LEAVENWORTH
KANSAS

CLIMATE ACTION PLAN

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INTRODUCTION

The historic town of Leavenworth, Kansas is situated along the west bank of the Missouri River just northwest of the Kansas City metropolitan area. This location along the river was fundamental to Fort Leavenworth's founding, and eventually the city that would follow. As the Missouri River has brought commerce, trade, and vitality to the region, it also has posed a constant threat along the northern and eastern borders of the City of Leavenworth.

As of the 2010 census, Leavenworth had a population of just over 35,000 residents. [1] The City of Leavenworth continues to sprawl south, contributing to a low density of just 165 residents per square mile. [2] Local residents are proud of Leavenworth's history. However, due to past hazards and future risk, this climate action plan is imperative to ensuring that the City of Leavenworth prospers in the future.

Leavenworth is unique in that it is home to a large federal presence, namely Fort Leavenworth in conjunction with the United States Disciplinary Barracks, the Leavenworth United States Penitentiary, and several other prison locations.[3] The fort employs over 4,000 employees, which comprises a large portion of the workforce in the area. Due to the large federal involvement, there is an opportunity to lead by example in regards to sustainable practices, especially, considering how the Fort has been affected by previous extreme weather events.

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[1] *American Fact Finder.* United States Census Bureau, 2015. Web. 11 June 2015.

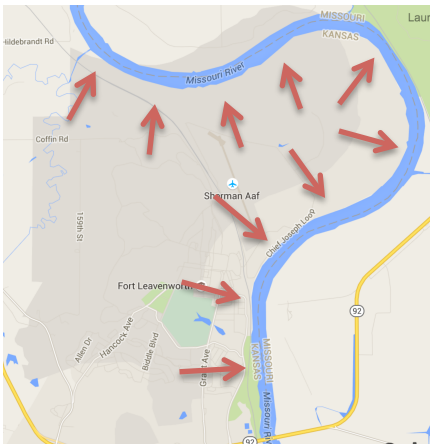
[2] Ibid.

[3] *Welcome to Leavenworth.* Leavenworth, Kansas, 2015. Web. 11 June 2015.

LEAVENWORTH, A BRIEF HISTORY

In 1854, the City of Leavenworth became the first established city in the State of Kansas.[4] The location along the Missouri River served as a key component to the founding of Fort Leavenworth in the late 1820s, which later gave rise to the City of Leavenworth in the 1850s. The City contributed to the civil unrest that the United States saw leading up the Civil War. As Missouri was a slave state, slaves often sought the freedom that Kansas offered. Leavenworth was a popular destination for slaves fleeing across the river and over the state border.[5] Due to its prime location along the Missouri River, Leavenworth has since experienced flooding, most recently in the 1993 and 2011 extreme flooding events.

FORT LEAVENWORTH



Fort Leavenworth was outside of the city limits when Leavenworth was originally incorporated. However, the fort was annexed in 1997 and continues to play a large role in shaping the economy, demographics, and environment of Leavenworth, Kansas. Today, Fort Leavenworth is noted as "the intellectual center of the Army" and houses the Combined Arms Center, the U.S. Army Command, General Staff College, National Simulation Center and the Army Corrections Complex (Welcome to Leavenworth Kansas). The United States Disciplinary Barracks is currently the Department of Defense's only maximum-security prison.

Additionally, the headquarters for the Kansas Army National Guard (KSARNG) is housed at Fort Leavenworth, and National Guard Division Warfighter Exercises and Brigade Training Seminars are consistently held out of the fort. The Fort not only acts as an educational asset for the local community, but also as an intellectual node for the greater region.

[4] Ibid.

[5] *Civil War on the Western Border.* The Kansas City Public Library. 11 June 2015.

CLIMATE CHANGE BASICS

The Intergovernmental Panel for Climate Change (IPCC) is an international group that aims to keep the world abreast of the current state of anthropogenic climate change. The IPCC Fifth Assessment Report states that risk is determined by the interaction of vulnerability, exposure, and hazard.[6] The IPCC defines these terms as the following:

> Vulnerability: The propensity of 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.
>
> Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure or economic, social, or cultural assets in places and setting that could be adversely affected.
>
> 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.
>
> *– IPCC Fifth Assessment Report*

As of 2010, ten (10) percent of the population in Leavenworth fell below the poverty line.[7] Citizens within this category are particularly vulnerable when it comes to their ability to cope and adapt to impacts from climate change such as rising food prices. Additionally, due to Leavenworth's position on the Missouri River, the community has great exposure to hazards such as extreme weather events and their consequences including flooding.

Climate Change Mitigation: Process to minimize the long-term effect of climate change

Climate Change Adaptation: Adjustment to new or anticipated effects and impacts from climate change

Hazard Mitigation: Process to reduce risk and future loss from natural disasters

[6] Intergovernmental Panel for Climate Change. "Fifth Assessment Report: Impact Adaptation and Vulnerability." Geneva, Switzerland, 2014. Print. 2 June 201

[7] *American Fact Finder.* United States Census Bureau, 2015. Web. 11 June 2015.

DOD: Climate Change as a National Security Issue

In the 2*014 Quadrennial Defense Review* (QDR) put out by the Department of Defense, climate change was identified as a concern for national security. [8] Additionally, General Christopher King, the chief academic officer for the U.S. Army's Command and General Staff College at Fort Leavenworth, argues that climate change is the biggest threat to national security as it relates to water shortages, food shortages, the displacement of populations, and therefore civil unrest and conflict.[9]

"Environmental issues are of such significance that they impact the peace and security of the world."

Dr. Wendell Christopher King

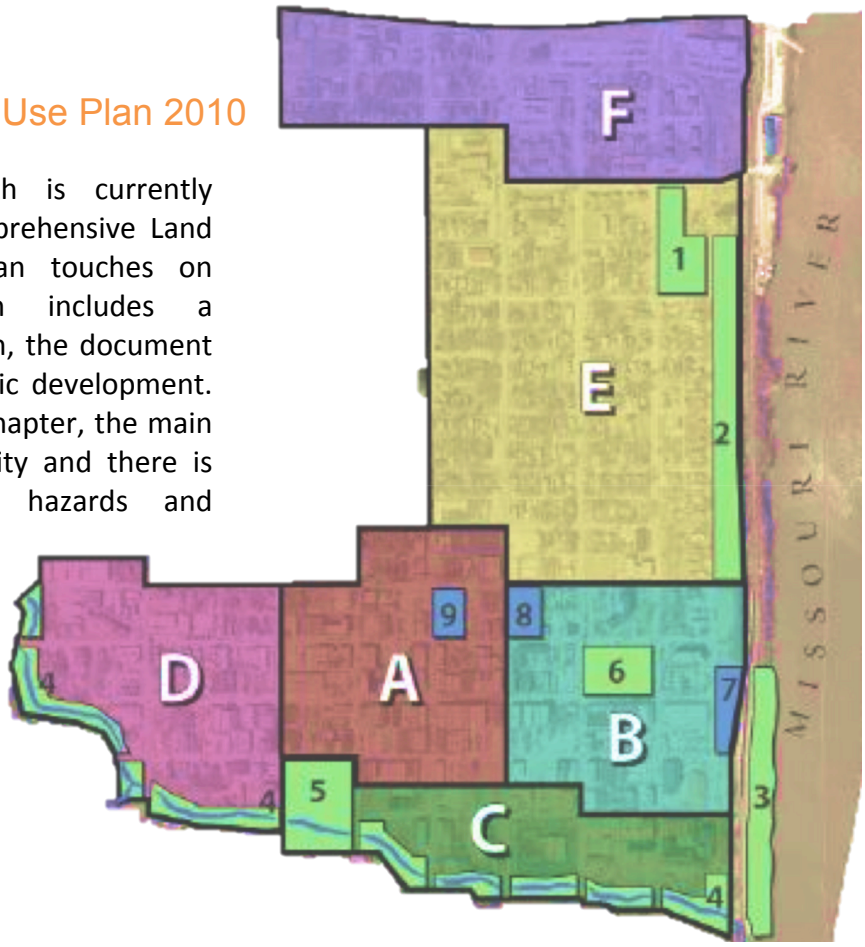
[8] *Quadrennial Defense Review 2014. Encyclopedia of United States National Security.* Department of Defense, 4 March 2015. Web 21 June 2015.

[9] King, Christopher. "National Security Implications of Climate Change." St. Paul's United Methodist Church. Lenexa, KS, 2014.

EXISTING PLANS AND DOCUMENTS

Comprehensive Land Use Plan 2010

The City of Leavenworth is currently operating from 2010 Comprehensive Land Use Plan. While the plan touches on sustainability and even includes a sustainability action portion, the document mainly focuses on economic development. Even in the sustainability chapter, the main emphasis is on social equity and there is little on environmental hazards and concerns. Nowhere in the document is climate change mentioned, nor any opportunities that the community has to mitigate climate hazards or adapt to a changing environment.



The City of Leavenworth has acknowledged that the land use in the area is unique, as 6,700 acres of the total 10,999 acres (just over 60% in total) within the boundary of the City of Leavenworth is federally owned. While the Fort and federal presence is significant, the Comprehensive Plan does not incorporate federal involvement in the future planning, policies, and strategies. Planning across different jurisdictional levels is complicated, but necessary to ensuring a resilient future for Leavenworth.

Additionally, as the City has made strides to designate park and green space along the Missouri River, the master plan still shows future development along the water. These future areas of development are in currently designated floodplains. Flood hazards must be incorporated into long-term development plans into to prepare for the long-term effects climate change will have on the Leavenworth community.

The help and support of the following individuals were instrumental in ensuring a smooth transition of information. Without their selfless dedication, sacrifice, and perseverance this plan would have been close to impossible.

To: Kim Buchanan, Assistant Director of Emergency Management Operations for Leavenworth County.

To: Mike Baughman, Program Coordinator, Emergency Operation Management Operations for the Unified Government of Wyandotte County.

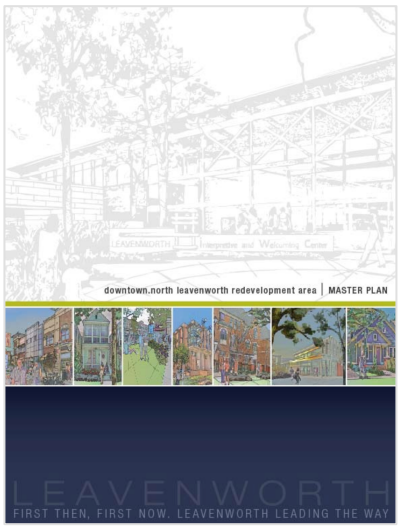
To: Cary Gerst, Assistant Director Emergency Management Operations, Planning, for Johnson County.

To: The Planning Committee for their relentless questions, input, corrections, critique's, and presence.

AMEC – for their superior facilitation and writing of the State HMP in a regional format. Many thanks for setting the 'stage' for the Regional Plan.

