Kansas Emission Reduction and Mitigation Plan

Priority Action Plan

February 2024

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Introduction

Overview

Through the Inflation Reduction Act (IRA) of 2022, the Climate Pollution Reduction Grants (CPRG) program is a two-phase federal grant that allows states, local governments, tribes, and territories to develop and implement community driven projects to reduce ambient air pollution while supporting the creation of quality jobs and lowering energy costs for Kansans, as well as to accelerate work to empower community-driven solutions in their neighborhoods. The Kansas Department of Health and Environment was designated to be the lead agency for the purposes of planning and outreach for this grant program in the state of Kansas. The Emissions Reduction and Mitigation Plan (E-RAMP) is the result of the planning award for the state from the CPRG. Through E-RAMP, this document includes all the required items from the CPRG guidelines to suffice as the Priority (Climate) Action Plan that will be submitted to EPA by the imposed March 1, 2024, deadline. This submission can be leveraged by eligible entities to apply for a share of $4.3 billion in funding that will be awarded as part of the CPRG implementation grants to assist in funding community driven projects across the state that reduce greenhouse gases and their impacts. To meet requirements for the CPRG planning grant, this Priority Action Plan includes:

- Greenhouse gas (GHG) inventory: simplified list of emission sources and sinks, along with associated emissions quantified using standard methods.
- Greenhouse gas measures: specific projects to reduce emissions across the state.
- Low income and disadvantaged communities (LIDAC) benefit analysis and measures: with the Climate and Economic Justice Screening Tool, the Environmental Justice Screening and Mapping Tool, and work by the Heartland Environmental Justice Center to identify which communities across Kansas are burdened with low incomes, limited access to resources, and disproportionate exposure to environmental or climate impacts.
- Review of authority to implement.

This Priority Action Plan (PAP) has been put together by the Kansas Department of Health and Environment to ensure that all areas of the state are included, and the projects are in the best interest of the people and environment of the state of Kansas. While some regional planning organizations or municipalities within the state may have their own sustainability or mitigation plans related to greenhouse gases and environmental impacts, the state Priority Action Plan encompasses the entire state and can be leveraged as a guide for all areas, especially entities who do not have resources of their own. Weather events such as drought, flooding, and temperature extremes have already had an impact on lives of the residents of Kansas. This action plan is intended to allow communities and organizations to set measurable goals to become more sustainable and conscious of greenhouse gas emissions while simultaneously providing an opportunity for federal funding to support the development of projects that assist in reaching those goals. This action plan is flexible and tailored to Kansas' unique resources, capacity, and includes a mix of key sectors responsible for emitting and absorbing greenhouse gases.

Approach

The establishment of E-RAMP necessitated the creation of a new BOA section to undertake and oversee CPRG planning efforts on behalf of the state of Kansas. Creation of the Data and Sustainability Section increased KDHE's capacity to complete required tasks to submit the action plan and allow Kansas communities the opportunity to pursue CPRG implementation funds directly from EPA. The process required an extensive public outreach effort to inform Kansas communities about E-RAMP objectives and assure public participation. An E-RAMP contact and information webpage (https://www.kdhe.ks.gov/2071/) was created to begin the outreach effort.

KDHE partnered with Wichita State University (WSU) Environmental Finance Center and Heartland Environmental Justice Center to develop, schedule, and promote a series of in-person and virtual public meetings. A description of the engagement process and results are provided in this document. Meetings with state agencies, businesses, industry, stakeholder groups, and the public discussed the E-RAMP program and potential projects to include in the action plan. As a result of these engagements, approximately 50 projects were submitted to KDHE for consideration and inclusion in the Priority Action Plan. KDHE worked with the Wichita State University (WSU) Environmental Finance Center and Heartland Environmental Justice Center to develop the LIDAC analysis and further develop project proposals. KDHE intended to support all efforts across the state which met program goals to reduce ambient air pollution while supporting the creation of quality jobs and lowering energy costs for Kansans, as well as to accelerate work to empower community-driven solutions in their neighborhoods.

The intention of the Priority Action Plan is to be all encompassing and provide necessary ambiguity that allows for state, regional, and local adaptations regarding projects that can help reduce greenhouse gases, improve carbon sinks, and provide additional benefits for Kansans. The inclusion and/or reference to specific projects does not favor specific projects over others that may not be referenced.

A draft of the Priority Action Plan was provided for public comment prior to the submittal to EPA to ensure that all voices within Kansas have an opportunity to provide input on the creation of the statewide plan. The public comments received are not included for a specific response within the final document but received comments provided impetus for changes from the initial draft developed. After the public comment period the final version of the Priority Action Plan was completed, posted on the E-RAMP webpage, and provided to EPA prior to the March 1, 2024, grant imposed deadline.

Greenhouse Gas (GHG) Inventory of Kansas

Kansas collects annual emissions inventory data from applicable facilities within the state as they are required to obtain proper permits and are subject to state administrative regulations under the applicability of the federal Clean Air Act. This annual inventory collection however does not include all greenhouse gases, rather only requiring the submittal of nitrogen oxides (nitrous oxide) as a reportable pollutant. Other greenhouse gases, including carbon dioxide, methane, and sulfur hexafluoride, are not pollutants subjected to annual reporting requirements following federal regulations. As of 2022, there were a total of 1,006 facilities in the state of Kansas which submitted a state required emissions inventory.

Numerous facilities in the state of Kansas are also subject to the federal Greenhouse Gas Reporting Rule, which requires the annual submittal of all greenhouse gases which are then published in a federal database. As of 2022, there were a total of 116 facilities in the state of Kansas which submitted a federally required greenhouse gas emissions inventory.

For the purposes of a complete greenhouse gas inventory of Kansas the state elects to use data compiled for the annual EPA publication, *U.S. Greenhouse Gas Emissions and Sinks by State*, with the most recent including emissions from the 1990-2021 period. This publication includes state level anthropogenic greenhouse gas emissions and sinks that are disaggregated from the national inventory, which are also consistent with international standards, and include all seven primary greenhouse gas categories in carbon dioxide equivalent units. Carbon sinks in this inventory reference total land use, land use change, and forestry emissions and sequestration related to forest, cropland, grassland, wetland, and settlements.

Table 1. State of Kansas trends in Greenhouse Gas Emissions by Gas and Sinks in metric million tons of carbon dioxide equivalent.

Gas	**1990**	**2005**	**2018**	**2019**	**2020**	**2021**
Carbon Dioxide (CO_2)	70.4	75.4	62.3	60.0	58.0	60.0
Methane (CH_4)	26.6	27.3	28.0	28.0	27.3	27.1
Nitrous Oxide (N_2O)	17.6	22.2	20.9	23.0	21.0	20.5
Hydrofluorocarbons (HFCs)	3.7	1.1	1.4	1.4	1.3	1.3
Perfluorinated Compounds (PFCs)	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur Hexafluoride (SF_6)	0.4	0.2	0.1	0.1	0.1	0.1
Nitrogen Trifluoride (NF_3)	0.0	0.0	0.0	0.0	0.0	0.0
Total (Source) Emissions	118.9	126.1	112.8	112.4	107.7	109.0
Carbon Sink Net Total	-6.4	-5.5	-2.8	-2.7	-2.7	-2.6
Net Emissions (Sources and Sinks)	112.5	120.6	110.0	109.7	105.0	106.4

This data, summarized in Table 1 and graphically displayed in Figure 1, shows that Kansas has had a net change in greenhouse gas emissions of 5.4 percent from 1990 to 2021 accounting for a decrease in total source emissions while also seeing a decrease in carbon sink (sequestration) from land use and forestry. The change over these 32 years includes source emission decrease of carbon dioxide of 14.8 percent; emission increase of methane of 1.8 percent; emission increase of nitrous oxide of 16.3 percent; emission decrease of fluorinated gases of 65.7 percent.

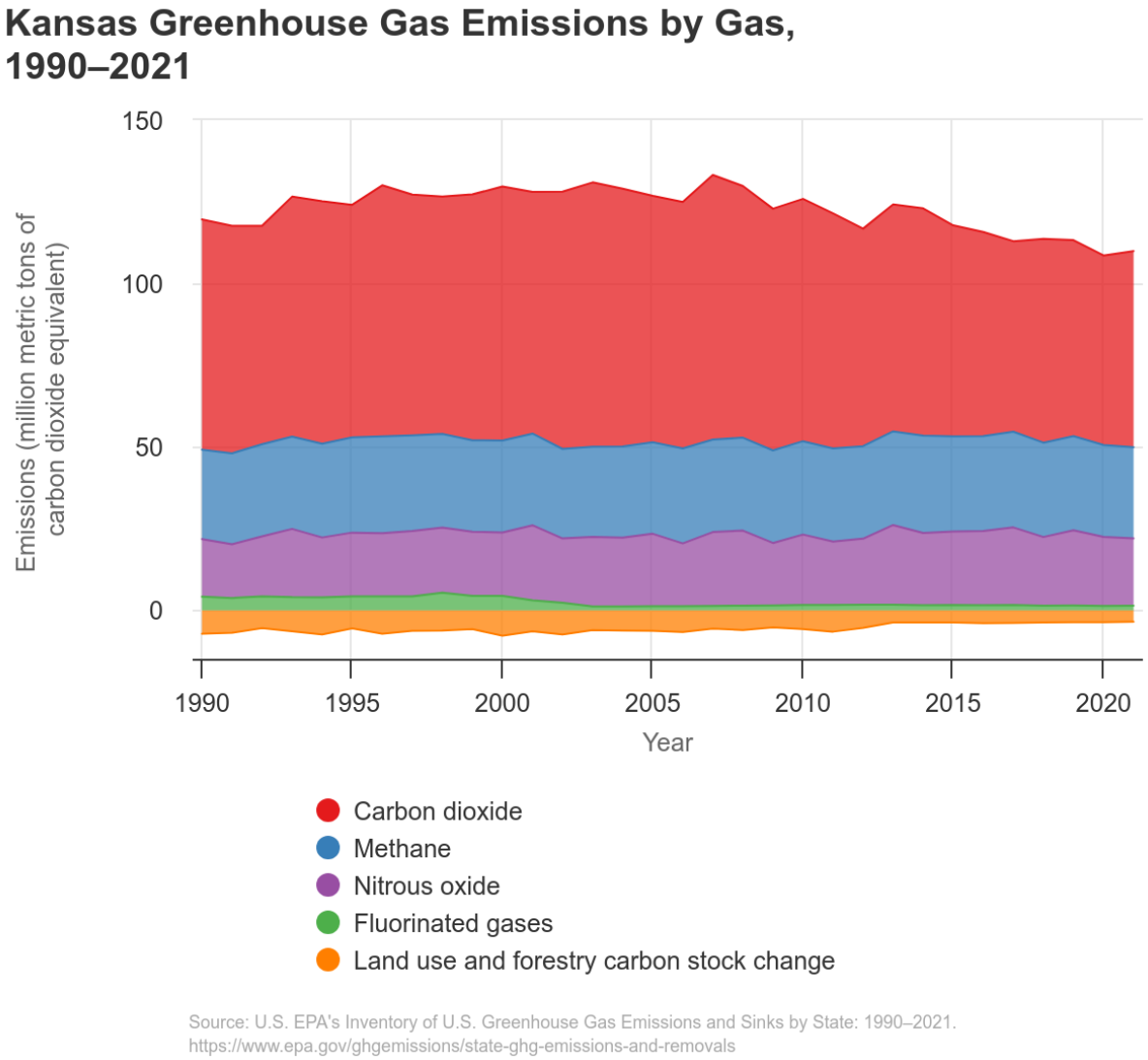

Figure 1. Kansas greenhouse gas emissions by gas and reduction from carbon sinks from 1990 to 2021.

Additional details on greenhouse gas emissions in Kansas are provided in Tables 2 and 3, in which the emissions are detailed by gas and source and by economic sector respectively. The largest source of carbon dioxide in the state is a result of fossil fuel combustion which accounts for 93.5 percent of the total carbon dioxide emissions in 2021; Emissions from fossil fuel combustion also account for 51.5 percent of total greenhouse gas emissions from sources in the state as of 2021. Methane emissions from the state are largely the result of enteric fermentation and natural gas systems which combined account for 69 percent of methane emissions from sources in the state in 2021. Nitrous oxide emissions in the state are primarily a result of agricultural soil management and manure management which combined encompass 94.6 percent of the total nitrous oxide emissions in 2021.

Fossil fuel combustion can be further attributed based upon economic sector as detailed in Table 3 with electric power industry, transportation, and industry all contributing to the bulk of emissions. Additional emissions are also contributed to residential, commercial, and agricultural economic sectors where fossil fuel combustion occurs. Additional economic sectors which contribute to the greenhouse gas emissions in the state include natural gas systems, petroleum systems, cement production, municipal landfills, agricultural soil management, enteric fermentation, and general manure management.

Table 2. State of Kansas trends in Greenhouse Gas Emissions by Gas and Source in metric million tons of carbon dioxide equivalent.

Gas/Source	**1990**	**2005**	**2018**	**2019**	**2020**	**2021**
CO_2	**70.4**	**75.4**	**62.3**	**60.0**	**58.0**	**60.0**
Fossil Fuel Combustion	65.5	71.5	58.9	56.3	54.3	56.1
Electric Power Sector	27.0	37.5	23.1	20.3	19.8	22.2
Transportation	17.8	16.8	17.3	17.7	16.4	16.5
Industrial	13.3	11.3	11.7	11.3	11.5	11.0
Residential	4.1	4.0	4.2	4.3	3.9	3.8
Commercial	3.3	1.8	2.6	2.7	2.6	2.6
Non-Energy Use of Fuels	1.7	0.5	0.4	0.4	0.3	0.3
Natural Gas Systems	1.4	0.7	0.3	0.3	0.3	0.2
Cement Production	0.8	1.5	1.1	1.0	1.2	1.3
Other Process Uses of Carbonates	0.1	0.1	0.1	0.1	0.1	0.1
Glass Production	0.0	0.0	0.1	0.1	0.0	0.1
Ammonia Production	0.5	0.5	0.9	1.0	1.0	1.0
Urea Consumption for Non-Agricultural Purposes	0.0	0.0	0.1	0.1	0.1	0.0
Petrochemical Production	0.1	0.1	0.1	0.1	0.1	0.1
Petroleum Systems	0.2	0.2	0.1	0.2	0.1	0.1
Liming	0.0	0.1	NO	0.2	0.2	0.2
Urea Fertilization	0.1	0.2	0.3	0.3	0.3	0.4
International Bunker Fuels	0.3	0.2	0.2	0.2	0.1	0.1
Wood Biomass, Ethanol, and Biodiesel Consumption	0.8	0.7	1.4	1.5	1.4	1.3
CH_4	**26.6**	**27.3**	**28.0**	**28.0**	**27.3**	**27.1**
Stationary Combustion	0.1	0.1	0.1	0.1	0.1	0.1
Mobile Combustion	0.1	0.0	0.0	0.0	0.0	0.0
Natural Gas Systems	10.6	9.6	7.6	8.0	7.4	7.3
Petroleum Systems	2.9	2.6	4.1	3.6	3.6	3.6
Abandoned Oil and Gas Wells	0.4	0.4	0.4	0.4	0.4	0.4
Enteric Fermentation	8.9	10.9	11.5	11.6	11.4	11.4
Manure Management	0.7	1.3	2.1	2.2	2.2	2.2
Landfills	2.4	1.7	1.5	1.5	1.5	1.5
Wastewater Treatment	0.5	0.6	0.5	0.5	0.6	0.6
N_2O	**17.6**	**22.2**	**20.9**	**23.0**	**21.0**	**20.5**
Stationary Combustion	0.3	0.5	0.4	0.3	0.3	0.4
Mobile Combustion	0.4	0.4	0.2	0.2	0.2	0.2
Nitric Acid Production	0.8	0.7	0.6	0.5	0.2	0.2
Manure Management	0.8	1.2	1.6	1.6	1.6	1.6
Agricultural Soil Management	15.1	19.1	17.9	20.0	18.3	17.8

Field Burning of Agricultural Residues	0.0	0.0	0.0	0.0	0.0	0.0
Wastewater Treatment	0.1	0.2	0.2	0.2	0.2	0.2
HFCs, PFCs, SF_6 and NF_3	**4.2**	**1.3**	**1.5**	**1.5**	**1.4**	**1.4**
HFCs	**3.7**	**1.1**	**1.4**	**1.4**	**1.3**	**1.3**
Substitution of Ozone Depleting Substances	0.0	1.1	1.4	1.4	1.3	1.3
Fluorochemical Production	3.7	0.0	0.0	0.0	0.0	0.0
SF_6	**0.4**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**
Electrical Equipment	0.4	0.2	0.1	0.1	0.1	0.1
NF_3	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total (Sources) Emissions	**118.9**	**126.1**	**112.8**	**112.4**	**107.7**	**109.0**
Carbon Sink Net Total	(6.4)	(5.5)	(2.8)	(2.7)	(2.7)	(2.6)
Net Emissions (Sources and Sinks)	**112.5**	**120.6**	**110.0**	**109.7**	**105.0**	**106.4**

Table 3. State of Kansas trends in Greenhouse Gas Emissions by economic sectors in metric million tons of carbon dioxide equivalent.

