Climate Resilience Strategy

for the Kansas City region

June 13, 2017

I. Overview

In November 2014, the U.S. Department of Energy and the White House designated a Kansas City-area consortium as a Climate Action Champion. Since then, the partnership — comprised of Bridging the Gap, the City of Kansas City, Missouri, Johnson County, Kansas, and the Mid-America Regional Council (MARC) — has led extensive community dialogue culminating in the development of this Regional Climate Resilience Strategy. This strategy provides a pragmatic starting point for continued community discourse, planning and action.

Resilience may be understood as the ability of a system or community to survive disruption and to anticipate, adapt, and flourish in the face of change. A resilient Kansas City region, then, would be able to not only to bounce back, but bounce forward from potential changes with respect to climate, demographics, technology, global markets, or other factors.

Regional stakeholder discussions clarified new opportunities, risks and vulnerabilities associated with potential changes in extreme weather in the Kansas City metro area. These issues were explored within the realms of public health, ecology, transportation, water, energy and housing. Assessments have and will require an understanding of the dynamics within and among each of these systems.

The proposed regional resilience strategy frames challenges and solutions within an integrated, systems-based perspective, building upon the region's impressive history and practice of sustainability. Emergent solutions and strategies will make the Kansas City region even more vibrant, green and connected – promoting economic resilience, growth and competitiveness together with other community goals. New opportunities, however, also will need to account for how climate change may exacerbate existing social, economic and environmental challenges.

Key themes and priorities emerged as clear initial steps toward increased resilience. Accelerated investment in energy efficiency, trees and green infrastructure, and local food systems would undeniably increase the region's resilience to extreme weather events while at the same time helping to achieve social equity, public health, economic and other community development goals. Implementation efforts must be complemented by more detailed planning, within the context of a sustainability-focused, integrated, collaborative, action-oriented framework.

II. Regional climate risks

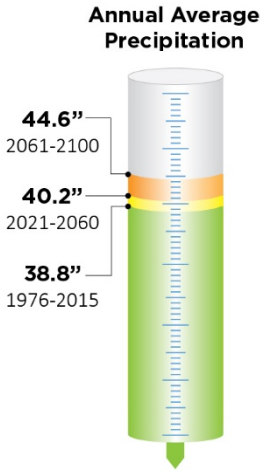
A recent publication, *Understanding Long-Term Climate Changes for Kansas City, Missouri Climate (Anderson and Walker, 2015),* quantifies potential changes in extreme weather for 2050 and 2100 under two climate scenarios — one that projects continuation of the current trend, with high greenhouse gas (GHG) emissions, and the second that assumes more moderate emissions. Observed changes in extreme weather in the Kansas City region since 1980 were also noted.

The report indicates that climate change will tend to amplify existing climate-related risks to people, ecosystems, and infrastructure in Kansas City and the Midwest region. Trends described in the report focus on expected changes in temperature and precipitation. While the proposed strategy emphasizes the urgent need for reductions in GHG emissions, the figures below for the year 2100 project current emissions trends continuing without reduction.

Precipitation

Recent and projected increases in annual precipitation for Kansas City 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.

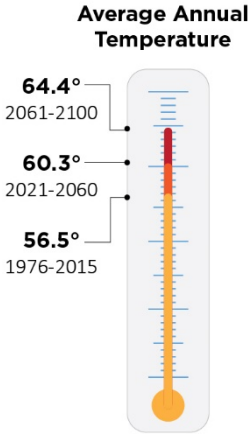
- Average annual precipitation will increase from 38.8 to 44.6 inches/year.
- Maximum precipitation occurring over one day will increase from 3.4 to 4.0 inches. Increases for the maximum five- and 15-day precipitation will be from 5.5 to 7.0 inches and from 7.5 to 10.4 inches, respectively.
- The number of days with more than 1.5” of precipitation will increase from 5.0 to 9.3.
- The maximum number of consecutive dry days will increase from 30.9 days/year 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. By 2100, in Kansas City:

- Average annual temperature will increase from 56.5°F to 64.4°F.
- The number of days/year in which the temperature exceeds 105°F 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 percent.
- The last spring frost is projected to be more than two weeks earlier, whereas the first fall frost will occur about 11 days later.



