KANE COUNTY, ILLINOIS

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Climate Action Baseline Assessment and Strategic Goal Recommendations

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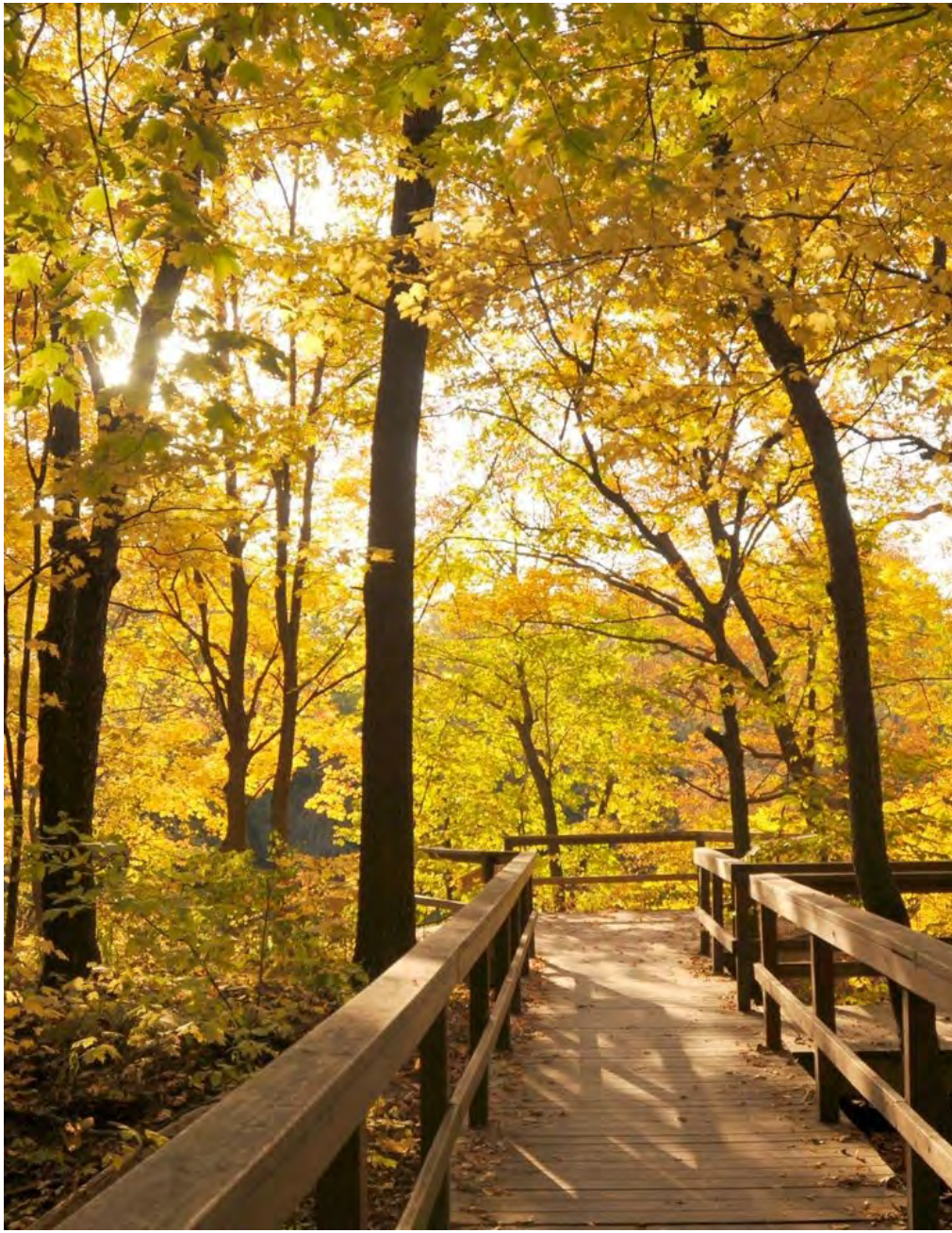


Introduction

Background

Kane County is developing its first Climate Action Implementation Plan to support climate resilience and mitigation county-wide. The plan, which will identify climate action strategies and actions through 2030, will help those who live and work in Kane County imagine and achieve a future where the earth and all who live on it thrive. The plan will be grounded in the targets, goals, and objectives of the Metropolitan Mayor's Caucus 2021 Climate Action Plan.

This Kane County Climate Action Baseline and Strategic Goals document is intended as a tool to support the Kane County Climate Action Planning team in collaboratively exploring, creating, refining, and finalizing the goals and strategies of the Climate Action Implementation Plan. The strategic goal recommendations included in this document should be understood as preliminary only and created solely for the purpose of supporting a fully collaborative planning team process.

Climate Action Plan Framework

Achieving community-wide greenhouse gas (GHG) reductions and addressing the impacts of climate change requires addressing considerations across a wide range of sectors. This Climate Action Baseline and Strategic Goal Recommendations report is organized around a unifying framework of environmental equity and justice, and includes eight community-wide sectors. Each sector has overarching Strategic Goals (or "Strategies") established to meet 2030 goals and organize or provide direction for detailed implementation Actions to be created in collaboration with the Climate Action Planning Team. Sector Strategies have primary focus on Climate Mitigation, Climate Adaptation, or both.

Climate Action Sectors

The Kane County Climate Action Plan will include the following community-wide sectors:

- Transportation and Land Use
- Buildings and Energy
- Waste Management
- Water and Wastewater
- Local Food and Agriculture
- Greenspace and Ecosystems
- Health and Safety
- Climate Economy

Strategies: are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions.

Actions: are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.

Climate Mitigation: addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions.

Climate Adaptation: seeks to lower the risks posed by the impacts of climate change which are now inevitable or likely.

Introduction

Cross-Cutting Pathways

GHG reduction pathways are themes which organize the strategic goals, or "strategies" needed to achieve community wide greenhouse gas reductions. A **cross-cutting pathway** represents pathways organized across multiple, or all, climate action sectors. The cross-cutting pathways for the Kane County Climate Action Baseline and Strategic Goal Recommendations report are:

Reduction
(Energy Efficiency, VMT, etc)

Fuel Switching
(Renewable Electricity, Thermal Energy, Transportation)

Sequestration
(Greenspace, Mechanical Carbon Sequestration and Storage)

Metropolitan Mayors Caucus (MMC) Climate Action Plan Framework

The Strategic Goal Recommendations included in this report are in alignment with the MMC Climate Action Plan Framework. The MMC Objective and Strategies which align with each Strategic Goal Recommendations are noted with this symbol: 

Climate Mitigation Goals in Global Context

Considering a plan's GHG emission reduction goals within a global context can help validate the appropriateness of the goal. An effective approach for evaluating goals within that global context is to consider the most current GHG emission reduction recommendations formulated by the International Panel on Climate Change (IPCC). The scientific consensus of the international IPCC working groups is to reduce global GHG emissions as needed in order to limit global warming to 1.5°C. In addition, the Paris Agreement aims to limit global warming to 1.5 to 2 degrees C above pre-industrial levels, considered to be the threshold for dangerous climate change.

The UNEP Emissions Gap Report published in November 2019 calculates that by 2030, global emissions will need to be 25% lower than 2018 and 80% lower by 2050 to put the world on the least-cost pathway to limiting global warming to below 2°C. To limit global warming to 1.5°C, the same report finds emissions would need to be 55% lower than in 2018 and carbon neutral by 2050.

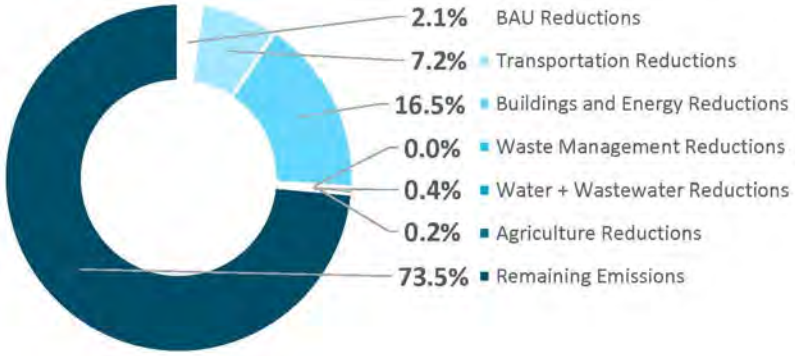
The State of Illinois current climate goals include a commitment to the Paris Agreement (see above) and to reduce GHG emissions by at least 26-28% below 2005 levels by 2025.

To be in alignment with the State's commitment to the Paris Agreement and the IPCC recommendations, then, we recommend a 2030 community-wide GHG emission reduction goal of 25-55% below 2019 levels.

Projected Emission Reductions Achieved by Draft Strategies

The following sections of this Baseline Assessment document include preliminary strategic goal recommendations for consideration by the planning team. These recommendations are based on the summary research presented in each section and are intended as preliminary statements for the purpose of supporting a collaborative team process which will result in the final strategic goal statements. These preliminary strategical goals generally align with current State of Illinois and IPCC recommended emission reduction goals.

Share of Total Projected Potential Emission Reductions by Sector by 2030 from 2019 Baseline (preliminary estimate):



Based on the illustrated potential reductions included in this document, we recommend the following as a preliminary Climate Mitigation goal statement for consideration by the planning team:

Recommended Kane County GHG Reduction Goal:

"To reduce county-wide GHG emissions by 25% below 2019 levels by 2030, and achieve carbon neutrality by 2050"

Section 02

Transportation and Land Use

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Moving ourselves and our goods and services from place to place is very energy intensive while the vehicles we use for that mobility are very material resource intensive. In addition to transportation vehicles, off-road equipment like construction, recreational and lawn equipment also consume significant amounts of fossil fuels for their operation. Off-road equipment have even higher GHG emission and overall air pollution rates per gallon of fuel consumed than on-road vehicles due to less efficient combustion and lower emission standards than on-road vehicles.

Equipment and transport systems have significant impacts on the environment, accounting globally for 20% to 25% of world energy consumption and carbon dioxide emissions. In Kane County, the transportation and land use sector accounts for 31.7% of Countywide GHG emissions. Vehicle Miles Traveled (VMT) are projected to increase, however, transportation emissions may decrease as this sector transitions from fossil fuel to electricity and as the electricity sector moves to more renewable energy sources.

Many options exist for improving the sustainability of our transportation systems while improving quality of life and equity. Increasing shared transportation while decreasing use of single-occupancy vehicles significantly reduces the environmental impacts of transportation. This change also can improve equity in mobility. Alternative transportation modes like bicycles, eBikes, and scooters can also increase opportunities for exercise while reducing air pollution. Lastly, studies indicate that recent advances in electric vehicles, car-sharing technologies and the potential for self-driving vehicles underline a much more sustainable usage of car assets that could remove up to 90% of the vehicles from the streets while enhancing mobility options.

Kane County Residential Density

The County's developed land totals 85,532 acres—25.5% of the total area of the County. This land supports a population of 518,648 for an average of 6.07 residents per developed acre.

Transportation and Land Use

Kane County Land Use Density Emissions Reduction Potential

According to Chicago Metropolitan Agency for Planning (CMAP), Kane County may see a population increase of 9.7% by 2030. The study "The Influence of Urban Form on GHG Emissions in the U.S. Household Sector" (Lee, S., and Lee, B. 2014) found that for every 1% increase in population-weighted urban density, household travel CO_2 emissions reduce by 0.48% and emissions associated with residential energy use decrease 0.35%. Based on this study, establishing zoning ordinances, codes, and land use policies guiding future growth into options which increase the density of existing developed land rather than increasing the quantity of developed land will have positive impact on decreasing total community wide emissions per household.

With policies guiding future population growth towards increased land use density, the potential 9.7% population increase could result in an increase of average population per developed acre from 6.07 to 6.63 residents per developed land use acre. Applying the figures established in the Lee study, this could equate to an emissions reduction of up to 4.65% for transportation related emissions.

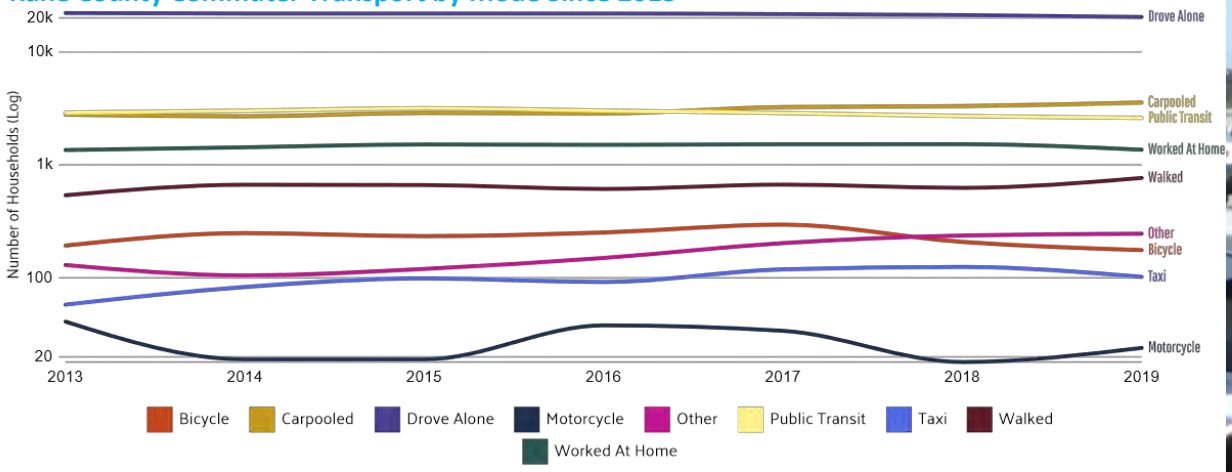
GHG emissions reduction associated with a 9.7% increased residential land use density by 2030: **(103,583)** Metric Tons.

Transportation Equipment and Mobility

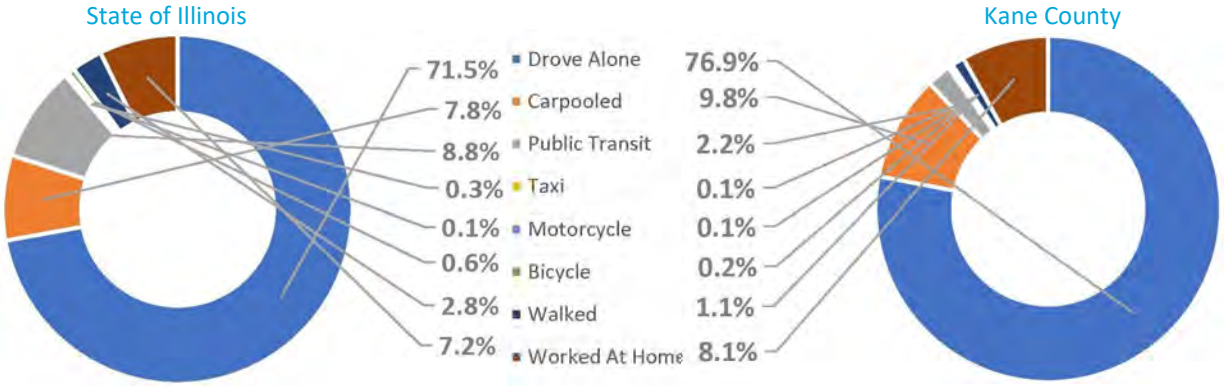
Kane County Commute

Since 2013, overall average commute time in Kane County has remained steady with a slight decrease from 29.3 to 29.2 minutes. 61% of those employed in the county commute from outside the County while 66% of Kane County residents who are employed commute to jobs outside of the county. The County has also seen some change in commuter modes with commuters driving alone decreasing 4% (from 80.9 in 2013 to 76.9% 2019), while working from home increased 3.5% and public transit, walking, and biking to work remained constant. These trends indicate strategies focusing job development near residential density and encouraging alternative commute modes like public transit, carpooling, walking, and working at home will decrease commuter emissions.