Sector/Source	**1990**	**2005**	**2018**	**2019**	**2020**	**2021**
Transportation	**18.5**	**18.0**	**17.8**	**18.2**	**16.9**	**17.0**
CO_2 from Fossil Fuel Combustion	17.8	16.8	17.3	17.7	16.4	16.5
Substitution of Ozone Depleting Substances	0.0	0.7	0.3	0.3	0.3	0.3
Mobile Combustion	0.4	0.3	0.1	0.1	0.1	0.1
Non-Energy Use of Fuels	0.3	0.2	0.1	0.1	0.1	0.1
Electric Power Industry	**27.8**	**38.2**	**23.6**	**20.8**	**20.3**	**22.8**
CO_2 from Fossil Fuel Combustion	27.0	37.5	23.1	20.3	19.8	22.2
Stationary Combustion	0.3	0.5	0.4	0.3	0.3	0.4
Electrical Equipment	0.4	0.2	0.1	0.1	0.1	0.1
Other Process Uses of Carbonates	0.0	0.0	0.0	0.0	0.0	0.0
Industry	**34.9**	**26.6**	**26.5**	**25.9**	**25.1**	**24.7**
CO_2 from Fossil Fuel Combustion	11.3	9.1	9.6	9.3	9.3	8.9
Natural Gas Systems	11.9	10.3	7.9	8.3	7.7	7.5
Non-Energy Use of Fuels	1.5	0.3	0.3	0.3	0.2	0.3
Petroleum Systems	3.1	2.8	4.3	3.7	3.7	3.7
Cement Production	0.8	1.5	1.1	1.0	1.2	1.3
Substitution of Ozone Depleting Substances	0.0	0.1	0.3	0.3	0.3	0.3
Petrochemical Production	0.1	0.1	0.1	0.1	0.1	0.1
Ammonia Production	0.5	0.5	0.9	1.0	1.0	1.0
Nitric Acid Production	0.8	0.7	0.6	0.5	0.2	0.2
Abandoned Oil and Gas Wells	0.4	0.4	0.4	0.4	0.4	0.4
Wastewater Treatment	0.4	0.4	0.4	0.4	0.4	0.4
Urea Consumption for Non-Agricultural Purposes	0.0	0.0	0.1	0.1	0.1	0.0

Mobile Combustion	0.0	0.0	0.1	0.1	0.1	0.1
Fluorochemical Production	3.7	0.0	0.0	0.0	0.0	0.0
Glass Production	0.0	0.0	0.1	0.1	0.0	0.1
Landfills (Industrial)	0.1	0.1	0.2	0.2	0.2	0.2
Agriculture	**27.7**	**35.2**	**35.6**	**38.0**	**36.4**	**35.7**
N_2O from Agricultural Soil Management	15.1	19.1	17.9	20.0	18.3	17.8
Enteric Fermentation	8.9	10.9	11.5	11.6	11.4	11.4
Manure Management	1.5	2.5	3.7	3.8	3.8	3.8
CO_2 from Fossil Fuel Combustion	2.0	2.3	2.1	2.0	2.2	2.0
Urea Fertilization	0.1	0.2	0.3	0.3	0.3	0.4
Liming	0.0	0.1	0.0	0.2	0.2	0.2
Mobile Combustion	0.1	0.1	0.1	0.1	0.1	0.1
Commercial	**5.9**	**3.9**	**4.7**	**4.9**	**4.8**	**4.8**
CO_2 from Fossil Fuel Combustion	3.3	1.8	2.6	2.7	2.6	2.6
Landfills (Municipal)	2.3	1.6	1.4	1.4	1.4	1.4
Substitution of Ozone Depleting Substances	0.0	0.2	0.5	0.5	0.5	0.5
Wastewater Treatment	0.3	0.3	0.3	0.3	0.3	0.3
Residential	**4.2**	**4.2**	**4.5**	**4.6**	**4.2**	**4.1**
CO_2 from Fossil Fuel Combustion	4.1	4.0	4.2	4.3	3.9	3.8
Substitution of Ozone Depleting Substances	0.0	0.1	0.2	0.3	0.3	0.3
Stationary Combustion	0.1	0.0	0.1	0.1	0.0	0.0
Total Emissions (Sources)	**118.9**	**126.1**	**112.8**	**112.4**	**107.7**	**109.0**
Carbon Sink Net Total	(6.4)	(5.5)	(2.8)	(2.7)	(2.7)	(2.6)
Net Emissions (Sources and Sinks)	**112.5**	**120.6**	**110.0**	**109.7**	**105.0**	**106.4**

Greenhouse Gas (GHG) Reduction Measures

Greenhouse gas reduction measures for the purpose of the Priority Action Plan are intended to be implementation ready, indicating they can be completed in the near term (approximately five years or less) and adequate information is available for the measure to be competitive in the EPA CPRG implementation grant phase. Measures in this section may not be an exhaustive list of all possible emission reduction measures, however the measures that are included in this section have been provided by stakeholders in Kansas, measures that may already be implemented but can be replicated in the state, or measures that are widely known to have impacts on reducing greenhouse gases and easily implemented in the state.

While a measure may be referenced within only one specific economic category below many measures have co-benefits and could impact greenhouse gas emissions across several sectors. All measures deemed appropriate are included in Appendix A, however a specific measure (project) not included in the appendix or mentioned within measures below do not exclude the project from being covered by the state priority action plan. Any project that can be shown to produce greenhouse gas reductions and is similar in nature to project(s) referenced is considered covered by this plan. Projects may include expanded education and outreach or workforce development, which play a vital role in the success of many community-driven projects and are certainly applicable in the goal of reducing greenhouse gas impacts.

In addition to the state of Kansas developing a priority action plan, the Kansas City metropolitan area was awarded funding to develop a localized priority action plan through the Mid America Regional Council (MARC). MARC followed their own process and is on the same timeline as the state to establish greenhouse gas reduction measures for the metropolitan area and submit their plan to EPA. While Kansas and MARC may include similar measures, the state also provides full support to MARC in completing their priority action plan. In doing so, any measures (projects) included in MARC's plan (available at https://kcmetroclimateplan.org/) are also supported by the state and are eligible measures for all Kansas entities to implement.

Agriculture, Natural and Working Lands

The agricultural economic sector is the largest source of greenhouse gas emissions in the state of Kansas, with soil and manure management being two primary sources of emissions. Projects that support the research, development, and practice of sustainable agriculture through soil management, water conservation, and waste (manure) management all have the potential to reduce greenhouse gases by thousands to millions of tons. Agriculture operation practices can include increased livestock production efficiencies (e.g., animal feed mix optimization, animal feed additives), manure digestion, water irrigation technology and practices, fertilization method improvements, and reduction in farm machinery and equipment energy usage including electrification or zero-emission on-farm machinery.

Projects that support the improvement of carbon sinks and restoration or improvement of the state's carbon sink values that have declined over the decades are also beneficial to reducing greenhouse gas impacts. Supporting afforestation in urban areas (i.e., green spaces), native

corridors such as riparian forests, and supporting windbreaks and shelterbelts with tree plantings and native vegetation to improve the carbon sink value and provide multiple co-benefits including reduction of urban heat island, improved soil health, improved water quality, and more.

An additional carbon sink that is prominent within Kansas is grassland (prairie) which according to the U.S. Department of Agriculture[1] can support the storage of approximately 50 metric tons of carbon per hectare, and result in approximately 0.15 metric tons of carbon influx (carbon storage) per year on average. Programs to protect and restore native grasslands in the state can help prevent their loss due to invasive species, encroaching woody plants, or land use changes. Such measures can significantly increase the amount of carbon stored within the state.

Buildings (Commercial and Residential)

Weatherization provides building upgrades that improve the energy efficiency and reduces energy requirements to heat or cool buildings. Projects can include improved air sealing through insulation, replacement of doors or windows, and other measures to prevent energy loss. Kansas has an existing Weatherization Assistance program which leverages state, regional, and local offices to assist low-income homes with funding for such projects. Funding to expand and support such projects can provide greenhouse gas reductions of approximately one metric ton of carbon dioxide emissions per home annually according to the U.S. Department of Energy[2].

Energy efficiency improvements for buildings includes projects that reduce energy demand for heating, cooling, cooking, lighting, and powering appliances. This strategy results in less energy required to operate a building and can reduce greenhouse gases by requiring less fossil fuel powered energy consumption; This strategy can also improve the benefits of renewable energy by allowing more households to consume the renewable energy. Projects can include switch to energy efficient lighting such as light-emitting diode (LED) bulbs, transition to newer and more efficient electrical appliances with ENERGY STAR certification. Greenhouse gas reduction quantifications can vary by age and type of appliance being replaced but can be tracked and calculated easily on a case-by-case basis of project completed.

Electrical Generation

The growth and utilization of renewable (electricity) energy can lead to dramatic reductions in greenhouse gas emissions in Kansas as the electric power sector is the largest producer of greenhouse gas emissions by an individual economic sector. The use of solar, wind, and other biofuels to produce electricity can all aid to decrease the reliance on fossil fuels and improve energy independence. Solar projects can vary in size from individual residences, neighborhoods, municipalities, commercial properties, and the largest being industrial solar projects intended to

[1] United State Department of Agriculture, U.S. Forest Service, Grassland Carbon Management, https://www.fs.usda.gov/ccrc/topics/grassland-carbon-management
[2] U.S. Department of Energy, Weatherization Assistance Program factsheet, https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf

feed the electrical grid. Kansas is already a leader in wind energy production[3] and additional projects which support this renewable energy are also a benefit to reducing greenhouse gas emissions. All sizes of wind and solar projects provide benefits to reducing greenhouse gas emissions with the Intergovernmental Panel on Climate Change (IPCC) estimating that per kilowatt hour of electricity generated solar is approximately 12 times less than natural gas and 20 times less than coal in terms of carbon footprints[4].

Kansas is also a national leader in the use of biofuels for electricity generation[5] which include products such as biodiesel, fuel ethanol, and renewable diesel. Projects which support the continued research, development, and use of biofuels for electrical generation can lead to additional reductions in greenhouse gas emissions. Additionally, some biofuels can also utilize biomass materials (feedstocks) that are low-carbon or result in a carbon sink due to their natural vegetative properties. Greenhouse gas emissions can be further reduced with the development of biofuel (bioenergy) facilities which incorporate carbon capture and storage technology.

Industry

Industry is a leading primary economic sector in terms of greenhouse gas emissions and opportunities exist for reducing these emissions through education, training, and process improvements. The state of Kansas already features programs such as Pollution Prevention Institute (PPI), Kansas Energy Program (KEP), Pollution Prevention (P2), and Sustainable Materials Management (SMM) that all support businesses, organizations, and industry to provide training, technical assistance, and project funding to support the reduction of greenhouse gas emissions. Such programs assist with industrial process efficiency, control and emission control technologies, and overall emissions management. Specific quantified emissions are dependent on projects completed but can vary from thousands to hundreds of thousands of tons of greenhouse gas emission reductions over the lifetime of the project.

Transportation

Conversion of vehicles from combustion-only engines to either plug-in hybrid-electric vehicles (PHEVs) or entirely electric vehicles (EVs) results in significant reductions in greenhouse gases in the transportation sector. The electrification of fleets includes but is not limited to passenger cars and trucks, buses, delivery vehicles, and non-road use vehicles and equipment; all of which will aid in more sustainable transportation system. Coinciding with any conversion to PHEVs or EVs is the expansion and improvement of electric vehicle charging infrastructure which is vital to increasing the adoption and acceptance. United States Department of Energy[6] estimates that

[3] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, https://www.energy.gov/eere/wind/wind-energy-technologies-office
[4] Intergovernmental Panel on Climate Change, Technology-specific Cost and Performance Parameters, https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf
[5] U.S. Energy Information Administration, State Energy Data System, https://www.eia.gov/state/seds/sep_prod/pdf/P4B.pdf
[6] U.S. Department of Energy Alternative Fuels Data Center, https://afdc.energy.gov/vehicles/electric_emissions.html

the national average of greenhouse gas reductions (carbon dioxide equivalent) is 4.93 tons per year for EVs and 3.92 tons per year for PHEVs.

Travel demand management, or reduction in personal (individual occupant) vehicle demand and operating time can also provide reductions in greenhouse gases in the transportation sector. A multitude of projects may fall within this generality. The improvement of mass transit options, both urban and rural, can result in decreased use of personal vehicles. Improvement of traffic to reduce idling, congestion, or providing more direct travel corridors, can result in decreased operating time for personal (and all) vehicles. The improvement or availability of alternative methods of transportation can also lead to reduced use of individual vehicles; Sidewalks, shared use paths, or dedicated routes for other individual transportation methods (e.g., bicycles, scooters) are a common example.

Additional reduction of greenhouse gases from the transportation sector can result from improved fuel efficiency and use of low carbon alternative fuels such as natural gas, ethanol, biodiesel, biomethane, propane, or hydrogen. Projects that promote the infrastructure, development, and/or purchase of alternative fueled vehicles are beneficial to emission reduction efforts.

Waste and Materials Management

Landfills are a significant source of methane emissions due to the anaerobic decay of waste that occurs with time. A common greenhouse gas reduction measure used with landfills is landfill gas capture, which is then utilized to produce energy and routed to suffice nearby energy needs. Kansas currently has 13 landfills which are leveraging this measure to reduce greenhouse gas emissions. There are 5 additional landfills which capture landfill gas but currently do not generate energy from the captured gas and an additional 11 landfills which could be considered for methane capture and energy production in the future. Utilizing methane capture at all candidate landfills in Kansas could reduce greenhouse gas emissions by approximately 0.3 metric million tons each year.

To reduce the amount of waste entered the landfill system there are focused efforts on the reduction of food waste which can be a primary proponent of methane generation during decay and EPA has shown food waste contributes to approximately 58 percent of the methane emissions from landfills in the United States[7]. There are also numerous co-benefits with the reduction of food waste that can be considered into the greenhouse gas reduction calculated (e.g., food processing, transportation), soil improvement, and public awareness of waste management. Projects that work with this measure would likely be educational and infrastructure in nature to promote neighborhood or individual composting and waste reduction techniques. EPA estimates that for each 907 metric tons of food waste landfilled, an estimated 838 metric million tons of greenhouse gases are released.