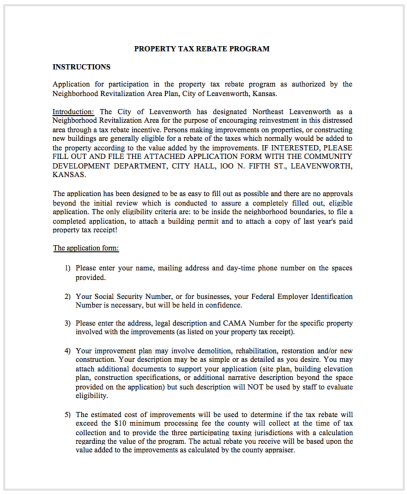
Hazard Mitigation Plan

Leavenworth County falls within the Region L and is accompanied by Johnson and Wyandotte Counties within the area. The hazard mitigation plan for this region outlines the following mitigation concerns that have a high level of planning significance: flooding, tornados, utility and infrastructure failure, windstorms, and winter storms. Other moderate concerns include: agricultural infestation, civil disorder, dam and levee failure, drought, expansive soils, extreme temperatures, hazardous material, lightning, major disease outbreak, terrorism and wildfires.



Downtown North Leavenworth Redevelopment Area Plan

More recently since the Comprehensive Plan, the Planning Commission and Board of Commissioners have passed the *Downtown North Leavenworth Redevelopment Area Plan*. This plan focuses mainly on aesthetic appeal and physical design guidelines with the goal of reinvestment in downtown. While the plan has a solid vision for where it wants to go, it does not take into account any hazards including flooding or designated floodplains in the future proposed development plan. Nevertheless the plan showed a strong community approach to planning and emphasized mixed-use development, infill, and green space.



PROPERTY TAX REBATE PROGRAM

INSTRUCTIONS

Application for participation in the property tax rebate program as authorized by the Neighborhood Revitalization Area Plan, City of Leavenworth, Kansas.

Introduction: The City of Leavenworth has designated Northeast Leavenworth as a Neighborhood Revitalization Area for the purpose of encouraging reinvestment in this distressed area through a tax rebate incentive. Persons making improvements on properties, or constructing new buildings are generally eligible for a rebate of the taxes which normally would be added to the property according to the value added by the improvements. IF INTERESTED, PLEASE FILL OUT AND FILE THE ATTACHED APPLICATION FORM WITH THE COMMUNITY DEVELOPMENT DEPARTMENT, CITY HALL, 100 N. FIFTH ST., LEAVENWORTH, KANSAS.

The application has been designed to be as easy to fill out as possible and there are no approvals beyond the initial review which is conducted to assure a completely filled out, eligible application. The only eligibility criteria are: to be inside the neighborhood boundaries, to file a completed application, to attach a building permit and to attach a copy of last year's paid property tax receipt!

The application form:

1) Please enter your name, mailing address and day-time phone number on the spaces provided.
2) Your Social Security Number, or for businesses, your Federal Employer Identification Number is necessary, but will be held in confidence.
3) Please enter the address, legal description and CAMA Number for the specific property involved with the improvements (as listed on your property tax receipt).
4) Your improvement plan may involve demolition, rehabilitation, restoration and/or new construction. Your description may be as simple or as detailed as you desire. You may attach additional documents to support your application (site plan, building elevation plan, construction specifications, or additional narrative description beyond the space provided on the application) but such description will NOT be used by staff to evaluate eligibility.
5) The estimated cost of improvements will be used to determine if the tax rebate will exceed the $10 minimum processing fee the county will collect at the time of tax collection and to provide the three participating taxing jurisdictions with a calculation regarding the value of the program. The actual rebate you receive will be based upon the value added to the improvements as calculated by the county appraiser.

Neighborhood Revitalization Area Plan/Tax Rebate Program

The *Neighborhood Revitalization Area Plan and Tax Rebate Program* initiated a rebate of ninety-five percent of the increase from property tax due to property improvements in specified areas such as the northeastern portion of the City of Leavenworth. This plan shows that the community values redevelopment and social justice, but the plan does not outline any guidelines or project requirements for structures that are most likely older and have a high vulnerability to climate hazards such as flooding.

PLANNING FOR CLIMATE CHANGE

Climate change will affect all communities differently and the effects will be felt on a variety of scales. Across the globe, some have been slow in accepting the escalating impacts of climate change since the industrial revolution and the combustion of fossil fuels. Leavenworth has been reminded of threats that climate change poses through the presence of the Missouri River.

Massive flooding in 1993, and again in 2011, reminds community members and political leaders in the city that nature is force to be reckoned with. With the most recent flooding damages in mind, the City of Leavenworth understands the importance of sustainability and planning for the future in regards to climate change.

Many of the effects will be felt through a chain reaction of events. Actions to mitigate climate hazards and decrease carbon emissions cannot wait. If we wait until everyone around the globe can feel the effects of climate change, it will be much more costly to make a difference and perhaps too late to stave off catastrophic impacts. It is imperative that individuals, organizations, communities, and governments engage now.

Regional and global actions are needed to mitigate future flooding of the Missouri River and other large-scale water sources. Nonetheless, local mitigation strategies are necessary. In addition to mitigation, the City of Leavenworth must make adaptation a priority, especially in regards to the future risk of flooding in the area.

A resilient Leavenworth is a city that is able to plan, prepare, and mitigate for all steps of natural hazards including before, during, and after a disaster strikes.

LEAVENWORTH AS A LEADER

The City of Leavenworth, as is true in many surrounding municipalities, is fairly conservation and tends to prioritize private property rights over planning strategies. Nonetheless, as Leavenworth is the county seat for the greater Leavenworth County, the city has the potential to instigate change not only on the municipal level but also across the greater county area.[10]

Fort Leavenworth also has the opportunity to lead by example across the military and the United States. As the fort is already nationally renowned for education within the military, there is the potential to prompt climate action planning on a much larger scale through incorporating Fort Leavenworth in the Climate Action Plan. There are jurisdictional and regulatory obstacles to incorporating a military fort in a local plan; yet, it would be a mistake to exclude such a large component of the community. Within the fort, the United State Disciplinary Barracks also has a great opportunity to instigate change on a large level.

With this plan it is our hope to not only prepare the local community for what is yet to come but also lead as a guiding figure in the region and the greater fifty states. A thorough understanding of the risks climate change holds on our community, thoughtful stakeholder analysis and community participation, well-rounded mitigation and adaptation implementation, and continual evaluation, will help make the City of Leavenworth a resilient community in the future.

[10] *Planning and Zoning*. Leavenworth, Kansas, 2015. Web. 11 June 2015.

INITIAL EMISSIONS ESTIMATES

Precise emissions data are not currently available for the City of Leavenworth. Therefore, initial emissions estimates are based on the city's relative population to the total population of Leavenworth County, as well as a review of a comparable city to Leavenworth that has already completed emissions inventories.

COMPARABLE CITY

Lawrence, KS[11]

2010 Population: 87,623

Due to Lawrence's is also located adjacent to a river and is quite separate from Kansas City, but also within driving distance for commuting, much like Leavenworth.

2010 Emissions Inventory (CO_2e)

Residential:	456,000	31%
Commercial:	488,000	35%
Industrial:	210,000	16%
Transportation:	216,000	17%
Waste:	18,000	1%
Total:	1,388,000	100%

Lawrence is particularly useful as the city is within fifty miles of Leavenworth and the daily lifestyles of citizens and culture of the community are similar. While Lawrence can provide a good estimate of Leavenworth's emissions, Lawrence is a larger municipality. The City of Leavenworth's population is roughly half of that of Lawrence. Therefore, this table shows Leavenworth's estimated carbon emissions based on a 2:1 ratio.

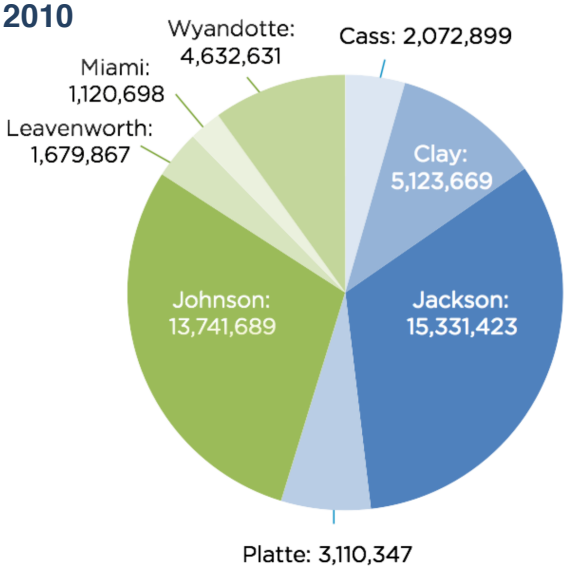
Emissions Estimates

Sector	(CO_2e tons)
Residential:	228,000
Commercial:	244,000
Industrial:	105,000
Transportation:	108,000
Waste:	9,000
Total:	694,000

11 Lawrence, Kansas. "Greenhouse Gas Emissions Inventory Update." Lawrence, Kansas, 2012.

The estimate presented above seems reasonable based on land use, commercial, and industrial sectors in Leavenworth. Still, the transportation estimates seem low based on a familiarity with the community. Leavenworth County is a member of Mid-America Regional Council (MARC), the Metropolitan Planning Organization (MPO) for the Kansas City Metropolitan area, which provides member municipalities with regional planning services including data collection. The organization published 2010 metro data including vehicle ownership, vehicle miles of travel (VMT), and vehicle occupancy statistics for the eight counties in the region. Considering that the City of Leavenworth represents half of the total population in the county, the following was calculated based on MARC report.