Kane County Commuter Transport by Mode Since 2013



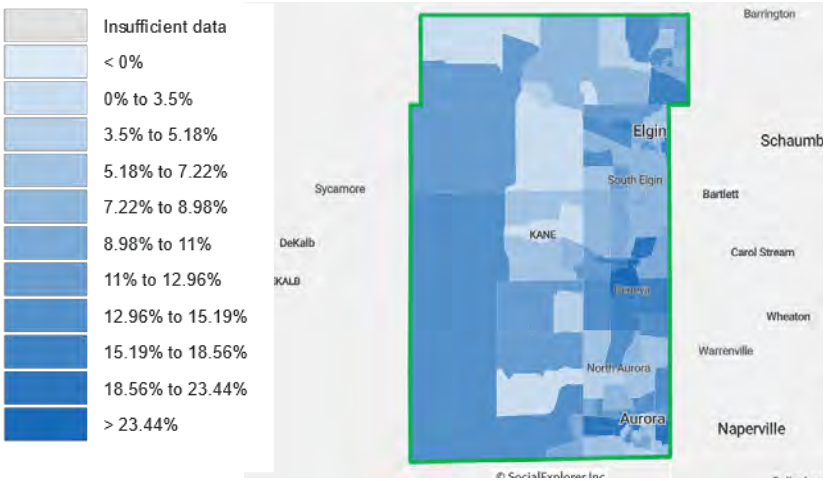
Commuter Transport Share by Mode 2020



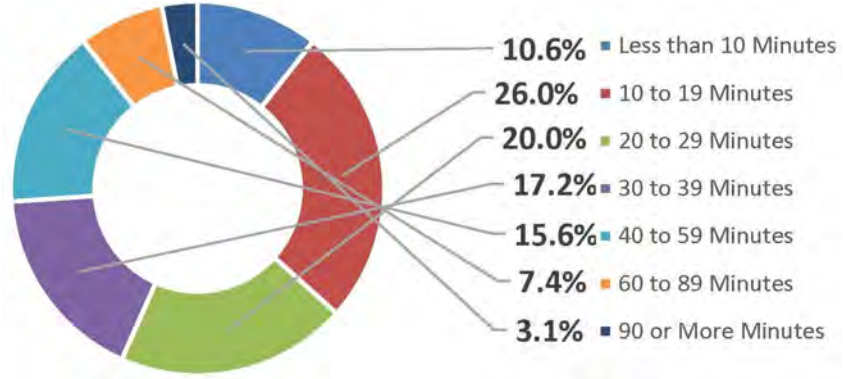
Transportation Equipment and Mobility

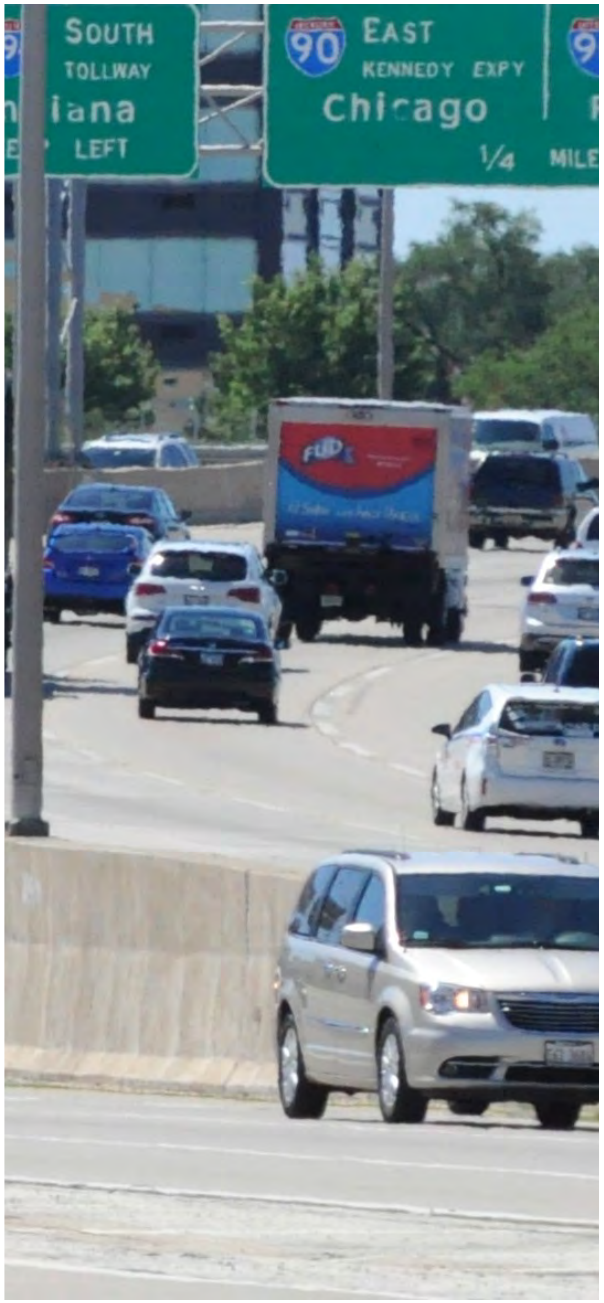
10.6% of all commuters in Kane County, over 24,500 workers, have a commute time of less than 10 minutes. Due to the shorter commute time, the distances traveled by these works may lend itself well to alternative transportation modes like walking or biking. Decreasing commuters driving alone by 5% to align with the state average, through increase of alternative modes of transportation, carpooling, working at home and other strategies, would decrease vehicle miles traveled by 50 million miles or more, saving an estimated $36,400,000 and eliminating up to **(24,000)** metric tons of GHG emissions annually.

Village of Skokie Workers with 10 Minute or Less Commute Time



Commuter Share by Commute Time



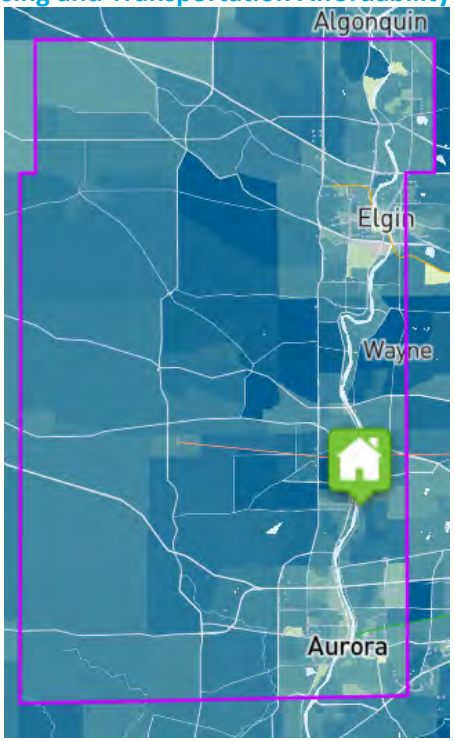


Transportation and Land Use

Housing and Transportation Affordability

Land Use density, job locations, and transportation significantly impact living costs, particularly housing and transportation affordability. The recommended share of income spent on housing is up to 30% and up to 15% for transportation, for a total transportation and housing burden of 45% of income. The map below, from Center for Neighborhood Technology, indicates the average Housing and Transportation affordability index for each of the census blocks within the Kane County. The Countywide average housing and transportation burden (H+T) is 51% (29% on housing and 22% on transportation). As shown on the household count by H+T income share, over 117,000 households in Kane County have a combined H+T burden that is *more than* 45% of household income. This trend indicates strategies that continue to focus job development nearest sections of residential density, increased housing affordability, and increased affordable mobility options may support decreasing cost of living, particularly associated with transportation.

Housing and Transportation Affordability



Combined housing and transportation expenses as share of household income (Source: H+T Index)

	Households
< 24%	861
24 - 36%	7,663
36 - 45%	53,433
45 - 54%	53,852
54 - 66%	46,575
66 - 78%	12,870
78 - 87%	4,383
87% +	0

Public Transit Performance Map

Overall transit score rating at connectivity, access to

< 1 | 1-2 | 2-4 | 4-5 | 5-6 | 6-7 | 7-9 | 9 +

AllTransit ™ Performance Score

2.7

County: Kane, IL

Low combination of trips per week and number of jobs accessible enabling few people to take transit to work

On Average Households have:

300	Transit Trips per Week within ½ Mile
2	Transit Routes within ½ Mile
27,973	Jobs Accessible in 30-minute trip
2.76%	Commuters Who Use Transit

Public Transit Indicators

The map to the left illustrates the community area served by transit options and the corresponding "Performance Score". Areas of lighter color have higher performance scores which represent a mixture of overall trips per week, number of jobs accessible, number of weekly commuters using the transit options, and equity of transit system. (Source: Alltransit)

The average commute in Kane County is 29.2 minutes, or approximately 20 miles. Meanwhile, AAA estimates that the cost per mile for operating a vehicle is $0.74. Consequently, every 1% increase in commuter utilization of public transit in Kane County may decrease vehicle miles traveled by 21.5 million miles, saving an estimated $14.5 million and eliminating **(10,150)** metric tons of GHG emissions annually.

JOBS

Jobs Near Transit: Percent of jobs that are located within ½ mile of transit.

55.6%

119,348 jobs are near transit

ECONOMY

Transit Access to Customers: Customer households accessible to a business within a 30 minute transit commute.

14,665

Households within a 30 minute transit commute.

HEALTH

Healthy Commuters: Workers who commute by walking or biking and live within ½ mile of transit.

1.71%	0.38%
Walk	Bike

EQUITY

Low-income Households Near Transit: Percent of households making under $50,000 within a ½ mile of high frequency full day transit.

0%

0 Households

TRANSIT QUALITY

High Frequency Transit: Households within ½ mile of high frequency transit.

0%	0%	0%
Around the Clock	Full Day	Rush Hour

MOBILITY

Transit Routes: Transit routes available within ½ mile of a block group on average.

2

Transit Routes

Transportation and Land Use

Vehicle Ownership in Kane County

According to the US Census, over 43% of all households in Kane County own two vehicles, nearly 26% own three, 12.6% own one vehicle, 11.5% own four, and nearly 6% own five or more vehicles. Communitywide, 1.3% are households with no vehicles. According to census data there are an estimated 660,000 vehicles total in the County.

Transitioning this rolling vehicle stock from fossil fuel combustion to low and no emission alternative is critical in meeting significant long-range emissions reductions in this sector. For every 1% of vehicles converted to EV or low/no emission fuel alternatives up to **(17,200)** metric tons of GHG emissions can be eliminated annually (including emissions associated with increased electricity consumption).

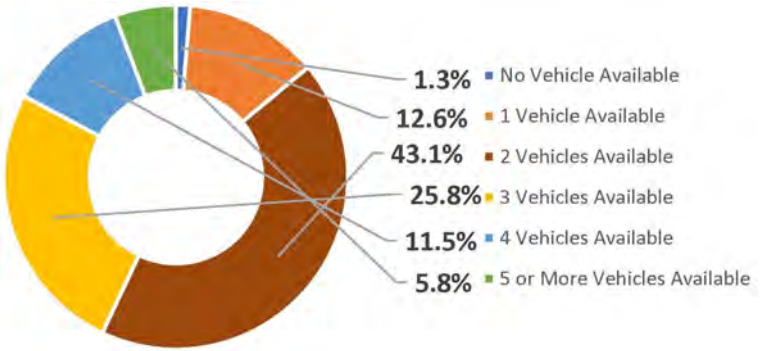
Existing Kane County Electric Vehicles and Infrastructure

The chart to the right illustrates the total number of electric vehicles and charging infrastructure in Kane County compared with the state. As of February 2023, Kane County had 2,556 battery electric vehicles* (BEV). Comparing the Kane County's EV rolling stock against state-wide vehicle counts (63,970 BEVs), it is clear that the County's adoption rate is very close to the state average. The County's current public charging infrastructure is slightly ahead of state average for Level II chargers and behind state average for DC Fast charging ports.

EV Adoption Rates in State

The graph to the right illustrates the new EV purchase adoption rates in the state since 2011. The trends illustrate a clearly increasing EV share of new vehicles purchased from 328 vehicles in 2011 to 19,557 in 2022.

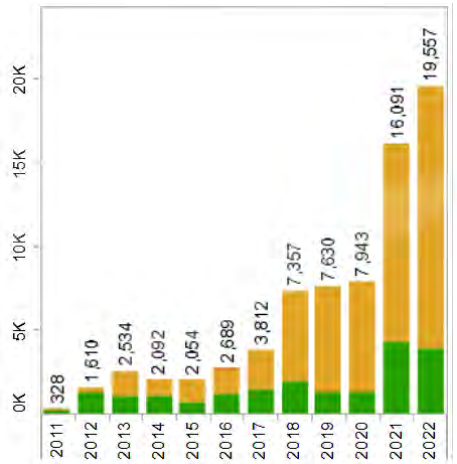
Vehicle Ownership by Household



Existing Kane County Electric Vehicles and Infrastructure

Type of Electric Vehicle	Vehicles in State	Vehicles in County*	EV % of All Vehicles in County	County Share of State	Share Compared to Population Share
BEV	**63,970**	**2,556**	**0.4%**	**4%**	**0.95x population**
Electric Vehicle Charging	**Chargers in State**	**Chargers in County**		**County Share**	**Share Compared to Population Share**
DC Fast Ports	740	24		3.2%	0.76x population
Level II Ports	2,203	101		4.6%	1.1x population

EV Adoption Rates in State



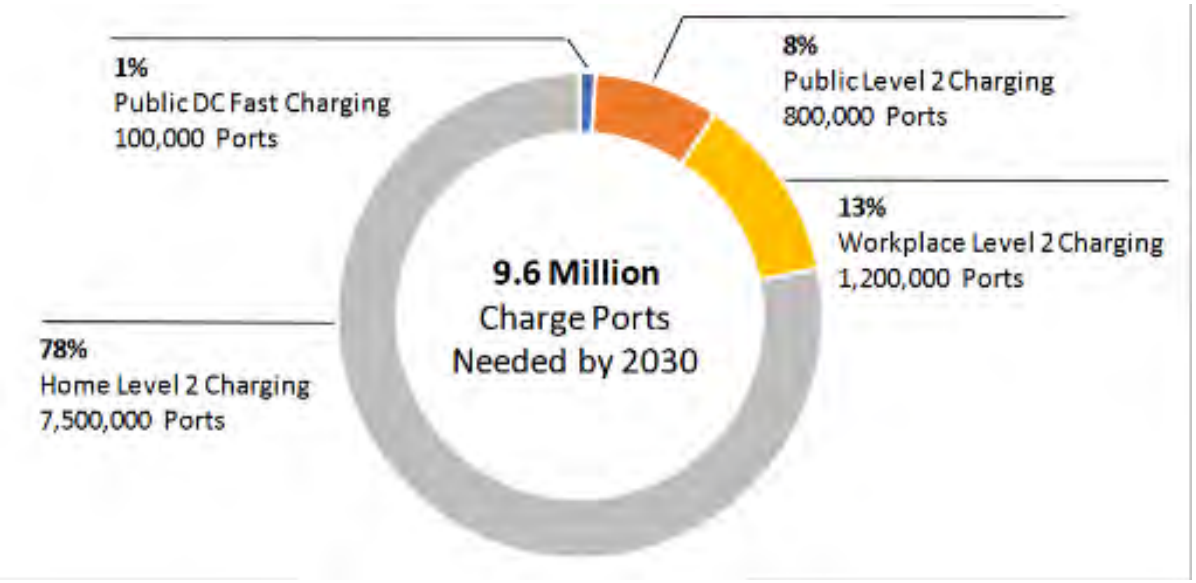
FCEV = Fuel Cell Electric Vehicle
BEV = Battery Electric Vehicle
PHEV = Plug-in Hybrid Electric Vehicle

(Source: Alliance for Automotive Innovation)

EV Charging Infrastructure Required in the US by 2030

(serving 18.7 million EV's in use)

According to the Edison Foundation, Electric Vehicle stock in the United States is projected to reach 18.7 million in 2030, up from slightly more than 1 million at the end of 2018. This means EV's will make up at least 7% of the vehicles on the road by that time.



(Sources: US Department of Energy, Alternative Fuels Data Center, US Census, Edison Foundation "Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030" report).

Minimum EV Infrastructure Needed in Kane County 2030

For Kane County, the Edison Foundation's EV charging infrastructure need projections mean anticipating 30,000 to 45,000 EV's owned and operated by Kane County residents by 2030 in addition to the increased EV utilization by visitors to the County and commuters who work in the County but live elsewhere. These EV's will require a minimum of 1,800 public level II charging ports, 3,000 workplace level II charging ports, and 225 public CD Fast Charging ports. This will require an increase of 4,700 level 2 charging ports and 200 DC Fast Charging ports by 2030. For every 1% increase in EV utilization beyond that, an additional 3.12 level 2 charging ports and 0.5 DC Fast charging ports should be planned.

Transportation Equipment and Mobility

Potential Climate Change Impacts by Sector

paleBLUEdot compiled a list of climate vulnerabilities for each of the sectors of interest included in this Baseline Assessment. The vulnerabilities were based on existing resources and our experience with other communities as well as regional planning documents and studies. The list of vulnerabilities generated for each sector included both direct impacts of climate change as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change or being exacerbated by climate change (see Climate Vulnerability Assessment for more information). The following are the vulnerabilities identified as being of particular concern for this sector:

***Vulnerability:* Increased Car Use**

Reduced interest in walking/biking or using public transportation on hot days, increasing dependence on cars with air conditioning.

Likelihood	Consequence	Capacity	Vulnerability
High	Moderate	High	Moderate

***Vulnerability:* Flood Damage to Infrastructure**

Increased flooding and associated damage to streets, sidewalks/trails, and parking lots during heavy rain events, particularly in low-lying areas or where stormwater infrastructure is inadequate

Likelihood	Consequence	Capacity	Vulnerability
Moderate	Very High	Moderate	High

***Vulnerability:* Resistance to Change**

Historical investment in car-focused and lower density development resulting in reduced walkability, complicating future changes to increase the use of public and alternative mobility.

Likelihood	Consequence	Capacity	Vulnerability
Moderate	High	Moderate	Moderate

Transportation and Land Use

Strategic Goal Recommendations Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Transportation and Land Use Strategic Goals:

Pathway 1—Reduction

TL 1: Decrease community wide Vehicle Miles Traveled (VMT) by 5% by 2030 .

Mitigation Objective 6

TL 2: Increase public transit commuter ridership from 2.24% to 4.48% by 2030.

Mitigation Objective 6

TL 3: Increase average population per developed acre by 4.5% by 2030 (from 6.07 to 6.35 ppl/acre).

Mitigation Objective 6

Fuel Switching

TL 4: Increase battery electric vehicle (BEV) use to 15% of vehicles on the road (from approximately 2,550 vehicles to 99,000 vehicles community-wide).

Mitigation Objective 5

TL 5: Establish viable renewable fuels in the economy and support infrastructure expansion and fuel adoption. Achieve 20% diesel consumption replacement by 2030. (Renewable fuels include hydrogen, renewable diesel, and bio diesel)

Strategic Goal Recommendations Government Operations

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Transportation and Land Use Strategic Goals:

Fuel Switching

TL 6: Achieve 25% conversion of county/municipal operations gasoline vehicles and equipment within county and municipal fleets to EV's by 2030. Achieve 100% conversion by 2040 .

Mitigation Objectives 1, 5

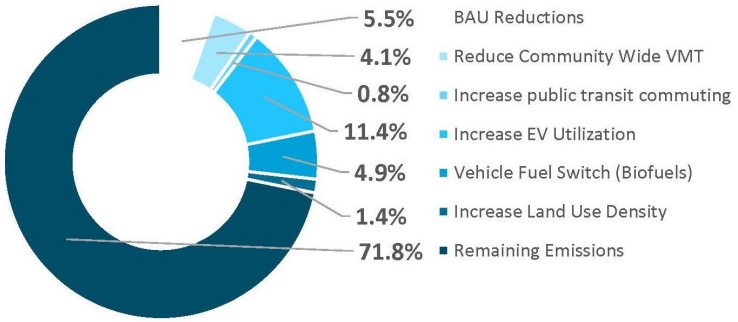
TL 7: Convert all county/municipal operations diesel fuel utilization to renewable diesel and/or biodiesel fuel by 2028.