[7] Quantifying Methane Emissions from Landfilled Food Waste, Environmental Protection Agency, October 2023, https://www.epa.gov/system/files/documents/2023-10/food-waste-landfill-methane-10-8-23-final_508-compliant.pdf

Wastewater treatment is another source of greenhouse gas emissions, primarily methane, that can commonly be found throughout the state. There are several opportunities to reduce the greenhouse gas emissions that come from wastewater treatment including retiring lagoons and use of enclosed wastewater treatment facilities, upgrading wastewater facilities to include methane capture, and like landfill gas capture the use of methane to produce energy. This again results in energy independence, potential reduced energy costs, and the reduction in emissions.

Waste diversion, improved recycling and reuse or repurpose of materials is another measure that would result in greenhouse gas reductions. Whether reductions are found in the decreased need for production of materials that are otherwise recycled, or through the repurpose of materials such as wood debris which can be chipped into ground cover or improved compostable material. Projects of this nature will also yield greenhouse gas reductions.

Low Income and Disadvantaged Communities Benefits Analysis

Identify LIDACs and Climate Impacts and Risks

An analysis was conducted on the data provided by the Climate and Economic Justice Screening Tool (CEJST) for Kansas. The comprehensive dataset shows a complex landscape of challenges faced by low-income disadvantaged communities (LIDACs) in Kansas. Across the 241 disadvantaged Census Tracts, approximately 738,083 residents, constituting roughly 24.5% of the state's population, grapple with a multitude of socio-economic difficulties. 64% of residents in LIDACs in Kansas are White, 17% are Black or African American, 12% are Hispanic or Latino, 1% are Asian, 1% are American Indian/Alaskan Native, while 2% are two or more races, and Native Hawaiian or Pacific accounted for less than 1%. Among the 105 counties in Kansas, 22 counties have a vulnerable population at or above 50%, and within 10 counties, the entire county population is classified as 100% vulnerable. The complete list of identified LIDACs with Census Tract ID numbers is provided in Appendix B.

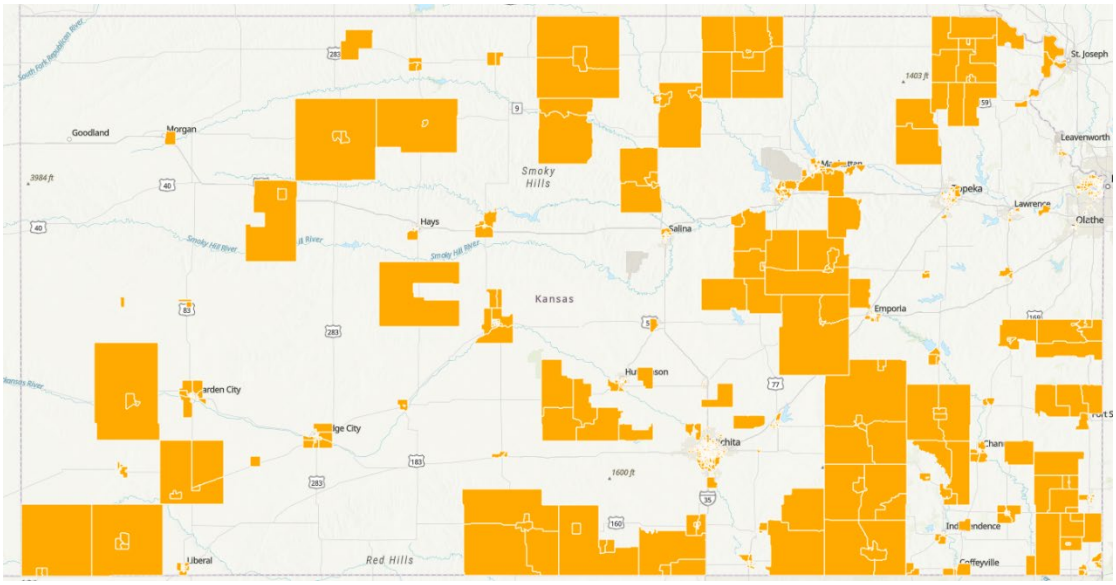

Figure 2. Map of disadvantaged census blocks/tracts based upon EPA Inflation Reduction Act definitions.

Within the 231 low-income Census Tracts, the economic struggles prevailing in these communities are heightened. For example, upon gathering information from CEJST, Kansas experienced an unemployment rate of 3.1% while LIDACs within Kansas suffered an unemployment rate of 6.2%. The economic challenges are further accentuated by a substantial energy burden in 11% of the state, by which energy costs are disproportionate to income, according to the CEJST. There is a clear need for focused interventions to alleviate the disproportionate strain on low-income households. Moreover, nearly 12% of Kansas communities are expected to undergo significant population loss, exacerbating existing socio-economic disparities. The demographic challenges highlighted across the data stress a need for targeted interventions to address the unique circumstances of LIDACs in Kansas.

Beyond demographic shifts, environmental risks are looming. Five (5) Kansas low-income communities are identified as being at high risk of floods within the next 30 years, posing potential threats to infrastructure and community well-being. Additionally, 6% of the state face an elevated risk of fire, necessitating urgent attention to environmental resilience and emergency preparedness in these vulnerable communities.

Across ten (10) Kansas Census Tracts, primarily located in the Western part of the state, face the imminent threat of substantial agricultural losses. This highlights the vulnerability of specific regions to environmental and economic shifts, adding a layer of complexity to the challenges faced by LIDACs. Structural risks are underscored by the anticipated high building loss rate in 5% of Kansas communities due to exceedingly out-of-reach yet necessary infrastructure investments. Building loss is expected due to natural hazards linked to climate change, in Kansas these include, cold wave, drought, hail, heat wave, ice storm, strong wind, tornado, wildfire, and winter weather.

These circumstances coalesce with the impending climate risks, impacts, and vulnerabilities faced by low-income disadvantaged communities in Kansas including,

Climate Risks:

- Extreme Weather Events: LIDACs are particularly vulnerable to the increasing frequency and intensity of extreme weather events, including storms, tornadoes, floods, and heatwaves. Low-income communities are at increased risk to be affected by the weather event itself due to a lack of weatherization and resiliency infrastructure available but also a lack of rebuilding capacity.
- Agricultural Disruptions: Climate change poses a significant threat to agriculture, affecting the livelihoods of residents in LIDACs. Changes in precipitation patterns and temperature extremes can impact crop yields and livestock.

Climate Impacts:

- Health Concerns: Higher temperatures and increased frequency of extreme weather events can lead to health risks, especially for vulnerable populations. Heat-related illnesses, vector-borne diseases, and respiratory issues may become more prevalent. One in ten Kansans already suffer from asthma[8].
- Economic Strain: Agricultural losses due to climate-related factors can further strain the economic conditions of LIDACs. Reduced crop yields and damage to infrastructure can hinder economic opportunities. These impacts will have a domino effect for the rest of the state's economy as agriculture makes up roughly 14% of total gross domestic product and creates over 250,000 jobs in the state[9].

[8] Center for Disease Control Asthma Data, https://www.cdc.gov/asthma/most_recent_data_states.htm
[9] State of Kansas 2022 Economic Contribution Report, https://agriculture.ks.gov/docs/default-source/ag-marketing/county-ag-stats/2022-county-ag-stats/state-of-kansas-reports-8-12-2022.pdf?sfvrsn=553e9bc1_4

- Water Scarcity: Changes in precipitation patterns and increased temperatures can lead to water scarcity, impacting public health, agriculture and food security, and the economy. At least 50% of the state at any given time has been in a state of drought since December of 2021.[10]. In the Southeast portion of the state water scarcity is becoming a reality for several small towns. One LIDAC which encompasses Sedan, Kansas is currently implementing conservation measures, such as prohibiting tap water from being used for landscaping. Some measures go as far as to use water from air conditioning runoff during the summer.[11]. Caney, Kansas, another LIDAC, requested a state of emergency to address their water scarcity.[12].

Climate Vulnerabilities:

- Limited Adaptive Capacity: LIDACs may have limited resources and infrastructure to adapt to changing climate conditions. This includes inadequate healthcare facilities, emergency response systems, and financial resources. Access to healthcare facilities is a risk for many in rural communities in the state. Kansas has the second highest percentage of rural hospitals at risk of closing according to the Center for Healthcare Quality & Payment Reform (CHQPR)[13] with 82% of hospitals reporting losses. The CHQPR projects that nearly 58% of rural hospitals are at risk of closing with over one-quarter at immediate risk.
- Housing Vulnerability: High building loss rates and the risk of floods can result in housing vulnerability. Many residents may lack the means to rebuild or relocate after climate-related disasters.

In summary, the expanded dataset shows the multifaceted challenges confronting LIDACs in Kansas. It underlines the urgency of tailored strategies that address not only economic but also environmental and social vulnerabilities, recognizing the diverse and intersectional nature of the hardships faced by these communities.

In addressing these climate risks and vulnerabilities there is a pressing need for holistic and community-driven strategies. These may include targeted investments in greenhouse gas emission mitigation, carbon sinks, resilient infrastructure, community education on climate adaptation, policies that address both environmental justice and climate justice concerns, workforce development in emerging clean energy, operational efficiencies across industry and

[10] United States Drought Monitor, https://droughtmonitor.unl.edu/
[11] *Kansas Reflector* "It's an emergency. Midwest towns scramble as drought threatens drinking water" https://kansasreflector.com/2023/09/17/its-an-emergency-midwest-towns-scramble-as-drought-threatens-drinking-water/
[12] KWCH News, "Caney Valley Schools moving to 4-day week due to ongoing water crisis" https://www.kwch.com/2023/10/18/caney-valley-schools-moving-4-day-week-due-ongoing-water-crisis/
[13] Center for Healthcare Quality and Payment Reform, Rural Hospitals at Risk of Closing https://chqpr.org/downloads/Rural_Hospitals_at_Risk_of_Closing.pdf

agriculture and more. Recognizing the intersectionality of challenges faced by LIDACs is essential for developing effective and inclusive climate resilience initiatives in Kansas.

The following priority action measures feature project idea submissions with accompanying benefits analysis, considering both direct and indirect impacts in Low-Income Disadvantaged Communities both locally and statewide.

Engage with LIDACs to understand community priorities.

Environmental Finance Center (EFC) staff identified and invited 536 participants across all 105 Kansas counties, to a series of public engagement meetings, both in-person and virtual. Identified participants represented 467 organizations including, state agencies, commissions, councils, city and county staff, regional economic and planning organizations, non-profit organizations, community foundations, educational institutions, and more.

Six (6) public meetings were held across the state, meeting locations were determined using the Kansas Department of Health and Environment district map (Figure 3). The Kansas Department of Health and Environment (KDHE)'s District Offices are strategically located throughout Kansas to provide services in an efficient, responsive manner and to provide access to citizens across the state[14].

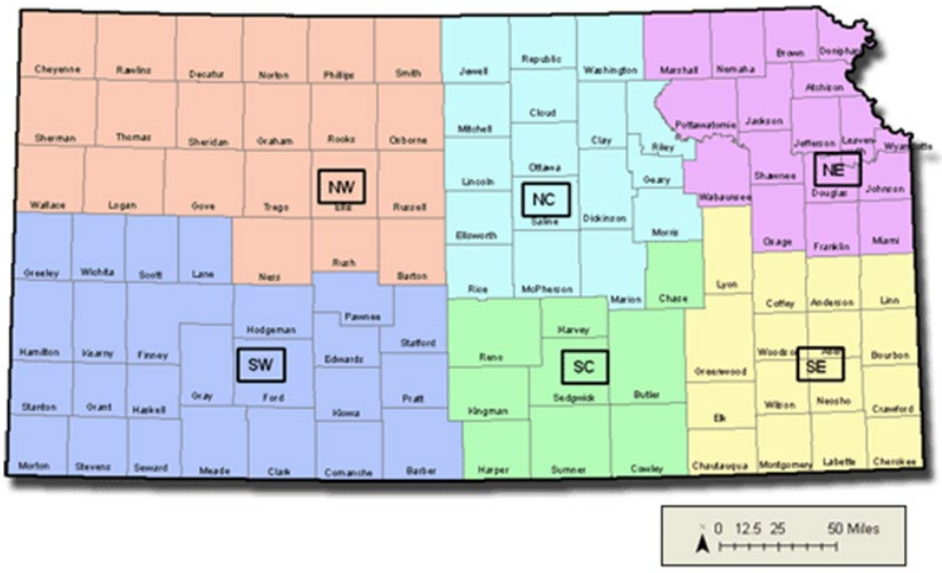

Figure 3. Map of six KDHE districts and associated counties included in each of the regional meetings.

EFC staff used the district boundaries established by KDHE to determine the appropriate participant list in each region. Participants were researched and recorded to ensure equitable representation across counties, and rural and urban areas. Participants received two (2) email invitations before the meeting series. Many participants also received a third email or follow-up

[14] Kansas Department of Health and Environment, https://www.kdhe.ks.gov/288/District-Offices

phone-call reminder closer to the meeting date. Two (2) virtual public meetings were also offered, and participants unable to attend a meeting in-person were invited to attend via email. EFC staff asked participants to register in advance to ensure sufficient materials and refreshments were available.

Of the participants invited, 268 (more than 50%) serve at least one (1) low-income, disadvantaged community. Around forty (40) community foundations were also contacted and over half serve low-income disadvantaged communities. One-hundred and forty-four (144) city municipalities were invited with 69 considered 100% low-income disadvantaged according to the CEJST (48%) and 123 serve at least one low-income disadvantaged community. 103 counties were invited to the public meetings and 73 out of the 103 counties serve at least one low-income disadvantaged community. A detailed breakout of county representation is provided in the following table.

Table 4. KDHE Districts, number of counties, and LIDAC values.

KDHE District	Number of Counties	Number of Counties at or above 50% disadvantaged	Percentage of the region considered low-income disadvantaged
SE Region	16	9	56%
SW Region	25	9	36%
SC Region	9	3	33%
NW Region	21	4	19%
NC Region	17	5	29%
NE Region	17	2	12%

Each public meeting was led by EFC staff and adhered to a structured workshop format. The agenda for each meeting encompassed a presentation by KDHE staff on the E-RAMP program, a collaborative brainstorming segment aimed at formulating and prioritizing project ideas for both the state and the region, a comprehensive overview of the project submission form intended for inclusion in the state's priority action plan, and a dedicated question-and-answer session.

Additionally, EFC staff hosted a booth at the Kansas Association of Counties (KAC) Conference Exposition. Staff connected with sixty (60) attendees and were able to provide an overview of E-RAMP, their opportunity for involvement, and the project submission form, for inclusion in the State’s priority action plan. Table 5 summarizes the public engagement efforts across Kansas as a part of the E-RAMP program.

Table 5. Public engagement meetings and efforts documented.

