associated with aging, such as loss of muscle and bone mass and agility, can limit mobility.

People with Low Incomes: Economic factors including income, poverty, and wealth, are collectively one of the largest determinants of health. From the poorest to richest ends of the income spectrum, higher income is associated with greater longevity in the US.

People with Mental Illness: Climate change is bringing a range of more frequent, long lasting and severe adverse environmental changes, which can affect the severity and incidence of mental health problems.

People who are Physically or Socially Isolated: Resilience to climate change impacts decreases in isolated populations (e.g. elderly, immigrant populations or rural communities), due to decreased access to resources, and delayed or limited assistance in crises. Climate change-related impacts are currently affecting rural communities. These impacts will progressively increase over this century and will shift the locations where rural economic activities (like agriculture, forestry, and recreation) can thrive.

People Experiencing Homelessness: Homelessness can be defined as individuals who use shelters to sleep as well as individuals who sleep outdoors or in other places not intended for human habitation. Homeless populations are more likely to live in poverty, lack access to health care services, and have multiple baseline conditions, including poor physical and mental health, which may be exacerbated by the impacts of climate change.

Indigenous People, Native Americans and Tribal Nations: Certain tribal lands are already experiencing the impacts of climate change, and some coastal tribal communities in the U.S. have begun to relocate due to sea level rise. Native American health and welfare statistics are startling. Tribes face disproportionate disparities for economic issues (poverty, education, and employment), social issues (violence, trauma) and health disparities and mental illness. The age-adjusted death rate for adults exceeds that of the general population by almost 40%, with deaths due to diabetes, chronic liver disease and cirrhosis, and accidents occurring at least three times the national rate, and deaths due to tuberculosis, pneumonia and influenza, suicide, homicide, and heart disease also exceeding those of the general population.

Immigrants and Refugees: Many immigrants and refugees have been displaced due to climate change impacts and have already suffered trauma or disaster. These groups are vulnerable to impacts of climate change because they tend to be overrepresented among the poor but underrepresented in public benefits enrollment. Many immigrants lack the rights of citizenship so are often afraid to ask for help or call the police. In the future, Kansas City may face increased level of immigration due to climate change.

Impervious Surfaces and Tree Canopy: Temperatures in most urban areas are significantly higher than less urbanized areas because pavement and building materials absorb sunlight and heat. This is known as the urban heat island effect. The most intense effects are often in neighborhoods where impervious paved surfaces predominate, and trees, vegetation, and parks are less common. For example, a study using national data found that African Americans were 52% more likely, Asians 32% more likely, and Hispanics 21% more likely than whites to live in areas where impervious surfaces covered more than half the ground and more than half the population lacked tree canopy.

Incarcerated & Formerly Incarcerated Populations: Climate change is responsible for increasing the frequency, intensity and duration of natural disasters. Climate-related natural disasters are not always predictable, so it is important to make emergency preparedness and evacuation plans ahead of time. In the development and preparation for evacuation plans in the face of climate-related natural disasters the incarcerated population is often left out.

LGBTQ (Lesbian, Gay, Bisexual, Transgender or Queer) Communities: Some LGBTQ people, especially youth, are more likely to possess characteristics that have been linked to higher risk from climate change impacts. These risks include higher rates of poverty, homelessness and mental illness.

Linguistically Isolated People: A household is linguistically isolated when all persons 14 years of age or older speak a language other than English and no one speaks English very well. Climate change and resulting natural disasters and extreme temperatures pose a serious public health concern for people who are linguistically isolated. Many immigrants are linguistically isolated.

Outdoor workers: Outdoor workers are often among the first to be exposed to the effects of climate change. A review of miners, construction workers, farm workers, first responders, and military personnel emphasized that heat-related illness may be the most common cause of nonfatal, environmentally caused emergency department admission in the United States. Climate change is likely to affect the health of outdoor workers through increases in temperature, poor air quality, extreme weather, diseases transmitted by ticks and mosquitoes, industrial exposures and damage to infrastructure. Outdoor workers affected by climate change include farmers, ranchers, and other agricultural workers; commercial fishery workers; foresters; construction workers; military personnel; miners; refinery workers; paramedics, firefighters, police and other first responders; hazardous waste site workers and transportation workers.