Daily vehicle miles traveled (VMT) 2010



Transportation Emissions Calculations

Daily vehicle miles traveled:		= 1,679,876 VMT
Annual vehicle miles traveled:	1,679,876 * 365	= 613,154,740 VMT
Fuel:	(613,154,740) / 27.5 mpg	= 22,296,536 gallons gasoline
Tons of CO_2 emissions:	22,296,536 gal. fuel * 8.8 kg CO_2	= 196,209,517 CO_2
Carbon equivalent:	196,209,517 * (100/95/1,000)	= **206,536 annual tons of CO_2e**

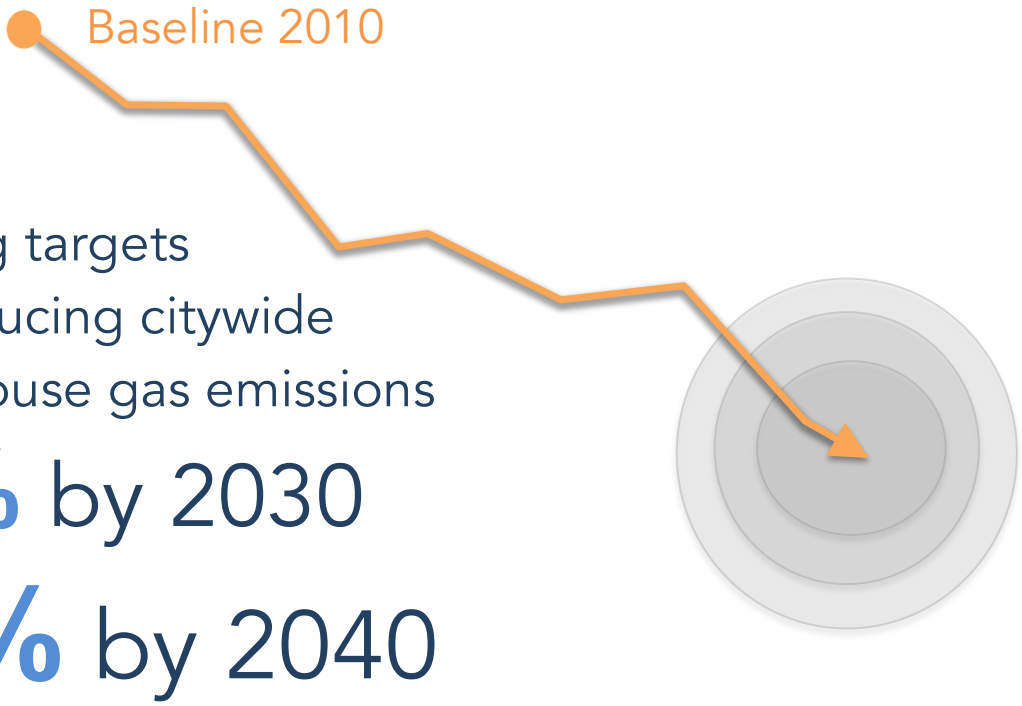
Adjusted Emissions Estimates

Sector	(CO_2e tons)
Residential:	228,000
Commercial:	244,000
Industrial:	105,000
Transportation:	207,000
Waste:	9,000
Total:	793,000

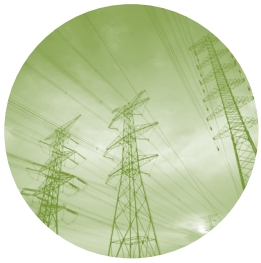
OVERARCHING PRINCIPLES

The following principles represent the values of the Leavenworth community. These concepts will serve as the foundation for policy formulation, prioritization, and implementation of the Climate Action Plan. They also provide a framework for setting targets and achieving the overall vision.

- Prioritize high impact, equitable, and cost effective strategies
- Seek strategies with multiple benefits
- Monitor progress, revisit goals and strategies, and make necessary changes
- Lead by example through the local government
- Collaboration with Fort Leavenworth and related military assets



By 2040 Leavenworth will:



Reduce energy use by 20%

At least **10%** of the electricity on the grid will be from **local, renewable sources**

Reduce total waste by 30%

Landfill waste will make up **less than 40%** of total waste citywide

Increase transit ridership by 25%

Improve **active transportation** infrastructure including **doubling** the total miles of trails

Implement smart land use strategies

Expand **green space**, increase the amount **shade trees**, and **plant native species**

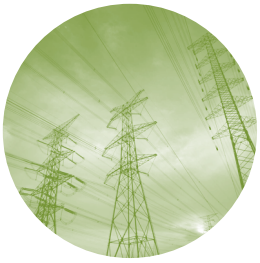
Decrease overall **risk** and **vulnerability**

Reduce development and vulnerable infrastructure within a **flood hazard area by 15%**

MITIGATION POLICIES AND IMPLEMENTATION

The following policies and implementation strategies are based on a preliminary assessment of the plans in place and current community in Leavenworth. The following strategies and actions focus on a reduction of emission in resident, commercial, industrial, transportation, and waste sector. A more thorough outline of objectives, policies, and implementation strategies will be the outcome of the following work plan.

BUILDINGS AND ENERGY



Reduce energy use by 20%

At least **10%** of the electricity on the grid will be from **local, renewable sources**

Decrease **local government** usage by **50%**

Energy efficiency has the potential to have a strong return on investment while increasing the longevity and marketability of buildings and homes within the City of Leavenworth. Efficient structures will decrease the amount of total energy used. Energy efficiency programs also have the potential to double as equitable programs as efficiency can help decrease monthly energy bills. It is important to show residents that high-energy efficiency, and even carbon neutrality is possible. Local governments can lead by example in initiating green building infrastructure and energy efficiency standards.

There is also room to decrease emissions and reduce energy usage through the type of building materials and building practices used in new or redevelopment. While energy efficiency and low impact building materials help towards meeting targets, reducing energy usage is the overall goal and avenue to mitigating the long-term effects of climate change. In the short term, innovative strategies can be used to encourage a decrease in energy and water use. But, in the long-term regulatory policies may need to be put in place to curb energy usage in Leavenworth.

Objective 1: Increase residential, commercial and industrial energy efficiency

Policy Option: Partnership between the City of Leavenworth Public Works and Leavenworth Waterworks, Westar Energy, and Kansas Gas Service

Action: Provide free benchmarking services in addition to either free or partially subsidized energy audits for small to medium sized businesses

Action: Research possible energy efficiency options for both commercial and residential users. Circulate the possible options as well as financing and return on investment estimates.

Action: Establish tax rebates for homeowners that upgrade to Energy Star or other appliances that are recognized as efficient

Action: In the long-term regulatory policies including strict building codes and regulated performance standards may be necessary

Policy Option: Hold citizens accountable for total energy usage through a neighborhood monitoring system

Action: Initiate a program that advertises total neighborhood energy and water usage to put citizens in competition with each other and hold each other accountable through public awareness without infringing on privacy rights

Action: In the long-term regulatory policies may be put in place to curb energy usage

Objective 2: Encourage environmentally friendly building materials

Policy Option: Incentives for developers and homeowners utilizing environmentally friendly building materials

Action: Research and select appropriate building material measures or certifications to use as a reference

Action: Compile a user-friendly list that can be made available and referenced by builders, developers, and homeowners

Action: Tax rebate for new development built under LEED certification or other previously approved certification standards

Policy Option: Lead by example through the local government

Action: All upgrades and new construction for local government will be built according to best practices

Action: After necessary changes have been made, use governmental buildings and operations for workshops to education citizens about changes that can be made

Objective 3: Increase percentage of local renewable energy sourced

Policy Option: Incentives and rebates to businesses, developers, and homeowners for installation of local and renewable energy sources including geothermal, solar, wind, and others

Action: Secure funding from a federal grant or match program

Action: Advertise program to community members in addition to making applications

Action: Tax rebate for new development built under LEED certification or other previously approved certification standards

TRANSPORTATION

Increase transit ridership by 25%
Improve **active transportation** infrastructure including **doubling** the total miles of trails
Reduce total VMT by 25%

Based on the initial GHG emissions estimates, the transportation sector accounts for just over twenty-five percent of Leavenworth's total emissions. While transportation currently emits a lot of carbon into the atmosphere, there is a great opportunity to decrease emissions from this sector.

Leavenworth is within commuting distance from Kansas City and therefor a portion of the population is driving daily to and from Kansas City. A variety of commuting options will help to decrease total vehicle miles traveled and decrease emissions from single occupancy vehicles on the road. Other 'alternative' modes of transportation such as walking and cycling have many co-benefits in addition to reducing emissions including healthier lifestyles, less infrastructure required, and building social capital.

Objective 1: Increase ridership in public transportation

Policy Option: Initiate car sharing, carpooling, or transit option to and from Kansas City during the workweek

Action: Utilize MARC resources to begin a carpooling community in the Leavenworth area

Action: Provide funding to KCATA to operate a single route to and from Leavenworth during the workweek that originates and ends at a park-and-ride facility

Objective 2: Increase use of active transportation including walking and bicycling

Policy Option: Expand sidewalk and trail system for pedestrians and cyclists throughout the Leavenworth community

Action: Target key pedestrian and cycling corridors within the Leavenworth community

Action: Construct cycling and pedestrian greenway connecting downtown and Fort Leavenworth along the Missouri River

LAND USE

Implement smart land use strategies

Expand **green space**, increase the amount **shade trees**, and **plant native species**

One of the most pressing goals includes designing the land with flood resilience in mind. While it is our goal to protect our community, we do not aim to stop the flooding. The flooding in this area is natural and a part of the earth's cycle, however, we need to design with flooding in mind.

There are a variety of tools available for mitigating hazards such as flooding from the Missouri River. Rain catchment is an efficient way to store and use water resources as well as minimize flooding impacts; pervious surfaces can help minimize runoff and unnatural flooding issues, and flood resiliency can be increased further through smart land use.

Objective 1: Reduce sprawl and promote mixed-use development

Policy Option: Target areas for mixed-use development

Action: Identify two key areas for mixed-used or infill development while taking into account transportation/transit access, job access, and hazard vulnerability

Action: Rely on values, housing knowledge, demographic data, and corridor and node evaluations that have already been brought together in the Downtown North Leavenworth Redevelopment Plan

Policy Option: Focus on infill and redevelopment

Action: Incentivize development in designated downtown areas that are designated as low risk for flooding

Action: Balance redevelopment with regulations for green and open space that include native species or low-maintenance landscaping

Policy Option: Creative growth boundary

Action: Research by staff on urban growth boundaries and alternative means of minimizing sprawl

Action: Determine a preferred boundary to development and new growth

Action: Procurement of land by local government outside of predetermined boundary

Action: Design thick greenway that allows for movement of community members through active transportation in conjunction with conservation easements to ensure the land does not one day become developed

Objective 2: A flood resilient infrastructure and community

Policy Option: Increase rain catchment through a variety of incentives

Action: Incentivize homeowners by providing homeowner reimbursements for rain gardens and rain barrels

Action: Market the reimbursement program and provide materials and education about the benefits of water catchment systems and resources

Action: Set up a community workshop on how to choose the right rain catchment system, financing options, implementation, and return on investments

Policy Option: Government procurement of vulnerable land

Action: Government purchasing of properties along the river as they become vacant or put up for sale. These properties can then be converted into natural green space to help alleviate flooding from the river

Objective 3: Increased native plant species and permeable surfaces

Policy Option: Design for flood resilience with nature in mind

Action: Improve storm water management through an expanded network of greenways designed for water absorption along the Missouri River

Action: Implement low impact development storm water management principles when possible including rain gardens, green vegetated filter strips, and porous pavements

Policy Option: Permeable pavements

Action: Staff member research a list of permeable pavements that are also ADA compliant.

Action: Remove unnecessary large blocks of impervious surfaces on government property

Action: Resurface government parking lots and other impervious surfaces with pervious pavement alternatives

WASTE

Reduce total waste by 30%

Landfill waste will make up **less than 40%** of total waste citywide

Though landfills do not burn fossil fuels or use large amounts of energy, they pollute the air and water with emissions. The most common emission from landfills is methane, a gas created from the decomposing of organic matter. Methane (CH_4) is natural, but the amount in the atmosphere has been drastically increased due to human activity. While carbon dioxide is the most prevalent GHG emitted, methane traps more radiation therefore giving methane a twenty-five times greater impact on climate change than carbon dioxide.[12]

The City of Leavenworth's Solid Waste Division operates a "Brush Site" where residents can bring organic materials for drop off. The site allows yard clippings, straw, hay, and tree branches, but the site does not currently allow food or animal waste. Additionally, drop offs are only allowed on Saturdays and there are seasonal closings during the winter months. The City of Leavenworth also operates a recycling center just west of the Municipal Service Center. The center is open five mornings a week and accepts tin, aluminum, batteries, cell phones, oils, plastic, glass, and paper products.