Meeting Details	Number of Attendees	Meeting Summary
Southeast (SE) Kansas Chanute, KS November 6, 2023 | 1:00 - 4:00 PM Neosho County Community College 800 W Fourteenth St Chanute, KS 66720	**2**	- Brief KDHE presentation on CPRG program - Attendee led discussion to share ideas and ask questions
South-Central (SC) Kansas Wichita, KS November 9, 2023 | 1:00 - 4:00 PM Advanced Learning Library 711 West 2nd St N Wichita, KS 67203	**14**	- EFC-led structured workshop - KDHE presentation on CPRG program - Collaborative project brainstorming - Project submission form overview - Dedicated Q&A session
Southwest Kansas Dodge City, KS November 15, 2023 | 1:00 - 4:00 PM Dodge City Public Library 1001 N 2nd Ave Dodge City, KS 67802	**0**	Although participants registered for the event, there were not any participants in attendance.
Northwest (NW) Kansas Colby, KS November 16, 2023 | 9:00 AM - Noon Colby Community College 1255 S Range Ave Colby, KS 67701	**1**	- Brief KDHE presentation on CPRG program - Attendee led discussion to share ideas and ask questions
North-Central (NC) Kansas McPherson, KS November 27, 2023 | 1:00 - 4:00 PM KMU Training Center 2090 E Ave. A McPherson, KS 67460	**4**	- EFC-led structured workshop - KDHE presentation on CPRG program - Collaborative project brainstorming - Project submission form overview - Dedicated Q&A session
Northeast (NE) Kansas Lawrence, KS November 28, 2023 | 1:00 - 4:00 PM Douglas County Fairgrounds 2120 Harper St Lawrence, KS 66046	**13**	- EFC-led structured workshop - KDHE presentation on CPRG program - Collaborative project brainstorming - Project submission form overview - Dedicated Q&A session

Virtual Meeting December 6, 2023 | 5:30 - 7:30 PM	**4**	- Brief KDHE presentation on CPRG program - Project submission form overview - Dedicated Q&A session
Kansas Association of Counties Exposition December 7, 2023 | 1:30 – 7:00	**75**	- Meet and greet with county representatives - CPRG and project submission form overview - Links to all resources
Presentation at Public Policy Management Center, Local Government Luncheon December 8, 2023 | 12:15 – 1:15 PM	**25**	- Announcement of CPRG program and funding - Project submission form overview - Invitation to virtual Q&A session
Virtual Question and Answer Session December 14, 2023 | 1:00 – 3:00 PM	**30**	- Dedicated question and answer session

Priority Action Measures, Project Idea Submissions, and Benefits Analysis

Agriculture Operational Practices

In Kansas, agriculture plays a pivotal role in the economy. As shown by the greenhouse gas inventory, agriculture also plays a significant role in greenhouse gas emissions with practices such as livestock rearing, fertilizer application, and general land management all contributing. The environmental impact of food production is significant, not only in Kansas but for the entire country, and this can be especially concerning for LIDAC who have historically faced a greater burden of the adverse effects of air, water, and soil pollution.

By implementing innovative operational practices and embracing emerging technologies, the agriculture sector can reduce its greenhouse gas footprint. Practices such as precision farming, cover cropping, and improved livestock management enhance efficiency and mitigate emissions. Additionally, emerging technologies like methane inhibitors and carbon sequestration methods offer promising avenues for further reducing the environmental impact of agriculture in Kansas. Adopting these advancements not only promotes sustainability but also addresses the disproportionate effects of emissions on vulnerable communities.

Biomethane Plant in Kingman County

Agriculture Operational Practices; Clean and Renewable Energy; Sequestration

Construction of a biomethane plant, leveraging the creation of Kansas Sustainable Agriculture District #001, to create a market for cover-crop grass. Cover-crop grasses provide CO_2 sequestration while biomethane production provides a renewable fuel source.

A biomethane plant in this region would create jobs and incentivize cover-crop grass production which would establish multiple carbon sinks in the area resulting in CO_2 sequestration and improved air quality. Additionally, creating a market for cover-crop grass production would incentivize sustainable agriculture and facilitate revenue generation for farmers.

This project has the potential to impact four identified low-income disadvantaged Census Tracts. Portions of Harper and Reno County exceed the CEJST threshold for heart disease, which has been linked to poor air quality[15]. This project estimates reductions of 298,875 metric tons of greenhouse gas emissions and could have a considerable impact on area air quality, resulting in improved health and fewer heart disease risks in low-income disadvantaged residents. Additionally, reductions in greenhouse gases and carbon sequestration results in mitigating negative climate change impacts overall, for communities across Kansas.

Conservation and Land Management Technical Assistance Provided by Kansas Forest Service

Agriculture Operational Practices; Sequestration; Non-CO_2 Emissions Management and/or Control

Technical assistance to landowners regarding a variety of conservation practices.

Conservation practices including, riparian forest buffers alongside streams and rivers, establishment and renovation of windbreaks and shelterbelts throughout Kansas, mitigation of urban forest canopy loss in Kansas communities, and woody fuels reduction projects designed to reduce wildfire risk have significant potential to increase carbon sinks and reduce emissions throughout the state.

This project estimates roughly 15,000 metric tons of greenhouse gas emissions over the grant period, and more should the conservation strategies established remain in place. The Kansas Forest Service will focus on high-risk areas and areas historically underserved. Reducing greenhouse gas emissions in underserved areas across the state of Kansas has the opportunity to impact 241 Census Tracts, approximately 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Climate Smart and Regenerative Agriculture in Douglas County

Agriculture and Operational Practices; Clean and Renewable Energy; Sequestration

Transitioning farmland and agrivoltaic research grant through incentive programs. This project includes one grant program that provides incentives and resources to transition farmland to climate smart and regenerative practices, or other carbon-sequestration assets. And a second

[15] United States Environmental Protection Agency, Air Pollution and Cardiovascular Disease Basics, https://www.epa.gov/air-research/air-pollution-and-cardiovascular-disease-basics

grant program incentivizes agrivoltaic projects that co-locate solar energy generation and agriculture.

> There are no Identified LIDACS in Douglas County where this project is proposed. However, reductions in greenhouse gases and carbon sequestration results in mitigating negative climate change impacts overall, for communities across Kansas.

Clean and Renewable Electricity

Kansas has a historical association with conventional energy sources, particularly coal and natural gas. However, in recent decades, the state has increasingly diversified its energy portfolio to include cleaner alternatives. Wind energy has played a pivotal role in this transition, with Kansas emerging as a leader in wind power generation. The state's vast plains and favorable wind conditions have attracted significant investments in wind farms.

Kansas ranks among the top in the nation for wind power, with wind constituting over 40% of electricity generation in the state[16]. The future of clean and renewable energy in Kansas looks promising for continued growth in wind and solar capacity. Solar power costs continue to improve and energy storage technologies, such as batteries, are anticipated to play a crucial role in enhancing the reliability of renewable energy. The integration of smart grid technologies and advancements in energy storage will contribute to a more resilient and sustainable energy infrastructure.

Low-income communities in Kansas stand to benefit from a transition to clean and renewable energy. The expansion of renewable energy projects leads to job creation, providing employment opportunities within these communities. Additionally, initiatives promoting energy efficiency lower energy bills for residents, alleviating the economic burden on low-income households. The deployment of clean energy technologies in Kansas contributes to environmental improvements, reducing air and water pollution. This, in turn, positively impacts public health, benefiting communities that may be disproportionately affected by environmental hazards.

Efforts to make clean energy accessible and inclusive, coupled with community engagement and education, can empower residents in low-income communities to participate in and benefit from the state's transition to a more sustainable energy future.

Solar Program for Kansans in Low-Income Disadvantaged Communities

Energy Efficiency; Clean and Renewable Electricity

Provide solar photo voltaic systems to single and multi-family households that are low-income and/or reside in disadvantaged communities according to the EPA's CJEST tool.

> The Kansas Housing Resources Corporation (KHRC) submitted an application on October 11, 2023, for the Environmental Protection Agency's (EPA) competitive *Solar for All* grant opportunity. If KHRC receives a *Solar for All* award, the funds will be used

[16] World Economic Forum, "Which US state generates the most wind power? There's a clear winner." https://www.weforum.org/agenda/2022/04/us-wind-electricity-generation-renewable-energy/

to fund a multi-tiered *Solar for All* program that will align with KHRC's ongoing mission of providing Kansans access to safe, affordable housing and the dignity they deserve. The KHRC is looking to accelerate their effort with Climate Pollution Reduction Grant funding.

The program will serve low-income and disadvantaged communities in all Kansas counties. This model is best suited due to the wide geographic expanse and disbursement of low-income and disadvantaged communities throughout Kansas, and the current lack of regulatory framework for community solar. KHRC projects to install 1,225 rooftop photovoltaics (PV) systems on single family households and install 1,527 units through multi-family properties and retrofits. The total projected number of households served via rooftop solar installations is 2,752 units. 2,752 Kansas families in low-income disadvantaged communities will experience energy security, and reduced energy costs, alleviating economic burden.

This project estimates 35,201 metric tons of greenhouse gas emissions over the grant period. Reducing greenhouse gas emissions in underserved areas across the state of Kansas has the potential to impact 241 Census Tracts, approximately 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Solar Initiative for Low-Income Disadvantaged Communities in Kansas City, Kansas

Clean and Renewable Electricity; Energy Efficiency

Grant program administered by Kansas City Board of Public Utilities to provide 5 MW AC solar projects to low-income disadvantaged community households in Kansas City, KS.

Kansas City, KS has one of the lowest per capita incomes, the lowest average life expectancy, and highest minority population in the state. The proposed solar project for low-income and disadvantaged communities in Kansas City, Kansas is estimated to reduce greenhouse gas emissions by 28,390 metric tons over five-years, improving health outcomes and reducing the climate change risks for a historically underinvested in and vulnerable community.

The Kansas City solar project aims to provide resiliency and carbon-free energy generation directly to low-income communities. There are 44 low-income Census Tracts in Wyandotte County, 31 of those are at or above the 90th percentile for energy cost, with 15 tracts above the 95th percentile. The 5 MW community solar project will create an avoided cost of approximately $398,370 annually (based on $35 wholesale price of power), which could increase if energy prices increase. The solar project anticipates directly reimbursing $318,700 of the cost savings to low-income households annually for years to come.

This project will be located within low-income communities and the value of the solar project will go directly back to help reduce the energy burden of those low-income individuals through on-bill credits, providing direct and meaningful improvement in the

lives of the community members in one of the most vulnerable counties in Kansas. Energy bills will be reduced for 1,000 households in the program by 20%. To support equity and benefits to the most vulnerable households the program will be available to renters and homeowners, and there will be income thresholds so that the dollars are spent in the most equitable manner possible.

This project will inherently add job opportunities as the solar is built and operated. This much needed job creation in the Kansas City community will improve job opportunities and household incomes, which is a big benefit to the 11 Census Tracts that are above the 90th percentile for unemployment. This project will also create opportunities to collaborate with local colleges, unions, and other organizations to develop job training and a local workforce.

A Series of Projects in Kansas Focused on Water, Energy, Air, Land, Transportation, and Health

Clean and Renewable Electricity; Energy Efficiency; Agriculture Operational Practices

Multi-pronged program advancing climate resilience and clean energy policies across the state and reducing climate risks to positively impact the Water, Energy, Air, Land, Transportation, and Health (WEALTH) in Kansas.

The Kansas WEALTH partnership is a coalition of twelve (12) nonprofit organizations cooperatively implementing seven (7) projects in Kansas including, Energy Navigator Program, KIFA Energy Navigator in Congregations, Kansas Renewable Siting Collaborative, Prairie Restoration, Urban Regenerative Agriculture, Regenerative Land Management, and Agroforestry Mobilization. Collectively these programs stand to create 4,222,723 metric tons of greenhouse gas emissions, CO_2 equivalent. Reducing greenhouse gas emissions in underserved areas across Kansas can impact 241 Census Tracts, about 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Solar Array in Valley Center, Kansas

Clean and Renewable Energy

Installation of a large solar array and battery storage system to support a new 44,000 square foot recreation and aquatic center.

There are no Identified LIDACS in the immediate project area; however, there are 45 LIDACs in Sedgwick County. Clean energy projects reduce greenhouse gases overall and results in mitigating negative climate change impacts for communities across Kansas.

Solar Retrofit Project for City of Haysville

Clean and Renewable Electricity; Energy Efficiency

Installation of solar panels at city facilities, reducing electrical consumption and associated greenhouse gases.

The Haysville solar project proposes to install solar panels on and around facilities and properties owned by the City of Haysville. The project will improve the renewable energy capabilities of the city resulting in a reduction in greenhouse gases by an anticipated 602 metric tons per year. Improving air quality through greenhouse gas emission reductions will have positive impacts on public health. Haysville has one (1) low-income disadvantaged community Census Tract experiencing low income (73rd percentile), and low life expectancy (92nd percentile) – a reduction in energy demand and associated greenhouse gas reductions stands to improve public health for the members in this community.

Solar Panel Projects for City of Wichita

Clean and Renewable Energy

Develop and install solar projects at City of Wichita buildings.

Installation of solar panels can offer benefits. For example, covering parking lots with solar panels could help shade the vehicle beneath them while also creating energy. It is estimated that 35% of downtown Wichita is dedicated to car parking[17].

Similarly, installing solar on the tops and sides of buildings that go largely unutilized would help shade the actual structure from direct sunlight creating less need to cool the building in warmer months while also producing energy. AC units are a major contributor to greenhouse gases in urban areas, so reducing reliance or need for their service alleviates climate change factors even further.

It is estimated that this solar project will offset the amount of energy produced through coal-burning power plants and would reduce greenhouse gas emissions by 119 metric tons. This, in turn, ensures that Wichitans have cleaner air to breathe and are less likely to experience the negative health effects of air pollution such as heart & lung disease, heart attack, and stroke[18]. LIDAC populations may not have access to the same level of medical services needed to address these health challenges making them more likely to have worse outcomes than those of more privileged areas.

Sustainability Department for the City of Wichita

Clean and Renewable Energy; Electrification; Fuel Efficiency; Low-Carbon Fuels; Non-CO2 Emissions Management and/or Controls; Sequestration; Travel Demand Management; Waste Diversion; Workforce Development

Creation of a Sustainability Office for the City of Wichita that includes a full-time Sustainability Director and support staff and allocates annual project funding to further the development and implementation of the City's Climate Action Plan.

[17] Parking Reform, Map of Wichita, KS
https://parkingreform.org/parking-lot-map/#parking-reform-map=wichita-ks
[18] World Health Organization, Air Quality and Health Impacts
https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-impacts

Greenhouse gas emissions are not quantifiable given the amount and variety of projects that could be implemented in the five-year grant period. However, the project anticipates development of multiple and various greenhouse gas reduction projects, and projects that support improvements for low-income disadvantaged communities.

Currently, the City of Wichita has a part-time coordinator of sustainability. The development and management of planned and projected climate action and sustainability programs requires the creation of an Office of Sustainability. The Office of Sustainability, with a full-time director, will allow the City of Wichita to become a leader in climate resiliency and sustainability practices. A staffed office and director would be empowered to work with low income and disadvantaged communities as decision makers for change. In 2021, the City of Wichita hired a consultant to identify and prioritize over 200 sustainability projects. The resulting roadmap is ready for implementation but requires dedicated staff to oversee a variety of efforts with multiple partners across the City of Wichita organization and Wichita community at large.

Wichita, population 400,000, is in Sedgwick County, population 513,375. There are a total of 124 Census Tracts in Sedgwick County, with forty-five (45) tracts that are considered low-income disadvantaged communities in Wichita alone. Twenty-three (23) of the forty-five (45) Census Tracts are considered historically underdeveloped and twenty-two (22) have energy costs at the 90th percentile or above. Having a director with staff can bring awareness to the issues that these communities are facing as well as provide jobs and workforce development. While not quantifiable, the potential for greater greenhouse gas emission reductions for LIDACs and surrounding communities is endless.

Electrification

Kansas has been making strides in the electrification of its energy sector. Initiatives promoting the use of electric cars, buses, and trucks are gaining momentum, contributing to a shift away from traditional gasoline vehicles. This not only reduces dependence on fossil fuels but also plays a crucial role in lowering emissions and improving air quality across Kansas.

To support the widespread adoption of electric vehicles (EV), Kansas is diligently working to expand its charging infrastructure. The development of a robust network of electric vehicle charging stations is vital for facilitating convenient charging, benefiting residents, businesses, and fleets alike. This infrastructure is a key enabler for the continued growth of electric transportation, and a focus on equitable infrastructure development aims to bridge potential gaps and enhance accessibility for all, irrespective of socio-economic status.

Kansas's approach to electrification extends beyond vehicles. The state, known for its abundant wind resources, is strategically leveraging wind power for clean electricity generation. This integration of renewable energy sources aligns with electrification efforts, contributes to a more sustainable and environmentally friendly energy landscape, and holds potential economic benefits for LIDACs through job creation in the renewable energy sector. The intentional

integration of renewable energy aligns with a commitment to inclusivity and environmental justice.