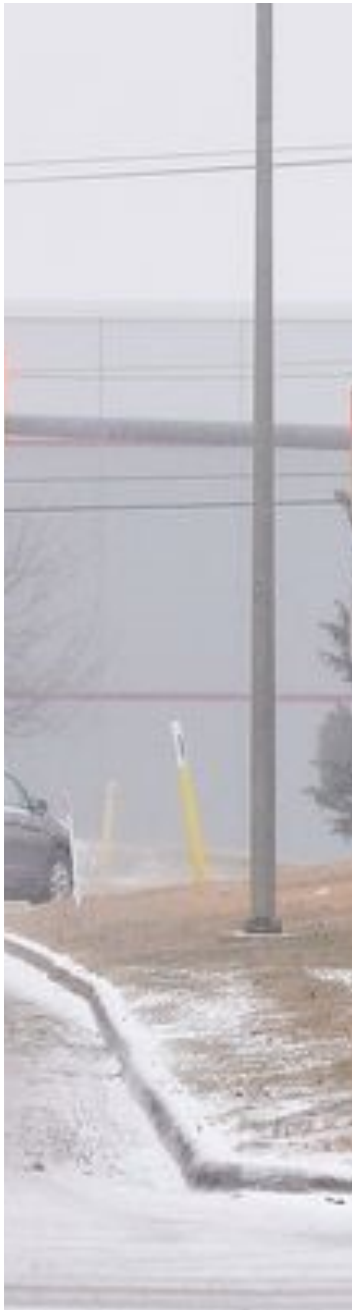
Mitigation Objectives 1, 5

TL 8: Increase fuel efficiency of remaining combustion engine fleet by 5% by 2030.

Mitigation Objectives 1, 5

Projected Sector Emission Reductions Achieved by Draft Strategies





Section 03

Buildings and Energy

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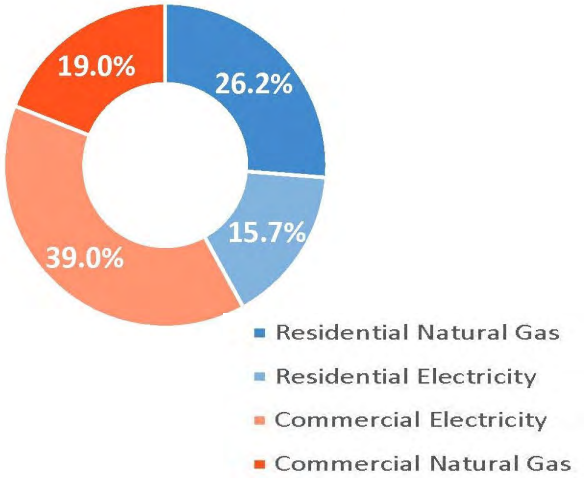
Building energy use is a major contributor to greenhouse gas (GHG) emissions. The Building Energy sector includes all residential, commercial, and industrial buildings. Greenhouse gas emissions from this sector come from **direct emissions** – from fossil fuels burned *on-site* for heating or cooking needs – as well as **indirect emissions** – from fossil fuels burned *off-site* in order to supply that building with electricity. Building design plays a large role in determining the future efficiency and comfort of facilities. Increasing energy efficiency can help reduce GHG emissions and result in significant cost savings for both homes and businesses. The Kane County community can also achieve climate resilience, environmental, social, and economic benefits through enhancements to the built environment.

Buildings and Energy Electricity and Natural Gas Emissions Share of 2019 GHG Emissions by Sub-Sector



Buildings and Energy

Kane County Energy Use Profile—Community Wide

Residential:

According to 2019 community wide data, the residential sector in Kane County consumes nearly 1.62 billion kWh annually. This is equal to 8,980 kWh per household. The sector also consumes over 217 million therms of natural gas annually, equal to 1,200 therms per household. Residential energy GHG emissions total over 1.84 million metric tons annually, approximately 42% of countywide buildings energy sector emissions.

Commercial and Industrial:

The Kane County commercial and industrial sector in 2019 consumed nearly 3.9 billion kWh, equal to 17,800 kWh per job. These sectors also consume over 157 million therms of natural gas annually, or approximately 720 therms per job. Commercial and industrial energy GHG emissions total over 2.55 million metric tons annually, approximately 58% of countywide buildings energy sector emissions.

Potential for Change in Kane County

According to US Census data, less than 0.5% of the county's housing stock was built in the last ten years while over 90% is more than forty years old. Based on the age of the County's building stock, significant renovations and new construction replacement projects may increase in the coming years. This means that a significant portion of the County's building infrastructure could be positively impacted and influenced through strategies that guide increased energy efficiency and increased renewable energy adoption.

Buildings and Energy

Kane County's Building Stock Efficiency

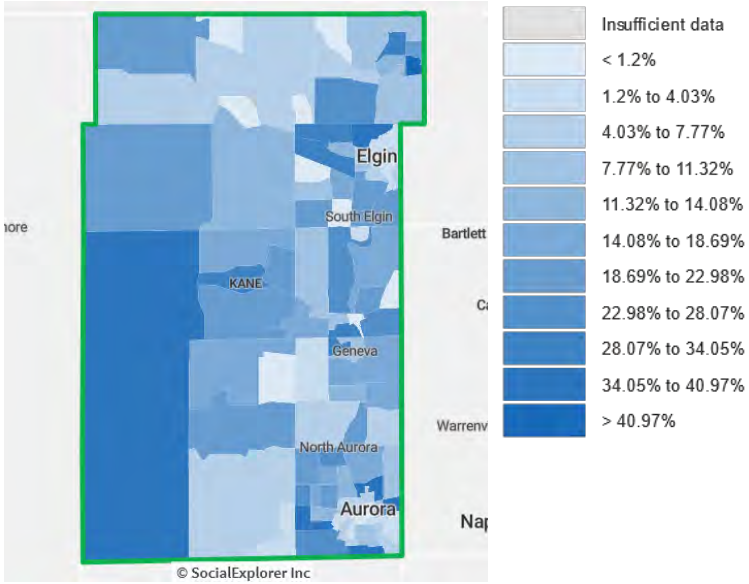
The measure of a community's existing building stock, certified high performance buildings, and housing characteristics provides a basis for determining the current and potential energy efficiency gains for the community. Energy and water efficiency upgrades are one of the simplest and most effective ways to conserve resources, save money, and reduce greenhouse gas emissions.

Residential Energy Efficiency Potential:

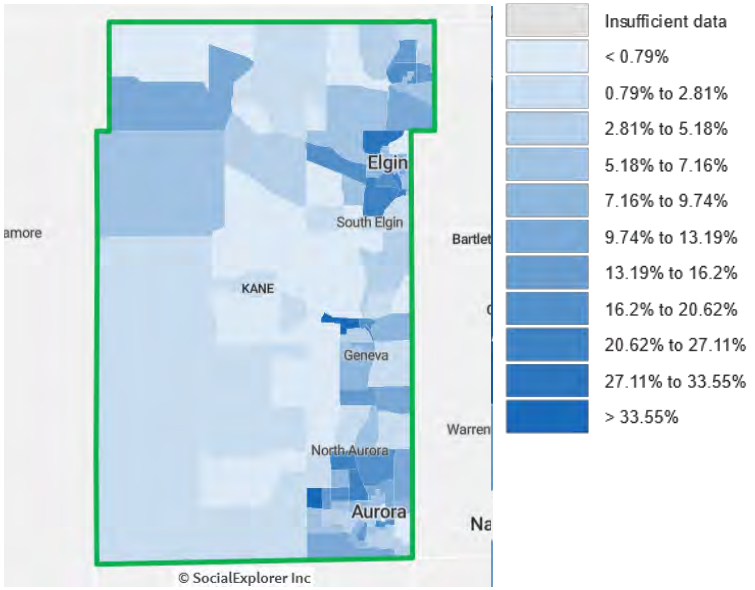
New building technology has increased energy efficiency significantly in recent decades. Although newer U.S. homes are 30 percent larger, they consume a similar amount of total energy as older homes - meaning they are more energy efficient per square foot of space. According to the US Energy Information Administration, homes built between 2000 and 2009 used 15% less energy per square foot than homes built in the 1980s, and 40% less energy than homes built before 1950.

Consequently, this means that retrofitting older homes with some of these technologies provides ample opportunity to improve energy efficiency throughout the community. The maps to the right illustrate the distribution of owner occupied and renter occupied homes built before 1980 throughout Kane County.

Kane County Owner Occupied Homes Built Before 1980



Kane County Renter Occupied Homes Built Before 1980



The chart below outlines the estimated annual energy savings potential for households within the County. Anticipating an energy efficiency participation of 36,253 of the County-wide total 181,263 housing units by 2030 (20% participation rate) with an average energy efficiency improvement of 15% each should yield an annual community-wide energy reduction of 75.24 million kWh of electricity and 10.09 million therms. This reduction would achieve an annual GHG reduction of **(55,356)** metric tons by 2030. Note, this reduction model anticipates a participation focus for residential units built prior to 1980.

Kane County Residential Building Stock Energy Efficiency Potential (based on 2021 US Census Data)

Home Age and Occupancy	Total Estimated Housing Units		Est Electricity Consumption (Million kWh)	Potential Electric Savings at 15% Improvement (Million kWh)	Est Thermal Energy Consumption (Million Therms)	Potential Thermal Energy Savings at 15% Improvement (Million Therms)	Targeted Energy Improvement Participation at 20% by 2030 (households)	Anticipated Annual Electric Savings by 2030 (Million kWh)	Anticipated Annual Thermal Energy Savings by 2030 (Million Therms)	Estimated GHG Reduction by 2030 (Metric Tons)
	Estimate									
Total:	181,263						36,253			
Owner Occupied:	**136,135**	**72.3%**	**1170.43**	**175.56**	**156.93**	**23.54**	**27,227**	**64.68**	**8.67**	**(41,575)**
Built 2020 Or Later:	339	0.8%	12.95	1.94	1.74	0.26				
Built 2000 To 2019:	39,642	4.5%	72.85	10.93	9.77	1.47				
Built 1980 To 1999:	38,669	10.7%	173.22	25.98	23.22	3.48				
Built 1960 To 1979:	25,968	25.0%	404.71	60.71	54.26	8.14	14,620	34.18	4.58	(22,325)
Built 1940 To 1959:	15,168	24.3%	393.38	59.01	52.74	7.91	6,067	23.60	3.16	(9,264)
Built 1939 Or Earlier:	16,349	7.1%	114.94	17.24	15.41	2.31	6,540	6.90	0.92	(9,986)
Renter Occupied:	**45,128**	**27.7%**	**448.42**	**67.26**	**60.12**	**9.02**	**9,026**	**10.57**	**1.42**	**(13,782)**
Built 2020 Or Later:	10	1.0%	16.19	2.43	2.17	0.33				
Built 2000 To 2019:	8,374	1.6%	25.90	3.89	3.47	0.52				
Built 1980 To 1999:	9,971	7.0%	113.32	17.00	15.19	2.28				
Built 1960 To 1979:	12,948	14.1%	228.26	34.24	30.60	4.59	2,113	5.59	0.75	**(3,227)**
Built 1940 To 1959:	6,184	3.4%	55.04	8.26	7.38	1.11	3,092	4.13	0.55	**(4,721)**
Built 1939 Or Earlier:	7,641	0.7%	11.33	1.70	1.52	0.23	3,821	0.85	0.11	**(5,834)**
Total Reduction Potential								**75.24**	**10.09**	**(55,356)**

**Includes estimated emissions associated with increased electrical use.

Buildings and Energy

Commercial and Industrial Building Energy Efficiency Potential: Similarly to residential construction, older commercial buildings or newer commercial buildings with under-performing energy efficiency represent a significant potential energy efficiency increase. This means that retrofitting older commercial buildings with some of these technologies provides ample opportunity to improve energy efficiency throughout the community. The chart below outlines the estimated annual energy savings potential for commercial buildings within the Kane County.

Anticipating an energy efficiency participation of 20% of commercial buildings by 2030 based (approximately 2,590 of a total estimated 12,951 commercial establishments) with an average energy efficiency improvement of 15% should yield an annual community-wide energy reduction of 116 million kWh of electricity and 4.73 million therms of thermal energy. This reduction would achieve an annual GHG reduction of **(76,525)** metric tons by 2030.

Kane County Commercial Building Stock Energy Efficiency Potential (based on 2021 US Census Data)

Commercial Building Stock	Total Estimated Commercial Establishments		Est Electricity Consumption (Million kWh)	Potential Electric Savings at 15% Improvement (Million kWh)	Est Thermal Energy Consumption (Million Therms)	Potential Thermal Energy Savings at 15% Improvement (Million	Targeted Energy Improvement Participation at 20% by 2030 (Establishments)	Anticipated Annual Electric Savings by 2030 (Million kWh)	Anticipated Annual Thermal Energy Savings by 2030 (Million Therms)	Estimated GHG Reduction by 2030 (Metric Tons)
	Estimate									
Commercial Establishments	**12,951**	100.0%	**3868.33**	**580.25**	**157.59**	**23.64**	**2,590**	116.05	4.73	**(76,525)**
Total Reduction Potential								**116.05**	**4.73**	**(76,525)**

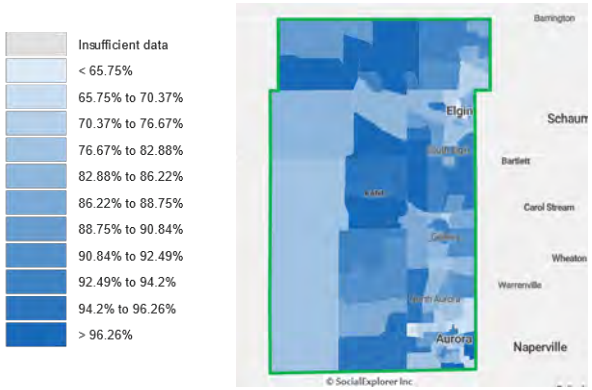
Buildings and Energy

Residential and Commercial Building Heating Fuel Switching Potential

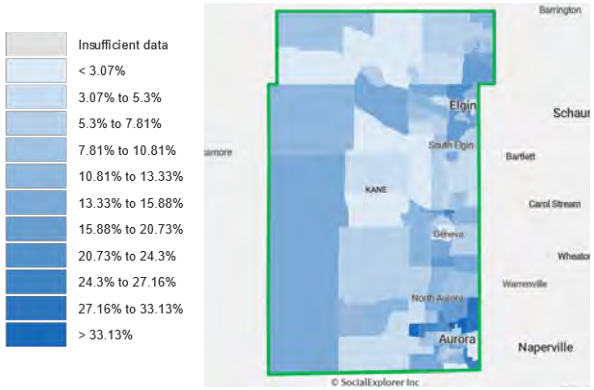
According to the US Census, approximately 87.9% of residential heating in the County is provided by natural gas, and 10.9% by electricity. Approximately 0.7%, or 1,324 households, are estimated by the US Census to use no heating fuel in their home.

As Kane County's electric grid nears carbon neutrality, building heating fuel will become an increasingly important target for emission reductions. Reduction, and ultimately the elimination of all fossil fuel heating (oil, propane, natural gas) will be required in order to achieve community wide carbon reductions.

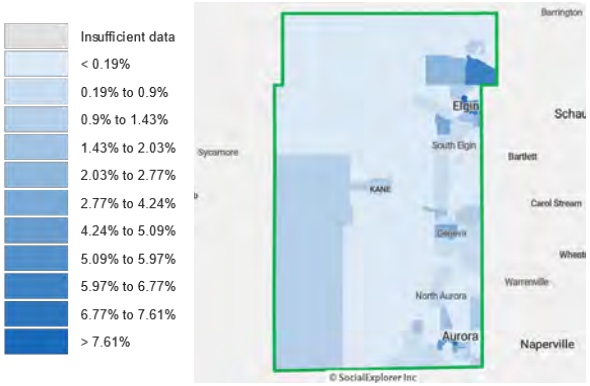
Kane County Homes with Utility Gas Heat
(for year 2021



Kane County Homes with Electric Heat
(for year 2021)



Kane County Homes with No Fuel Used
(for year 2021



Buildings and Energy

Heating fuel switch options include:

- Conversion to electric heat (e.g. heat pump).
- Conversion to solar thermal systems.
- Switching fuel oil or diesel fuels to biofuels.