Schools and large employers produce a substantial amount of food waste that needs to be adverted from the landfill. Centers of education have an already captive audience that is eager to learn and act. Leavenworth can make the most of this opportunity by getting kids and young adults in the habit of composting and recycling their daily lunch waste.

Objective 1: Expand composting and recycling efforts, education, and user feasibility

Policy Option: Expand Brush Site operations

Action: Expand the type of materials allowed at the site to include food waste, cardboard, and animal waste.

Action: Offer monthly tours to community members and visitors in order to increase transparency and educate citizens about the benefits of composting and what types of items can be composted.

Action: Begin curbside pick-up for compostable items bi-weekly. Once citizens become more familiar about what can be composted, increase compost pick-up to weekly rounds.

[12] Environmental Protection Agency (EPA). (2010). *Overview of Greenhouse Gases, Methane Emissions.* U.S. Environmental Protection Agency, Washington, DC, USA. Web. 1 July 2015.

Policy Option: Expand recycling operations

Action: Begin curbside pick-up for recyclable paper and plastic items. Then expand to bi-weekly glass pick-up.

Policy Option: Initiate composting within the school system

Action: Identify a champion at each of the four elementary schools within the city limits (including Fort Leavenworth) to promote, educate, and facilitate the green waste program during the lunch hour.

Action: Expand composting and recycling facilities to the junior and high schools in the area as well as the

Objective 2: Decrease the overall amount of waste produced

Policy Option: Introduce a financial burden for excess waste produced in the long-term

Action: In the long-term regulatory policies may need to be put into place to curb the amount of waste still going to the landfill such as a cost structure per bag of trash or weight of weekly waste

CLIMATE ADAPTATION

In addition to local mitigation policies and strategies to minimize the long-term effects of climate change, Leavenworth must prepare to adapt in the short and long-term to climate change effects. Local adaptation strategies are imperative especially relating to flooding in the area. The ultimate goal of climate adaptation in Leavenworth is minimizing the overall risk that the community faces including the vulnerability of special populations, infrastructure, and intangible goods.

Decrease overall **risk** and **vulnerability**
Reduce development and vulnerable infrastructure within a **flood hazard area by 15%**

Objective 1: Reduce vulnerability to extreme weather events

Policy Option: Better understand the potential hazards the region faces and develop infrastructure with hazards in mind

Action: Identify a 200-year floodplain and prevent future development in vulnerable areas

Action: Research design standards for extreme winds, tornados and other conditions that Leavenworth can expect

Objective 2: Preparedness for when disaster strikes

Policy Option: Prepare an emergency disaster plan for possible hazards in the area

Action: Improve stormwater and sewer system capabilities throughout the city

Action: Review and update evacuation plans and procedures with an emphasis on planning for special populations and transportation

Action: Design and implement a community outreach and multimedia campaign about evacuation and disaster response policies throughout the city with an emphasis on nodes of education

Objective 3: Resilient Agriculture and Food Supply

Policy Option: Initiate program in conjunction with the greater Leavenworth County to educate and assist farmers in transitioning standard agricultural practices

Action: Work towards more diverse crops to protect against disease, changing temperatures, and precipitation patterns

Action: Regulate water and soil moisture conservation measures to minimize potential water shortages

Action: Research and make available resources on crops that are more tolerant of droughts, increased precipitation, and flooding

Objective 4: Stay abreast with current data analysis

Policy Option: Stay abreast with current data analysis and data processing technologies

Action: Expand Geographic Information System (GIS) database and computer processing technologies

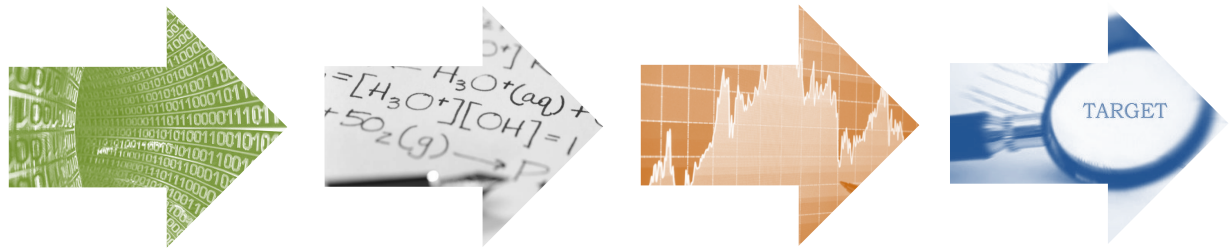
Action: Use FEMA resources as well as local resources including MARC to help to identify 100 year and 200 year flood plains

Action: Reflect floodplain and hazard areas on planning and GIS map for rapid look-up and retrieval

FUTURE WORKPLAN

STEP 1. GHG EMISSIONS INVENTORY

The first step to planning for hazard mitigation and climate change is constructing a thorough greenhouse gas (GHG) emissions inventory. While the previous emissions estimates included in this document are a good starting point, more robust numbers will be needed to fully understand the total emissions makeup of Leavenworth. A detailed GHG emissions inventory will help to identify emissions sources and magnitude, pinpoint trends, and benchmark for reduction targets.[13] The Local Government Operations Protocol outlines the proper procedures to follow in creating a GHG emissions inventory, but the main steps include data collection, emissions calculations and reporting, forecasting, and reduction target setting.



Data collection

Emissions calculations and reporting

Emissions forecasting

Emissions reduction target setting

STEP 2. STAKEHOLDERS AND PUBLIC ENGAGEMENT

After staff has a firm foundation and understanding of Leavenworth's emissions landscape it will be imperative to involve the public, political leaders, and relevant stakeholders. Public participation is a key component to any planning initiative and staff needs political and community support in order to implement key policies included in the Climate Action Plan. Possible approaches to public participation include a green ribbon task force, public task force, community workshops, or some combination of the three.[14]

Transparency Communication Perspective
Leadership Investment Citizens Participation

[13] Boswell, Michael R., Adrienne I. Greve, and Tammy L. Seale. Local climate action planning. Island Press, 2012.
[14] Ibd.

STEP 3. SELECTING STRATEGIES

Possible goals, policies, and implementation actions have been outlined in this document, but it will be up to the steering community and staff as to what policies and action items get included in the final Climate Action Plan. The strategies chosen should put Leavenworth on track to meet the desired targets, which in turn should help to achieve the community goals. Goals should be outlined in advance, measureable, and reachable while still pushing Leavenworth to mitigate hazards and climate change.

Adaptation is an important component in addition to hazard mitigation. There is much to be done in reducing emissions and mitigation the long-term effects of climate change around the world. Therefore, climate adaptation is a crucial component to any Climate Action Plan and should be included in the Leavenworth plan.

After thorough research by staff, stakeholders, and steering committee members has been completed a more robust set of mitigation policies and adaptation strategies will need to be outlined. The above mentioned objectives, policies, and actions can be used as a starting point, but the workplan should result in the Leavenworth ending with a robust plan. It is important to choose these strategies based on underlying values, goals, and targets. An important component to the research and selection process will include data analysis capacities and data management by the City of Leavenworth. Data analysis tools such as Geographic Information Systems (GIS) will help Leavenworth to stay abreast and make informed decisions when looking at targeted land use areas and their vulnerabilities to hazards.

STEP 4. PLAN IMPLEMENTATION AND EVALUATION

Policy and strategy creation is important, but the implementation of a plan determines the overall success. Before the following plans can be implemented the City staff must work with local politicians to find one or more political champions. Additionally, funding will need to be obtained, timelines for goals and action items should be laid out in more detail, and aspects of the Climate Action Plan must be continually work upon in order to achieve Leavenworth's long-term goals.

FUNDING OPPORTUNITIES

Trash Tax

Increased trash tax over the course of five years to fund mitigation strategies relevant to waste reduction and aversion of waste from landfills

Grants and Matching Program

Utilize MARC's resources in regards to funding, expertise, research, and data analysis. Specifically, apply for grants through MARC and with the assistance of MARC for Planning Sustainable Places Grant, TIGER funding, HUD grants, Community Transformation Grant Program, and others.

Annual Vehicle Sticker Fee

Creating an annual vehicle sticker fee would supply funding that could be directed at decreasing emissions from the transportation sector. Cost of stickers would be determined based on the vehicle type.

Development Impact Fee or Excise Tax

Initiating an initial fee or excise tax on new development (both residential and non-residential) would allow for additional funding to be used towards decreasing emissions and hazards related to land use and energy usage.

If plans lay on a shelf then they serve no purpose and have no hope at achieving outlined goals. It is essential to continually monitor and evaluate the implementation progress and reduction target attainment. The Climate Action Plan should be revisited and updated at least every three years and some form of update or report should be given annually to keep progress on the right track.

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City of Mission. "GHG Emissions Inventory." Mission, Kansas, September 2008. Web. 27 June 2015. Retrieved from: http://www.missionks.org/docview.aspx?docid=15978

Civil War on the Western Border. The Kansas City Public Library. 11 June 2015. Retrieved from: http://www.civilwaronthewesternborder.org/map/leavenworth-kansas

CyRIde. "TIGER Sustainability Calculations." Web. 28 June 2015. Retrieved from: http://www.cyride.com/modules/showdocument.aspx?documentid=5592

Environmental Protection Agency (EPA). (2010). *Overview of Greenhouse Gases, Methane Emissions.* U.S. Environmental Protection Agency, Washington, DC, USA. Web. 1 July 2015. Retrieved from: http://epa.gov/climatechange/ghgemissions/gases/ch4.html

Intergovernmental Panel for Climate Change. *"*Fifth Assessment Report: Impact Adaptation and Vulnerability." Geneva, Switzerland, 2014. Print. 2 June 2015.

King, Christopher. "National Security Implications of Climate Change." St. Paul's United Methodist Church. Lenexa, KS, 2014.

Leading Employers, Leavenworth County Development Council, 2011. Web. 11 June 2015. Retrieved from: http://www.lvcountyed.org/living-working/leading-employers/

Lawrence, Kansas. "Greenhouse Gas Emissions Inventory Update." Lawrence, Kansas, 2012. Web. 27 June 2015. Retrieved from: https://www.lawrenceks.org/assets/agendas/cc/2014/12-02-14/greenhouse_gas_emissions_inventory_update.pdf

Mid-America Regional Council. Kansas City, Missouri, 2010. Web. 11 June 2015. Retrieved from http://www.marc.org

Planning and Zoning. Leavenworth, Kansas, 2015. Web. 11 June 2015. Retrieved from: https://www.lvks.org/department/index.php?structureid=15

Quadrennial Defense Review 2014. Encyclopedia of United States National Security. Department of Defense, 4 March 2015. Web 21 June 2015. Retrieved from: http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf.