The electrification wave extends to public transportation, benefiting LIDACs in urban areas. The introduction of electric buses and other electrified modes helps address environmental justice concerns, providing cleaner air and reduced emissions in communities that may be disproportionately affected by pollution. Industries in Kansas are also embracing electrification, aiming to shift processes from traditional fuel sources to electricity. This transition leads to lower emissions and enhances energy efficiency in industrial operations.

Energy storage solutions, such as batteries, play a pivotal role in electrification efforts. These technologies help store excess electricity generated from renewable sources, ensuring a reliable power supply and supporting the integration of clean energy into various sectors.

Modernizing the electric grid is essential for LIDACs, ensuring that the benefits of electrification are distributed equitably. Upgrading the grid infrastructure facilitates efficient transmission and distribution of electricity, supporting the integration of renewable energy sources and accommodating new electrified technologies in underserved communities.

Electrification initiatives have positive implications for low-income communities. Beyond potential reductions in energy costs, these efforts aim to improve air quality and create job opportunities in emerging clean energy sectors.

Electric Vehicle Replacements for City of Hillsboro

Electrification

Electric vehicle and bus replacement in the City of Hillsboro including, two electric trash trucks, six fleet service trucks, one passenger vehicle, four school buses, and four midsize transport vehicles. Project also includes charging infrastructure upgrades to allow for rapid charging at facilities and in the community.

> Transportation is the largest sector for greenhouse gas emissions. Replacing fossil fuel vehicles with electric vehicles (EV) directly reduces carbon emissions. EVs permanently eliminate all the carbon emissions from the fossil fuel vehicles they replace. EVs improve the health of the community by eliminating the harmful pollutants from vehicle emissions that can lead to lung damage, asthma, and smog.
>
> The Hillsboro school district encompasses a low-income disadvantaged community Census Tract. This community is disadvantaged in climate change and energy costs. Transitioning school vehicles to EV reduces the risks of climate change and reduces the health risk for the community.
>
> Another direct benefit of this project is the installation of charging stations available to the public. A 2020 study found that nearly one in four respondents felt that lack of access

to charging stations prevented them from purchasing an EV[19]. Charging infrastructure in Hillsboro has the potential to encourage community members to switch to EV for their personal vehicles, further reducing emissions, improving health, and reducing climate risks. Indirect benefits include education on EVs and on the harmful effects of fossil fuels.

Electric Vehicle Replacements for City of South Hutchinson

Electrification

Electrical vehicle replacement and charging infrastructure.

The City of South Hutchinson is proposing an electric vehicle replacement project for one (1) fire pumper truck, two (2) police cars, and charging infrastructure to support each the fire and police departments. Additionally, the proposed project includes the installation of DC fast charging station at intersection of two major highways.

Fossil fuel vehicles are the leading source of greenhouse gas emissions, and emergency responder vehicles spend significant time on the road or idling. Converting a fire truck and police vehicles to electric will allow the City of South Hutchinson to reduce greenhouse gas emissions and remove toxic pollutants from the air.

This project will provide a South Hutchinson low-income disadvantaged community (LIDAC) Census Tract with new emergency response vehicles, improve ambient air quality, lower risk of heart disease, and increase life expectancy. An additional benefit will be the installation of a charging station for public use. This could encourage members of the community to learn more about EVs and potentially make the switch themselves, further reducing emissions from fossil fuel vehicles and amplifying the health and climate risk reduction benefits.

Electric Vehicle Charging Stations for City of Wichita

Electrification

Installation of electric vehicle charging stations at City of Wichita owned facilities, such as libraries, cultural centers, and recreation centers.

Switching from fossil fuel vehicles to electric vehicles is essential to reducing greenhouse gas emissions, as transportation is the leading producer of greenhouse gases. Electric vehicle (EV) charging infrastructure is necessary for residents to feel confident making the switch. Installing charging stations in public spaces like libraries, cultural centers, and recreation centers will provide the community with more opportunities to charge EVs and encourage more people to make the switch to EV.

Sedgwick County, where Wichita is located, includes forty-five (45) low-income disadvantaged communities Census Tracts. Installing EV charging stations in low-income

[19] Consumer Reports, Survey Shows Strong Interest in Electric Cars
https://www.consumerreports.org/cars/hybrids-evs/cr-survey-shows-strong-interest-in-evs-a1481807376/

areas has the potential to increase EV adoption and decrease air pollution caused by fossil fuel vehicles.

The City of Wichita plans to add EVs to their City fleet, further decreasing emissions from vehicles. These measures will help low-income communities in Wichita reduce risks associated with pollution from vehicle emissions such as asthma (12 Census Tracts above 90th percentile), heart disease (6 Census Tracts above 90th percentile), climate change (1 Census Tract above 90th percentile), and low life expectancy (12 Census Tract above 90th percentile). Twenty-four (24) of Wichita's forty-five (45) low-income disadvantaged communities Census Tracts experience historic underinvestment. By investing in charging stations in these areas, historically overlooked communities have the potential to see an increase in business, revenue, and property value.

Electric and Alternative Fuel Vehicle and Infrastructure Support from the Kansas Department of Transportation

Electrification; Low-Carbon Fuels

A pass-through grant program to help communities make the switch to electric and alternative fuel vehicles.

Many individual communities struggle to meet federal minimums for projects that support the purchase of electric and alternative fuel vehicles, installation of electric vehicle charging stations, and alternative fuel infrastructure. The Kansas Department of Transportation is proposing using Climate Pollution Reduction Grant funds to develop a pass-through program whereby communities could access funding for smaller projects.

This project will reduce transportation emissions by assisting communities with electric and alternative fuel vehicle purchases and supporting infrastructure – emission reductions will range from 13% for alternative fuel vehicles all the way to 100% reductions in cases where electric vehicles are adopted.

Reducing greenhouse gas emissions statewide has the potential to impact 241 Census Tracts, approximately 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Education and Outreach

Education and outreach play a crucial role in driving awareness, understanding, engagement, and behavior change on topics like clean energy, environmental sustainability, and social equity. By providing information and resources, outreach and education programs empower individuals and communities to make informed decisions and take actions that support emission reduction that contribute to a more resilient, healthy, and equitable society.

Empowerment is particularly impactful in the context of clean energy, enabling communities to collectively participate in sustainable practices and advocate for positive change. Outreach campaigns also lead to behavioral change. When individuals understand the environmental and

social impacts of their actions, they are more likely to adopt sustainable practices, such as energy conservation and responsible waste management. Additionally, informed communities are more likely to support policies that promote clean energy, environmental protection, environmental justice, and social equity. Education helps individuals understand the implications of policy decisions and raises awareness of the disproportionate impacts of environmental issues on marginalized communities, leading to advocacy for fair and equitable environmental policies.

Sustainability Education and Outreach Programs in Wichita, Kansas

Education and Outreach; Agriculture Operational Practices; Clean and Renewable Electricity; Sequestration

Education and community outreach program focusing on agriculture, community gardens, sustainability practices, and emission reduction initiatives.

> ICT Tree Huggers is a nonprofit organization that seeks to reduce greenhouse gas emissions by providing communities with the knowledge and skills to do so. ICT Tree Huggers will develop and conduct educational community workshops focused on sustainable urban agriculture practices and cover topics like organic farming, water conservation, renewable energy, and waste management. ICT Tree Huggers will also develop, promote, and conduct an agriculture-based summer reading program.
>
> Additionally, community gardens and partnerships with local businesses and organizations will help to implement emission reduction initiatives for households and businesses. With well-maintained community gardens in disadvantaged low-income communities, community members would have access to fresh produce which would reduce their reliance on imported and/or unhealthy food and lower carbon emissions from transporting food and transportation by community members to acquire food. In tandem with increasing access to healthy foods, partnerships can build systems to reduce food loss at the gardens and ensure that all food produced is getting to people for consumption. Furthermore, coalitions for composting remaining organics (e.g., stems, rotted produce, etc.) can help develop a circular urban agricultural economy within food insecure, highly vulnerable neighborhoods within Wichita.
>
> While Kansas is considered a rural-focused state, the City of Wichita is urban, with several South-central Census Tracts disadvantaged in energy, health, and housing.

Energy Efficiency

Kansas continues to explore energy efficiency initiatives, promoting measures to reduce overall energy consumption and increase the efficiency of buildings and infrastructure. Energy efficiency programs encourage the adoption of technologies in homes, businesses, and public facilities. Initiatives like building retrofits, appliance upgrades, and sustainable practice programs and incentives curtail overall energy consumption this reducing greenhouse gas emissions.

Energy efficiency aligns with many communities' environmental sustainability objectives, but energy efficiency also carries significant social and economic benefits for LIDACs. By

implementing energy-efficient technologies and practices, communities stand to experience reduced energy costs, alleviating the burden on household budgets. Moreover, improved energy efficiency contributes to enhanced indoor comfort and a healthier living environment - as energy efficiency reduces the reliance on traditional energy sources, it mitigates air pollution and lowers exposure to harmful pollutants, positively impacting respiratory health.

LIDACs often face disproportionate impacts from environmental challenges, and therefore prioritizing energy efficiency measures becomes an equitable and inclusive approach toward fostering resilience, economic empowerment, and environmental justice within these communities.

Building Efficiency Projects for City of Hillsboro

Energy Efficiency; Clean and Renewable Electricity

Installation of solar panels and battery storage systems at City of Hillsboro public facilities including the water treatment plant, wastewater treatment lagoons and lift stations, City Hall, public library, fire station, public works facility, and multiple recreation facilities.

> There are no Identified LIDACS in the immediate area of the project, however there are dozens of LIDACs in the Greater Kansas City area. Energy efficiency projects reduce greenhouse gases overall and results in mitigating negative climate change impacts for communities across Kansas.

Public Facility Energy Audits for City of Wichita

Energy Efficiency

Perform energy audits on historically high energy use facilities and carryout associated retrofits for energy efficiency improvements.

> Energy efficiency reduces energy demand and therefore reduces greenhouse gas emissions. Wichita is the largest metropolitan area in Kansas and the City of Wichita maintains over 100 buildings and assets including, recreation facilities, museums, libraries, city hall, utility plants, and more. Some of the assets are upwards of 80 years old and do not include energy efficiency features such as motion-activated lights, low-emissivity windows, smart building technologies, or even sealing of gaps and cracks.
>
> Energy audits will identify where inefficiencies exist across assets and identify a path for implementing energy-efficiency technologies. Energy efficiency strategies reduce greenhouse gas emissions and ultimately environmental impact.
>
> There are currently forty-five (45) low-income disadvantaged Census Tracts in Wichita. Twenty-three (23) of the forty-five (45) Census Tracts are considered historically underdeveloped and twenty-two (22) have energy costs at the 90th percentile or above. All forty-five are at an increased risk due to climate change. Updating public facilities in historically underdeveloped areas could help increase property values and reducing

greenhouse gas emissions due to energy demand will stave-off the effects of climate change in all low-income areas and across Kansas.

LEED Platinum Status at Two Public Facilities in the City of Prairie Village

Energy Efficiency

Construction and renovation of City Hall and Central Justice Center, respectively, that will achieve LEED Platinum status. Greenhouse gas reduction through energy efficiency to meet community's 2030 and 2050 greenhouse gas emission goals.

There are no Identified LIDACS in the immediate area of the project, however there are dozens of LIDACs in the Greater Kansas City area. Energy efficiency projects reduce greenhouse gases overall and results in mitigating negative climate change impacts for communities across Kansas.

Fuel Efficiency and Low Carbon Fuels

In Kansas, efforts to enhance fuel efficiency and promote the use of low-carbon fuels are gaining prominence as part of broader initiatives to expand Kansas economy and reduce energy dependence. This includes promoting the adoption of electric vehicles (EVs), investing in charging infrastructure, and promoting the use of low-carbon fuels, particularly Compressed Natural Gas (CNG).

CNG is often considered a transition fuel because it is a lower carbon fuel compared to traditional fossil fuels like gasoline and diesel, it is however not carbon neutral. While CNG is not entirely carbon-neutral, it produces fewer greenhouse gas emissions during combustion and therefore is a great interim step for communities unable to adopt electric vehicle infrastructure. In addition, many Kansas communities have developed plans for a closed loop energy system whereby they create their own CNG as a byproduct of an industrial operational process and then use the produced energy to fuel vehicles, heat buildings and more.

Through these efforts, Kansas aims to contribute to the reduction of greenhouse gas emissions, improve air quality, and support the transition to a more sustainable and resilient transportation sector, all of which will have positive impacts on low-income communities. Furthermore, these measures align with broader environmental and environmental justice goals and have the potential to positively impact public health, reduce dependence on fossil fuels, and create economic opportunities within the state.

Heavy Equipment Upgrades for Finney County

Fuel Efficiency; Low-Carbon Fuels; Electrification

Heavy equipment upgrades to lower-emission alternatives and electric and hybrid vehicle replacement for passenger vehicles. Project includes associated charging infrastructure for municipal and public use.

Older vehicles and heavy equipment produce more greenhouse gas emissions than newer more fuel-efficient vehicles. Finney county will replace an aging public works fleet with

newer, more fuel-efficient heavy equipment/vehicles. The County will also replace department vehicles with EV or hybrid vehicles and install charging station for county and public use. By changing out older, less fuel-efficient vehicles/equipment, the county will reduce the cost of fueling for those vehicles and therefore could reduce the cost of providing services for their low-income communities reducing their tax burden. Additionally, by switching to EV or more fuel-efficient vehicles the amount of harmful air pollutants is reduced improving air quality and health for the community, especially LIDACs who often bear the burden of negative environmental health impacts.

Compressible Natural Gas Facility in Reno County

Fuel Efficiency; Low-Carbon Fuels

Reno County plans to build Renewable Natural Gas (RNG) Facility and this project proposed to pipe the RNG facility to a new compressible natural gas facility (CNG). The CNG facility will be used to power fleet vehicles for the landfill, public works department, and potentially other County departments in the future.

Reno County Landfill has submitted a project-group that contains four elements meant to improve overall function and reduce greenhouse gas emissions at the existing landfill. This compressible natural gas facility component is the third phase of the multi-phase project and will upgrade a renewable natural gas facility to feed into this CNG facility to be used to power Fleet Vehicles for the Landfill, Public Works Department, and/or other County Departments and reduce the greenhouse gas emissions from the current vehicles.

Each part of this proposed project has the potential to reduce greenhouse gas emissions with each phase stacking and accelerating anticipated reductions and associated benefits. Reno County Landfill anticipates reductions of at least 45,360 metric tons per year if all phases are completed and deployed.

There are multiple low-income and disadvantaged communities in Reno County and community members are at greater risk for asthma, heart disease, and low-life expectancy. Reducing greenhouse gas emissions, toxic air pollutants, and particulate matter will have a direct impact on low-income disadvantaged communities in the region.

Green Space, Carbon Sinks, and Sequestration.

Green spaces, encompassing parks, nature reserves, and wildlife habitats, are instrumental in biodiversity conservation, providing essential ecosystem services like pollination, water filtration, and habitat for native flora and fauna.

Beyond ecological benefits, parks and recreational green spaces become hubs for outdoor activities, exercise, and community engagement, contributing to both physical and mental well-being. The presence of trees and vegetation not only enhances air quality by absorbing pollutants but also acts as natural filters, mitigating soil erosion and improving water quality. These green spaces serve as focal points for community interaction and cohesion, fostering a sense of shared identity among residents. Their aesthetic appeal enhances the cultural identity of communities,

acting as venues for cultural events and celebrations. Integrating green spaces into urban planning is crucial for creating sustainable and resilient cities, mitigating urbanization impacts, and enhancing overall livability.