The charts below outline the potential annual GHG reductions with achieving a heating fuel switch for 10% of Kane County households and commercial establishments by 2030. These reductions would achieve a reduction in GHG emissions equal to **(51,195)** metric tons for residential and **(37,170)** metric tons for commercial and industrial.**

Home Age and Occupancy (based on 2018 US Census Data)	Total Estimated Housing Units		Est Electricity Consumption (Million kWh)	Heating Fuel Emissions Remaining After Energy Efficiency Targets	Targeted Additional Fuel Switching Participation at 10% by 2030 (households)	Estimated Heating Fuel Emissions Reduction From Fuel Switching by 2030 (Metric Tons)**
	Estimate					
Total	181,263					
Owner Occupied	**136,135**	**72.3%**	**1170.43**	**807,558**	**13613.5**	**(36,970)**
Built 2010 or Later	339	0.8%	12.95	9,223	33.9	(422)
Built 2000 to 2009	39,642	4.5%	72.85	51,880	3964.2	(2,375)
Built 1980 to 1999	38,669	10.7%	173.22	123,358	3866.9	(5,647)
Built 1960 to 1979	25,968	25.0%	404.71	274,272	2596.8	(12,556)
Built 1940 to 1959	15,168	24.3%	393.38	274,362	1516.8	(12,560)
Built 1939 or Earlier	16,349	7.1%	114.94	75,616	1634.9	(3,462)
Renter Occupied	**45,128**	**27.7%**	**448.42**	**310,738**	**4512.8**	**(14,225)**
Built 2010 or Later	10	1.0%	16.19	11,529	1	(528)
Built 2000 to 2009	8,374	1.6%	25.90	18,446	837.4	(844)
Built 1980 to 1999	9,971	7.0%	113.32	80,702	997.1	(3,694)
Built 1960 to 1979	12,948	14.1%	228.26	160,540	1294.8	(7,349)
Built 1940 to 1959	6,184	3.4%	55.04	36,248	618.4	(1,659)
Built 1939 or Earlier	7,641	0.7%	11.33	4,425	764.1	(203)
Total Reduction Potential				**1,118,296**	**18,126**	**(51,195)**

**Includes estimated emissions associated with increased electrical use.

Commercial Building Stock	Total Estimated Commercial Establishments		Est Electricity Consumption (Million kWh)	Heating Fuel Emissions Remaining After Energy Efficiency Targets	Targeted Additional Fuel Switching Participation at 20% by 2030 (Establishments)	Estimated Heating Fuel Emissions Reduction From Fuel Switching by 2030 (Metric Tons)**
	Estimate					
Commercial Establishments	**12,951**	100.0%	**3868.33**	**811,923**	**1295**	**(37,170)**
Total Reduction Potential						

**Includes estimated emissions associated with increased electrical use.

Residential and Commercial Building Electricity Fuel Switching Potential (on-site renewable) Community Wide

Based on State of Illinois goals and commitments by electric utilities in the region, the GHG emissions associated with electricity use can be anticipated to continue to reduce over the years. Generally, however, increasing utilization of on-site renewable energy has multiple benefits for a community beyond GHG emissions reductions. The range of community benefits of increased on-site renewable energy include energy cost savings and increased energy resilience potential. For these reasons, we still recommend inclusion of strategic goals to increase on-site renewable energy.

paleBLUEdot has assessed the rooftop solar PV potential throughout the Kane County. This assessment has been conducted based on community -wide satellite data (sources: NREL, NOAA, and NASA). Generating capacity was calculated by roof orientation and tilt category. The projected potential for roof characteristics likely to result in economically viable solar arrays were then summarized—see "Total Countywide Optimized Rooftop Solar PV Potential" chart on following page.

Kane County's Solar Share Based on 2021 Data:	State	Kane County	Kane County's Share
Population	12,720,000	515,588	**4.05%**
Number of Solar Installations	37,995	252	**0.66%**
Average Solar Installations / 1,000 households	1.14	0.94	**82.46%**
Estimated Solar Generating Capacity (MW)	1,909	12.66	**0.66%**
Average Array Size (KW)	50.24	50.24	**100%**
Solar Industry Businesses	343	10	**2.92%**

Buildings and Energy

Total County Wide Optimized Rooftop Solar PV Potential

			Flat	Low Tilt	Mid-Low Tilt	Mid-High Tilt	High Tilt
Subtotal Flat							
Suitable Buildings	25,099	24.91%	**25,099**	-	-	-	-
Suitable Roof Planes	46,180	24.91%	**46,180**	-	-	-	-
Square Footage	14,598,565	24.91%	**14,598,565**	-	-	-	-
Capacity (KW dc)	129,704	24.91%	**129,704**	-	-	-	-
Generation (KWH)	161,870,826	28.21%	**161,870,826**	-	-	-	-
Subtotal South Facing							
Suitable Buildings	36,434	36.16%	-	**7,857**	**23,394**	**5,165**	**18**
Suitable Roof Planes	67,036	36.16%	-	**14,456**	**43,043**	**9,504**	**33**
Square Footage	21,193,031	36.16%	-	**4,569,770**	**13,607,469**	**3,004,620**	**11,172**
Capacity (KW dc)	188,294	36.16%	-	**40,601**	**120,899**	**26,695**	**99**
Generation (KWH)	209,425,430	36.50%	-	**43,621,333**	**134,174,021**	**31,517,572**	**112,503**
West + Southwest							
Suitable Buildings	32,244	32.00%	-	**6,887**	**25,357**	-	-
Suitable Roof Planes	59,326	32.00%	-	**12,672**	**46,654**	-	-
Square Footage	18,755,346	32.00%	-	**4,005,950**	**14,749,396**	-	-
Capacity (KW dc)	166,636	32.00%	-	**35,592**	**131,044**	-	-
Generation (KWH)	167,771,694	29.24%	-	**34,928,772**	**132,842,923**	-	-
East + Southeast							
Suitable Buildings	6,982	6.93%	-	**6,982**	-	-	-
Suitable Roof Planes	12,846	6.93%	-	**12,846**	-	-	-
Square Footage	4,061,108	6.93%	-	**4,061,108**	-	-	-
Capacity (KW dc)	36,082	6.93%	-	**36,082**	-	-	-
Generation (KWH)	34,684,280	6.05%	-	**34,684,280**	-	-	-

Grand Total		**Subtotal: Flat Roof**		**Subtotal: Low Tilt**		**Subtotal: Mid-Low Tilt**		**Subtotal: Mid-High Tilt**		**Subtotal: High Tilt**	
Suitable Buildings	100,759	25,099	24.91%	21,726	21.56%	48,751	48.38%	5,165	5.13%	18	0.02%
Suitable Roof Planes	185,388	46,180	24.91%	39,974	21.56%	89,697	48.38%	9,504	5.13%	33	0.02%
Square Footage	58,608,050	14,598,565	24.91%	12,636,828	21.56%	28,356,865	48.38%	3,004,620	5.13%	11,172	0.02%
Capacity (KW dc)	520,716	129,704	24.91%	112,275	21.56%	251,943	48.38%	26,695	5.13%	99	0.02%
Generation (KWH)	573,752,231	161,870,826	28.21%	113,234,385	19.74%	267,016,944	46.54%	31,517,572	5.49%	112,503	0.02%

Solar PV Rooftop Market Absorption Scenario

paleBLUEdot then explored potential new solar PV market absorption scenarios through 2030 building on the existing installed capacity within the county. The market projection we recommend using for guidance on potential new solar installations within Kane County uses Kane County's share of State population, adjusted for community average household income compared to state average, and applies that to the statewide new solar PV projections.

The resulting scenario outlined to the right anticipates a 33.5% initial growth rate. This scenario would result in approximately 3% of current countywide electrical consumption being met through rooftop solar PV by 2030.

Ground Mounted and Carport Capacity

In addition to roof mounted solar PV potential, the Kane County has significant solar PV potential associated with ground mounted arrays as well as arrays mounted over parking—known as "Carport" arrays. The 2022 Kane County Solar Renewable Energy Potentials Study outlined potential scenarios for each of these. The resulting recommended total distributed renewable energy potentials projection for 2030 is outlined to the right.

GHG emissions reduction associated with increased on-site solar projection by 2030: **(107,926)** Metric Tons.

Recommended Rooftop Growth Target
Based on Population Share, Adjusted for Community Ave Household Income (35.5% Initial Annual Increase)

Year	Cumulative Installed (KW)	Annual Generation (KWH)	% of Community Electric Consumption	This is Equivalent to adding (x) Average 9KW Residential Arrays Annually:	Or Equivalent to adding (x) 40KW Commercial Arrays Annually:
2025	31,517	34,726,679	**0.63%**	**698**	**157.1**
2030	144,048	158,719,737	**2.89%**	**2,877**	**647**
2040	994,212	1,095,475,065	**19.96%**	**10,843**	**2,440**

Total Distributed Renewable Energy Potentials Projection—2030

Source Potential	Cumulative Installed	Annual Generation Esti	Share of Demand
Estimated Existing	12,000 KW	13,950,000 KWH	0.25%
Rooftop	131,400 KW	144,750,000 KWH	2.65%
Carport	25,200 KW	31,125,000 KWH	0.6%
Ground Mounted	70,000 KW	86,300,000 KWH	1.6%
Total Potential	**238,600 KW**	**246,125,000 KWH**	**5.1%**

To achieve this solar PV generation Capacity, the Region would need to achieve the following solar PV installation coverage by 2030:

Rooftop Coverage	14.8 Million SF
Parking Lot Coverage	65 Acres
Lawn / Bare Ground Coverage	538 Acres

Buildings and Energy

Potential Climate Change Impacts by Sector

paleBLUEdot compiled a list of climate vulnerabilities for each of the sectors of interest included in this Baseline Assessment. The vulnerabilities were based on existing resources and our experience with other communities as well as regional planning documents and studies. The list of vulnerabilities generated for each sector included both direct impacts of climate change as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change or being exacerbated by climate change (see Climate Vulnerability Assessment for more information). The following are the vulnerabilities identified as being of particular concern for this sector:

Vulnerability: **Energy Cost and Power Outages**

High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages (with potentially significant impacts on vulnerable residents such as those who are already under financial stress)

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High

Vulnerability: **Flood Damage**

Increased damage or loss of buildings due to flooding or related impacts

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High

Vulnerability: **Infrastructure Damage**

Increased damage or loss of buildings and infrastructure due to extreme weather events or related impacts

Likelihood	Consequence	Capacity	Vulnerability
High	High	Moderate	Moderate

Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following community-wide Buildings and Energy Strategic Goals:

Pathway 1—Reduction

BE 1: Improve total Community wide residential, commercial, institutional, and industrial building energy efficiency by 12% for electricity and natural gas by 2030.

Mitigation Objective 3

BE 2: Increase adoption of high performance building construction technology, achieving 1% Net Zero households and commercial properties community wide by 2030. (Net Zero buildings are energy efficient buildings that produce as much energy on-site as they consume in a year)

Mitigation Objectives 2, 3

Fuel Switching

BE 3: Achieve 10% residential and commercial and industrial building "fuel switching" from on-site fossil fuel combustion to electrification by 2030.

Mitigation Objective 2

BE 4: Increase renewable energy to 25% (5% on-site and 20% green source purchase / Opt-Out Municipal Aggregation Program) of community-wide residential, commercial, institutional, and industrial building electric use by 2030.

Mitigation Objectives 2, 4

Adaptation

BE 5: Increase resilience of community-wide buildings to potential impacts of climate change. (impacts include increased flooding risk, increased extreme weather events, and increased extreme temperature events).

Adaptation Objective 4

Strategic Goal Recommendations Government Operations

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Buildings and Energy Strategic Goals:

Pathway 1—Reduction

BE 6: Improve total government building energy efficiency by 15% by 2030 (electricity and natural gas, including water and wastewater infrastructure).

Mitigation Objectives 1, 3, 7

Fuel Switching

BE 7: Achieve 15% government building thermal “fuel switching" from on-site fossil fuel combustion to electrification by 2030.

Mitigation Objectives 1, 2

BE 8: Increase renewable energy to 100% (10% on-site and 90% green source purchase / Opt-Out Municipal Aggregation Program) of government building electric use by 2030.

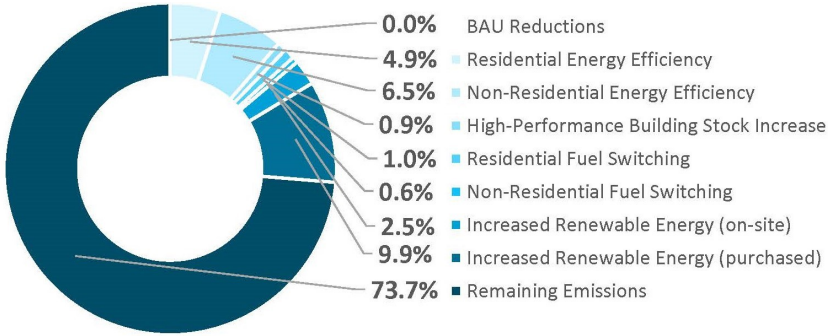
Mitigation Objectives 1, 2, 4

Adaptation

BE 9: Increase resilience of government facilities to the impacts of climate change.

Adaptation Objectives 1, 4

Projected Sector Emission Reductions Achieved by Draft Strategies



Section

04

Waste Management

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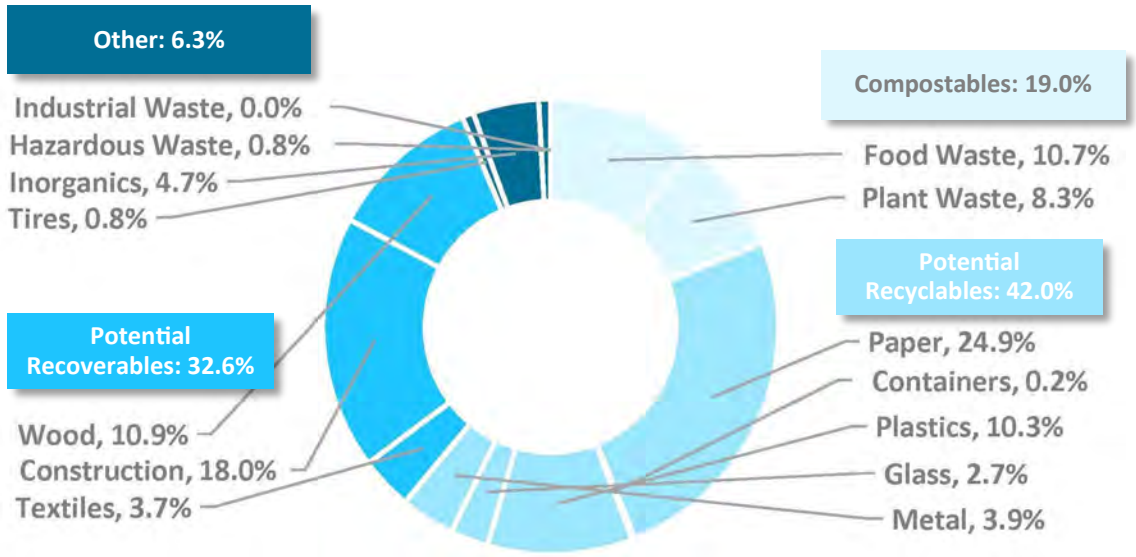
Waste Management

Waste management refers to both municipal solid waste and recycling, and includes consideration of volume, demand and service capacity, and infrastructure associated with collection and disposal

Community-wide municipal solid waste (MSW) handled has been estimated based on the County's GHG Inventory. In 2019, community-wide MSW totaled 597,852 tons. According to the Chicago Metropolitan Agency for Planning (CMAP), of the MSW handled an estimated 6.7% were organics collection, and the remaining 93.3% were landfilled. According to CMAP data, per capita organics collection has increased 36% in Kane County since 2010. However, the same data indicates a 21% increase in per capita landfilled solid waste over the same period indicating strategies to reduce overall waste generation as well as strategies to increase recycling and organics diversion are likely to reduce county-wide solid waste emissions.

Kane County Solid Waste Characteristics

According to the Chicago Metropolitan Agency for Planning (CMAP) and the 2015 Illinois Waste Characterization Study, organics comprise 19% of landfilled waste streams, while recyclables (paper, plastic, paper, glass, and metal) make up 42%. Potential recoverable materials such as wood, construction materials, and textiles comprise 32.6% of landfilled waste streams, and the remaining 6.3% are hazardous and other inorganic materials.

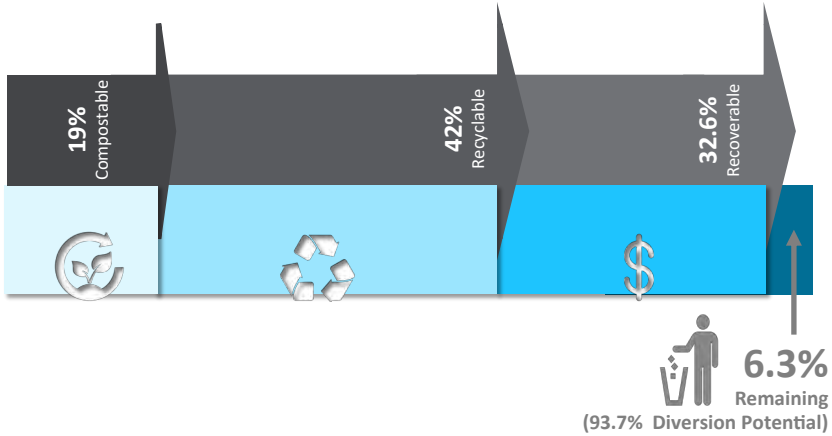


Waste Management

Waste Diversion Potential

Based on the 2015 Illinois Waste Characterization Study, there may be waste diversion potential of up to 93.7% in the current landfilled materials (idealized maximum). Below is the breakdown of the estimated total maximum potential waste diversion (excluding waste reduction):

Compostables	**19%**
Potentially Recyclable Materials	**42%**
Potentially Recoverable Materials	**32.6%**
Other Materials (remaining landfill waste)	**6.3%**



Waste Management

Potential Climate Change Impacts by Sector

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Vulnerability: **Energy Cost and Power Outages**

Increased leakage and run-off, potentially impacting local water quality.

Likelihood	Consequence	Capacity	Vulnerability
Moderate	Very High	High	Low

Vulnerability: **Increased Waste Generation**

Increased waste generation due to debris and other damage (including organic debris from vegetation damage), which is likely to be exacerbated by illegal dumping.

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High

Vulnerability: **Resistance to Change**

Historical precedence for solid waste collection frequency, complexity of encouraging behavior change required to reduce solid waste generated and/ or increase effective diversion to recycling and organics composting results in complications in reducing solid waste impacts.

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High

Waste Management

Strategic Goal Recommendations

Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Waste Management Goals:

Pathway 1—Reduction

WM 1: Decrease total municipal solid waste handled 2.5% by 2030 (-17.5% estimated per household decrease).

Mitigation Objective 1

WM 2: Achieve 35% organics landfill waste diversion by 2030 (from 6.7% to 15.5% of total MSW).