Welcome to Leavenworth. Leavenworth, Kansas, 2015. Web. 11 June 2015. Retrieved from: https://www.lvks.org/

Appendix A:
ANNOTATED BIBLIOGRAPHY

The following reports, videos, and websites have been compiled to serve as a reference list. They are all relevant in some aspect to planning for hazard mitigation and climate adaptation. The resources range in scope and include national policy, local government strategies, public engagement techniques, emissions calculators and much more. Below each source a few key terms highlight the general topics of the resource for browsing purposes and then a more detailed description of the source and why it is relevant for a community planning for climate change.

American Planning Association. (2011). *Policy Guide on Planning and Climate Change*. 22 June 2015. Retrieved from: https://www.planning.org/policy/guides/pdf/climatechange.pdf

Policy · Land Use · Transportation · Development · Hazards · Health · Infrastructure

The American Planning Association created this report as a policy guide for both mitigation and adaptation strategies. This document covers policy related to a wide variety of topics related to climate change including land use, transportation, energy, green development, natural resources, economic development, hazard mitigation, public health and infrastructure. The guide also discusses the various roles different levels of government can play relation to climate planning.

Barbu, A. D., Ricardo, Griffiths, N., Morton, G. (2013). Achieving Energy Efficiency through Behavior Change: What Does It Take? European Environmental Agency (EEA). Retrieved on 24 June, 2015 from http://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour

EPA · Energy Efficiency · Behavior · Energy · Consumption

Human behavior can be very complicated in regards to climate mitigation efforts. The European Nations have set a positive example in climate change mitigation that the United States can learn from and follow. This technical report from the European Environment Agency (EEA) provides guidance on how to achieve energy efficiency through behavior change. This study identifies energy consumption practices, consumer behavior, and technology tools used to achieve the goal of energy efficiency. It also highlights practices that have shown to be successful.

Batac, Tiffany, et al. (2012) *NCHRP 08-36, Task 107 Synthesis of State DOT and MPO Planning and Analysis Strategies to Reduce Greenhouse Gas Emissions*. 22 June 2015. Retrieved from: http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36(107)_FR.pdf

Greenhouse Gas · Transportation · Strategies · Emissions Reduction

The Planning Standing Committee of the American Association of State Highway and Transportation Officials (AASHTO) prepared this document to focus on strategies for reduction in greenhouse gas emissions. The report focuses on regional planning methods, tools, and strategies that can be used to reduce greenhouse gasses emitted from the transportation sector.

California Air Resource Board. *Cool California, Climate Calculators*. 22 June 2015. Retrieved from: http://www.coolcalifornia.org/article/climate-calculators

Greenhouse Gas · Emissions Inventory · Emissions Reduction · Modeling Tools

The California Air Resource Board initiated a campaign titled "Cool California." The online website includes a page compiling tools and calculators to help cities and counties conduct greenhouse gas emissions inventories. While a few of the resources are only relevant to municipalities within California, the majority of the tools can be used across the United States to assist municipalities in their emissions inventory.

Cruce, Terri, & Holsinger, Heather. (2012). *Climate Change Adaptation: What Federal Agencies Are Doing.* Retrieved from http://www.c2es.org/docUploads/federal-agencies-adaptatio.pdf

Climate Change · Adaptation · Policy

This report references multiple government entities including the Department of Agriculture, Department of Commerce, Department of Defense, Education, Energy, Health and Human Services, Homeland Security, and Housing and Urban Development. This documents outlines how they have set up various protocols to have a successful transition to dealing with climate change. The document is organized by department and highlights specific future plans dealing with a variety of topics such as water, sustainable energy, and dismantling our nuclear power plants.

Declet-Barreto, Juan, & Alcorn, Sean. (2015). *Sneezing and Wheezing: How Climate Change Could Increase Ragweed Allergies, Air Pollution, and Asthma* (R:15-04-A). New York City, NY: National Resources Defense Council. Retrieved from http://www.nrdc.org/globalwarming/sneezing/files/sneezing-report-2015.pd

Air Pollution · Allergies · Health · Asthma · Climate Change · Temperature · Emissions

Around the globe, and particularly within the Midwest region, climate change has led to the rise in average temperatures over the last few decades. This has not only contributed to agricultural troubles, but also to health of the people within the region. With the rising carbon emissions, more people are susceptible to ragweed allergies, asthma, and other respiratory health issues.

Department of Defense. (2014). *Quadrennial Defense Review 2014, Encyclopedia of United States National Security.* 21 June 2015. Retrieved from: http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf.

National Security · Climate Change · Military · United States

Every four years the Department of Defense puts out a Quadrennial Defense Review. The legislatively mandated document outlines the threats and challenges of the United States. The *2014 Quadrennial Defense Review* identifies climate change as a concern for national security. When planning for climate change, it is key to have political support from both the local municipal government, but also the state and federal governments in the United States.

Dokupil, Tony. (2015). *Obama Administration Lays Out Doomsday Climate Change Scenario*. MSNBC. 22 June 2015. Web. 24 June 2015. Retrieved from: http://www.msnbc.com/msnbc/obama-administration-lays-out-doomsday-climate-change-scenario

EPA · Planning · Air Quality · Heat Waves · Predictions · Health

This article references some of the extreme effects and impacts science tells us that climate change will have on cities and citizens alike in the United States as the century progresses. Specifically, it details the number of deaths expected from poor air quality in the United States within this century as well as the expected costs of disasters like droughts and wildfires. This article frames the consequences of climate change for planners and politicians.

Environmental Protection Agency. (2011). Local Government Climate and Energy Strategy Series: Energy Efficiency in Local Government Operations. Retrieved on 24 June, 2015 from http://www.epa.gov/statelocalclimate/documents/pdf/ee_municipal_operations.pdf

Energy Efficiency · Renewable Energy · Energy Cost · Strategies

There is perceived difficulty in determining which jurisdictions will take the lead in planning for climate change. In the absence of federal action, local governments can begin with a bottom up strategy. The EPA has created a manual to guide local governments who aim to commence energy efficiency strategies in its operations. This manual provides an overview of benefits, key stakeholders, and implementation strategies. The EPA also includes best practices based on previous case studies.

Federal Emergency Management Agency. (2015). *Hazard Mitigation Planning Resources.* 22 June 2015. Retrieved from: https://www.fema.gov/hazard-mitigation-planning-resources

Hazard Mitigation · Planning · State Review · Mitigation Grants

The Federal Emergency Management Agency (FEMA) provides a multitude of hazard mitigation planning resources. The compiled resources include the Mitigation Planning Handbook. The handbook is considered the official guide for municipal governments for developing and implementing local mitigation strategies.

Federal Emergency Management Agency. (2000). Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability. FEMA. 24 June 2015. Retrieved from http://www.fema.gov/media-library/assets/documents/2110

Sustainability · Hazard Mitigation · Livability · Sustainable Development

Livability is a vitally important aspect of planning that can often be overlooked or approached inefficiently. This FEMA resource integrates hazard planning with sustainable development and provides communities with the means and documentation to encourage more economical, environmental, and equitable growth.

Federal Emergency Management Agency. (2003). Building a Disaster-Resistant University. FEMA. 24 June 2015. Retrieved from http://www.fema.gov/media-library/assets/documents/2288

Disaster · University · Hazard Planning

College campuses can be some of the most vulnerable sites during times of severe weather because their populations are constantly in motion. Unpredictability of catastrophic events makes hazard planning particularly important and distinctive for universities. This resource is a guideline to preparing for these events and provides examples of what some campuses are doing right now to plan for the unplanned.

Federal Emergency Management Agency. (2013). Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials. FEMA. 24 June 2015. Retrieved from: http://www.fema.gov/media-library/assets/documents/31372

Hazard Planning · Local Planning · Case Studies · Integration

In order to be fully prepared for a natural disaster or other unforeseeable circumstances, communities are working to integrate hazard mitigation into their current city plans. This resource provided by FEMA offers guidelines to those communities. It also shares case studies of successful cases to help others overcome obstacles and reach a more sustainable future.

GreenFacts.org, prod. *Hazard, Risk & Safety - Understanding Risk Assessment, Management and Perception*. YouTube, 2014. Web. 25 Jun 2015. Retrieved from: <https://www.youtube.com/watch?v=PZmNZi8bon8&list=PL2vMhKNwvYnInIZvAnh8ryaDRme0zECdd>.

Hazards · Risk · Safety · Exposure

Many factors go into evaluating hazards and risk whether that be how, where, frequency, length of exposure, and conditions. There are other tools that have not been developed to measure certain risks such as Nano materials. Risk and perception of risk is not always aligned and should be based on facts not opinion. This article explores these issues as well as others

Gotham, D. J., J. R. Angel, and S. C. Pryor. (2012). Vulnerability of the electricity and water sectors to climate change in the Midwest. *Climate Change in the Midwest: Impacts, Risks, Vulnerability and Adaptation.* Bloomington, IN: Indiana University Press, 192-211.

Energy · Security · Adaptation · Vulnerability · Midwest

While not as dependent on hydroelectric power as a state like Washington, both Missouri and Kansas are dependent to varying and lesser degrees on hydroelectric energy. Additional energy is generated in both states by wind power, aside from more conventional fossil fuel resources

like coal and oil. Cities in both Missouri and Kansas will need to take steps to insure the continued ability of their power grids to supply the increasing demands of their citizens in an age of increasing temperature extremes. Similar steps will have to be taken in the to protect the water supply in times of increasing droughts and floods.

Hirsch, Robert M., and Archfield, Stacey A. (2015). Flood trends: Not higher but more often. *Nature Climate Change 5.3,* 198-199.

Climate Change · Floods · Risk · Impacts

Numerous cities in the Midwest are situated along bodies of water such as streams and rivers. In many cases the cities have sprawled out into additional flood-prone and low-lying areas. Risks are calculated based on the perceived frequency of flooding events. In the future when those expectations may be increasingly off. More people will be susceptible to an increased number of floods with significant impacts on property and lives.

Kansas Division of Emergency Management. (2010). *Kansas Hazard Mitigation Plan.* Topeka, Kansas: Author. Retrieved from http://www.kansastag.gov/AdvHTML_doc_upload/CompleteKSHMP2.5.11.pdf

Natural Disasters · Kansas · Hazards · Mitigation

This is the Kansas statewide plan to prepare both people and property for natural disasters and other such occurrences. The document is constantly changing and evolving with the introduction of new information. Its overarching purpose is to discuss the hazards that Kansas is most vulnerable to, and how the state plans to aid in the mitigation of these hazards.