Green spaces also contribute to climate resilience by providing shade, reducing the urban heat island effect, and supporting natural cooling processes, which is particularly crucial in mitigating extreme temperatures in urban areas. These spaces can serve as educational opportunities for environmental learning and awareness. Lastly, green spaces positively influence property values, attract businesses, and stimulate local economies, making neighborhoods more desirable and fostering economic development.

Ensuring equitable access to green spaces promotes environmental justice, guaranteeing that all residents have equal opportunities to enjoy the health and well-being benefits derived from nature's positive impact.

Carbon sinks are natural or artificial reservoirs that absorb and store carbon dioxide (CO_2) from the atmosphere, helping to mitigate the effects of climate change. These sinks play a crucial role in the global carbon cycle by acting as storage mechanisms for carbon, preventing it from accumulating in the atmosphere as CO_2 and contributing to the greenhouse effect. Carbon sinks can be classified into two main types: natural and artificial. In Kansas, common natural carbon sinks are trees and forests, prairie, and grasslands.

Both Green Space and Carbon Sinks are forms of biological CO_2 sequestration – using plants and trees to capture and store CO_2 through photosynthesis to help offset emissions. CO_2 sequestration plays a role addressing climate change by reducing the amount of CO_2 released into the atmosphere, but it is only a tool and not a replacement for reducing overall greenhouse gas emissions.

Increased Tree Cover Initiative in Wichita, Kansas

Green Space; Sequestration

Tree planting on public and private land to reduce heat island and expand carbon sequestration.

> Tree planting across the City of Wichita will reduce the urban heat island effect improving health burdens; improve energy efficiency due to a reduction in need for indoor climate control; improve ambient air quality for respiratory health benefits; and increase carbon sequestration that will reduce climate change impacts. Wichita has experienced a reduction in tree canopy over the past five years due to die-off and development. A 2022 NASA DEVELOP study[20] found that there are 17 high risk Census Tracts that experience highest average temperatures and experience low CDC Socially Vulnerability Index scores. Increased tree canopy will reduce the heat island and energy burden currently experienced by community members in these 17 tracts along with those

[20] NASA DEVELOP, Environmental Justice and Climate Change in Wichita, KS https://ntrs.nasa.gov/api/citations/20220013018/downloads/Environmental%20Justice%20%26%20Climate%20Change%20in%20Wichita%2C%20Kansas.pdf

in the other 25 Census Tracts that are identified as disadvantaged by the CEJST. Of Wichita's 45 low-income Census Tracts, 24 are above the 90th percentile for energy cost burden and 24 have had historic underinvestment and would experience significant benefits from additional tree canopy. And all Wichitans in all Census Tracts will experience reduced climate change risks as a result of the carbon sequestration and reduction in CO2 emissions due to energy efficiency. It is anticipated that for every $73 spent on this project one metric ton of CO_2 will be mitigated.

Industrial Process Efficiency

Industrial process efficiency has significant impacts on the environment and public health, influencing factors such as air and water quality, resource consumption, and the release of pollutants.

Inefficient industrial processes often result in higher emissions of air pollutants, including particulate matter, sulfur dioxide (SO2), nitrogen oxides (NOx), and volatile organic compounds (VOCs). These pollutants contribute to respiratory issues, cardiovascular diseases, and overall degradation of air quality in surrounding areas. Industrial facilities are often disproportionately located in low-income communities that face health and economic disparities, increased vulnerability to disasters, limited access to green spaces, and poor quality of life due to noise, odors, and other nuisances. Communities near industrial facilities can experience a range of health impacts, including respiratory diseases, cardiovascular issues, and a higher prevalence of certain health conditions.

Energy-intensive industrial processes are major contributors to greenhouse gas emissions. Inefficient use of energy sources, particularly fossil fuels, leads to higher carbon dioxide (CO2) emissions, contributing to climate change and its associated impacts on public health which also cares a disproportionate burden on low-income communities.

Additionally, inefficient processes often lead to higher resource consumption, including raw materials and energy. This contributes to resource depletion, deforestation, and habitat destruction, impacting ecosystems and biodiversity. Similarly, inefficiencies tend to generate more waste, including hazardous waste, which can pose risks to both the environment and human health. Poorly managed waste disposal can lead to soil contamination and water pollution, affecting local communities.

Lastly, inefficient processes may also impact the health and safety of workers. Poorly designed or outdated equipment, inadequate safety measures, and exposure to harmful substances can lead to occupational illnesses, injuries, and long-term health effects among industrial workers.

Efforts to improve industrial process efficiency, such as adopting cleaner technologies, enhancing energy efficiency, and implementing sustainable practices, can mitigate these negative impacts. Sustainable industrial practices contribute to a healthier environment, reduced pollution, and improved public health outcomes.

Hydrogen Production and Hydrogen Boiler Demonstration Facility in Parsons, Kansas

Industrial Process Efficiency

Construction of a Hydrogen Production and Hydrogen Boiler Demonstration Facility.

> The goal of this project is to showcase Hydrogen Technologies' innovative Dynamic Combustion Chamber™ (DCC™) system, emphasizing zero-emission and high-efficiency capabilities. The goal of this demonstration facility is to encourage all current boiler owners in the state of Kansas to adopt a hydrogen boiler alternative.
>
> This project estimates a reduction of 9.4 million tons of CO_2 boilers continue to be swapped over the five-year grant period. Emission reductions of this magnitude will have state-wide impact. Reducing greenhouse gas emissions statewide has the potential to impact 241 Census Tracts, approximately 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Training and Technical and Financial Assistance for Industry Provided by Kansas State University Extension

Industrial Process Efficiency

Training and workshops at regular intervals including, greenhouse gas emission inventory and reduction, how to utilize published inventory tools, auditing equipment, and more. Technical and financial assistance for energy efficiency, pollution prevention, and sustainable materials management project assessment and implementation.

> Greenhouse gas emissions due to training and technical assistance are not quantifiable however Kansas State Engineering Extension has a history of providing this type of industrial process improvement training with over 200 case studies available for review on their website – each with quantifiable outcomes due to process improvements. Training and assistance will be dispersed across all 105 Kansas counties, with special attention to the sixty-two (62) counties that make up the 241 low-income disadvantaged communities Census Tracts.
>
> Reducing greenhouse gas emissions statewide has the potential to impact 241 Census Tracts, approximately 738,083 residents. Greenhouse gas emission reductions will improve public health, mitigate climate risks, and improve low-income disadvantaged communities.

Food-grade Research Facility at Kansas State University

Industrial Process Efficiency

Food-grade research and teaching activities include a milling lab, baking lab, sensory lab, and test kitchen that will facilitate the development of new products and the optimization of food manufacturing techniques. Optimizations include, enhancing the efficiency of the HVAC system

for both the new construction and existing structures and incorporating solar technology to offset energy needs in new spaces.

Kansas State Engineering Extension (EEX) proposes applying CPRG grant funds for a three-fold strategic plan that allows the University to make profound advancements in the development of new food related products and optimization of food manufacturing techniques. Energy is wasted in the food production of certain snacks. Through the research and teaching activities, EEX can develop best practices for food production industries within the state of Kansas and perhaps on a national level. This process will be based at the campus of Kansas State in which laboratories and pilot plant will coexist. With the construction of the Global Center for Grain and Food Innovation (GCGFI), the university is implementing strategic measures to collectively contribute to the overarching goal of minimizing environmental impact and promoting sustainable practices. The GCGFI serves as an example of innovation and a catalyst for positive change in the realm of agricultural research and education, and the facility itself will be a model and benchmark for sustainable best practices that will impact campuses for years to come.

The first strategy focuses on heat recovery chiller systems for the complex (281,594 GSF), enhancing the efficiency of the HVAC system for both the new building and existing structures. One option is to add a smaller HR chiller sized for simultaneous heating and cooling load for the complex. The emission reduction is estimated to be 210 metric tons CO2e per year, accompanied by an additional upfront cost of $1.3 million. Another option is to add a larger ground-couple HR chiller sized for the expected full heating load of the complex. The emission reduction for this enhanced option is estimated to be 1,203 metric tons CO2e per year, with an additional upfront cost of $5.94 million.

The second strategy is to incorporate solar technology to offset energy needs in the new spaces. A photovoltaic system would produce an emission reduction of approximately 285 metric tons CO2e per year and add $1.4 million to the project.

The third strategy involves designing the building envelope to improve overall performance and reduce energy loss. Upgrading the wall insulation and fenestration assembly would result in a reduction of 39 metric tons CO2e per year, adding $500k to the initial expenses.

This project has the potential to impact all 241 LIDACs across the state, resulting in better health, workforce development, and greenhouse gas emission reductions associated with agricultural production. However, all 770 Census Tracts could benefit from the research and development of best practices as they are discovered in the lab and plant.

Emissions Management and/or Control and Emission Control Technologies

Emissions are a byproduct of industry, transportation, agriculture, residential and commercial buildings, waste management, oil and gas extraction, and energy consumption. Emissions also occur naturally from wildfires and volcanic activity. When emissions occur, harmful pollutants

are released into the atmosphere such as particulate matter, nitrogen oxides (NOx), sulfur dioxide (SO2), volatile organic compounds (VOCs), and other hazardous substances.

Emission control technologies help reduce the release of harmful pollutants into the atmosphere. This contributes to improved air quality and protecting public health. Reduced exposure to harmful pollutants helps prevent respiratory diseases, cardiovascular issues, and other health problems associated with poor air quality such as diabetes. Many emission control technologies, particularly those in the energy sector, focus on improving overall energy efficiency. This not only reduces pollutant emissions but also conserves energy resources, promoting sustainability and lowering the environmental footprint of energy production. Certain emission control technologies, particularly those addressing greenhouse gas emissions, play a role in mitigating climate change. By limiting the release of carbon dioxide (CO2) and other greenhouse gases, these technologies contribute to global efforts to reduce the impacts of climate change.

Emission control technologies help industries and vehicles comply with environmental regulations and standards set by authorities. Adherence to these regulations ensures that businesses operate within acceptable environmental limits, promoting sustainable and responsible practices. Improved air quality resulting from emission control technologies enhances the well-being of communities located near industrial facilities or high-traffic areas. Communities benefit from reduced exposure to pollutants, leading to a healthier and more livable environment.

In summary, emission control technologies are essential tools for creating a cleaner, healthier, and more sustainable environment. Their implementation is crucial for addressing air quality concerns, protecting public health, and promoting responsible industrial practices worldwide.

Procurement of a Woodchipper in Seward County

Non-CO_2 Emissions Management and/or Control

Procurement of a woodchipper to divert wood and brush from onsite burn operations into the product of cover material for the landfill.

> Diverting wood and brush from onsite burn operations to produce cover material for the landfill will simultaneously reduce onsite emissions, toxic air pollution, and particulate matter (PM10 and PM2.5) that would be created through the burn process, while producing material that can be used for natural run-off and erosion mitigation.
>
> Seward County includes three low-income disadvantaged community Census Tracts. These communities have a projected wildfire risk of 93rd, 96th, and 90th percentiles. These communities are also at risk for agriculture loss, likely associated with wildfire risk. Reducing burn operations at the landfill will mitigate risk of wildfires. Additionally, a reduction of burning brush will improve air quality and improve public health.

Gas Collection and Control System for Reno County

Non-CO2 Emissions Management and/or Control

Improvements to the gas collection and control system (GCCS) listed below will increase gas collection, which will reduce fugitive methane emissions from the landfill. The additional methane collected will be flared, which converts the methane to carbon dioxide, a less potent greenhouse gas.

> Reno County Landfill has submitted a project-group that contains four elements meant to improve overall function and reduce greenhouse gas emissions at the existing landfill. The first phase of the project includes improvements to the gas collection system. Improvements to the system could reduce the total fugitive gas release by an estimated 10,000 metric tons of CO_2 equivalent annually.
>
> There are multiple low-income and disadvantaged communities in Reno County and community members are at greater risk for asthma, heart disease, and low-life expectancy. Reducing greenhouse gas emissions, toxic air pollutants, and particulate matter will have a direct impact on low-income disadvantaged communities in the region.

Renewable Natural Gas Facility in Reno County

Non-CO2 Emissions Management and/or Control; Fuel Efficiency

Planning, design, construction, and permitting of a Renewable Natural Gas (RNG) Facility. An RNG Facility would allow the landfill to convert landfill gas to pipeline quality RNG.

> Reno County Landfill has submitted a project-group that contains four elements meant to improve overall function and reduce greenhouse gas emissions at the existing landfill. The second phase of this project is the design and construction of a Renewable Natural Gas Facility (RNG). This facility would replace a 2,200 square feet per cubic meter flare and reduce greenhouse gas emissions. RNG gas would instead be injected into a pipeline.
>
> Each part of this proposed project has the potential to reduce greenhouse gas emissions with each phase stacking and accelerating anticipated reductions and associated benefits. Reno County Landfill anticipates reductions of at least 45,360 metric tons per year if all phases are completed and deployed.
>
> There are multiple low-income and disadvantaged communities in Reno County and community members are at greater risk for asthma, heart disease, and low-life expectancy. Reducing greenhouse gas emissions, toxic air pollutants, and particulate matter will have a direct impact on low-income disadvantaged communities in the region.

Procurement of a Woodchipper in Reno County

Non-CO2 Emissions Management and/or Control; Industrial Process Efficiency

Procurement of an industrial woodchipper to divert brush from onsite burn operations into the production of cover material for the landfill.

> Reno County Landfill has submitted a project-group that contains four elements meant to improve overall function and reduce greenhouse gas emissions at the existing landfill. The fourth and final project component is the purchase of a woodchipper to diver brush from onsite burn operations into the production of cover material for the landfill. Diverting wood and brush from onsite burn operations will simultaneously reduce onsite emissions, toxic air pollution, and particulate matter (PM10 and PM2.5) that would be created through the burn process, while producing material that can be used for natural run-off and erosion mitigation.
>
> There are multiple low-income and disadvantaged communities in Reno County and community members are at greater risk for asthma, heart disease, and low-life expectancy. Reducing greenhouse gas emissions, toxic air pollutants, and particulate matter will have a direct impact on low-income disadvantaged communities in the region. A 2016 study[21] found that long-term exposure to $PM_{2.5}$ are associated with increased cardiovascular risk. A reduction of air toxic pollutants and particulate matter (PM2.5 and PM10) will improve air quality and public health in Reno County.

Landfill Gas Collection and Control System for City of Salina

Non-CO_2 Emissions Management and/or Controls; Emission Control Technology

Design and install a landfill gas collection and control system (GCCS) to reduce fugitive methane emissions and volatile organic compounds from the City of Salina's Municipal Solid Waste Landfill.

> This initiative aims to capture fugitive methane and reduce the emission of organic gases produced at the landfill, including methane and VOCs, by implementing and operating a capture system within the existing landfill waste infrastructure. The project is poised to bring about positive changes in two distinct low-income disadvantaged communities. Notably, one of these communities ranks in the 90th percentile for asthma prevalence, while both communities exhibit life expectancies in the 94th and 95th percentiles.
>
> Anticipated outcomes of the project encompass the reduction and collection of an estimated 51,437 to 65,839 metric tons per year of gases that would otherwise be released into the atmosphere, contributing to persistent environmental harm. Additionally, the initiative aims to address ongoing health concerns faced by residents in the area.

[21] *The Lancet*, Association between air pollution and coronary artery calcification within six metropolitan areas in the U.S.
https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00378-0/fulltext

Travel Demand Management

Travel Demand Management (TDM) strategies and policies influence travel behavior to optimize the use of transportation infrastructure, reduce traffic congestion, and promote more sustainable and efficient modes of transportation. The primary goal of TDM is to manage and modify travel patterns to enhance mobility while minimizing negative impacts on the environment, economy, and overall transportation system. Public transportation, carpooling/ridesharing, flexible work schedules, active transportation, parking management, information technology systems, and traffic forecasting are just some of the ways a community can manage traffic demand. Any combination of these measures could reduce traffic congestion, lower emissions, and improve the overall quality of transportation services.