Mitigation Objective 7

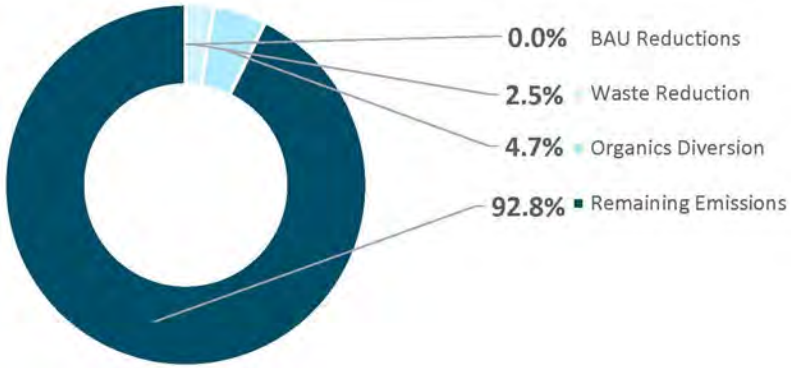
WM 3: Increase recycling from 31% to 41% of total MSW handled by 2030.

Mitigation Objective 37

WM 4: Decrease municipal solid waste from government operations 15% by 2030.

Mitigation Objective 7

Projected Sector Emission Reductions Achieved by Draft Strategies



Section

05

Local Food and Agriculture

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Local Food and Agriculture

Transporting food across long distances burns fossil fuels and emits greenhouse gases. The extended period of time of long-distance transport increases the need for refrigeration. Refrigeration is carbon-intensive. The less transportation and refrigeration needed to supply us our food, the more sustainable it becomes.

According to the US EPA, Agriculture accounted for 9.9% of the total national 2018 greenhouse gas emissions. Of that total, 42% of the emissions – approximately 259 million metric tons in CO2 equivalents -- were related to livestock management. The balance comes from soil management practices and energy inputs to power agricultural equipment and operations. Tillage practices affect soil health, soil carbon content, water pollution, and farmers' energy and pesticide use.

Economic Potential of Local Food Purchases

Buying food from local sources can reduce the carbon intensity of our diet while also supporting your small business local economy. Studies have indicated that nearly 32 jobs are created for every $1 million in revenue generated by produce farms involved in a local food market, compared to only 10.5 jobs for those involved in wholesale channels exclusively. Meanwhile, the outdoor and social activity supported by community gardens and increased gardening in neighborhoods have social and community benefits like increasing social cohesion, providing multi-generational activity, supporting outdoor low-impact exercise, and support of plant/animal/pollinator habitat)

Local Food and Agriculture

Kane County Agriculture

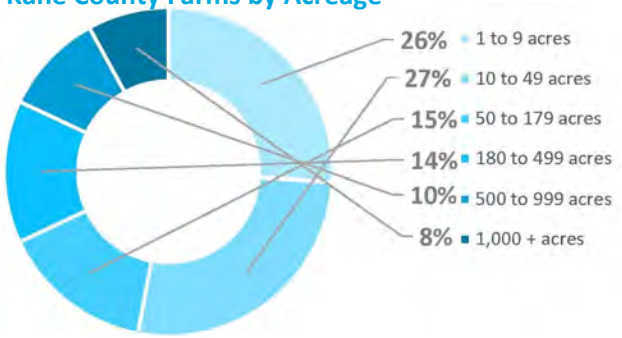
Agriculture land uses cover 41% of the land in Kane County. The area supports over 600 farms with an average size of 280 acres producing an average of $300,000 in annual sales.

The farm operations within the County harvest approximately 130,000 acres of crops. Livestock supported by Kane County farms include 4,900 cattle, 51,100 hogs, 3,800 chickens, and 1,500 horses.

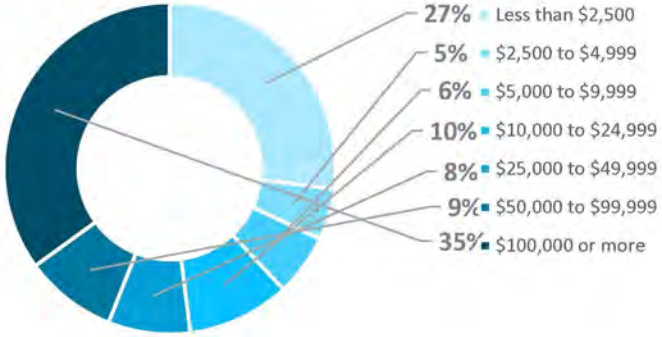
Land Use Practices (% of farms)

No till	25
Reduced till	22
Intensive till	28
Cover crop	9

Kane County Farms by Acreage



Kane County Farms by Sales

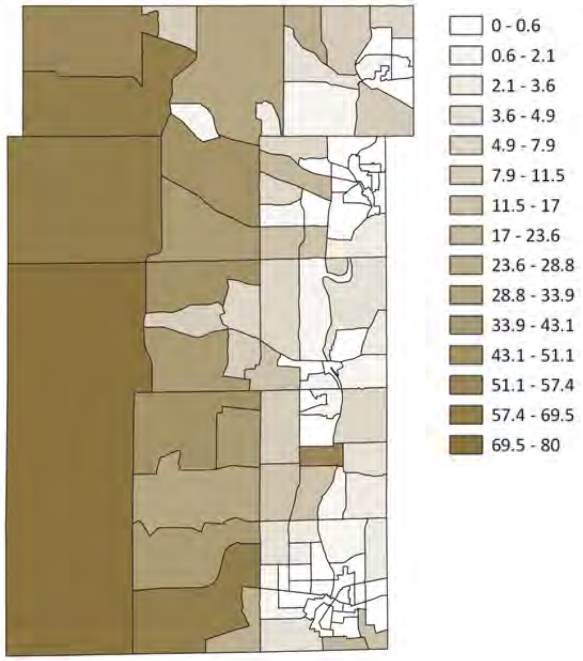


Agriculture Land Coverage

County Average:
41.0%

County High:
80%
Tract 8524.03

County Low:
0.0%
Multiple Tract



*Source: US EPA State Inventory Tool (SIT)

Local Food and Agriculture

Animal Farming and GHG Emissions

Livestock on farms are responsible for a significant release of GHGs from various aspects along the production process. Much of these emissions are from the biological processes of the livestock themselves. There are three primary ways in which dairy farms create – and consequently can manage the production of GHG emissions:

- **Direct emissions** from biological processes of the livestock (manure, enteric fermentation)
- **Indirect emissions** related the support and management of the livestock
  (reduced carbon sequestration and soil carbon associated with tillage and some soil management practices, emissions associated with soil nitrates from excess and synthetic fertilizer use, energy inputs for fertilizer manufacture, energy inputs for farm operations)
- **Post-production emissions**
  (energy inputs for transportation, processing, packaging, and retailing)

Kane County Livestock

4,900 Cows	13,138 **MTCO2e** annually*	**5,911 lbs CO2e** / animal
1,476 Horses	755 **MTCO2e** annually*	**1,128 lbs CO2e** / animal
51,093 Hogs	17,309 **MTCO2e** annually*	**747 lbs CO2e** / animal
800 Sheep	201 **MTCO2e** annually*	**553 lbs CO2e** / animal
140 Goats	18 **MTCO2e** annually*	**291 lbs CO2e** / animal
3,776 Chickens	11 **MTCO2e** annually*	**6 lbs CO2e** / animal

*Source: US EPA State Inventory Tool (SIT)

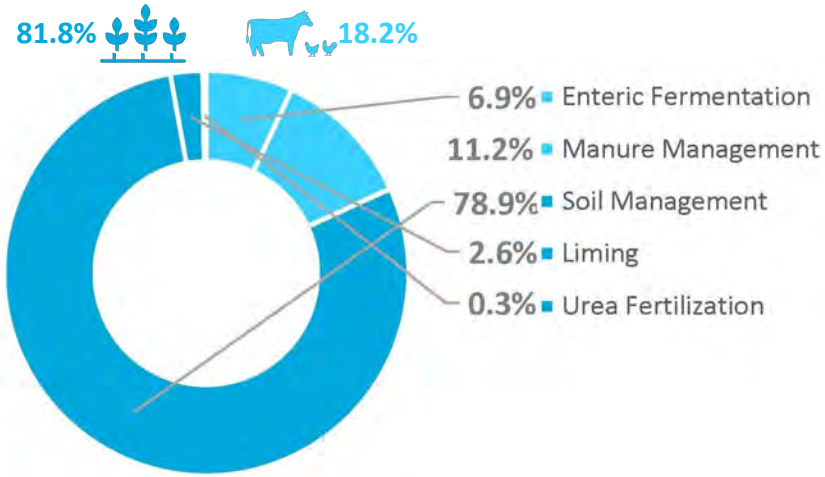
Crop Farming and GHG Emissions

Agricultural soil management practices can lead to increased greenhouse gas emissions. The level of availability of nitrogen in the soil can result in emissions of nitrous oxide (N_2O). Practices that contribute to N_2O emissions from agricultural lands include the application of synthetic and organic fertilizers, the growth of nitrogen-fixing crops, the drainage of organic soils, drainage, and irrigation practices. Management of agricultural soils accounts for just over half of the greenhouse gas emissions from the Agriculture economic sector.

General strategies to reduce emissions from crop farming include: Reducing emissions from fertilizer use through appropriate amount and timing of nitrogen required for optimal crop production (over-application of nitrogen can lead to higher nitrous oxide emissions without enhancing crop production).

Increasing adoption of carbon positive soil and crop management practices can increase the sequestration of carbon in agricultural soils.

Kane County Agriculture Emissions by Source



Strategies for Reducing Cattle Farm Emissions

Research is ongoing in the United States and Europe to quantify the emissions reduction potential of a number of cattle and diary practices, though evidence illustrates their intrinsic value in managing and reducing dairy farm emissions. General strategies include:

Feed Efficiency and Mix

Approximately 75% of all the energy contained in feedstuffs that the cow eats is converted into methane (CH4) emissions. Considering emissions per animal versus emissions per unit of production (gallons of milk) is an important distinction, however, as increasing productivity per animal can result in lower overall GHG emissions.

According to Farm Carbon Toolkit, a community interest company in the UK, there are a range of studies that have shown positive results from increasing the legume content of the forage, replacing maize with grass forage, and increasing the oil content of the feed.

Manure Management

Use of anaerobic digestion has three layers of emissions benefits as it can reduce emissions associated with manure storage and application while converting the methane into an energy source replacing fossil fuel use support farm operations or for sale to industrial consumers.

Soil and Crop Management

Farmers can adopt soil management practices to increase carbon sequestration and reduce soil carbon losses. These practices focus on increasing the volume of organic matter stored in the soil and include switching from conventional tillage to conservation tillage or no-till, reducing or eliminating fallow as part of planned crop rotations, switching from annual to perennial crops, increasing field residues through irrigation, improved drainage, organic fertilization, planting hay or cover crops, or using additional organic material. Fertilizer use is estimated to account for up to 20% of agricultural emissions, meaning that implementing improved soil and crop management practices with a focus on reduction of fertilizer use can help reduce GHG emissions while improving overall farm gross margins through reduction of input costs.

Renewable Energy and Energy Efficiency

As outlined in the Buildings and Energy section, increased use of on-site renewable energy sources and improved energy efficiency of farm buildings and facilities can result in important emissions reductions. Equally important is the operational cost reductions these strategies can have on overall farm operational costs.

Local Food and Agriculture

Climate Change and Food Security

Our food system is vulnerable to impacts of climate change. These vulnerabilities include physical impacts like extreme precipitation and heat, crop and livestock vulnerabilities like animal heat stress, biological impacts like increasing invasive insect infestations, interruptions to natural annual cycles, and socioeconomic impacts.

Pacific states are particularly sensitive to reduced water supplies, warmer winters, and more variable spring weather. Grain production is vulnerable to more variable weather, warmer winters, heat wave, and hot summer nights and flooding in the Great Plains and the Midwest. Beef, pork, and poultry production is vulnerable to increased frequency and intensity of extreme weather in the Great Plains and the Southeast as well as sensitive to interruptions in feed, water, and power supplies that can occur with extreme weather events and other climate change drivers.

Although all community members may feel any affects of climate change impacts on the food system, individuals who are already experiencing low income or food insecurity will very likely experience these affects more profoundly. Today, food insecurity—disruption of nutrition availability because of lack of money, access, or other resources—is inequitably felt: people experiencing low income are nearly three times more likely to experience food insecurity. We should anticipate that the climate change vulnerabilities of our national food system will exacerbate the inequities of food security in all communities

Increased local food system capacity can help increase resilience, food security, job creation, and community wealth building benefits.

Community Gardens per 100,000 Residents

(Sources: American Community Gardening Association)

United States (18,000 Total)	**5.5**
City of Chicago (57 Total):	**2.1**
Glenview (1 Total):	**2.1**
Oak Park (1 Total):	**1.9**
Lake County (11 Total):	**1.5**
McHenry County (3 total):	**1.0**
Kane County (11 total):	**2.2**

Farmers Markets

(Sources: USDA, Kane County Farm Bureau, Naturally McHenry County, Lake County, Illinois Convention & Visitors Bureau)

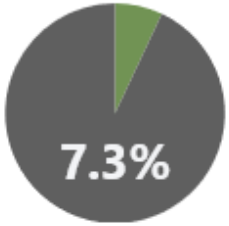
Evanston	**3**
Glenview	**1**
Highland Park	**2**
Oak Park	**3**
Lake County	**1**
McHenry County	**20**
Kane County	**10**

Potential Food Insecurity in Kane County

According to Feeding America's Map The Meal Gap tool and USDA data, the Kane County counties have an estimated total food insecure population of 38,650. This represents an estimated average county level food insecure rate of 7.3%.

KANE COUNTY — **FOOD INSECURE POPULATION: 38,650**

FOOD INSECURITY RATE

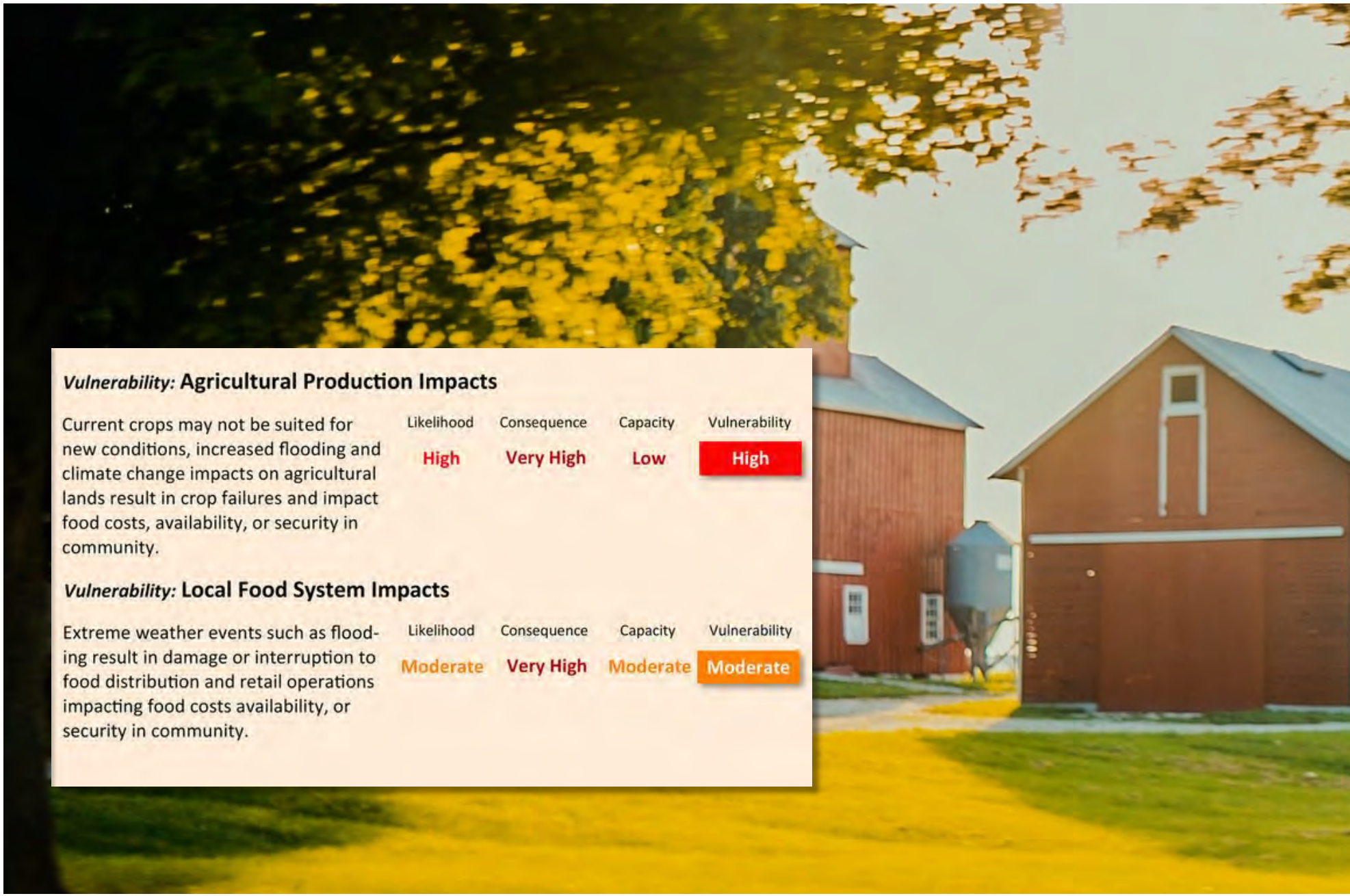


ESTIMATED PROGRAM ELIGIBILITY AMONG FOOD INSECURE PEOPLE OVERALL

32%	Above Other Nutrition Program threshold of 185% poverty
9%	Between 165% - 185% poverty
60%	Below SNAP threshold of 165% poverty

AVERAGE MEAL COST
$ 3.41

ADDITONAL MONEY REQUIRED TO MEET FOOD NEEDS
$ 21,203,000



Vulnerability: Agricultural Production Impacts

Current crops may not be suited for new conditions, increased flooding and climate change impacts on agricultural lands result in crop failures and impact food costs, availability, or security in community.

Likelihood	Consequence	Capacity	Vulnerability
High	Very High	Low	High

Vulnerability: Local Food System Impacts

Extreme weather events such as flooding result in damage or interruption to food distribution and retail operations impacting food costs availability, or security in community.