Kennerly, Jim. (2014). Rethinking Standby and Fixed Cost Charges: Regulatory and Rate Design Pathways to Deeper Solar Cost Reductions. *North Carolina Clean Technology.* Retrieved from http://nccleantech.ncsu.edu/rethinking-standby-and-fixed-cost-charges-regulatory-and-rate-design-pathways-to-deeper-solar-cost-reductions/

Economics · Energy · Renewables · Pricing · Demand

This report takes a critical view on the current fixed cost charges that utilities companies have historically utilized. Renewables are changing the energy landscape and therefore, innovative financing tools are necessary to change consumer pricing, demand, and use. The article focuses on solar energy; however, these concepts could be used on other renewable energies and across a variety of sectors.

Landscape Performance Series. (2014). *Landscape Performance Series*. Retrieved June 10, 2015, from http://landscapeperformance.org/

Green Space · Landscaping · Co-Benefits · Parks · Case Studies

The Landscape Performance Series (LPS) is a collection of resources targeted at landscape architects, planners, engineers, developers and others to help advocate for public parks and green spaces. It includes a "Benefits Toolkit," "Fast Fact Library," and "Case Study Briefs." The Fast Fact Library includes 85 facts from published research that show the benefits that landscaping, greening, and parks can have on communities (i.e. co-benefits of climate change mitigation strategies). The LPS holds over 100 case studies that each includes an overview, sustainable features used, challenges, solutions, cost comparisons, lessons learned, products used and the project team.

Mann, Charles C. (2014). *How to Talk About Climate Change So People Will Listen*. The Atlantic. September 2014. Web. 24 June 2015. Retrieved from: http://www.theatlantic.com/magazine/archive/2014/09/how-to-talk-about-climate-change-so-people-will-listen/375067/

Climate Change · Environmentalists · Communication · Activists · Engagement

One of the many issues surrounding climate change is all the noise and obscure terminology. For a variety of reasons, communicating with the general public about climate change has been more difficult than communicating about other issues or phenomenon. Any engagement in climate change planning must begin with the ability to effectively communicate about the topic. This article explores the challenges that scientists and policy makers have had communicating clearly about the causes and impacts of climate change, and provides some ideas about possible strategies for improving the situation.

Mid-America Regional Council. (2014). *MARC Sustainable Development Navigator*. Kansas City, Missouri. Retrieved from: http://codes.sustainable-kc.org/

Regional Planning · Population · Development · Sustainability

Even in the midst of great changes in the natural world, population pressures and market forces will continue to drive development. Having strategies in place in terms of plans, codes, regulations, and incentives can help steer those developments in more sustainable and resilient directions.

Mid-America Regional Council. (2010). *Transportation Outlook 2040*. Kansas City, Missouri. Retrieved from: http://www.to2040.org/

Transportation · Vehicle Miles of Travel · Extreme Weather Events · Natural Disasters · Kansas City · Strategies

One key to adapting to a changing climate and the new risks presented by climate change, will be designing, updating, and building a transportation infrastructure that is more resilient to extreme weather events and natural disasters. MARC's Transportation Outlook 2040

incorporates ideas about making the transportation network more sustainable and those ideas can and should be applied both within and without the Kansas City region.

MySidewalk. (2015). *MySidewalk.* Retrieved from https://mysidewalk.com/organization-landing?utm_source=pd&utm_medium=email&utm_campaign=201504_editorintrosw_apav2

Public Engagement · Tools · Technology · Planning · Creative

MySidewalk by Mindmixer was developed to be a "no cost" engagement tool that serves as a platform to share ideas for free. Public engagement is an important aspect in "Local Climate Action Planning." This is creative tool that could be utilized by climate change planners to involve community members in the planning/brainstorming process.

National Aeronautics and Space Administration. (2015). *Global Climate Change: Vital Signs of the Planet*. NASA. Web. 24 June 2015. Retrieved from: http://climate.nasa.gov/

NASA · Global Climate Change · Mitigation · Evidence · Adaptation · Emissions · Greenhouse Gas

This website from NASA is a substantial resource for an overview of the climate change problem as well as a source for mitigation and adaptation tools and practices. Links to articles, charts, data, and other compelling and visually attractive resources make this a valuable online destination for planners and constituents when familiarizing themselves with climate change and associated mitigation and adaptation strategies.

National Conference of State Legislatures & University of Maryland's Center for Integrative Environmental Research. (2008). *Kansas: Assessing the Cost of Climate Change.* Retrieved from http://cier.umd.edu/climateadaptation/Climate%20change--KANSAS.pdf

Agriculture · Economics · Water · Climate Change · Production

The states including those in the Midwest rely heavily on agriculture as a vital export to support its economic livelihood. As a result, water and the accessibility to water are valuable assets that are directly affected by climate change. A decrease in agricultural production could cost region billions of dollars and greatly affect future investments.

National Weather Service. (2009). *Natural Hazard Risk Assessment Information for Crawford County, Kansas.* Retrieved from http://www.weather.gov/media/sgf/hazard_book/Hazard_Book_Crawford.pdf

Data · Natural Hazards · Inventory · Climate Change

The website contains historical data of different natural hazards such as tornados, heat, drought, and floods, etc. It contains a database for nearly every county in the United States. This

data can be used as supplementary data to federal climate change inventory data when local data inventory is not readily available.

Pace Law School, Land Use Law Center. (2013). *Technical Guidance for Sustainable Neighborhoods. How to Use the LEEDS for neighborhood Development Rating System to Evaluate and Amend Local Plans, Codes, and Policies.* Retrieved from http://www.smartgrowthamerica.org/documents/Technical-Guid.-Man.-for-Sust.-Neighborhoods-2012.pdf

Green Building · Performance Metrics · Sustainability · Efficiency · Energy Consumption

This documents explains the smart growth development paradigm in urban development practices referring to the LEED system. The smart growth method upholds comprehensive and integrated urban elements development. This will make the cities are more efficient and sustainable. The relevance of this document is to reflect on how to systematically change urban development plans, policies, or codes that aim to reduce energy consumption, and in turn, reduce climate change impacts.

Pryor, Sara C., Climate Change in the Midwest: Impacts, Risks, Vulnerability, and Adaptation. Bloomington, IN: Indiana University Press, 2013. Retrieved from: http://KU.eblib.com/patron/FullRecord.aspx?p=1100795 (accessed June 26, 2015)

Climate · Midwest · Impact · Risk · Vulnerability · Adaptation

Indiana University Press provides research that brings forth the historical context, current, and future weather patterns from climate change within the Midwest. Additionally, it illustrates the various risks and hazardous exposure for the human species and environment. Important divisions of this research touch base on renewable energy, infrastructure, mitigation, human health, and climate adaptation.

Raven, M. (2015). G7 Puts the End of Fossil Fuels on the Global Agenda, Now for More Action to Get Us There. *Climate Action Network International*. Retrieved from http://www.climatenetwork.org/press-release/g7-puts-end-fossil-fuels-global-agenda-now-more-action-get-us-there

Fossil Fuels · Climate Change · Funding · Negotiations · International

The Group of Seven is made up of the following seven countries: Canada, France, Germany, Great Britain, Italy, Japan, and the United States. The organization focuses on economic teamwork. Also known as G7, this group commented while in Bonn, Germany in a press release on climate change and stated it would like to decarbonize the globe this era. Germany's representative, Chancellor Angela Merkel, stated that Germany will double its climate funding to 4 billion dollars. However, the main message of the meetings held in Germany urge for faster action and investing more in sustainable energies, infrastructure, research, transportation, and coal elimination.

Remix: The New Standard in Transit Planning. (2015). Code for America. Retrieved from http://getremix.com/

Technology · Public Engagement · Transit · Transportation · Citizens · Workshops

Remix (previously known as Transitmix) is an online tool that may not be the best overall platform for community engagement; however, it can serve as a great resource or activity for a community workshop. Public transportation as we have read can be a key strategy/component of a CAP and remix could be a creative way for citizens to get involved in submitting their own ideas and preference for public transit and bus routes in their city or area.

Riedy, C., Herriman, J., Ross, K.,Lederwasch, A., & Boronyak, L. (2013). Innovative Techniques for Local Community Engagement on Climate Change Adaptation. University of Technology, Sydney, Australia. Retrieved on 24 June, 2015 from http://global-cities.info/wp-content/uploads/2013/11/Innovative-Technologies.pdf

Engagement · Community · Pilot · Activity

Planning requires communities to identify their own problems, and formulate strategies to tackle them. This document contains best practices on how to involve communities in Australia for climate change adaptation planning. Cities in the United States can learn from Australia, a country that has also experienced climate change impacts. This document can be used as a reference to design community engagement in climate change adaptation at the local level.

Smart Growth America. (2015). *Leadership Institute, Smart Growth Implementation Toolkit*. 22 June 2015. Retrieved from: http://www.smartgrowthamerica.org/leadership-institute/implementation-tools

Smart Growth · Tools · Implementation · Policy · Incentives

The Implementation Toolkit aims to provide planners and municipalities with the tools they need to succeed in smart growth. The toolkit includes seven components that are important throughout the implementation process. As municipalities grow and expand, the toolkit can help planners grow in a more sustainable manner, a co-benefit of planning for climate change.

Smith, Joel B., Vogel, Jason M., Cruce, Terri L., Seidel, Stephen, & Holsinger, Heather A. (2010). *Adapting To Climate Change: A Call For Federal Leadership.* Retrieved from http://www.c2es.org/docUploads/adaptation-federal-leadership.pdf.

Climate Change · United Nations · Negotiations · Biodiversity · Ecosystems · Leadership

Above is an initiative that lays out collective planning that should be adopted by the society in order to “mainstream,” the concept of climate change. An example would be Leonardo

DiCaprio's star power to spread his stance on climate change by being an ambassador for the UN Climate Summit. There are federal and state strategies that are a necessity for the survival of the human species and this guide is a strong source for reference. Another point from this reading includes the support for increased research on the cost, impact, and reality of biodiversity, ecosystems, infrastructure, energy, and health stemming from climate change.

Srikrishnan, Maya. (2014). *Climate Change Reflected in Altered Missouri River Flow, Report Says*. Los Angeles Times. 17 August 2014. Wen 24 June 2015. Retrieved from: http://www.latimes.com/nation/la-na-missouri-river-20140817-story.html

Missouri River · Climate Change · Midwest · Temperature · Precipitation · Predictions · Drought · Flooding · Resources

The Missouri River System is one of the key resources for Midwesterners. Any change in the flow or characteristics of the Missouri River or its tributaries carries serious consequences for the people who depend on it for water or those who live near its banks. This article details recent data and anecdotal evidence that climate change is already affecting the way the river behaves. At times drought is seriously reducing its flow, and other times, heavy rains are leading to increased floods and erosion. For planners and community leaders whose communities sit along the river or who depend on it for water or trade, the impacts of changes of the Missouri River must be continually monitored and evaluated.

Story of Stuff. (2014). *The Project.* Retrieved from http://storyofstuff.org/

Consumerism · Education · Communication · Tools

The Story of Stuff originated as a short documentary on consumerism, however, it has progressed into a movement consisting of short educational online videos. Communication of the current environmental issues including climate change and cap and trade are covered in captivating cartoons. These videos are just one of many tools that could be useful (or inspirational) when communicating about the facts or impacts of climate change to a variety of audiences.