Implications

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 rather than heat adaptation, because changes in rainfall are already present and expected to continue. Temperature, in contrast, is expected to be more of an emergent change.

Another report, *Risky Business*[1] (sponsored by Michael R. Bloomberg, Henry Paulson, and Tom Steyer – https://riskybusiness.org/report/heat-in-the-heartland-climate-change-and-economic-risk-in-the-midwest/), suggests increased heat will lead to an increase of 5.3 percent in violent crime solely due to hotter temperatures, decreased labor productivity of 2.3 percent, and increased energy demand of 8–19 percent. Further, many reports note that changes in extreme weather will likely impact disadvantaged communities in a disproportionate manner.

III. Community engagement process

Extensive community and stakeholder participation drove the formulation of the proposed strategy. Feedback from over 400 community members and stakeholders, received through a mix of workshops, focus groups, and committee deliberations, informs the recommendations in the regional strategy.

Two workshops provided opportunities for more than 250 people to share thoughts about previous efforts, key risks and vulnerabilities, and priority solutions. At the first workshop, held on November 14, 2015, Iowa State University climatologist Christopher Anderson provided an overview of climate trends facing the Midwest and Kansas City. Workshop participants discussed the many local resilience efforts underway in their organizations and communities, and how those efforts might provide a strong basis for future work.

In April and May 2016, two focus groups were held involving regional leaders and experts. The first focused on the intersection of sustainable infrastructure and natural hazard mitigation. Discussions about hazard mitigation squarely intersect with sustainable water, energy and transportation infrastructure design and management. Participants noted that a risk management approach to inform infrastructure design would support decision-making under conditions of growing uncertainty. Increased focus on mitigation elements of regional hazard mitigation

[1] Sponsored by Michael R. Bloomberg, Henry Paulson, and Tom Steyer. Online at https://riskybusiness.org/report/heat-in-the-heartland-climate-change-and-economic-risk-in-the-midwest/

plans may create synergies with or impetus for more resilience infrastructure design. The second group explored linkages among public health, housing, neighborhood development and social equity.

Steve Adams, a facilitator of national regional climate resilience plans for the Institute for Sustainable Communities, keynoted the second community stakeholder workshop on August 24, 2016. His focus on the value of collaborative regional approaches for resilience was followed by in-depth stakeholder discussions about risks, vulnerabilities and priority solutions in five sectors: public health, ecosystem health, transportation, water, and energy and housing.

Preliminary findings were shared with multiple MARC committees during the past year, including the Air Quality Forum, Total Transportation Policy Committee, Sustainable Places Policy Committee, and the Regional Water Quality Education Committee. MARC committees and workshop participants will review and comment on the final draft strategy before sharing with the MARC Board of Directors for review and consideration.

IV. An initial framework for regional resilience

Community stakeholders articulated a clear set of principles to guide future planning. From an overarching standpoint, climate resilience is embedded within a broader concept of sustainability. The adopted regional vision of sustainability — to simultaneously enhance the vitality of the region's communities, economy and environment for current and future generations — provides a tested, well-supported approach from which the region can build toward greater community resilience.

At the same time, resilience is inextricably linked with climate mitigation and adaptation. Reducing greenhouse gas emissions remains imperative, even as communities plan to adapt to or bounce forward from potential climate impacts. Given that impacts from climate change are broadly recognized to be disproportionately borne by vulnerable and disadvantaged populations, the framework emphasizes strong consideration on social equity in all future efforts. Similarly, climate resilience is understood to be fundamentally linked with economic resilience.