People of Color: Some communities of color are more likely to reside in areas with greater flooding threats and more heat-absorbing surfaces. These populations also experience disproportionately high levels of vulnerabilities to climate change including lower income, less formal education, poorer physical health, multiple chronic conditions, language barriers, more elderly living alone, occupational exposures such as outdoor environments and less access to air conditioning. With clear causal pathways linking the experience of racism, socio-economic status and poor health outcomes, differences in vulnerability may be attributed to social and economic disparities rather than, or as well as, ethnicity.

People with Existing Chronic Health Conditions: People with existing chronic health conditions (such as diabetes, cardiovascular diseases, and asthma) are especially vulnerable to the impacts of climate change through an array of intersections. This includes heat waves, extreme weather events, unreliable or unavailable access to medical care, tenuous interpersonal support networks, and simply having fewer resources to relocate, adapt, or otherwise manage climate change impacts.

People with Physical Disabilities: People with disabilities are a broad and diverse community, and their needs differ depending on individual circumstances like their age or ability to live independently within their communities. In general, however, climate change-related health impacts may affect people with disabilities more than others. Approximately 1 in 5 people in the United States has a disability. This includes about half of all-American adults 65 and older and about 17% of Americans age 21-64. Many people with disabilities experience high rates of social risk factors that contribute to poor health, such as poverty, unemployment, and lower education. For example, people with disabilities are twice as likely to be unemployed than those without disabilities.

People Without Life-supporting Resources: Life-supporting resources are essential to one's resilience in the face of climate change. There are many of these resources: secure housing, food and other sustenance, means to stay cool during extreme heat events, reliable transportation (for evacuating or navigating natural disasters), and access to necessary services including healthcare. Health, well-being and resilience during climate change-related events are closely related to the number and amount of these resources; individuals who lack one or multiple (i.e. those 14 who are food-insecure, the uninsured, people who lack adequate or quality housing or are tenants or renters, and the poor) are especially vulnerable.

Pregnant People: Pregnant people are more vulnerable due to health impacts of pregnancy, and limitations on health interventions during pregnancy. Pregnant people are more susceptible to heat intolerance, and other disruptions.

Vehicle Ownership: Vehicle ownership is a measure of mobility and access to transportation. Transportation is a critical resource for evacuation and survival during heat waves and other extreme weather events. For example, access to a vehicle is important during flooding which may require emergency evacuation of populations living in coastal and low-lying areas and may also require adequate sheltering for displaced populations.

Glossary of Equity Terms

Acculturation: in which there is an adaptation to a different culture but retention of original identity.

Adaptation: adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, public and private adaptation, and autonomous and planned adaptation.

Assimilation: being absorbed into the cultural tradition of the dominant society and consequently losing one's historical identity.

Climate Justice: recognition of climate change's disproportionate impacts on historically marginalized communities who also contribute the least to climate change and benefit the least from fossil fuel consumption both locally and around the world. Climate justice aims to level these impacts.

Climate Resilience: CAKC's vision of climate resilience takes a holistic view of the challenges our communities face and pursues solutions to climate change at the intersection of people, the environment, and the economy. Climate resilience requires implementing "whole-systems" solutions.

Community: is a social unit with commonality such as norms, religion, values, customs, or identity.

Culture: refers to the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group striving.

Discrimination: is the act of making distinctions between human beings based on the groups, classes, or other categories to which they are perceived to belong.

Disparity: when communities exposed to a combination of poor environmental quality and social inequities have more sickness and disease than wealthier, less polluted communities.

Diversity: refers to the traits and characteristics that make people unique while inclusion refers to the behaviors and social norms that ensure people feel welcome. Diversity encompasses the range of similarities and differences everyone brings to the workplace, including but not limited to national origin, language, race, color, disability, ethnicity, gender, age, religion, sexual orientation, gender identity, socioeconomic status, veteran status, and family structures.

Energy Justice: initiatives that provide everyone, regardless of race, gender, etc. with safe, affordable, and sustainable energy.

Environmental Equity: protection from environmental hazards as well as access to environmental benefits, regardless of income, race, and other characteristics.

Environmental Justice: the fair and equal treatment of all people regardless of race, color, national origin, gender, sexual orientation, gender identity, ability, or income level, etc. in the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental Racism: refers to the way in which minority group neighborhoods (populated primarily by people of color and members of low socioeconomic groups) are burdened with a disproportionate number of hazards, including toxic waste facilities, garbage dumps, and other sources of environmental pollution and foul odors that lower the quality of life.