United States Department of Energy. (2012). Climate Change and Infrastructure, Urban Systems and Vulnerability. Retrieved on 24 June, 2015 from http://www.esd.ornl.gov/eess/Infrastructure.pdf

Climate Change · Infrastructure · Urban Systems · Vulnerability

Climate change will have great impacts on urban infrastructure. This report provides a range of assessments on the urban infrastructure components that are vulnerable, or prone to degrade if extreme weather events occur. The report suggests possible strategies to combine the data behind the science to what we currently know about the resiliency of infrastructure already in place. Additionally, a key component of the report is focuses on strategies for adaptation.

United States Environmental Protection Agency. *Midwest: Climate Impacts in the Midwest.* Web. 24 June 2015. Retrieved from: http://www.epa.gov/climatechange/impacts-adaptation/midwest.html

Climate Change · Midwest · Climate Impacts · Adaptation Examples · Health · Ecosystems

This resource provides the public with a basic understanding of how climate change impacts the Midwest area specifically. In the Midwest, climate change could impact human health and increase heat-related disease. It could also dramatically affect agriculture in the area.

United States Global Change Research Program. (2012). The National Global Change Research Plan 2012-2021: A Strategic Plan for the U.S. Global Change Research Program. 24 June 2015. Retrieved from: http://www.globalchange.gov/browse/reports/national-global-change-research-plan-2012–2021-strategic-plan-us-global-change

USGCRP · Research · Global Change · Climate Theory · Strategic Plan

This document is a ten-year Strategic Plan that advances the climate change conversation and shares information from multiple collaborative efforts across different agencies. The goals of this report are: advance science, inform decisions, conduct sustained assessments, and communicate and educate. The USGCRP strives to better understand Earth's natural systems while working to find the means to combat climate change on a global scale.

Union of Concerned Scientists. (2009). *Confronting Climate Change in the U.S. Midwest: Missouri.* Cambridge, MA: Author. Retrieved from http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/climate-change-missouri.pdf

Extreme Weather Events · Global Warming · Threats · Air Quality · Pollution · Biodiversity

Missouri encounters effects of global warming through severe summer heat, dangerous thunderstorms, and additional threats to the farming industry. This report presents new projections of these potentially devastating results, as well as, threats to water quality, air pollution, and increased insect life.

Union of Concerned Scientists. (2012). *Heat in the Heartland: 60 Years of Warming in the Midwest.* Cambridge, MA: Author. Retrieved from http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/Heat-in-the-Heartland-Full-Report.pdf

Temperature · Heat · Economics · Health · Mitigation Strategies

With a consistent increase in average temperatures over the last 60 years, the Midwest region is experiencing a growing risk of health issues and economic woes. This report aims primarily at

investigating and further understanding this dramatic increase in seasonal temperatures while studying the efforts major metropolitans are taking to mitigate these issues.

United States Environmental Protection Agency. (2013). *Climate Impacts in the Midwest*. Washington, D.C. Retrieved from: http://www.epa.gov/climatechange/impacts-adaptation/midwest.html

Impacts · Planning · Policy · Adaptation · Best Practices · Climate

Keeping abreast of the EPA's cutting edge predictions about the potential impacts of climate change in the Midwest will be important for planners and other policy makers as they make decisions that will guide the futures of their communities. The EPA's Climate Impacts & Adaptation resource provides examples and best practices for communities looking to better prepare for the various eventualities associated with climate change.

United States Environmental Protection Agency. (2013*). 2013 Green House Gas Emissions from Point Source.* Retrieved from http://ghgdata.epa.gov/ghgp/main.do

Emissions · Greenhouse Gas · Data · Geography · Point Source

This website contains a database and information regarding Point Source Greenhouse gas emissions throughout the United States. The website has navigation tools that lead to the interested geographical locations, find the types and level of greenhouse gases emitted, and other related data and information. Thus, the website can be used to find out types of point sources distributed in the researched cities, or counties.

United States Environmental Protection Agency. (2014). *Motor Vehicle Emission Simulator (MOVES): Using MOVES for Estimating State and Local Inventories of On-Road Greenhouse Gas Emissions and Energy Consumption.* Retrieved from http://www.epa.gov/oms/stateresources/420b12068.pdf

Greenhouse Gas · Emissions · Jurisdiction · Local · Transportation · Energy

The document outlines the method and tools used to create Green House Gas Emission inventories at the different jurisdictional levels; it includes local city level and county. All on-road motorized vehicles are assessed to estimate the quantity of Greenhouse gases emitted. This document can be used to identify the current energy consumption and emissions.

University of Missouri. (2015). *Missouri Climate Center*. Web. 24 June 2015. Retrieved from: http://climate.missouri.edu/climate.php

Missouri · Weather · Climate Change · Midwest · Temperature · Precipitation

The University of Missouri's Climate Center online features a detailed and thorough explanation of the unique variability of the state's climate and weather. In addition, the site features links to historical climate data for Missouri and other resources pertaining to Missouri's weather and climate. This resource is particular useful for those planning for climate change in Missouri to understand the current state of Missouri's climate as well as to understand its past climate history.

Vahid, R. (2013). *Assessing Impacts of Climate Change on Kansas Water Resources: Rainfall Trends and Risk Analysis of Water Control Structures.* Kansas State University. Retrieved from https://krex.k-state.edu/dspace/bitstream/handle/2097/18342/VahidRahmani2014.pdf?sequence=5

Kansas · Precipitation Pattern · Rain · Climate · Weather

This research study discusses the impacts of climate change on the precipitation pattern in the state of Kansas. The study reveals that Southeast Kansas has experienced extreme precipitation events. The study can be used to explain the current and future climate state in terms of rain pattern.

Appendix B:
ILLUSTRATED GLOSSARY

The following glossary will help to define the key terms and concepts used in this document for elected officials, policy makers, local businesses, citizens, and other stakeholders. Under each term a visual aid has been provided in addition to a short description of the concept or term and the image source. The icons were taken from a variety of online sources and the descriptions were written by a group of emerging professionals.

Adaptation

Adaptation is an adjustment by people to new or anticipated effects and impacts from climate change. Adaptation is concerned with the short-term timescales of climate change and requires a change of mind in regards to how people anticipate the impacts of climate change. Strategies can be put in place to minimize the long-term effects of climate change, but adaptation is the process of recognizing real impact, and adjusting behaviors to mold to a changing world.

Source: *Windows 8 Metro Style*. Digital image. *Icon Finder*. YouZign, n.d. Web. 23 June 2015. Retrieved from: https://www.iconfinder.com/icons/175204/change_user_icon

Active Transportation

The transportation sector is a large contributor to greenhouse gas emissions. Active transportation generally refers to cycling and pedestrian transportation. These forms of transportation have many co-benefits in addition to decreasing carbon emissions.

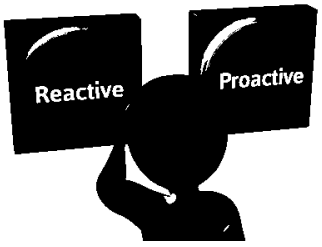
Source: *Pedestrian and Bicycle*. Digital image. *Move DC*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.wemovedc.org/howsitmoving.html

Anthropogenic

Resulting from or produced by human beings. Weather and climate are constantly fluctuating, but climate change is likely due to human activity. This change is a result of the increased emissions that have been occurring since the industrial revolution.

Source: *Publics*. Digital image. *Buzz NITRO*. N.p., 2015. Web. 23 June 2015. Retrieved from: http://www.buzznitro.com/PR-terms.html

Anticipatory Planning



Anticipatory (rather than reactive) planning is a necessity to mitigating hazards and building resilient communities. Planners must be proactive in their strategies and approaches to climate change.

Source: Live Help Now. (2013). *Reactive vs. Proactive Customer Service.* Retrieved from: http://blog.livehelpnow.net/reactive-vs-proactive-customer-service/

Climate

Climate (different from weather) refers to the average temperatures and weather patterns over an extended period of time. Climate greatly impacts how we live on a daily basis and how planners will plan for future societies including land use, agricultural crop choice, development patterns and much more.

Source: *Rising Water*. Digital image. *The Water Campus*. N.p., 2015. Web. 23 June 2015. Retrieved from: http://www.thewatercampus.org/

Climate Action Plan

Climate action planning is critical in order to reduce emissions. ICLEI – Local Governments for Sustainability outlines a planning process can be broken down into five key steps, however, recognizing achievements is also important in helping communities stay positive.

Source: *Climate Action Planning.* Digital Image. *Cool California*. Retrieved from: http://www.coolcalifornia.org/article/climate-action-planning

Climate Mitigation

Climate Mitigation is a process to minimize the long-term effects of climate change. Mitigation strategies are focused on reducing the total emissions released into the atmosphere. Strategies for mitigation rely on resources available, governance, and leadership.

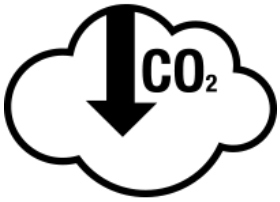
Source: RAD.E8. *Sidebar Utilities Icon*. Digital image. *Icon Archive*. N.p., 2015. Web. 23 June 2015. Retrieved from: http://www.iconarchive.com/show/minium-2-icons-by-rade8/Sidebar-Utilities-icon.html

Co-benefits

Co-benefits are the added benefits society gains when actions are taken to control climate change. These go above and beyond the direct benefits of a more stable climate. They are sometimes referred to as "multiple benefits" or "synergies".

Source: Wlan Entertainer. *Benefits*. Digital image. *Loop 21*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.loop21.net/index.php/en/how-it-works

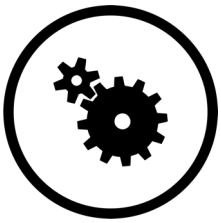
CO2 Emissions



Atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in the last 800,000 years. Carbon dioxide concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. Most of the recent increase in carbon dioxide emissions comes from the combustion of fossil fuels.

Source: *Sustainable Ecology*. Digital image. *Sekem*. N.p., 2013. Web. 23 June 2015. Retrieved from: http://devel.sekem.com/susrep13.html

Comprehensive Plan



Comprehensive plans are large over-arching documents that include a vision and goals for a community. They incorporate multiple aspects of planning such as land use, transportation, housing, and others. Comprehensive plans work to make sure that all documents support each other, rather than mutually excluding other plans.

Source: Wlan Entertainer. *Featrues*. Digital image. *Loop 21*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.loop21.net/index.php/en/how-it-works

Disaster

Disasters are often caused by extreme weather events, but can also derive from other sources such as acts of terrorism. The events are sudden, and cause great damage to communities either in regards to infrastructure, human lives, or psychologically.

Source: *Disaster Relief*. Digital image. *MIT Center for Civic Media*. N.p., n.d. Web. 23 June 2015. Retrieved from: https://civic.mit.edu/blog/mstem/81-ways-humanitarian-aid-has-become-participatory

Ecology

The focus on the natural, living environment. Ecology is one point on the sustainability prism and an important component to planning for climate change and a sustainable future.