Because of the complexity inherent in addressing resilience, a systems-based, integrated, highly collaborative approach is necessary. Building an understanding about linkages among systems such as public health, natural ecosystems, transportation, housing, energy and water will be instrumental to identify and pursue effective and efficient multi-benefit solutions and investments.

RESILIENCE PRINCIPLES

Resilience is intrinsically a triple-bottom-line concept, with an unblinking social equity lens.

Mitigation, adaptation and resilience go hand in hand.

Complex linkages among sectors and disciplines require an integrated, systems-based, collaborative approach.

Leadership comes from the top-down, bottom-up and middle-in.

Institutional solutions must match the scale of the problem.

Resilience builds from existing successes.

Do no harm.

Further, integrated planning and action at the neighborhood, municipal, county, watershed and regional scales requires a nuanced approach to capacity building, leadership and action. The National Academy of Sciences in its *Pathways to Urban Sustainability* report (October 2016) recommends that

> "Making cities livable, economically competitive and sustainable demands new models of governance, institutions, and innovative partnerships that can address multiple dimensions of a city's connections with other places, stakeholders, and decision making. A multiscale governance system that explicitly focuses on interconnected resource chains and places is essential to transition toward urban sustainability."

This framework organizes recommendations in two parts: action and planning. Investments in energy efficiency, trees and green infrastructure, and local food production would demonstrably enhance community sustainability and resilience. Heightened levels of community coordination and education are critical to ensure broad-based understanding, engagement and support, while facilitating well-distributed outcomes in all portions of the community.

Action

1. **Energy efficiency.** Energy efficiency investments are consistent with all of the community resilience principles. The region has advanced a variety of programs and policies to support energy efficiency in recent years. Energy use in buildings contributes more than 70 percent of the region's greenhouse gas emissions. A continued focus on energy efficiency improvements will reduce greenhouse gas emissions, and reduce the disproportionate energy cost burden facing many of our region's most disadvantaged and vulnerable populations. Increased energy efficiency will likely improve building comfort and performance, thereby improving public health — especially during extreme heat waves.

2. **Trees and green infrastructure.** Trees and green infrastructure[2] provide a wide array of community benefits tied to public health and safety, air and water quality, flood risk reduction, walkability, energy conservation, and wildlife habitat. Green infrastructure approaches provide a cost-effective alternative to hardening grey infrastructure to withstand extreme weather events, while at the same time providing invaluable contributions to environmental quality and overall quality of life.

3. **Local food production.** Over 250,000 people in the metro area lacking access to sufficient, safe and nutritious food to meet their dietary needs. Such food insecurity results in negative family, health and educational outcomes. The burgeoning urban agriculture movement creates possibilities to enhance diet and nutrition, restore vacant lots and neighborhoods, and while simultaneously reduce GHG emissions and build social cohesion.

4. **Coordination and collaboration.** The Institute for Sustainable Communities noted a spectrum of organizational arrangements used to address resilience at the regional scale, ranging from information sharing and coordination to more formalized shared funding and governance arrangements. MARC plays a coordinating role within the metro on a wide variety of issues,

[2] According to The Nature Conservancy, green infrastructure is ". . . planned and managed natural and semi-natural systems which can provide more categories of benefits, when compared to traditional gray infrastructure." Gray infrastructure largely focuses on such items as roads, bridges and sewers.

including climate resilience to some degree, but no organizational structure currently exists within the community to guide ongoing assessments, planning and investment related to climate resilience. Leadership, coordination and meaningful collaboration are needed at the neighborhood, city, watershed, county and regional scales. In local communities, coordination is needed within city governments to assess local risks and vulnerabilities at a more detailed level and guide future city growth, city operations and management.

5. **Education and engagement.** Political polarization around climate change confounds practical problem-solving. Building consensus on this agenda in a meaningful, inclusive manner requires engagement of diverse groups throughout the community. Community engagement is necessary to foster greater social cohesion, a defining element of resilience.