Equality: the quality or state of being equal. Ensuring that every individual has an equal opportunity.

Equity: justice according to natural law or right specifically; freedom from bias or favoritism.

Equitable Development: is an approach for meeting the needs of underserved communities through policies and programs that reduce disparities while fostering places that are healthy and vibrant.

Equitable Representation: something that is equitable is fair and reasonable in a way that gives equal treatment to everyone.

Health Equity: when every person has the opportunity to "attain his or her full health potential" and no one is "disadvantaged from achieving this potential because of social position or other socially determined circumstances."

Health Inequities: are reflected in differences in length of life; quality of life; rates of disease, disability, and death; severity of disease; and access to treatment.

Implicit Bias: is the unconscious attribution of particular qualities to a member of a certain social group.

Impacts: consequences of climate change on natural systems and human health. Depending on the consideration of adaptation, we can distinguish between potential impacts and residual impacts:

- *Potential impacts* are all impacts that may occur given a projected change in climate, with no consideration of adaptation.
- *Residual impacts* are the impacts of climate change that can occur afteradaptation.

Inclusion: is a state of being valued, respected and supported. It's about focusing on the needs of every individual and ensuring the right conditions are in place for each person to achieve his or her full potential.

Inclusive Diversity: a set of behaviors that promote collaboration amongst a diverse group.

Institutional Racism: the systematic distribution of resources, power and opportunity in our society to the benefit of people who are white and the exclusion of people of color.

Justice: the quality of being just; righteousness, equitableness, or moral rightness.

Marginalize: is to treat a person or group as unimportant, insignificant or of lower status.

Oppression: deprivation of human rights or dignity to those who are (or feel) powerless to do anything about it.

Prejudice: unfair negative attitude toward a social group or a member of that group.

Racism: the belief that groups of humans possess different behavioral traits corresponding to physical appearance and can be divided based on the superiority of one race over another.

Resiliency: the ability of something to return to its original size and shape after being compressed or deformed.

Social Equity: all people within a specific society or isolated group have the same status in certain respects, including civil rights, freedom of speech, property rights, and equal access to social goods and services.

Social Justice: is a concept of fair and just relations between the individual and society, as measured by the distribution of wealth, opportunities for personal activity, and social privileges.

Stereotype: is the association of a person or a social group with a consistent set of traits.

Structural Racism: in the U.S. is the normalization and legitimization of an array of dynamics – historical, cultural, institutional and interpersonal – that routinely advantage whites while producing cumulative and chronic adverse outcomes for people of color. It is a system of hierarchy and inequity, primarily characterized by white supremacy – the preferential treatment, privilege and power for white people at the expense of Black, Latino, Asian, Pacific Islander, Native American, Arab and other racially oppressed people.

Transportation Equity: access to reliable and affordable transportation is essential to addressing poverty, unemployment, obesity, and a variety of other social ills.

Underserved: refers to populations which are disadvantaged because of ability to pay, ability to access care, ability to access comprehensive healthcare, or other disparities for reasons of race, religion, language group or social status.

Institutional Racism: the systematic distribution of resources, power and opportunity in our society to the benefit of people who are white and the exclusion of people of color.

Vulnerability: the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity.

Vulnerable Populations: are groups and communities at a higher risk for poor health as a result of the barriers they experience to social, economic, political and environmental resources, as well as limitations due to illness or disability. Vulnerable populations often include those with low income, some communities of color, immigrant groups (including those with limited English proficiency), Indigenous peoples, children and pregnant women, older adults, vulnerable occupational groups, persons with disabilities, and persons with preexisting or chronic medical conditions.

For more glossary terms throughout the Climate Action Plan, please see page 159.

Equity in Climate Action: Immediate actions local governments can take

Local governments can take simple actions now to address the urgent needs of vulnerable communities that lie at the heart of the climate crisis. Below are ten equitable resilience strategies for governments:

1. **Weatherization and Healthy Homes Programs**
   Governments can collaborate with utilities to promote and expand existing programs, and to launch new programs geared toward tenants, low-income communities, and public housing. Weatherization and healthy homes programming in tandem directly address issues of substandard housing, environmental health, and burdensome energy costs.

2. **Community Solar and Solar-Ready Roofs**
   Community solar opens the renewable energy market to low-income households, eliminating major cost barriers and enabling multi-family housing units and renters to use solar energy. Eliminating financial and regulatory barriers can incentivize growth of community solar locally. In addition, passing a solar-ready roof ordinance ensures that all homes can ultimately support solar.