Likelihood	Consequence	Capacity	Vulnerability
Moderate	Very High	Moderate	Moderate

Local Food and Agriculture

Strategic Goal Recommendations— County Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Local Food and Agriculture Goals:

Sequestration

FA 1: Increase adoption of carbon positive soil, crop, fertilizing, irrigation, and drainage management practices from approximately 25% to 50% by 2030.

Mitigation Objective 8

Reduction

FA 2: Increase share of farms using high feed efficiency practices, achieve 20% adoption rate by 2030.

FA 3: Reduce GHG emissions from manure management, achieve 20% adoption rate by 2030.

Fuel Switching

FA 4: Shift to low / no GHG and renewable energy in agricultural operations (reductions included in Buildings and Energy calculations).

Mitigation Objectives 2, 4

Adaptation

FA 5: Increase production of and access to local food, particularly serving low income and food insecure individuals.

FA 6: Reduce food waste and hunger, achieve a 50% reduction in food insecurity County-wide by 2030.

FA 7: Protect and preserve agricultural land while increasing its resilience to climate shocks.

Section

06

Water and Wastewater

Click here to return to TOC

Water and Wastewater

Water and Energy Nexus

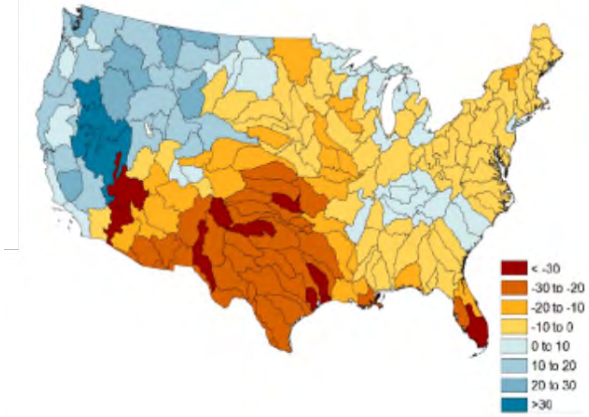
Water and energy are fundamental components of our 21st century life. Production, distribution, consumption, and treatment of water consumes energy. Production of energy - particularly those generated through fossil fuel use - consumes water. The water-energy nexus is the relationship between how much water is used to generate and transmit energy, and how much energy it takes to collect, clean, move, store, and dispose of water. Both fresh water production and waste water treatment are typically the highest energy and carbon emission sources within a community's operations. Reduction of water demand saves energy not only in the production and distribution of fresh water but also in the collection and treatment of wastewater.

Regional Water Stress

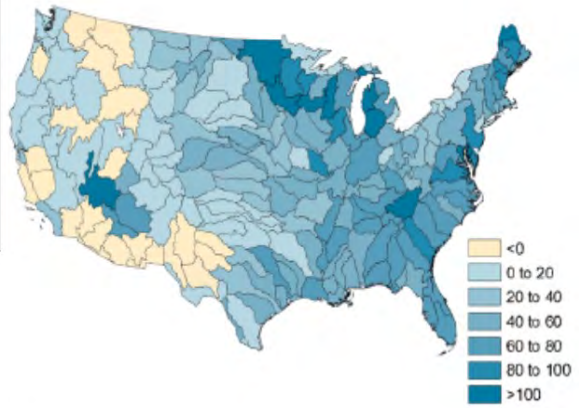
By 2025, an estimated 1.8 billion people will live in areas plagued by water scarcity, with two-thirds of the world's population living in water-stressed regions. Since 1985 the Kane County region has had a reduction in water yield of approximately 10%. Through 2050, the County can anticipate an increase in water demand of 20%.

(Sources: "Adaptation to Future Water Shortages in the United States Caused by Population Growth and Climate Change", World Resources Institute, USGS).

Change in Water Yield Since 1985



Projected Change in Water Demand by 2050



Mitigating Flood Impacts

According to the US National Climate Assessment, the ten rainiest days can contribute up to 40% of the annual precipitation in the Illinois region. By 2070, the Kane County area can anticipate an increase of up to 15% in the total annual precipitation. In addition, the timeframe between rains is expected to continue to increase, (source US National Climate Assessment). Under this scenario, it is likely that certain periods of the year, like spring, may be significantly wetter with storms producing heavier rains. In anticipation of that, it is appropriate to review the areas of the County with flood risk and to review current storm water management capacity against future extreme rainfall event projections.

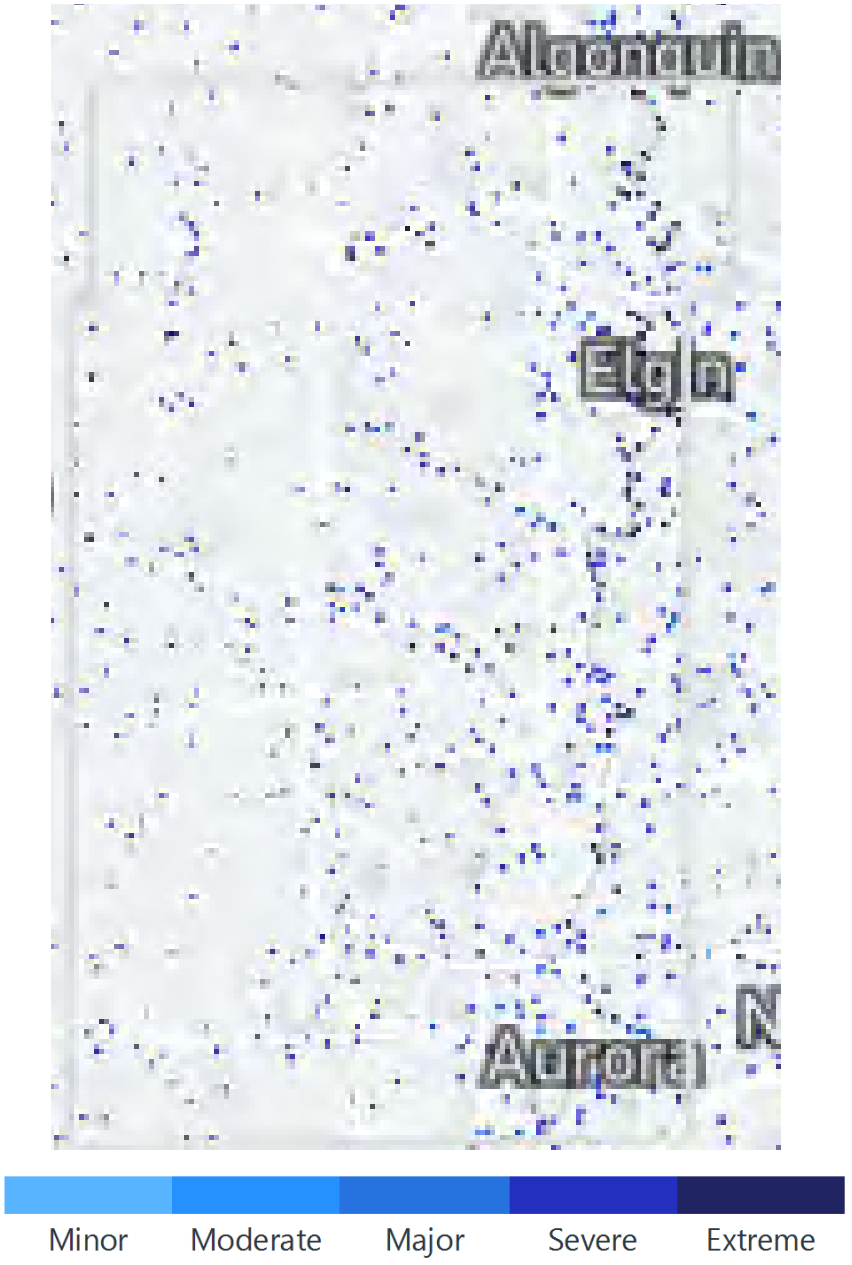
The map to the right shows the flood risk areas throughout the County as defined by FEMA . Flood risks illustrated relate to water surface elevations for 1% chance annual floods ("100 year flood event"). Areas shown relate to existing bodies of water as well as potential "flash flood" zones in low-lying areas.

Properties at Risk

There are over 15,100 properties in Kane County that have **greater than a 26% chance** of being severely affected by flooding over the next 30 years. This represents **11%** of all properties in the city. Properties at risk in Kane County:

- **12,101** Households (8.5% of total)
- **2,347** Commercial Properties (23.5% of total)
- **28** Critical Infrastructure (25% of total)
- **95** Social and Gathering Facilities (19.9% of total)

Source:
First Street Foundation, FEMA



Water and Wastewater

Water Conservation Potential

Based on Chicago Metropolitan Agency for Planning (CMAP) data, water consumption county-wide totaled 22.5 billion gallons in 2005. CMAP projections anticipate a 7-12% increase in water withdrawals through 2050 due to climate change impacts alone.

Water conservation can help maintain healthy aquifers as the region's water demand increases and improve resilience. In addition to water consumption behavior change, significant water conservation opportunities likely exist. According to CMAP's 2014 water loss report, the average system water loss in the metro area is 12.5%. For Kane County, this could represent up to 2.8 billion gallons of water annually.

Potential Climate Change Impacts by Sector

paleBLUEdot compiled a list of climate vulnerabilities for each of the sectors of interest included in this Baseline Assessment. The vulnerabilities were based on existing resources and our experience with other communities as well as regional planning documents and studies. The list of vulnerabilities generated for each sector included both direct impacts of climate change as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change or being exacerbated by climate change (see Climate Vulnerability Assessment for more information). The following are the vulnerabilities identified as being of particular concern for this sector:

Possible Climate Change Impacts on Water Withdrawals

Weather scenario	2005 use (mgd)	Use in 2050 (mgd)	2005-2050 change (mgd)	Change from CT in 2050 (+/-%)
Current scenario	1,428	1,958	530	—
+6°F and +2.5" precip.	1,428	2,105	677	+7
+6°F and -3.5" precip.	1,428	2,188	760	+12

Vulnerability: Increased Flooding

Increased flooding during periods of heavy rain, particularly where the City's stormwater infrastructure is inadequate for increased volumes or impermeable surfaces prevent infiltration.

Likelihood	Consequence	Capacity	Vulnerability
Very High	Very High	Moderate	High

Vulnerability: Groundwater Infiltration

Elevated groundwater tables due to frequent large storms, infiltrating the sanitary sewer system and increasing the cost of treatment.

Likelihood	Consequence	Capacity	Vulnerability
Very High	Moderate	High	Moderate

Vulnerability: Resistance to Change

Water consumption behaviors and infrastructure investments (i.e. landscape sprinklers, non-native plantings, etc) as well as perception of a water rich region result in complications in reducing water consumption patterns.

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High

Projected Sector Emission Reductions Achieved by Draft Strategies

* Emissions associated with water processing included in Buildings and Energy

Water and Wastewater

Strategic Goal Recommendations

Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Water and Wastewater Strategic Goals:

Reduction

W 1: Promote increased water conservation and wastewater generation County-Wide with a targeted reduction of 5% by 2030.

Mitigation Objective 7; Adaptation Objectives 1, 3, 4, 5

Adaptation

W 2: Update design standards and implement plans to meet projected climate change storm water and flood mitigation requirements.

Adaptation Objective 8

W3: Increase groundwater, stream, river and wetland water quality protection and restoration.

Adaptation Objective 4

W4: Educate, engage, and empower the public on water quality and conservation.

Adaptation Objective 1

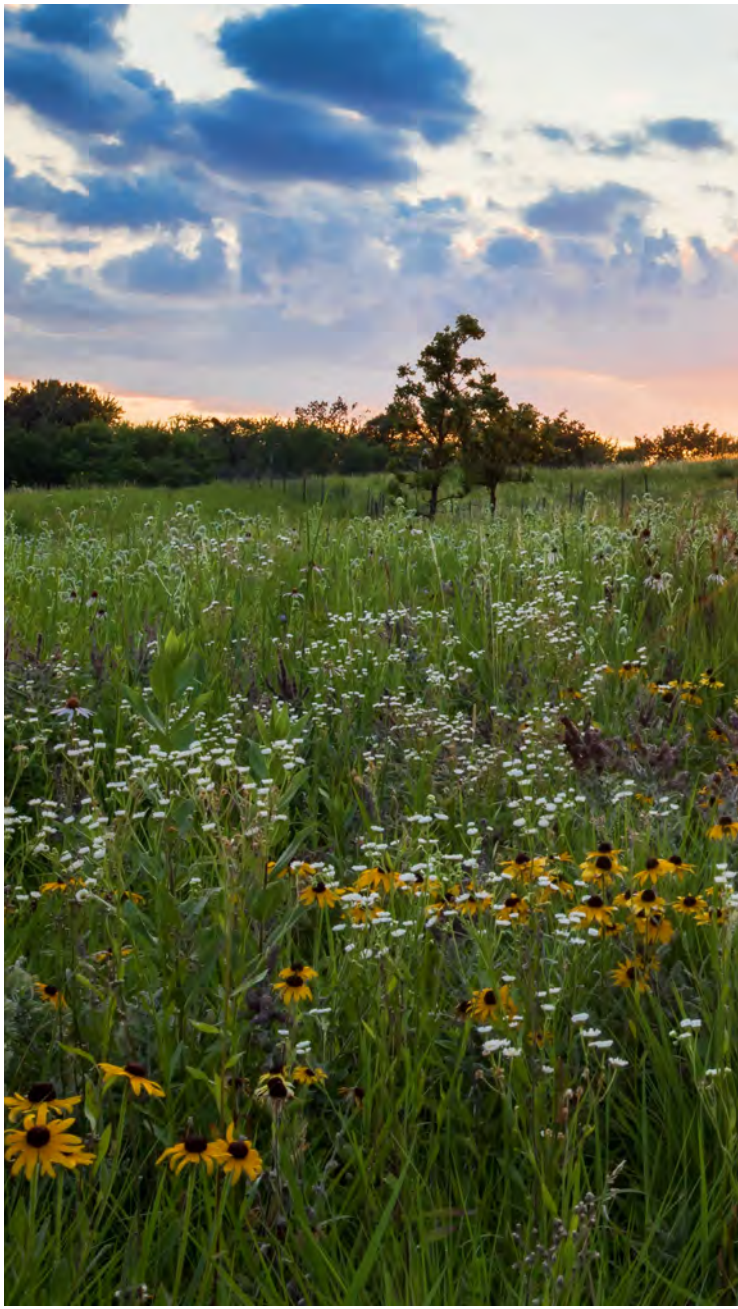
Section 07

Greenspace and Ecosystems

Click here to return to TOC

Trees and natural ground covering play a central role in supporting community health, improving air and water quality, helping to reduce building energy use, and supporting climate mitigation. Recent studies have shown that sometimes, going to a park, or even looking a single tree can significantly improve a person's health and stress levels. Our understanding of the value of trees has been expanded to include mental and physical health benefits. Trees are critical in filtering air, removing harmful pollutants, such as Carbon Monoxide, particulate matter, and Ground-level Ozone - pollutants that can be toxic at high levels and which can cause asthma and other respiratory impacts.

Conversely, higher levels of impervious surfaces (pavement and buildings) within a community will increase the heat island of the community. Heat island refers to the phenomenon of higher atmospheric and surface temperatures occurring in developed areas than those experienced in the surrounding rural areas due to human activities and infrastructure. Increased heat indices during summer months due to heat island effects raise human discomfort and health risk levels in developed areas, especially during heat waves. Based on a 2006 study done by Minnesota State University and the University of Minnesota, the relationship between impervious surface percentage of a City and the corresponding degree of heat island temperature increase can be understood as a ratio. (see "Impervious Surface Reduction Potential" for more)



Greenspace and Ecosystems

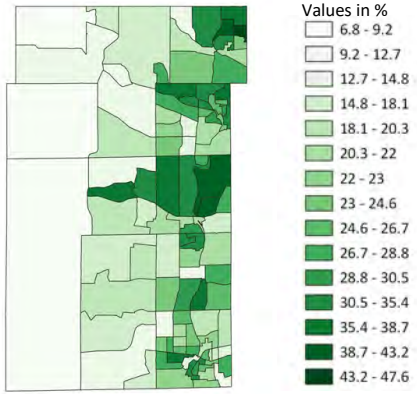
Community-wide Land Cover Characteristics

Based on the Ground Cover Survey and Carbon Sequestration Study, the County's land cover characteristics are:

County Average: **16.9%**

County High: **47.6%**
Tract 8502.01

County Low: **6.8%**
Tract 8524.03

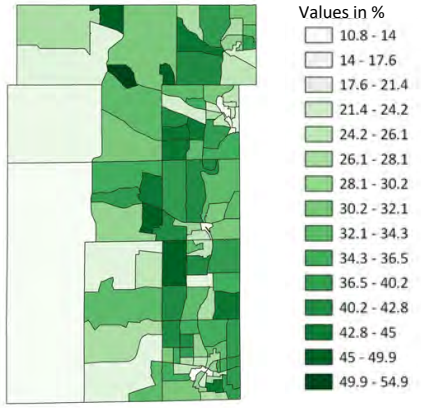


Lawns and Grass Coverage

County Average: **26.5%**

County High: **54.9%**
Tract 8507.1

County Low: **10.8%**
Tract 8524.03

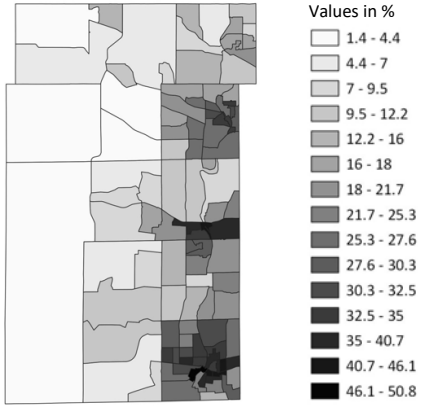


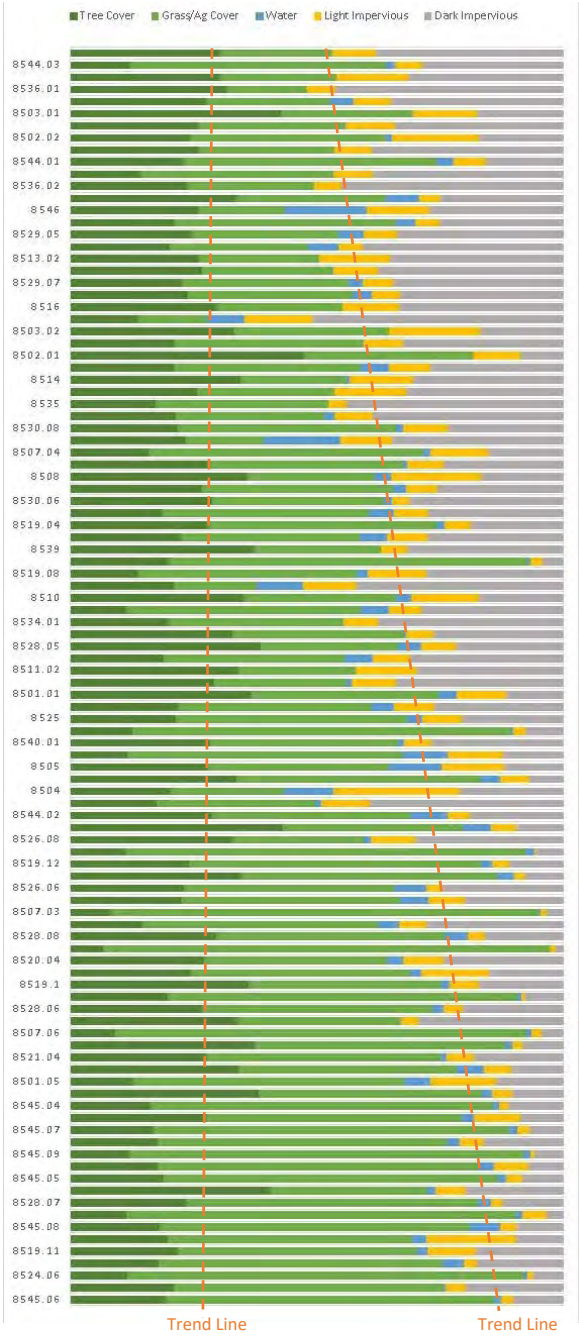
Dark Impervious Surface Coverage (buildings+pavement)

County Average: **3.1%**

County High: **5.9%**
Tract: 412bg1

County Low: **0.96%**
Tract: 410.05bg3





More LMI

Less LMI

Ground Cover Characteristics by Census Tract

Organized by Share of Low Income Population (LMI)

The bar chart provides a side-by-side comparison of the of land cover by Census Tract. The trend lines indicate census tracts with more lower income residents have more dark impervious surfaces.