Planning

These recommendations provide a starting point for deeper analysis about risks and vulnerabilities within and across multiple sectors. Planning recommendations fall in three categories: learning more about risks and vulnerabilities; integrated, cross-sector planning; and building on success.

1. **Vulnerability and risk analysis.** Given the enormous uncertainty surrounding possible climate change scenarios, additional analysis is imperative about risks and vulnerabilities associated with public health, transportation, natural ecosystems, energy, air, water and other issues. Such analysis would provide a more detailed understanding about how climate change might affect these sectors individually and collectively. Analysis would include an explicit equity lens while also striving to understand how current decision-making structures may support future efforts.

2. **Integrated planning.** The Mid-America Regional Council adopted a Regional Plan for Sustainable Development in 2011, and updated the plan after the completion of the Creating Sustainable Places initiative in 2014. That plan is slated to be updated again in 2017 in preparation for the development of the next Metropolitan Transportation Plan in 2020.

   The Regional Plan for Sustainable Development considers the breadth of current regional plans, addressing transportation, land use, housing, economic development, air quality, water quality, greenways, natural resource management, energy, hazard mitigation and public health. The plan identifies common goals and strategies such as the nodes and corridors strategy highlighted in the land use vision, and builds from adopted local plans from communities throughout the region.

   However, plan elements were developed through independent processes, stakeholder groups and funding. The resilience framework provides an opportunity assess linkages and opportunities among sectors and constituencies. For example, in pursuit of cross-cutting resilience strategies, the community may:

   - Facilitate green infrastructure or transit-oriented development to catalyze urban or suburban revitalization, improve public health and restore environmental quality.

- Develop sustainable infrastructure design standards, specification and criteria in the transportation, water and energy sectors to enhance the region's emergency preparedness for extreme weather events.

- Formulate philanthropic, civic and public strategies to intentionally build social cohesion while at the same time meeting other programmatic goals.

3. **Build from success.** A variety of strong regional and local sustainability efforts provide the basis for continued progress toward resilience. Collectively, hundreds of sustainability-focused projects, programs and policies have been recognized by consortium members and other community partners. Building from the region's track record of success and commitment is a practical step toward greater community resilience.

    - To date, over 50 projects have been funded through the regional Planning Sustainable Places program. These projects will bring even greater focus to multi-benefit place-making that restores vitality and resilience to all parts of the community.

    - MetroGreen turned 25 years old in 2016. Over 350 miles of regional trails complement another 550 miles of local trails. Opportunities exist to restore the region's 225,000 streamside acres, some of which are located along area trails, to better conserve water quality, restore biodiversity, and reduce the risk of flooding.

    - The Clean Air Action Plan, first written in 2004 and updated in 2011, has spurred a variety of local policies, programs and investments in clean air, helping protect air quality and public health in the region. Diesel engine retrofits, native landscaping, energy efficiency, green building, alternative transportation and public education support clean air along with many related community goals.

    - Over 10 area municipalities adopted complete street ordinances, following on the regional complete and green street policy adopted by the MARC Board of Directors. More treed streets can substantially reduce urban heat islands while improving walkability, retail profitability and public health risks associated with extreme heat.

    - Waste reduction, reuse and recycling represent a set of well-supported community environmental initiatives. In 2015, the local recycling and reuse industries directly contributed $214 million and 6,250 jobs to the local economy. With a regional waste diversion rate of approximately 34 percent, extraordinary opportunities exist to improve economic efficiencies while creating new jobs.

    - Energy efficiency and renewable energy are imperative for climate protection and resilience alike. Through Energy Works KC and Home Performance with Energy Star, over 5,000 residential and commercial buildings were made more energy efficient, while a new Energy Empowerment Ordinance (to benchmark energy use in Kansas City, Missouri's largest buildings) helps large building owners monitor energy and water usage as a first step toward higher levels of building performance.