3. **Tree Planting and Urban Heat**
   Tree planting and cool roofs can help reduce the urban heat island effect, which impacts many of our most vulnerable populations. Planting trees on residential properties, at transit stops and along streets can improve community resilience and mitigate some impacts of extreme heat. In addition, governments and utilities can establish incentives programs for urban heat abatement in vulnerable communities.

4. **Community Gardens and Urban Agriculture**
   Local governments can include community gardening in parks, and plant fruit-bearing trees to help create self-sustaining communities. In addition, governments can incentivize new community gardens by decreasing taxes for land used for urban agriculture.

5. **Expand Shelter Capacity and Warming/Cooling Centers**
   Extreme weather impacts of climate change are life-threatening for unhoused individuals. Expanding shelter capacity as well as increasing resources for temporary heating and cooling centers can provide life-saving shelter. In addition, these can provide expand infrastructure for populations displaced by climate-related natural disaster.

6. **Improve Biking and Pedestrian Infrastructure**
   Well-maintained sidewalks are critical for pedestrian safety and transit access, and disabled individuals are most impacted by poorly maintained infrastructure. Plentiful, accessible, and safe biking and walking infrastructure is critical for the pedestrians who rely on our sidewalks most and encourages zero-emission transportation habits.

7. **Native Plants and Green Space**
   New park space can be identified to improve quality of life and environmental health of underserved communities. Increasing native plants on public land and reducing turfgrass acreage can boost local ecosystems. Ecological valuable and socioeconomically vulnerable areas should be prioritized. Governments also can use compost to restore soils in parks and for stormwater management.

8. **Equitable Planning & Policymaking Practices**
   Diverse voices and leaders should be at the table from the very beginning when developing sustainability policies. Planning practices like adopting form-based codes, contractor requirements with workforce development provisions, reduction of parking requirements, and transit connectivity promote sustainability equitably.

9. **Utility Assistance**
   Kansas City residents experience some of the greatest burden related to energy bills in the country. Utility assistance programs can be promoted and expanded to aid low-income families and ensure their access to basic needs like water, heat, and electricity.

10. **Community Resilience**
    Community finance trusts, response teams, and resilience investment districts can ensure that underserved communities have access to the resources they need. Municipal codes should also be reviewed for disaster resilience. Resources and services must be communicated at the grassroots level, direct to residents.

Electric bus charging station
Photo courtesy of Metropolitan Energy Center (MEC) of KCMO.

Climate Action Plan | Glossary

Accelerator: Accelerators are an innovative startup funding mechanism leveraged heavily in the tech sector. These programs use a selective application process to target scalable, high-value, and high-growth startups.

Activity center: An activity center is an area that attracts people for shopping, work, school, recreation and socializing. It is an urban planning term that implies a dense area with significant pedestrian traffic.

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Adaptive Capacity: The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences. [3]

Anthropogenic: Made by people or resulting from human activities. Usually used in the context of emissions that are produced as a result of human activities.

Bikeshare: Bike sharing is an innovative transportation solution, ideal for short-distance, point-to-point trips. These systems provide users the ability to pick up a bicycle at any self-serve bike station and return it to any other bike station located within the service area. Some systems have floating bikes that do not need to be docked at a station.

Biodiversity: The diversity of life on earth, from genes to species to ecosystems.

Biomass: Materials that are biological in origin, including organic material (both living and dead) from above and below ground, for example, trees, crops, grasses, tree litter, roots, and animals and animal waste.

Btu (British thermal units): Unit of heat energy equal to the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit at sea level. [6]

Building codes: A collection of regulations adopted by a city to govern the construction of buildings.

Business-as-usual: Used to say that something is working or continuing in the normal or usual way.

Carbon dioxide equivalent (CO_2e): Carbon dioxide equivalent, a standard unit for measuring carbon footprints. Used to express the impact of each different greenhouse gas in terms of the amount of CO_2 that would create the same amount of warming. That way, a carbon footprint consisting of different greenhouse gases can be expressed as a single unit.