Greenspace and Ecosystems

Review Criteria - Green Infrastructure

Prioritization of locations for increased green infrastructure included in this report is based on an equity approach. This approach reviews a range of land cover and demographic characteristics of each neighborhood in an "Environmental Equity Index", based on procedures developed by the USDA Forest Service.

To determine the best locations to plant trees, tree canopy and impervious cover maps were used in conjunction with U.S. Census data to produce an index of priority planting areas by neighborhood. Index values were produced for each neighborhood with higher index values relating to higher priority of the area for tree planting. This index is a type of "environmental equity" index with areas with higher human population density, higher economic stress, lower existing tree cover, and higher total tree canopy potential receiving the higher index value. The criteria used to make the index were:

- Priority Tree Canopy Increase Based on Tree Stock Potential Levels.
- Priority Tree Canopy Increase Based on Economic Stress Density.
- Priority Tree Canopy Increase Based on Tree Population Density.
- Priority Tree Canopy Increase Based on Heat Island Mitigation Potential.

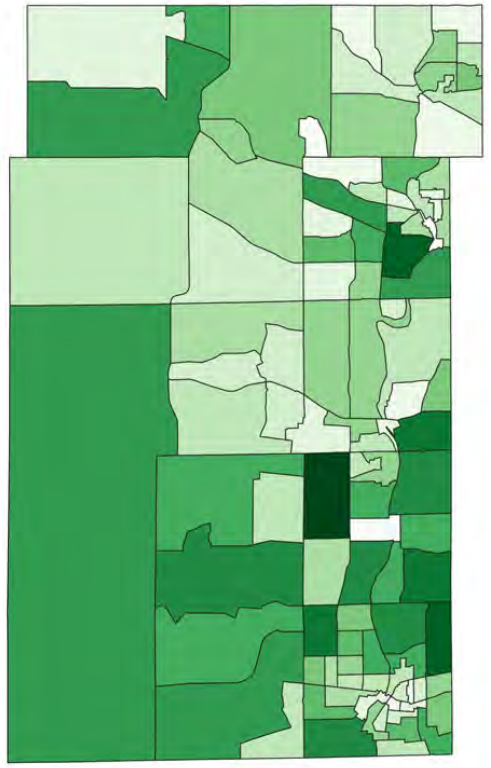
Weighted Priority Tree Canopy Increase

The weighted prioritization for tree canopy increase looks to balance the potential for increased tree canopy with the opportunity to improve tree canopy benefit equity, potential to positively impact as many households as possible, and the need for mitigation of heat island impacts. The priorities above are weighted as follows:

- Potential for new trees: 20%
- Population density: 20%
- Low Income Population (equity adjustment): 30%
- Heat Island mitigation need: 30%

Weighted Priority Tree Canopy Increase

To improve environmental equity, the darker green areas of this map with higher numbers in the legend below should be prioritized for new tree plantings.



Greenspace and Ecosystems

Calculating Tree Canopy Coverage Goals

Total tree canopy coverage goals are central to long-range land cover goal recommendations for the city. In support of an "Environmental Equity" approach to tree canopy goalsetting, as outlined, identification of long-term tree canopy coverage goals includes consideration of each neighborhood's Tree Stock value (the amount of existing tree canopy compared to available land for tree canopy coverage), population densities, economic stress densities, and heat island mitigation need. As a long-term focus, we are using 2040 as a goal calculation date reflecting the time for planted tree to reach maturity, however, final and refined goals can be established for 2030 or any other interim year. Goals are established with a progressive percentage increase goal based on neighborhood prioritization. As the total Tree Stock area (potential tree canopy) varies by neighborhood, the resulting Tree Canopy percentage varies for each neighborhood.

The recommended Tree Stock increase goals are:

For neighborhoods in the top 1/3rd Neighborhood Priority Ranking: **12%**
For neighborhoods in middle 1/3rd Neighborhood Priority Ranking: **7.25%**
For neighborhoods in bottom 1/3rd Neighborhood Priority Ranking: **2.5%**

Tree Canopy Increase Over Existing Tree Canopy Area

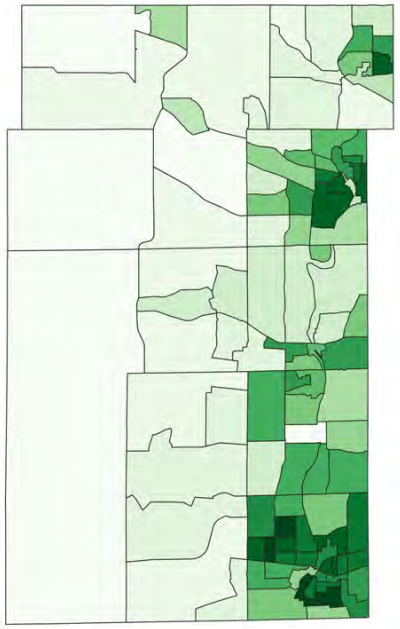
Values in %

- 3.3 - 4.1
- 4.1 - 5.5
- 5.5 - 7.2
- 7.2 - 11
- 11 - 12.6
- 12.6 - 15.1
- 15.1 - 18
- 18 - 21.2
- 21.2 - 24.1
- 24.1 - 26.6
- 26.6 - 29.6
- 29.6 - 34.4
- 34.4 - 37.2
- 37.2 - 48.2
- 48.2 - 53.9

Tree Canopy Increase in Absolute Land Cover %

Values in %

- 0.3 - 0.5
- 0.5 - 0.9
- 0.9 - 1.3
- 1.3 - 1.8
- 1.8 - 2.6
- 2.6 - 3
- 3 - 3.6
- 3.6 - 4
- 4 - 4.4
- 4.4 - 4.7
- 4.7 - 5.2
- 5.2 - 6.1
- 6.1 - 6.5
- 6.5 - 7.1
- 7.1 - 7.9



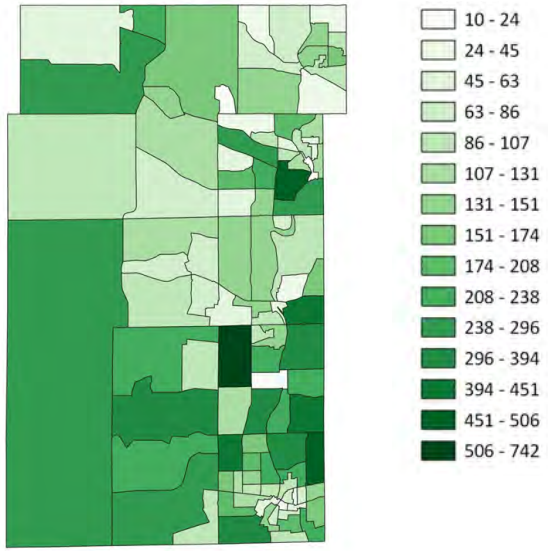
New Tree Planting Annual Target to Meet 2040 Tree Canopy Goal

Community-Wide Total:
(Note, Acreage represents the canopy coverage at year of planting, with an assumed new tree crown radius of 5')

16,550 New Trees **228** Acres

New Tree Planting Annual Target by Census Tract

(in number of new trees planted annually)



Other Ground Cover Goal Potentials

In addition to opportunities to expand and improve the County's tree canopy, the findings of the ground cover study as outlined in the the Kane County Ground Cover, Tree Canopy, and Carbon Sequestration Study may be used to identify additional opportunities for increased heat island mitigation and increased native grass installations.

**Comparison of impervious surface area and normalized difference vegetation index as indicators of surface urban heat island effects in Landsat imagery.* Fi Yuan and Marvin Bauer, February 2007

Greenspace and Ecosystems

Turf Reduction Potential

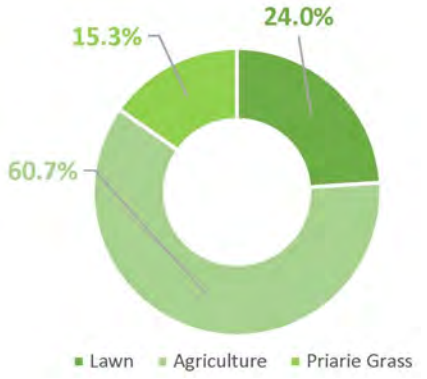
As illustrated in the chart below, 60.7% of all grasslands in Kane County are agricultural and crop lands. An estimated 15.3% are native prairie and wildflower grasses. The remaining 24% are manicured lawns—representing a great opportunity for turf reduction.

Impervious Surface Reduction Potential

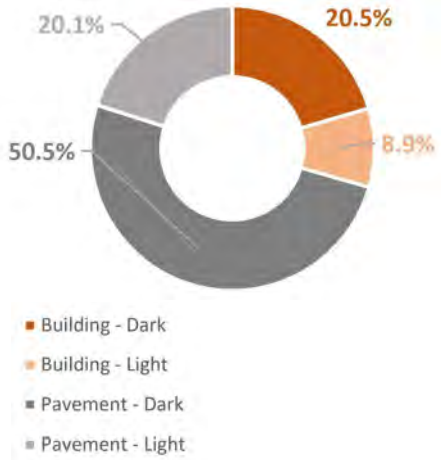
The city's experiences of heat island are directly impacted by the level of impervious surface coverage—particularly dark roofs and pavement. Based on a 2006 study done by Minnesota State University and the University of Minnesota*, the relationship between impervious surface percentage of a City and the corresponding degree of heat island temperature increase can be understood as a ratio. This chart illustrates dark pavements make up 50.5% while dark roof structures make up 20.5% for a total of 71% of all impervious surfaces. These represent significant opportunities for decreasing heat island impacts in the community through "cool" and "green" roof and pavement strategies. For every 1% decrease in impervious surfaces in a neighborhood of Kane County, that area's likely experience of summer time heat island temperatures may decrease 0.17° F

See Kane County Ground Cover Survey and Carbon Sequestration study for more information: https://cutt.ly/c4t3vRf

Existing Grass Coverage in Kane County by Type



Existing Impervious Surface Coverage by Type



Greenspace and Ecosystems

Potential Climate Change Impacts by Sector

paleBLUEdot compiled a list of climate vulnerabilities for each of the sectors of interest included in this Baseline Assessment. The vulnerabilities were based on existing resources and our experience with other communities as well as regional planning documents and studies. The list of vulnerabilities generated for each sector included both direct impacts of climate change as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change or being exacerbated by climate change (see Climate Vulnerability Assessment for more information). The following are the vulnerabilities identified as being of particular concern for this sector:

Vulnerability: **Invasive Species**

Expansion of non-native invasive plants and insect pests as temperatures increase (particularly winter temperatures), likely resulting in the introduction of new invasive species into the area.

Likelihood	Consequence	Capacity	Vulnerability
Very High	Moderate	Moderate	Moderate

Vulnerability: **Flooding Impacts**

Increased flooding and erosion, impacting native plant communities (e.g., can result in loss of species such as ash) as well as access to and condition of parks and conservation.

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	Moderate

Vulnerability: **Tree Canopy Stress**

Increased stress and potential loss of tree canopy due to invasive pests (i.e. Emerald Ash Borer), changing temperature and precipitation patterns, extreme weather events, and invasive species impacts.

Likelihood	Consequence	Capacity	Vulnerability
Very High	Very High	Moderate	High

Greenspace and Ecosystems

Strategic Goal Recommendations

Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Greenspace and Ecosystems Strategic Goals:

Adaptation

GE 1: Increase tree cover, particularly in the priority neighborhoods, from 16.9% to 18% by 2030 and 19.5% by 2040 (an increase over existing coverage of 6.5% and 15% respectively with growth coming from non-invasive species and an emphasis on climate adaptive species).

Mitigation Objective 8; Adaptation Objective 4; Aligns with CRTI recommendation

GE 2: Increase pollinator supportiveness of lawns and grasslands in County and achieve a 5% turf replacement with native grasses and wildflowers Community-wide by 2030.

Mitigation Objective 8; Adaptation Objective 4

GE 3: Reduce heat island effect through Community-wide “dark” impervious surface coverage particularly in neighborhoods identified with higher heat island impacts, from 3.1% to 2.9% by 2030 and 2.7% by 2040.

Adaptation Objective 3, 4

GE 4: Reduce invasive species and increase climate resilience and biodiversity of County’s tree canopy, parks and greenspaces .

Adaptation Objective 5

GE 5: Increase connectivity, accessibility and equity of County’s parks and Greenspaces.

Adaptation Objective 5

Section 08 Health and Safety

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Health and Safety

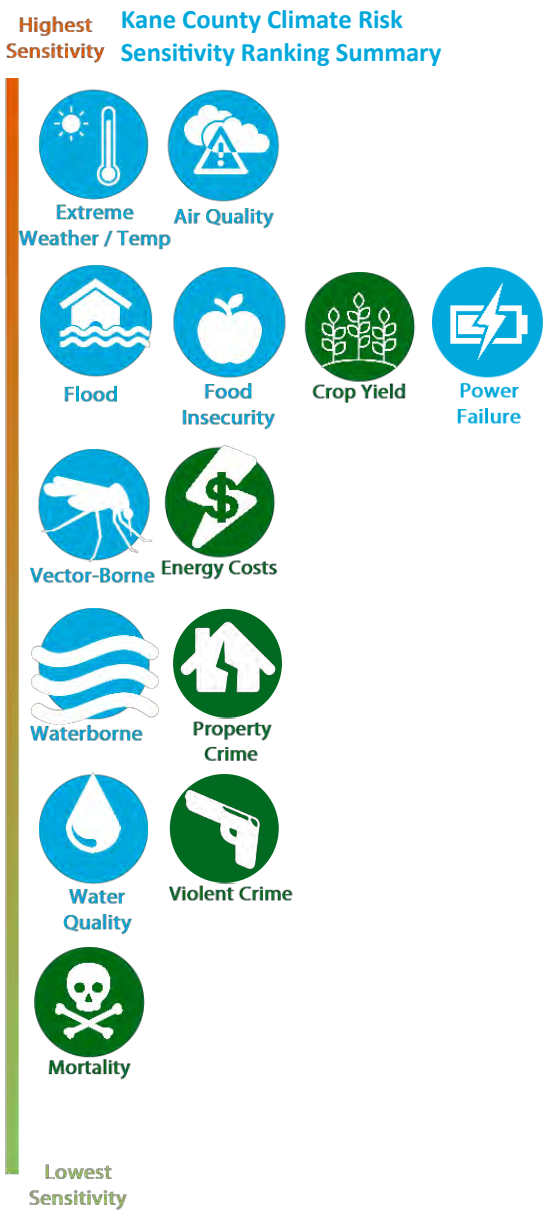
There is a strong relationship between human health and environmental health. From the air we breathe to the water we drink and use, life here on Earth depends on the natural resources and the environment around us. This link between the environment and human health is a critical consideration of the impacts of climate change. As outlined in the County's 2023 Climate Vulnerability Assessment, changes in climate, such as higher average temperatures and increased storm frequency and intensity, can intensify public health stressors. These climate change impacts endanger Health and Safety by affecting the air we breathe, the weather we experience, our food and water sources, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow.

In the same way local governments and the health care industry promotes healthy behaviors such as eating right and exercising; agencies should recognize the relationship between climate action, environmental stewardship and community health since the health of our environment affects public health.