For low-income disadvantaged communities (LIDACs), transportation systems and services influence several aspects of day-to-day life. Historical patterns of urban development may result in transportation infrastructure that disproportionately affects low-income neighborhoods. Highways or major roadways, for example, may divide communities and limit residents' access to amenities. The quality and reliability of public transportation services can vary, with some low-income communities experiencing inadequate or infrequent service. This can result in transportation deserts, where residents have limited access to viable transit options. Limited transportation options can restrict access to job opportunities, education, healthcare, groceries, and other essential services. Low-income individuals may face challenges in reaching employment centers or educational institutions, potentially limiting their socioeconomic mobility. Transportation costs, including public transit fares or private vehicle expenses, can be a significant financial burden for low-income households.

Separately but related, low-income communities often bear a disproportionate burden of the environmental impacts associated with transportation, such as air pollution and noise. Proximity to highways or industrial areas can expose residents to health risks, contributing to environmental injustice.

Addressing these issues across current transportation systems involves improving public transit options, ensuring affordability, and incorporating community input into transportation planning processes to create equitable and accessible transportation systems.

Increased Trail and Sidewalk Network for City of Hillsboro and Marion County

Travel Demand Management

Increase trails and sidewalk network to facilitate pedestrian transportation, includes connectivity to nearby Marion County to increase accessibility.

> The City of Hillsboro is proposing an expansion to their existing trails and sidewalk network to facilitate pedestrian transport and reduce vehicle miles traveled. This expansion includes extending a trail system between Hillsboro and the Marion Reservoir recreational area. It is anticipated that this project could generate 4,000 metric tons of greenhouse gas emissions.

This project has the potential to positively impact a low-income disadvantaged community in Marion County. The low-income disadvantaged community Census Tract in Marion County is experiencing energy cost burdens (96th percentile), as well as climate change (90th percentile). Vehicle miles are a significant contributor to greenhouse gas emissions and reducing vehicle miles can have a meaningful impact on climate change, alleviating the climate change burden on Marion County residents and community members across Kansas.

Pedestrian Bridge in Goddard, Kansas

Travel Demand Management

Construction of a bicycle/pedestrian bridge to serve as a connecting link in the city's active transportation network by crossing a major highway barrier dividing the community.

There are no Identified LIDACS in Goddard, Kansas where this project is being proposed. However, reductions in vehicle miles traveled and time spent idling significantly impacts greenhouse gases and results in mitigating negative climate change impacts overall, for communities across Kansas.

Redbud Trail Expansion and Completion in Wichita, Kansas

Travel Demand Management; Fuel Efficiency

Complete and improve the Redbud trail through the addition of pedestrian overpasses to increase safety and reduce traffic congestion at three busy intersections.

This project proposes an expansion of the existing Redbud trail project. With this expansion the Redbud Trail will be complete. This expansion includes the addition of pedestrian overpasses for increased safety and reduced traffic congestion at three busy intersections. The overpasses will help increase safety and ease of movement by non-vehicular travelers and reduce congestion and idling at those intersections. This project estimates 5,160 metric tons of greenhouse gas emissions as a result of reduced congestion and idling at the identified intersections.

There are currently forty-five (45) low-income disadvantaged Census Tracts in Wichita. All forty-five are at an increased risk of climate change effects. Reducing idling at three major intersections has the potential to reduce greenhouse gas emissions and mitigate climate change. Additionally, these efforts will improve air quality for patrons on the Redbud Trail and improve public health.

Transportation System for Barber County

Travel Demand Management

Development of alternative transportation system that includes accessible paths for the city's 300 registered golf carts. Paths will connect residential areas with physical activity opportunities, healthy food, Intertribal Grounds trails, family spaces, museums, cultural assets, schools, and business district.

Currently, a low-income disadvantaged community in Northern Barber County, which contains Medicine Lodge, has a markedly high amount of golf cart and ATV use for transportation proposes, owing in part to the demographic distribution that is twenty percent (20%) sixty-five (65) years of age and older. This project seeks to improve the infrastructure and travel routes that are available to golf cart and ATV users.

This project aims to reduce vehicle related emissions by expanding the transportation system for golf carts and ATV users – connecting residential areas to essential services. While the quantifiable benefits of transportation infrastructure specifically oriented around golf carts and ATVs has not been extensively studied, it is widely accepted that any supplemental multimodal transportation infrastructure that allows for lower-impact transport (such as public transportation, bikes, or pedestrian) can have varying but typically significant positive impacts to an area's vehicle-related emissions. In many cases, transportation emissions are the leading source of urban pollution[22], so any improvement of strategic transportation planning and allowance for alternative transportation methods will contribute to a general lowering of the emissions, as well as positively contribute to public safety.

Connector Road for Douglas County

Travel Demand Management

Construction of north-south connector road for large service area in southwest Douglas County.

Emission reduction measured in reduced vehicle miles traveled - anticipate a reduction in 1.6 million vehicle miles driven per year. There are no Identified LIDACS in the immediate area of the project, however there are dozens of low-income disadvantaged communities in the Greater Kansas City area. Energy efficiency projects reduce greenhouse gases overall and results in mitigating negative climate change impacts for communities across Kansas.

Waste Diversion

Waste diversion strategies including, source reduction, recycling programs, composting programs, waste-to-energy (WTE) facilities, pay-as-you-throw programs, construction and demolition (C&D) waste recycling, banning single-use plastics, educational campaigns, smart waste management technologies, green procurement policies, and community engagement are designed to reduce the amount of waste sent to landfills. These strategies aim to minimize environmental impact, conserve resources, and contribute to a more circular and sustainable economy.

Waste in landfills produces methane, a potent greenhouse gas that contributes to climate change. When waste is mitigated the associated greenhouse gas emissions can be mitigated. This is especially important for low-income disadvantaged communities (LIDACs) as these

[22] *Atmospheric Chemistry and Physics*, Impact of urbanization on air quality and the related health risks in a city with complex terrain
https://doi.org/10.5194/acp-23-771-2023

communities are more commonly disproportionally impacted by the effects of climate change. Brush waste at landfills is typically burned, releasing air pollutants and particulate matter into the air, and impacting health. Asthma, heart disease, and lung cancer are all linked to particulate matter exposure and vulnerable populations including, children, pregnant women, and the elderly are all at an elevated risk.

Commercial Composting for Kansas City, Kansas

Waste Diversion

Large-scale composting facility in Overland Park, Kansas.

> This project proposes is proposing a new commercial composting infrastructure in Overland Park. KC Can Compost will provide a critical soil amendment necessary for the successful implementation of regional green infrastructure and agricultural goals, such as contributing to the development of regenerative agriculture, increasing the tree canopy, creating a green corridor, and mitigating heat islands.
>
> KC Can Compost plans to utilize advanced composting technologies. Specifically, a Covered Aerated Static Pile (CASP) method. CASP provides one of the most effective solutions for mitigating odor and air quality and stormwater concerns in addition to reducing methane production. It is a mobile system that is fully contained and easily scalable. This system is a low-power solution that is operated efficiently and effectively with 100% solar energy, lowering carbon emissions for the project. This project will more than double the Northeast Kansas region's current capacity to capture and process organic waste, thereby decreasing GHG emissions and contributing significantly to regional climate action goal attainment.
>
> As the demands for food waste collection and high-quality compost continue to rise, so too does the need for job creation. This new compost processing facility will create jobs that provide living-wage opportunities to individuals who are often excluded from the labor market due to criminal records, lack of stable housing, and educational deficits. Additionally, KC Can Compost's bylaws require that a percentage of the board of directors be representative of the disadvantaged communities which includes low-income, immigrants, formerly incarcerated, houseless, or chronically un or underemployed - ensuring initiatives and growth are being driven by individuals with direct knowledge and experience from within a specific community.
>
> The direct results of this project will decrease GHG emissions, decreased landfill use, increase high-quality compost production, and support job training and creation for vulnerable populations.

Weatherization

Weatherization in Kansas is crucial for a variety of reasons, focusing on enhancing energy efficiency, reducing costs, and improving overall well-being. Measures such as adding insulation, sealing air leaks, and upgrading windows and doors significantly contribute to

improved energy efficiency in homes and buildings. This not only results in reduced energy consumption but also leads to lower utility bills for residents, offering positive impacts on household budgets, particularly for low-income families.

The benefits of weatherization extend beyond economic considerations. Increased energy efficiency plays a vital role in mitigating the environmental impact of energy consumption, aligning with Kansas' sustainability and environmental goals. This becomes especially relevant given the state's diverse weather conditions, including extreme cold and heat. Weatherization measures help homes and buildings withstand these conditions, contributing to resilience and reducing vulnerability during extreme weather events.

Moreover, the comfort improvements brought about by proper insulation and sealing of air leaks enhance the indoor environment. Resident’s experience improved thermal comfort with fewer drafts and temperature fluctuations. These weatherization measures also contribute to better indoor air quality by sealing gaps and addressing insulation issues, reducing the likelihood of pollutants and outdoor allergens entering homes.

Beyond individual benefits, weatherization projects in Kansas contribute to job creation within local communities, particularly in the construction and energy sectors. This not only generates employment opportunities but also stimulates economic activity at the local level. The investments in weatherization create demand for materials, equipment, and skilled labor, supporting businesses and communities alike.

Targeting low-income households, weatherization programs in Kansas aim to assist those facing challenges in affording home improvements. This ensures that the positive impacts of weatherization reach those who need them the most, addressing both economic and environmental considerations. While there may be upfront costs, weatherization is viewed as a long-term investment with benefits such as energy savings and increased property value, aligning with broader energy efficiency goals and contributing to the creation of sustainable and resilient communities in Kansas.

Weatherization Program for Douglas County

Weatherization; Energy Efficiency; Workforce Development

Weatherization program for low-income and lower-middle-income homeowners and renters that includes home energy and health and safety audits. Program will result in energy efficiency, greenhouse gas reduction, lower utility bills, and improve health of inhabitants.

> Weatherization of homes leads to reduced demand on the electrical grid. Reduced energy demands will affect the entire community indirectly by helping to ensure energy infrastructure remains sufficient and reliable for all homeowners. Weatherization of homes is estimated to reduce greenhouse gas emissions by 102,567 metric tons over the next 5 years by reduce the demand on coal-burning power plants. There are no Identified LIDACS in the immediate area of the project, however there are dozens of low-income disadvantaged communities in the Greater Kansas City area. Energy efficiency projects

reduce greenhouse gases overall and results in mitigating negative climate change impacts for communities across Kansas.

Weatherization Program for North Central Kansas Residents

Weatherization

Weatherization Gap Program to assist low-income disadvantaged communities in North Central Kansas.

The North Central Regional Planning Commission is a regional planning and development district focused on a rural region of North Central Kansas. By assisting rural residents in weatherizing their homes, the Commission can help ensure that even the most isolated Kansans are able to endure weather extremes throughout the year. Utility development in rural parts of the state may not have the funding available to initiate large projects at the same rate as larger, more-developed communities can. Weatherization of homes can help mitigate the need to upgrade energy infrastructure in these regions while ensuring their residents enjoy a heightened quality of life through comfortability throughout the seasons, and potentially experience less health effects.

Studies estimate that weatherization of residential buildings can reduce energy consumption by seven percent (7%)[23]. This has the potential to alleviate economic burdens in low-income communities, lower energy demand, and reduce greenhouse gas emissions across the state.

Weatherization Program for Saline County, Kansas

Weatherization; Energy Efficiency

Weatherization Program expansion for low-income residents. Program will result in energy efficiency, greenhouse gas reduction, lower utility bills, and improved health.

The benefit of a weatherization project in this area is primarily the improved performance of individual and smaller scale shared dwelling units. Currently, the area is comprised partly of two (2) different low-income disadvantaged community areas, with one experiencing high rates of asthma (90th percentile), and both of whom suffer from low life expectancy (94th and 95th percentiles).

This project is motivated by a general desire to improve energy performance on a unit level and create improved air and general health conditions for residents, especially lower-income residents. The broader expectation is that the improved general wellness of the dwelling units and the higher energy efficiency will result in better overall health performance of the area and lower energy losses and lower energy-creation emissions.

[23] *The Quarterly Journal of Economics*, Do Energy Efficiency Investments Deliver? Evidence From the Weatherization Assistance Program
https://doi.org/10.1093/qje/qjy005

The benefits for residential weatherization improvements can be substantial, with quantifiable energy savings around seven percent (7%)[24].

Workforce Development

Workforce development in Kansas is a multifaceted effort aimed at enhancing the skills, knowledge, and employability of the state's workforce.

Workforce development initiatives tailored for low-income disadvantaged communities (LIDACs) in Kansas aim to address unique challenges and create pathways for economic empowerment. These initiatives should focus on providing targeted support, skill development, and resources to enhance employability and financial stability. Programs tailored for LIDACs in emerging markets, particularly in clean energy, offer a range of added benefits including, increased employability, access to sustainable careers, reduction in unemployment and underemployment, diverse representation in clean energy, community resilience, environmental stewardship, policy advocacy and systemic change.

Overall, these benefits contribute to the creation of strong, sustainable, and inclusive communities, aligning with broader goals of economic development, environmental conservation, and social equity.

Green Jobs Training Program Provided by Green Core Training

Workforce Development; Industrial Process Efficiency; Energy Efficiency; Fuel Efficiency

Environmental literacy and green jobs training program to develop local workforce, build community, and change environmental behaviors to reduce greenhouse gas emissions and other pollution. Program expansion to low-income disadvantaged communities, Kansas Department of Corrections, and schools.

Expanding the Green Core Training (GCT) program will develop the local workforce by introducing more than 100 different green careers and change how the community interacts with their environment to reduce greenhouse gasses and other pollution. The GCT staff are certified instructors, the curriculum is certified by the US Department of Labor (DOL), and graduates earn credentials from the DOL as “Environmental Specialists.” And six (6) of the training modules cover areas KDHE recognizes as responsible for emitting and absorbing emissions (industry, electricity generation, transportation, commercial and residential buildings, agriculture, natural and working lands, and waste and materials management).

The target area of this project is Kansas City, KS from Highway 635 east to the Kansas and Missouri Rivers, bounded on the north and south by those rivers. Within that area are twenty-three (23) identified low-income disadvantaged communities Census Tracts. All twenty-three (23) tracts are between the 87th and 99th percentile for low income, with the

[24] *The Quarterly Journal of Economics*, Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program
https://doi.org/10.1093/qje/qjy005

average rate of 93rd percentile. Eighteen (18) tracts are considered historically underinvested, and in six (6) tracts, the unemployment rate is between 92nd and 98th percentile. Every Census Tract in the target area is above the 10% threshold for percent of people ages twenty-five (25) or older whose high school education is less than a high school diploma. Non-high school diploma rates in this area are between 11% and 55% with an average rate of 33%.

This community demonstrates a high need for workforce training and workforce development investment. Investing in green jobs will improve the economic factors in this community and alleviate economic burdens. Greenhouse gas emission reductions are expected because of this effort, however, are not currently quantifiable.

Other Projects

Other projects were received by KDHE beyond the deadline required to ensure timely inclusion in the LIDAC analysis above. However, these projects are still included in Appendix A and are still intended to be included in the State's priority action plan as they meet goals to reduce or mitigate greenhouse gases in the state.

Review of Authority to Implement

This document provides a list of voluntary projects that are available to Kansas communities for the CPRG implementation phase. Reduction measures listed in the plan are likewise voluntary. Per K.S.A. 65-3005, KDHE, Bureau of Air (BOA) was designated as the lead agency for the CPRG planning phase on March 30, 2023, by the Agency Secretary.[25] The bureau is responsibility for management of the CPRG planning phase funds and completion of required deliverables pertaining to the CPRG planning phase.