Source: *Neighbourhood Clean Up*. Digital image. *The Toronto Beaches*. N.p., 2014. Web. 23 June 2015. Retrieved from: http://www.thetorontobeaches.com/properties/events/event/308-toronto-neighbourhood-clean-up.html

Economy

The focus on the management of resources and growth in terms of profitability. Economy is one of four point on the sustainability prism.

Source: *Raphael Dollar Sign Icon*. Digital image. *Icon Setc Pro*. N.p., 2014. Web. 23 June 2015. Retrieved from: http://iconsetc.com/icon/raphael_dollar-sign/?style=simple-black

Ecosystem Services

Ecosystem services create the benefits that society gains and relies upon that are produced by natural systems in the environment. Ecosystem services have been classified into the following four categories: supporting, provisioning, cultural, and regulating. Bees and other insects act as pollinators that allow society to enjoy fruits and vegetables.

Source: *Queen Bee Icon*. Digital image. *Imgarcade*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://imgarcade.com/1/bee-icon/

Emissions Inventory

An emissions inventory is a database that lists, by source, the amount of air pollutants discharged into the atmosphere of a community during a given time period. An emissions inventory is often the first step to developing an climate action plan.

General Parish Council Self Assessment. Digital image. *Stewardship Advocates*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.stewardshipadvocates.org/general-parish-council-assessment-long-form/

Environmental Justice

The fair treatment of all beings. Environmental justice represent equal care regardless of race, religion, economics or creed. Planning with environmental justice in mind also includes social justice consideration.

Source: *Environmental Scale Free Vector 2.01MB*. Digital image. *All Free Download*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://all-free-download.com/free-vector/download/environmental_scale_310998.html

Equity

The process of being fair rather than equal in offering more help where more help is needed. No person has more intrinsic value than the next in equitable planning.

Source: *Scale*. Digital image. *Icons ETC*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://icons.mysitemyway.com/legacy-icon-tags/scale/

Exposure

A location or setting that puts people, ecosystems, resources, infrastructure, or culture at risk due to their location.

Source: *Radiation Icon*. Digital image. *Outlaw Custom Designs*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.outlawcustomdesigns.com/icon-radiation-003/

Extreme Weather Events

The frequency of extreme weather and climate events such as droughts, heat waves, and tornadoes have increased in the last decades, and evidence increasingly indicates that these events are related to human caused climate change.

Source: *Tornado Clipart*. Digital image. *Cliparts.Co*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://cliparts.co/tornado-clipart-free

Gentrification Conflict

The tension between livability and equity, or the conflict between the preservation of poorer urban neighborhoods and the redevelopment of those neighborhoods to attract a higher-income population

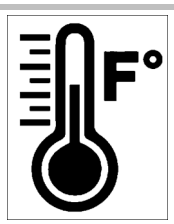
Source: *Ultra Luxury*. Digital image. *Smiling Albino*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.smilingalbino.com/where-we-go/thailand/

Green Cities Conflict

The tension between livability and ecology, or the conflict between the natural and the built environments.

Source: *Rural Hotel Symbol*. Digital image. *Free Pik*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.freepik.com/free-icon/rural-hotel-symbol-like-a-bird-house-behind-a-leaf_733927.htm

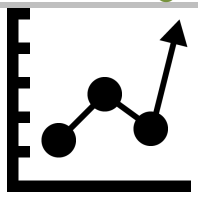
Greenhouse Gas/ Greenhouse Gas Effect



Greenhouse gasses include water vapor, carbon dioxide, methane, nitrous oxide and other chemicals. These materials help hold in heat and the captured heat is leading to an overall warming of the planet.

Source: *Facing Climate Change*. Digital image. *Jet Blue*. N.p., n.d. Web. 23 June 2015. Retrieved from: https://www.jetblue.com/green/climate-change/

Growth Management Conflict



The tension between livability and economy, or the conflict involved in unmanaged development and providing a livable environment.

Source: *Line Chart 8*. Digital image. *Simple Icon*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://simpleicon.com/line-chart-8.html

Hazard

Hazards pose a threat to human life and can also threaten infrastructure, environmental systems, culture, or health.

Source: *Biological Hazard*. Digital image. *Wikipedia*. N.p., n.d. Web. 23 June 2015. Retrieved from: https://en.wikipedia.org/?title=Biological_hazard

Hazard Assessment

Hazard assessment provides the factual basis for estimating the likely costs and benefits of alternative land use scenarios and various strategies for reducing risks. Three levels of sophistication: 1) hazard identification, 2) vulnerability assessment, and 3) risk analysis.

Source: Burby, R.J. (1998). *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. Washington, DC: Joseph Henry/National Academy Press.

Hazard Mitigation

The policies and actions that can be implemented over the long term to reduce risk and future loss to communities from natural disasters.

Source: Federal Emergency Management Agency (2015). *Multi-Hazard Mitigation Planning*. Retrieved from: https://www.fema.gov/multi-hazard-mitigation-planning

Hazard Mitigation Plan

A plan put together with the purpose of reducing the risk posed by hazards. The *Disaster Mitigation ACT of 2000* requires municipalities to pursue mitigation requirements in planning in order to be eligible for federal aid in the form of mitigation assistance grants.

Source: *Biological Hazard*. Digital image. *Wikipedia*. N.p., n.d. Web. 23 June 2015. Retrieved from: https://en.wikipedia.org/?title=Biological_hazard

Kyoto Protocol

A legally binding agreement among developed States (Countries) to decrease global emissions by recognizing their fault from consequences of industrialization.

Source: *Handshake*. Digital image. *Premium LLC,*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.premiumcaptive.com/

Leadership for Energy and Environmental Design (LEED)

Leadership for Energy and Environmental Design (LEED) is a building certification program to promote best practices. Certification is based on a points system for green strategies and practices.

Source: *LEED.* Digital Image. U.S. Green Building Council. (2015). *LEED*. Retrieved from: http://www.usgbc.org/leed

Livability

The focus on everyday place-making through infrastructure, preservation of space, and civic engagement.

Source: *Connecticut by the Numbers.* Digital Image. *Report Calls for Transition to Livable Communities across Connecticut*. Retrieved from http://ctbythenumbers.info/2014/07/02/report-calls-for-transition-to-livable-communities-across-connecticut/

National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides a means for property owners to acquire subsidized flood insurance otherwise unobtainable on the open market. Flood insurance is offered to homeowners, renters, and business owners of participating communities that agree to adopt and enforce ordinances that meet or exceeds FEMA requirements to reduce the risk of flooding.

Source: *Flood*. Digital image. *Boster, Kobayashi & Associates*. N.p., n.d. Web. 23 June 2015. Retrieved from: http://www.boster-kobayashi.com/safety-warning-accident-prevention-icons/flood_icon_bka/

Risk

The level of risk is a combination of vulnerability, exposure and hazard. In areas were all three of these indicators overlap, there is a high level of risk that needs to be planed for.

Source: *Alarm.* Digital Image. *Icon* Finder. N.p., Web. 23 June 2015. Retrieved from: https://www.iconfinder.com/icons/338778/alarm_alert_attention_caution_damage_danger_error_exclamation_hazard_message_problem_protection_risk_safe_safety_warning_icon

Scenarios

As the total amount of carbon dioxide and other greenhouse gases in the atmosphere increases, the world will continue to warm. Different scenarios have been estimated based on the degree to which the earth will continue to warm. Possible scenarios range from severe droughts in the great plains to a collapse of civilization and mass extinction.

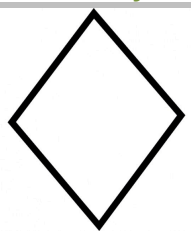
Source: *Possibilities*. Digital Image. *Icon* Finder. N.p., Web. 23 June 2015. Retrieved from: http://www.canstockphoto.com/

Smart Growth

Smart growth is a way to build towns and cities that:
1) promotes pedestrian traffic and is transit oriented,
2) preserves open spaces and protects the environment,
3) features town centers, and
4) is built in a resilient manner to mitigate threats from natural hazards.

Source: *Smart Growth Principles.* Digital Image. *Zoning the Garden State.* N.p,. Web. 23 June 2015. Retrieved from: https://zoningthegardenstate.wordpress.com/2014/03/31/how-smart-is-smart-growth/

Sustainability/Livability Prism



A tool used by planners in order to identify areas of concern that are being overlooked during the decision-making process.

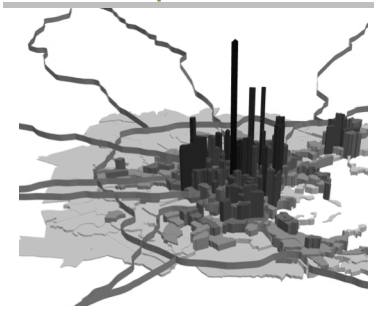
Source: *Diamond Shape.* Digital Image. *Free* Pik. Np,. Web. 23 June 2015. Retrieved from: http://www.freepik.com/free-icon/diamond-shape--ios-7-interface-symbol_747290.htm

Urban Heat Island Effect

The urban heat island effect refers to significantly increased temperatures in cities and metropolitan areas. This rise in temperature is due to the mass amounts of surfaces that store heat, as well as, heat produced from energy usage.

Source: *Urban Development.* Digital Image. *Durrell*. Np,. Web. 23 June 2015. Retrieved from: http://www.durrell.org/durrell-index/threats/

Urban Sprawl



Land development that is low density and dispersed. This sort of development often takes form through homogenous land use that is automobile oriented.

Source: *Urban Sprawl.* Digital Image. *Phlexp*. Np,. Web. 23 June 2015. Retrieved from: http://phlexp.com/2011/04/06/its-not-the-size-but-how-you-use-it/

Vulnerability

Vulnerability refers to a position that is susceptible to harm or adverse effects. Subsections of populations with limited resources such as those in poverty can increase the effects of climate change and lead to populations in particularly vulnerable situations.

Source: *Lee, Cody.* Digital Image. *iDownloadBlog*. Np,. Web. 23 June 2015. Retrieved from: http://www.idownloadblog.com/tag/unlock/

Water Cycle

The continuous movement of water on, above, and below the earth's surface. Climate change will disrupt the water cycle as the atmosphere becomes warmer. Evaporation rates have the potential to increase, ultimately leading to higher quantities of heavy precipitation events.

Source: *Arrow.* Digital Image. *Icon Finder*. Np,. Web. 23 June 2015. Retrieved from: https://www.iconfinder.com/icons/307180/arrow_cycle_drop_ecology_green_nature_recycle_refresh_repeat_water_icon

Weather

Weather refers to the short-term state of atmospheric conditions. This includes temperature, precipitation, sunshine, wind speed, UV index, dew point, and other similar features.

Source: *Weather Icon.* Digital Image. *World Weather Online*. Np,. Web. 23 June 2015. Retrieved from: http://www.worldweatheronline.com/api/docs/weather-icons.aspx