Kane County Vulnerable Populations Risk Sensitivity Chart

The following identification of Kane County population climate vulnerabilities is excerpted from the Kane County Climate Vulnerability Assessment. Please see that report for additional information: https://tinyurl.com/avj6mzr7

		Primary Risks to The Population								Economic Vulnerabilities				
Vulnerable Demographic	Population	Extreme Weather / Temp	Flood	Air Quality	Vector-Borne	Food Insecurity	Water Quality	Waterborne	Power Failure	Crop Yield	Mortality	Energy Costs	Property Crime	Violent Crime
Children Under 5	33,569	33,569		33,569	33,569	33,569		33,569	33,569	33,569	33,569	33,569		
Seniors Over 65	72,886	72,886	72,886	72,886	72,886	72,886			72,886	72,886	72,886	72,886	72,886	
Individuals with Disabilities	44,358	44,358	44,358	44,358		44,358			44,358		44,358	44,358	44,358	
Est Total Low Income	120,554	120,554	120,554	120,554	120,554	120,554	120,554	120,554	120,554	120,554		120,554	120,554	120,554
People of Color	154,127	154,127	154,127	154,127	154,127	154,127	154,127	154,127	154,127	154,127		154,127	154,127	154,127
Limited English	21,723	21,723	21,723	21,723	21,723		21,723	21,723	21,723			21,723	21,723	21,723
At-Risk Workers	60,288	60,288	60,288	60,288			60,288							60,288
Limited Mobility	23,929	23,929	23,929		23,929			23,929	23,929					
Total by category		531,434	497,865	507,505	463,147	471,146	274,681	390,261	471,146	426,788	150,813	447,217	413,648	356,692
percentage of Vuln pop		100%	94%	95%	87%	89%	52%	73%	89%	80%	28%	84%	78%	67%
Rank by Vulnerability		1	2	1	3	2	5	4	2	2	6	3	4	5
Percentage of Tot Pop		99.9%	93.6%	95.4%	87.1%	88.6%	51.7%	73.4%	88.6%	80.3%	28.4%	84.1%	77.8%	67.1%



Health and Safety

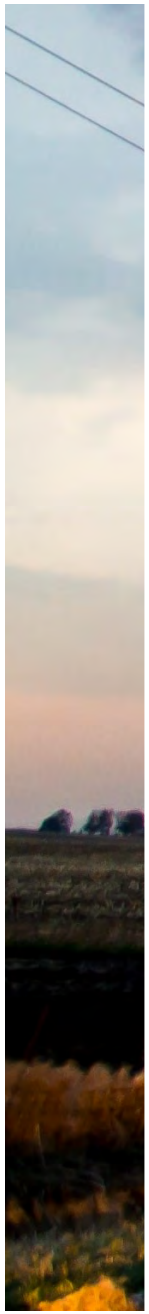
Based on the total estimated population count for each vulnerable population and considering the risks each demographic is most sensitive to, the population vulnerabilities can be considered from highest sensitivity (more vulnerable individuals) to lowest (fewer vulnerable individuals) sensitivity. It should be noted that risks which appear to have lower sensitivity levels should not be considered irrelevant for the community.

The Vulnerable Population Risk Sensitivity Chart tabulates the instances of vulnerable population which are particularly sensitive to each of the Climate Risks. The left side of the chart includes all of the primary climate risks while the right side includes the economic climate risks.

Prioritizing Risk and Vulnerabilities

Climate change impacts affect everyone and County policies and actions should consider climate adaptive needs of the entire community. As with all planning efforts, climate adaptation benefits from analysis in order to assist in establishing priorities for initial efforts. Prioritization, however, is necessary to ensure the greatest impact and effectiveness of limited municipal resources.

Based on the above review Kane County adaptive efforts may be most effective by prioritizing strategies which address the climate risks of **Extreme Heat, Air Quality, Flooding, Food Security, Crop Yield, and Power/Infrastructure Failure**. Particular attention should be paid to strategies which are most effective for **People of Color, Individuals in Economic Stress, and Seniors Over 65**.



Health and Safety

Potential Climate Change Impacts by Sector

paleBLUEdot compiled a list of climate vulnerabilities for each of the sectors of interest included in this Baseline Assessment. The vulnerabilities were based on existing resources and our experience with other communities as well as regional planning documents and studies. The list of vulnerabilities generated for each sector included both direct impacts of climate change as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change or being exacerbated by climate change (see Climate Vulnerability Assessment for more information). The following are the vulnerabilities identified as being of particular concern for this sector:

***Vulnerability:* Extreme Temperature Health Impacts**

Increase in heat- or cold-related illness and death, which may be exacerbated by pre-existing medical conditions, age, occupation, and/or socioeconomic variables (e.g., access to a vehicle or regular health care).

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	High	Moderate

***Vulnerability:* Emergency Shelter Demand**

Increased demand for public shelter, emergency, and medical services.

Likelihood	Consequence	Capacity	Vulnerability
Very High	High	High	Moderate

***Vulnerability:* Interruption to Services**

Increased flooding and extreme weather events causing associated damage or interruption to health and emergency services.

Likelihood	Consequence	Capacity	Vulnerability
High	Very High	Moderate	High

Health and Safety

Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Health and Safety Strategic Goals:

Adaptation

HS 1 : Assist the County's climate vulnerable population in preparing for and mitigating climate change impacts.

Adaptation Objective 1, 2

HS 2: Educate, engage, and empower the public on health and safety risks of climate change impacts.

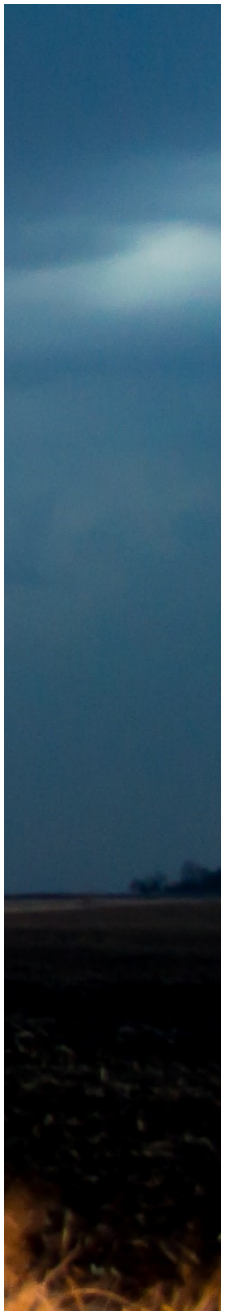
Adaptation Objective 1

HS 3: Ensure that mission critical, emergency services and health care facilities within the county are prepared for impacts of climate change.

Adaptation Objective 3, 4, 5

HS 4: Strengthen community response capacity and social support networks.

Adaptation Objective 2, 3



Section

09

Climate Economy

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Sustainable Economy

Climate change and the Sustainable Economy are inexorably linked. Left unabated, the impacts of human-made climate change through the end of this century will cost the United States billions of dollars. According to a 2019 study by two EPA scientists, the difference in economic impact between the mid-range climate model (RPC6) and the high range climate model (RPC8.5) may account for as much as $224 billion in economic impact annually by 2090. According to a 2019 World Bank report on trends in carbon pricing, a carbon price range of $40-$80 per ton is necessary as of 2020 to reach the goals set by the 2015 Paris Agreement, while other studies have placed the full cost of carbon at $200-$400 per ton. In 2018, Illinois State legislators passed the Zero Emission Credits Program which establishes credit values based on a social cost of carbon of approximately $45 per ton. The County's 2022 Climate Vulnerability Assessment calculates a community specific social cost of carbon of $146 per metric ton based on the County's projected climate change economic impacts and the County's reported 2019 emissions. Using that figure, every 1% in community-wide emissions reductions will generate over $10 million in social community benefits alone, not including other economic savings or revenue generation.

The Sustainable Economy is also directly linked to climate action as well. One common concern is that sustainability action and addressing climate change damages the economy. However, sustainability action today avoids the future costs associated with unmitigated environmental damage and climate change. Further evidence is building a clear case that acting on climate change, and reducing fossil fuel emissions can be done without weakening the economy.

Climate Action and Economic Development

Rather than weakening the economy, sustainability and climate action can support economic development. Transitioning away from fossil fuel use, improvements to public transit systems, and growth of local food industries are all, in part, a transition to local energy and labor sources. These transitions represent opportunities for communities to reduce the community wealth that is being exported and increase the percentage of community wealth that remains in the community in the form of local jobs. Additionally, many of the jobs potentials in sustainability action redirect funds away from less labor intensive (but more material resource intensive) sectors of the economy to support greater overall employment combined with less resource utilization. In general, economic opportunities include:

Energy Efficiency and Renewable Energy Jobs

Increases in County-wide energy efficiency, fuel switching, and renewable energy installations all require energy retrofits and renovations within existing building stock. This construction effort provides new opportunities for construction laborers, efficiency experts, and testing agents. The specialty niche also provides opportunities for new businesses to be created to address the demand. A study by the American Council for an Energy-Efficient Sustainable Economy illustrated that a $15 million investment in energy efficient facilities within the community, when compared against "business-as-usual", would increase local employment by 45 jobs in year one and have on-going impacts creating up to 20 additional jobs annually for 20 years.

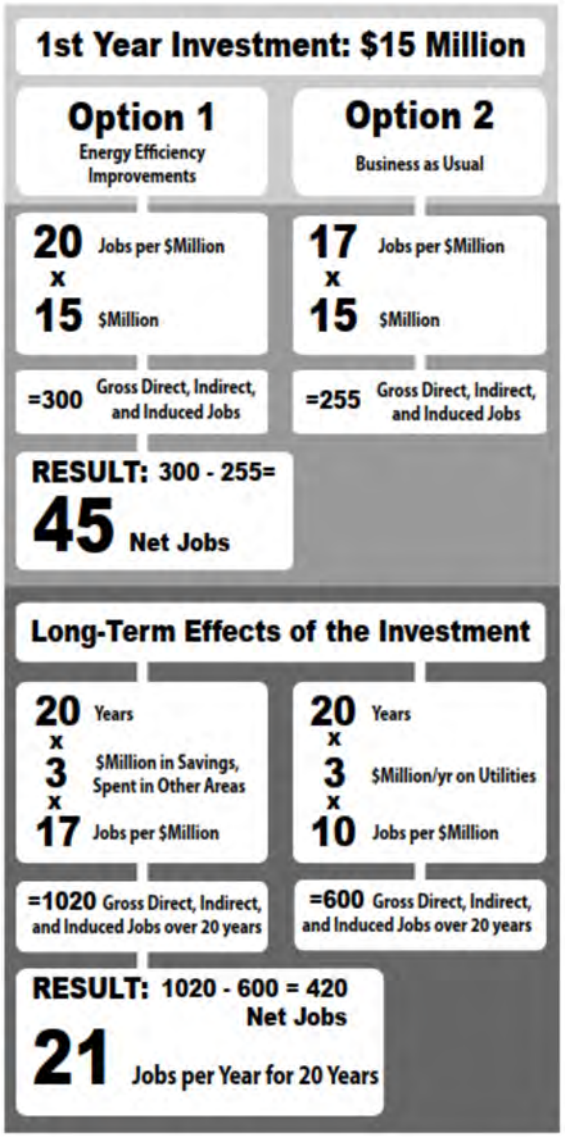
For the Kane County, a program increasing residential energy efficiency targeting households constructed before 1980 (similar to potential outlined in the Buildings and Energy section of this report) could result in 5-10 jobs or more for every 100 households upgraded annually. Similarly, a program increasing commercial building energy efficiency combined with a program focusing on commercial building retro-commissioning would result in additional jobs.

Public Transit Jobs

Transit is key to both creating jobs and increasing access to existing jobs. A study by Smart Growth America found that investments in public transit created almost twice the number of jobs than the same level of spending in auto-centric transportation systems. Cities with better public transportation systems also have lower levels of unemployment, and greater reductions in unemployment, among young people - likely because public transit links areas with entry-level jobs to neighborhoods where people live. According to the American Public Transit Association, for every $1 invested in public transportation, $4 in economic returns are generated. Investing in more buses and drivers both creates jobs directly and makes local labor markets function better.

Economic Savings

Investments in energy efficiency, public transportation, renewable energy, and many other climate action strategies ultimately result in cost savings for community businesses and residents. These savings contribute to an increase in the quality of life for residents and will largely be spent within the community on goods and services, providing indirect and induced economic development potential for the community.



Graphic Source: American Council for an Energy-Efficient Sustainable Economy

Sustainable Economy

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Vulnerability: **Utility Interruptions due to Extreme Weather**

Increased demand and extreme weather impacts on utilities (electric, natural gas) and communications infrastructure which increase costs or potential for service interruption impacting local businesses and industry.

Likelihood	Consequence	Capacity	Vulnerability
Very High	Moderate	Moderate	Moderate

Vulnerability: **Local Business Damage due to Extreme Weather**

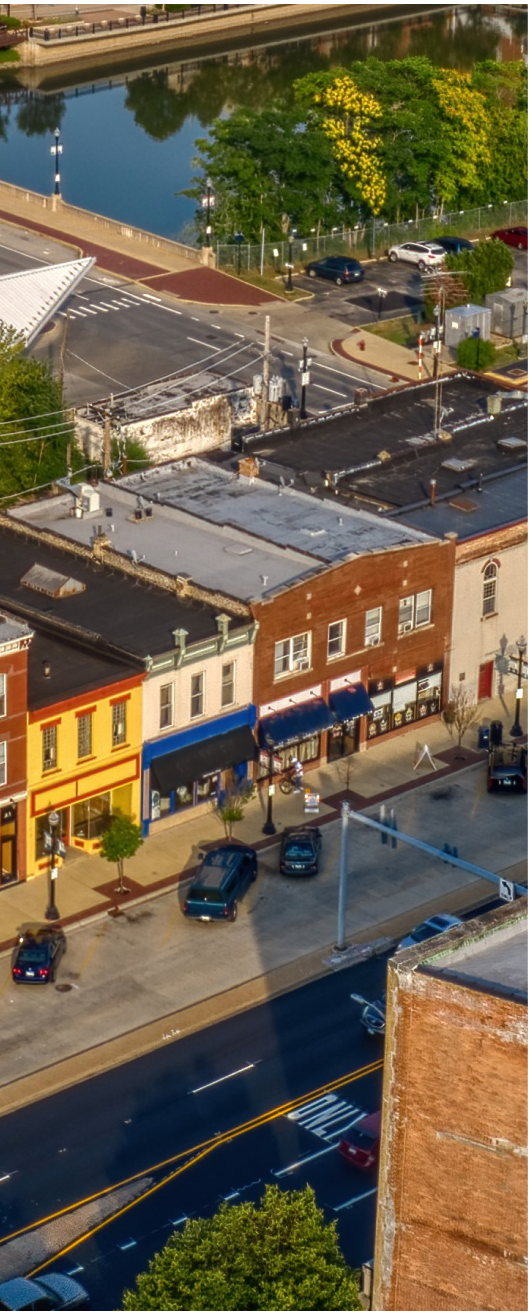
Extreme weather events, flooding, and other climate change impacts result in service interruption or economic damage for local businesses and industry.

Likelihood	Consequence	Capacity	Vulnerability
High	Very High	High	High

Vulnerability: **Impacts on At-Risk Workers**

Increased risks for outdoor and other at-risk workers who are more exposed to heat, potentially reducing labor productivity.

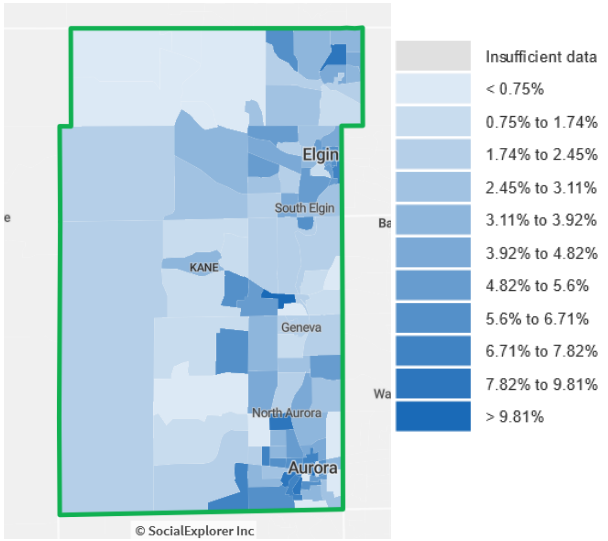
Likelihood	Consequence	Capacity	Vulnerability
Very High	High	Moderate	High



Sustainable Economy

Unemployment in Kane County

According to the US Census, in 2021, community wide unemployment averaged 3.6%. When viewed at the census block level, portions of the County had unemployment levels as high as 11%. As noted earlier, the potential of local job creation associated with sustainability and climate action strategies may provide a meaningful avenue for increasing employment opportunities and quality of life potential among Kane County's most vulnerable.



Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the Kane County explore establishing the following Sustainable Economy Strategic Goals:

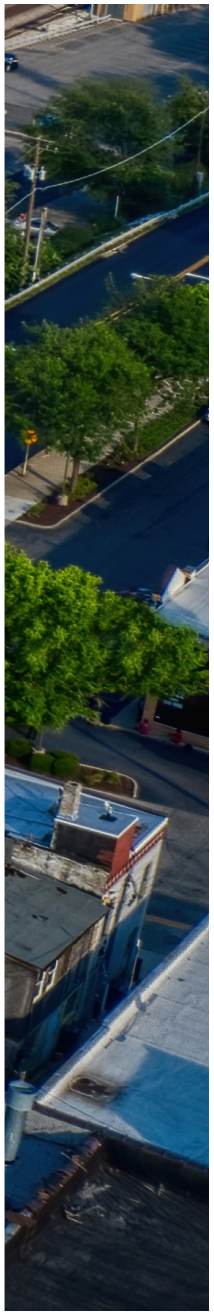
Adaptation

CE 1: Capture economic value of climate action.

CE 2: Support equitable workforce development and entrepreneur opportunities of climate action in the economy.

CE 3: Support local businesses operations in building resilience in the face of climate change.

CE 4: Establish sustainable financing for the implementation phase of the County's Climate Action Implementation Plan.



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