[25] The following webpage lists air quality statutes and regulations for the State of Kansas: https://www.kdhe.ks.gov/237/Air-Quality-Statutes-Regulations

Future Work

The priority action plan will be utilized to allow eligible entities the opportunity to apply for the CPRG implementation grant, where approximately $4.3 billion is available as a national competitive grant process to fund future projects that will reduce greenhouse gases. This competitive grant process will ideally include at least some awards within Kansas which are projected to be announced in the summer of 2024 with funding provided by October 2024. Future work as a part of the CPRG program may be based upon this awards announcement, for example, assisting with the measurement of actual emission reductions.

Additional work that is a part of the planning grant deliverables includes a comprehensive (climate) action plan which is due approximately August 2025, and a final status report which is due approximately August 2027. The comprehensive action plan will further identify all significant greenhouse gas sources and sinks within the state, establish reduction and mitigation goals, and provide strategies and identified measures to achieve these goals. To meet EPA requirements as a part of the grant, the comprehensive plan will include:

- A comprehensive greenhouse gas inventory – identifying emission sources and sinks.
- Greenhouse gas emissions projections.
- Greenhouse gas reduction or mitigation goals based upon community solutions.
- Quantifiable greenhouse gas reduction measures.
- A benefits analysis for Kansas.
- A low income and disadvantaged communities' benefits analysis.
- A review of the authority to implement.
- A plan to leverage other federal funding.
- A workforce planning analysis.

To meet EPA requirements as a part of the grant, the final status report will include:

- The implementation status of greenhouse gas reduction measures including in the comprehensive action plan.
- Relevant updated analyses or projections which support the comprehensive action plan implementation.
- Next steps and future needs to continue to support the comprehensive action plan.

Future work will continue to focus on coordination and engagement with all stakeholders, from the public to intergovernmental entities. Communication through electronic newsletters, website updates, and other public outreach will continue.

KDHE E-RAMP Website: https://www.kdhe.ks.gov/2071/

KDHE E-RAMP E-mail: kdhe.eramp@ks.gov

Disclaimer: This project has been funded wholly or in part by the United States Environmental Protection Agency (EPA) under assistance agreement 96702501 to Kansas Department of Health and Environment. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

Appendix A

Entity	Location (County)	Priority Measure	Project	Cost
Barber County United	Barber County	Transportation	Build an alternative transportation system of accessible paths connecting the community.	$4,000,000
City of Goddard	Sedgwick County	Transportation	Construction of a bicycle/pedestrian bridge over US-54/400.	$3,799,641
City of Haysville	Sedgwick County	Buildings, Electrical Generation, Transportation	Install solar panels to power city facilities, including but not limited to: Public Works, City Hall, Police Station, Library, Activities Center, Wells Fields 5-9, Economic Development Office and Senior Center.	$2,000,000
City of Hillsboro	Marion County	Buildings, Electrical Generation	Install solar panels and battery systems at its public facilities, including water treatment plant, wastewater treatment lagoons, life station, city hall, library, fire station, public works facility and recreational facilities.	$2,000,000
City of Hillsboro	Marion County	Transportation	Complete a series of trails and sidewalks within the communities to facilitate pedestrian transportation and connect pedestrian infrastructure to the Marion Reservoir.	$3,000,000
City of Hillsboro	Marion County	Transportation	With USD 410, would replace a portion of their fleets with electric vehicles; Includes charging infrastructure upgrades for vehicles at municipal facilities and in the community.	$4,750,000
City of Prairie Village	Johnson County	Buildings	Construction of a new City Hall facility that will achieve LEED Platinum status.	Unknown
City of Pratt	Pratt County	Industry, Transportation	Conversion from natural gas to thermal energy; Production of fuel ethanol.	$79,000,000
City of Salina	Saline County	Buildings, Waste and Materials Management	Design and install a landfill gas collection and control system, including a blower and flare system, installation of gas extraction wells, installation of dewatering pumps, pneumatic air supply, and related piping.	$8,500,000
City of South Hutchinson	Reno County	Transportation	Converting police and fire departments to electric vehicles and install EV charging within the community.	$2,700,000

Entity	Location (County)	Priority Measure	Project	Cost
City of Valley Center	Sedgwick County	Electrical Generation	Add large solar array and battery storage system to new recreation and aquatic center; Level 2 and 3 charging stations for public EV charging.	$3,000,000
City of Wichita	Sedgwick County	Buildings	Energy audits of city-owned buildings and recommended retrofits based on audit findings.	$5,000,000
City of Wichita	Sedgwick County	Transportation	Replace 25 old school buses with electric buses, including charging infrastructure.	$11,000,000
City of Wichita	Sedgwick County	Waste and Materials Management	Compost program including facility, trucks, containers, plan development and administrative costs.	$30,000,000
City of Wichita	Sedgwick County	Industry, Waste and Materials Management	Landfill gas recovery system.	$6,500,000
City of Wichita	Sedgwick County	Transportation	Expand public access to electric vehicle charging stations through installations at city-owned facilities and add electric vehicles to the city fleet.	$2,400,000
City of Wichita	Sedgwick County	Electrical Generation	Solar capacity added to city-owned buildings.	$1,100,000
City of Wichita	Sedgwick County	Transportation	Redbud trail project completed and improved, including additional pedestrian overpasses.	$8,500,000
City of Wichita	Sedgwick County	Land Use	Reduce heat island effects and expand carbon sinks across the city by expanding city's current tree maintenance plan and private/public partnerships.	$4,300,000
Climate + Energy Project	Statewide	Buildings, Land Use, Transportation, Electrical Generation	Prairie restoration, community resilience planning, renewable energy expansion, energy justice and efficiency across the state.	$27,200,000
Douglas County / City of Lawrence	Douglas County	Buildings	Weatherization program for low-income and lower middle-class homeowners to improve energy efficiency.	Unknown
Douglas County Sustainability	Douglas County	Land Use, Electrical Generation	Increase and accessible incentives and resources for transitioning farmland to climate smart and regenerative practices or other carbon-sequestering assets.	Unknown

Entity	Location (County)	Priority Measure	Project	Cost
Douglas County Sustainability	Douglas County	Transportation	North-south connector road to reduce traffic from congested areas; bicycle lane and enhanced green spaces with nature-based solutions for 100-year floodplain.	$2,000,000
Finney County	Finney County	Transportation	Replace most Public Works vehicles with hybrid and/or electric vehicles and install charging stations for county and public use.	$4,000,000
Great Plains Industrial Park	Labette County	Buildings, Industry, Waste and Materials Management	Collaborative effort to establish a state-of-the-art Hydrogen Production and Hydrogen Boiler Demonstration Facility, emphasizing zero-emission and high-efficiency capabilities.	$55,000,000
Harper County Commission	Harper County	Agriculture, Transportation	Replication of the biomethane plant built by Kansas Sustainable Agriculture District #001 to benefit low-income and disadvantaged communities in Harper County.	$90,000,000
ICT Treehuggers	Sedgwick County	Land Use	Agricultural education program, community gardens, emissions reduction initiatives, summer reading program.	$10,000,000
Jayhawk Fine Chemicals	Cherokee County	Buildings, Industry, Waste and Materials Management	Install an emissions control device that prevents N2O from venting into the atmosphere.	$8,500,000
Kansas State University Engineering & Extension	Riley County	Buildings, Electrical Generation, Industry	GHG emission inventory and reduction training; technical and financial assistance for energy efficiency, pollution prevention, and sustainable materials management project assessment and implementation; Global Center for Grain and Food Innovation energy efficient HVAC system, solar system, and wall insulation.	$50,000,000
Kansas City Board of Public Utilities	Wyandotte County	Electrical Generation	Low-income community solar project in Kansas City, KS.	$10,000,000
Kansas Department of Transportation	Statewide	Transportation	EV charging, EV purchase, alternative fuel vehicle and infrastructure deployment.	Unknown

Entity	Location (County)	Priority Measure	Project	Cost
Kansas Forest Service	Statewide	Land Use	Support cooperative efforts with partners, greenhouse/nursery plant production capacity, outreach and education to landowners, technical assistance capacity, contractor development and implementation of projects, specialized equipment necessary for implementation of practices and administrative oversight of all activities.	$8,500,000
Kansas Housing Resources Corporation	Statewide	Buildings, Electrical Generation	Expand rooftop solar system program for single and multi-family homes and serve low-income and disadvantaged communities in all Kansas counties.	$50,000,000
Kansas Sustainable Agriculture District #001	Kingman County	Agriculture, Transportation	Commission a model biomethane plant that provides natural gas fuel and bio-fertilizer byproduct from conversion of grass silage.	$90,000,000
	Statewide	Land Use, Waste and Materials Management	A state-wide Master Composter program to increase awareness, create expertise throughout the state, and jumpstart projects throughout the state.	Unknown
	Statewide	Land Use	State-wide roadside vegetation management program that uses native and other types of appropriate vegetation.	Unknown
KC Can Compost	Johnson, Wyandotte	Waste and Materials Management	Creation and establishment of a regional composting facility including collection, processing, and finishing.	$7,509,350
KC Can Compost, Green Core Training	Wyandotte County	Waste and Materials Management	Expand Green Core Training in frontline and vulnerable communities including correctional facilities and schools.	$2,191,300
North Central Regional Planning Commission	Clay, Cloud, Dickinson, Ellsworth, Jewell, Lincoln, Marshall, Mitchell, Ottawa, Republic, Saline, Washington	Buildings	Weatherization Gap Program to assist low-income individuals with structural and emergency repairs. Moderate-income HVAC rehabilitation program to reduce air pollution (HCFCs) and lower energy costs.	$3,000,000

Entity	Location (County)	Priority Measure	Project	Cost
Reno County MSW Landfill	Reno County	Waste and Material Management	Installation of gas extraction well dewatering pumps, installation of pneumatic air supply system, upgrades to blow and flare system, Impact Detection installation on wellheads or CAT Equipment System GIS upgrades.	$850,000
Reno County MSW Landfill	Reno County	Industry, Waste and Material Management	Design and build a Renewable Natural Gas Facility, including permitting.	$30,000,000
Reno County MSW Landfill	Reno County	Waste and Material Management	Purchase a woodchipper to offset emissions of combustion.	$800,000
Saline County	Saline County	Buildings	Weatherization for low-income and disadvantaged households.	$2,000,000
Seward County Landfill	Seward County	Industry, Waste and Material Management	Installation of a gas collection and control system to collect produced landfill gas and piped to the National Beef Company for use or burned. Includes design and permitting services, new extraction wells, piping, connection to existing system and a flare system.	$3,000,000
Seward County Landfill	Seward County	Waste and Material Management	Procurement of an industrial wood-chipper to divert brush from on-site burn operations into the production of cover material for landfill. Includes machine specification, purchase, and construction of wood-chipper on site.	$870,000
Sumner County Commission	Sumner County	Agriculture, Transportation	Replication of biomethane plant built by the Kansas Sustainable Agriculture District #001 to serve the low-income and disadvantaged communities in Sumner County.	$90,000,000
Waste Management	Shawnee, Wyandotte	Transportation	Transition heavy-duty diesel trucks used for waste collection to compressed natural gas (CNG).	$8,000,000

Appendix B

Census Tract 2010 ID	County
20001952800	Allen
20003953600	Anderson
20005081900	Atchison
20007968100	Barber
20007968200	Barber
20009971300	Barton
20009971400	Barton
20009971800	Barton
20011955600	Bourbon
20011955800	Bourbon
20011956000	Bourbon
20013480600	Brown
20013480700	Brown
20013480800	Brown
20015020400	Butler
20015020800	Butler
20017960600	Chase
20019964600	Chautauqua
20021958100	Cherokee
20021958300	Cherokee
20021958500	Cherokee
20021958600	Cherokee
20029977100	Cloud
20029977200	Cloud
20029977300	Cloud
20031966300	Coffey
20035493100	Cowley
20035493600	Cowley
20035493700	Cowley
20035493800	Cowley
20035494100	Cowley
20037956700	Crawford
20037956800	Crawford
20037957100	Crawford
20037957200	Crawford
20037957500	Crawford
20041084500	Dickinson
20041084600	Dickinson
20043020300	Doniphan
20047969700	Edwards
20049965100	Elk
20051072900	Ellis
20055960200	Finney
20055960300	Finney
20055960404	Finney
20055960501	Finney
20055960505	Finney
20055960507	Finney
20055960508	Finney
20055960600	Finney
20057961800	Ford
20057962000	Ford
20057962101	Ford
20057962102	Ford
20059954200	Franklin
20061000100	Geary
20061000200	Geary
20061000600	Geary
20063955100	Gove
20065952200	Graham
20067963700	Grant
20073965700	Greenwood
20077961700	Harper
20077961800	Harper
20081463100	Haskell
20089576100	Jewell
20089576200	Jewell

20091052418	Johnson
20091052905	Johnson
20091053555	Johnson
20091053556	Johnson
20093959100	Kearny
20099950100	Labette
20099950200	Labette
20099950300	Labette
20099950400	Labette
20099950800	Labette
20103070100	Leavenworth
20103070500	Leavenworth
20107955100	Linn
20111000100	Lyon
20111000300	Lyon
20111000500	Lyon
20115489500	Marion
20123176700	Mitchell
20125950200	Montgomery
20125950400	Montgomery
20125950500	Montgomery
20125950600	Montgomery
20125950900	Montgomery
20125951000	Montgomery
20125951100	Montgomery
20125951200	Montgomery
20125951300	Montgomery
20129964600	Morton
20133951800	Neosho
20133951900	Neosho
20139010400	Osage
20143085700	Ottawa
20147475300	Phillips
20151968700	Pratt
20155000400	Reno
20155000600	Reno
20155000700	Reno
20155000800	Reno
20155001000	Reno
20155001300	Reno
20155001700	Reno
20155001800	Reno
20161000303	Riley
20161000801	Riley
20161000802	Riley
20161001002	Riley
20163974600	Rooks
20165972100	Rush
20167973800	Russell
20169000100	Saline
20169000200	Saline
20169000300	Saline
20169000400	Saline
20169000500	Saline
20173000100	Sedgwick
20173000200	Sedgwick
20173000300	Sedgwick
20173000400	Sedgwick
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20173003900	Sedgwick
20173004000	Sedgwick
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20173005100	Sedgwick
20173005200	Sedgwick
20173005400	Sedgwick
20173005800	Sedgwick
20173005900	Sedgwick
20173006000	Sedgwick
20173006200	Sedgwick
20173006300	Sedgwick
20173006500	Sedgwick
20173006800	Sedgwick
20173006900	Sedgwick
20173007000	Sedgwick
20173007500	Sedgwick
20173007800	Sedgwick
20173008200	Sedgwick
20173008700	Sedgwick
20173008900	Sedgwick
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20175966000	Seward
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20177001000	Shawnee
20177001100	Shawnee
20177001200	Shawnee
20177001300	Shawnee
20177001603	Shawnee
20177002100	Shawnee
20177002800	Shawnee
20177002900	Shawnee
20177003001	Shawnee
20177003100	Shawnee
20177004000	Shawnee
20183475800	Smith
20189965200	Stevens
20191962300	Sumner
20191962400	Sumner
20191962500	Sumner
20201978600	Washington
20201978700	Washington
20205097100	Wilson
20205097300	Wilson
20205097400	Wilson
20207096600	Woodson
20207096700	Woodson
20209040200	Wyandotte
20209040300	Wyandotte
20209040400	Wyandotte
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20209040800	Wyandotte
20209040900	Wyandotte
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20209041700	Wyandotte
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20209042001	Wyandotte
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20209042100	Wyandotte
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20209044101	Wyandotte
20209044104	Wyandotte
20209044301	Wyandotte
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20209044400	Wyandotte
20209044500	Wyandotte
20209045000	Wyandotte
20209045100	Wyandotte