Carbon offset: Carbon offsets are used to reduce the amount of carbon that an individual or institution emits into the atmosphere. Carbon offsets work in a financial system where, instead of reducing its own carbon use, a company can comply with emissions caps or targets by purchasing an offset from an independent organization. The organization will then use that money to fund a project that reduces carbon in the atmosphere. An individual can also engage with this system and similarly pay to offset his or her own personal carbon usage instead of, or in addition to, taking direct measures such as driving less or recycling. Carbon offsets are most often used by companies or institutions to reduce their carbon footprint without actually polluting less.

Carshare: Car sharing is a free-market approach to mobility that can offer important mobility options for those who do not need or want to own a car, but who may need to use one for a few hours.

Circular economy: Looking beyond the current take-make-waste extractive industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles: design out waste and pollution, keep products and materials in use and regenerate natural systems.

Climate change: Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Community Supported Agriculture (CSA): Community Supported Agriculture consists of a community of individuals who pledge support to a farm operation so that the farmland becomes, either legally or spiritually, the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production.

Complete and green streets: A complete streets are streets for everyone and may include sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more.

Composting: The controlled biological decomposition of organic material in the presence of air to form a humus-like material. Controlled methods of composting include mechanical mixing and aerating, ventilating the materials by dropping them through a vertical series of aerated chambers, or placing the compost in piles out in the open air and mixing it or turning it periodically.

Conservation (environmental conservation): Environmental conservation is the protection, preservation, management, or restoration of natural environments and the ecological communities that inhabit them. Conservation is generally held to include the management of human use of natural resources for current public benefit and sustainable social and economic utilization.

Energy efficiency: Energy efficiency simply means using less energy to perform the same task – that is, eliminating energy waste. Energy efficiency brings a variety of benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and lowering our costs on a household and economy-wide level.

Environmental justice: The fair treatment and meaningful involvement of all people regardless of race, color, culture, national origin, income, and educational levels with respect to the development, implementation, and enforcement of protective environmental laws, regulations and policies.

Equity (social equity): The just and fair inclusion into a society in which all can participate, prosper, and reach their full potential. Unlocking the promise of the nation by unleashing the promise in us all. Unlike equality, which connotes sameness, equity is responsive to difference; equitable policies actively mitigate the disproportionate harm faced by certain communities.

Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure or economic, social or cultural assets in places and settings that could be adversely affected.

Food access: a condition where a person has enough food to eat.

Food security: When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.[22]

Food insecurity: the condition assessed in the food security survey and represented in USDA food security reports—is a household-level economic and social condition of limited or uncertain access to adequate food.

Food supply chain: A food supply chain or food system refers to the processes that describe how food from a farm ends up on our tables. The processes include production, processing, distribution, consumption and disposal.

Food system: A food system gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes. There are three constituent elements of food systems: food supply chains; food environments; and consumer behavior.

Footprint: The impact of a building on the environment.

Global warming: The progressive gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns. See enhanced greenhouse effect, greenhouse effect, climate change.[7]

Frontline communities: Those communities that experience climate change first and often feel the worst effects. They are communities that have higher exposures, are more sensitive, and are less able to adapt to climate change impacts for a variety of reasons.

Green infrastructure: a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits.

Greenhouse gas: Gases that absorb heat in the atmosphere near the Earth's surface, preventing it from escaping into space. If the atmospheric concentrations of these gases rise, the average temperature of the lower atmosphere will gradually increase, a phenomenon known as the greenhouse effect. Greenhouse gases include, for example, carbon dioxide, water vapor, and methane.

Hazard mitigation: the effort to reduce loss of life and property by lessening the impact of disasters. Hazard mitigation is best accomplished when based on a comprehensive, long-term plan developed before a disaster strikes.

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. The term hazard usually refers to climate-related physical events or trends or their physical impacts. [28]

Incubator: An organization designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services that could include physical space, capital, coaching, common services, and networking connections.

Infrastructure: A term connoting the physical underpinnings of society at large, including, installations, parks, public buildings, and communications networks.

Land stewardship: the conservation and management of a property's natural resources and features.

Land use: Activities taking place on land, such as growing food, cutting trees, or building cities.

Methane: A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 25 times that of carbon dioxide (CO_2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. [7]

Mitigation: A human intervention to reduce the human impact on the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

Mobility: The ability to move or be moved from place to place.

Net zero carbon emission: Net zero looks at achieving an overall balance between emissions produced and emissions taken out of the atmosphere. Removing greenhouse gases could be via nature, as trees take carbon dioxide from the atmosphere, or through new technology or changing industrial processes.