- Affordable housing challenges are present in communities throughout the metropolitan area. The Housing Element of the Regional Plan for Sustainable Development describes the underlying dynamics, needs and opportunities within this sector, along with key policy and programmatic recommendations.

Goals and Strategies

Climate mitigation, adaptation and resilience require urgent planning and action at multiple levels in ever more coordinated and collaborative ways. Finding the right forums to inform decisions and investments at different geographic scales is imperative. The goals and strategies noted below were shared through various stakeholder discussions. These proposed strategies will guide future planning and implementation efforts. Development of clear evaluation and metrics will be integral to this work.

Table 1. Proposed climate resilience strategies for the Kansas City region.

TRANSPORTATION	
Climate Variables	Flooding, drought, heat stress
Successes	• Regional land use vision (nodes and corridors) • Green/Complete Streets Policy • Planning for Sustainable Places
Goal	Create and implement a Regional Transportation Climate Resiliency Action Plan guided by a regional advisory body.
Major strategies/ next steps	1. Conduct vulnerability analysis of regional transportation infrastructure to potential flood, drought and heat risks. 2. Evaluate transportation mobility options and public health threats from urban heat islands in disadvantaged communities. 3. Evaluate opportunities to enhance resiliency through green infrastructure, green/complete streets, alternative fuels and electric vehicles. 4. Evaluate resilience of all regional initiatives, including the Planning Sustainable Places program.
ENERGY	
Climate Variables	Heat — doubling of cooling-degree days
Successes	• Demand side management programs • Comprehensive energy plan • Growth of renewable energy sector • Strong nonprofit presence and investment in affordable housing sector.
Goal	Ensure an affordable, clean energy system in the KC metro to respond to a changing climate and energy demand.
Major strategies/ next steps	1. Implement regional demand-side management (e.g., energy efficiency and conservation) and distributed energy generation programs. 2. Spur energy improvements, especially within vulnerable and disadvantaged communities. 3. Implement multi-benefit heat island abatement initiatives. 4. Advance affordable, energy efficient housing initiatives.

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WATER (Drinking water, stormwater and wastewater)	
Climate Variables	Increased flood risk, drought, heat stress
Successes	• APWA 5600 and MARC/APWA BMP Manual • Reliable, high quality water supply
Goal	Develop integrated water resource management initiatives.
Major strategies/ next steps	1. Conduct long-term system risk assessments for capacity, treatment, production and distribution. 2. Develop regional capacity for integrated water resource management. 3. Strengthen mitigation elements of the Regional Hazard Mitigation Plan. 4. Update planning and design standards to mitigate flood risks and restore ecosystem functions. 5. Implement low impact development and stormwater BMPs to reduce stormwater load in new and redevelopment.
ECOSYSTEMS	
Climate Variables	Changes in temperature and precipitation regimes.
Successes	• MetroGreen • KC Wildlands • Heartland Tree Alliance • KC Native Plants Initiative
Goal	Refine and implement a regional green infrastructure conservation and restoration plan.
Major strategies/ next steps	1. Evaluate the implications of climate change on natural systems. 2. Restore all Wildland sites. 3. Implement MetroGreen. 4. Implement native landscaping at scale on public and private lands. 5. Meet urban forest canopy coverage goals. 6. Expand local food production, with a focus on areas of food deserts.
PUBLIC HEALTH	
Climate Variables	Increased flood risk, drought, heat stress
Successes	• Smoke-free ordinances • Significant investment in active living • Strong philanthropic support
Goal	Safeguard our communities by protecting people's health, wellbeing, and quality of life from climate change impacts.
Major strategies/ next steps	1. Identify and monitor climate-sensitive public health data as a region. 2. Develop/ strengthen early warning systems for extreme weather (not just acute conditions). 3. Update Emergency management plans/ Regional Hazard Mitigation Plan to enhance mitigation and recovery elements.