Organic Waste: Manure and particles of once-living plants and animals.

Recycling: Collecting and reprocessing a resource so it can be used again. An example is collecting aluminum cans, melting them down, and using the aluminum to make new cans or other aluminum products. [7]

Regenerative agriculture: Farming and grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle.

Renewable electricity: Energy obtained from sources that are essentially inexhaustible, unlike, for example, the fossil fuels, of which there is a finite supply. Renewable sources of energy include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy. [7]

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

Restoration: The process of repairing sites in nature whose biological communities and ecosystems have been degraded or destroyed. In many ecosystems, humans have altered local native populations of plants and animals, introduced invasive species, converted natural communities to extractive use (such as agriculture or mining), fouled waters, and degraded soil resources. Ecological restoration focuses on repairing the damage human activities have caused to natural ecosystems and seeks to return them to an earlier state or to another state that is closely related to one unaltered by human activities. Ecological restoration is distinguished from the practice of conservation, which is primarily concerned with preventing further losses to ecosystems.

Riparian habitat: Riparian corridors are comprised of rivers and streams, riparian vegetation, wetlands, side channels, floodplains and usually contain a complex mix of trees or woody vegetation, shrubs and plants.

Risk: The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard. In this report, the term risk is used primarily to refer to the risks of climate-change impacts.

Sequestration: The process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions.

Solid waste: Non-liquid, non-soluble materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues.[6]

Stationary emission: Relatively large, fixed sources of emissions (i.e. chemical process industries, petroleum refining and petrochemical operations, or wood processing).

Stormwater management: The control and use of stormwater runoff. It includes planning for runoff, maintaining stormwater systems and regulating the collection, storage and movement of stormwater. The goals of stormwater management include protection our environment; reducing flooding to protect people and property; reducing demand on public stormwater drainage systems; supporting healthy streams and rivers and creating healthier, more sustainable communities.

Stream buffer: Stream buffers are vegetated areas along and adjacent to streams where clearing, grading, filling, building of structures, and other activities are limited or prohibited. Stream buffers protect water quality, reduce flooding, and provide other benefits.

Sustainability: Human practices that do not result in the permanent damage, alteration or depletion of the environment, ecosystems, species or natural resources.

Urban agriculture: Urban Agriculture is part of a local food system where food is produced within an urban area and marketed to consumers within that area. Urban farming can also include animal husbandry (e.g., breeding and raising livestock), beekeeping, aquaculture (e.g., fish farming), aquaponics (e.g., integrating fish farming and agriculture), and non-food products such as producing seeds, cultivating seedlings, and growing flowers. Urban farms can also contribute to the revitalization of abandoned or underutilized urban land, social and economic benefits to urban communities, and beneficial impacts on the urban landscape.

Urban Heat island Effect: The tendency for higher air temperatures to persist in urban areas as a result of heat absorbed and emitted by buildings and asphalt, tending to make cities warmer than the surrounding countryside.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Vulnerable communities: Communities that are particularly vulnerable and disproportionately affected by the impacts of climate change.[34]

Waste diversion: EPA facilities minimize solid waste generation through source reduction, recycling, reuse or composting. Waste diversion also reduces disposal costs and the burden on landfills.

Watershed: An area of land that drains or “sheds” water into a specific waterbody. Every body of water has a watershed. Watersheds drain rainfall and snowmelt into streams and rivers. These smaller bodies of water flow into larger ones, including lakes, bays, and oceans. Gravity helps to guide the path that water takes across the landscape.

Weatherization: Weatherization saves energy in the home by repairing and improving the building. The goal is to increase your home’s energy efficiency, safety, and comfort by eliminating drafts by weather-stripping or repairing broken exterior doors, patching small holes in walls and roofs (and repairing damaged windows), and performing minor furnace maintenance and repair, insulation in attic, walls, floor and perimeter, and insulating water heater pipes or furnace ducts.

Workforce development: Initiatives that educate and train individuals to meet the needs of current and future business and industry in order to maintain a sustainable competitive economic environment.

Zoning ordinance: A zoning ordinance is a rule that defines how property in specific geographic zones can be used. Zoning ordinances detail whether specific geographic zones are acceptable for residential or commercial purposes. Zoning ordinances may also regulate lot size, placement, density, and the height of structures. Zoning ordinances also describe the procedures for how to handle any zoning rule infractions and penalties.

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