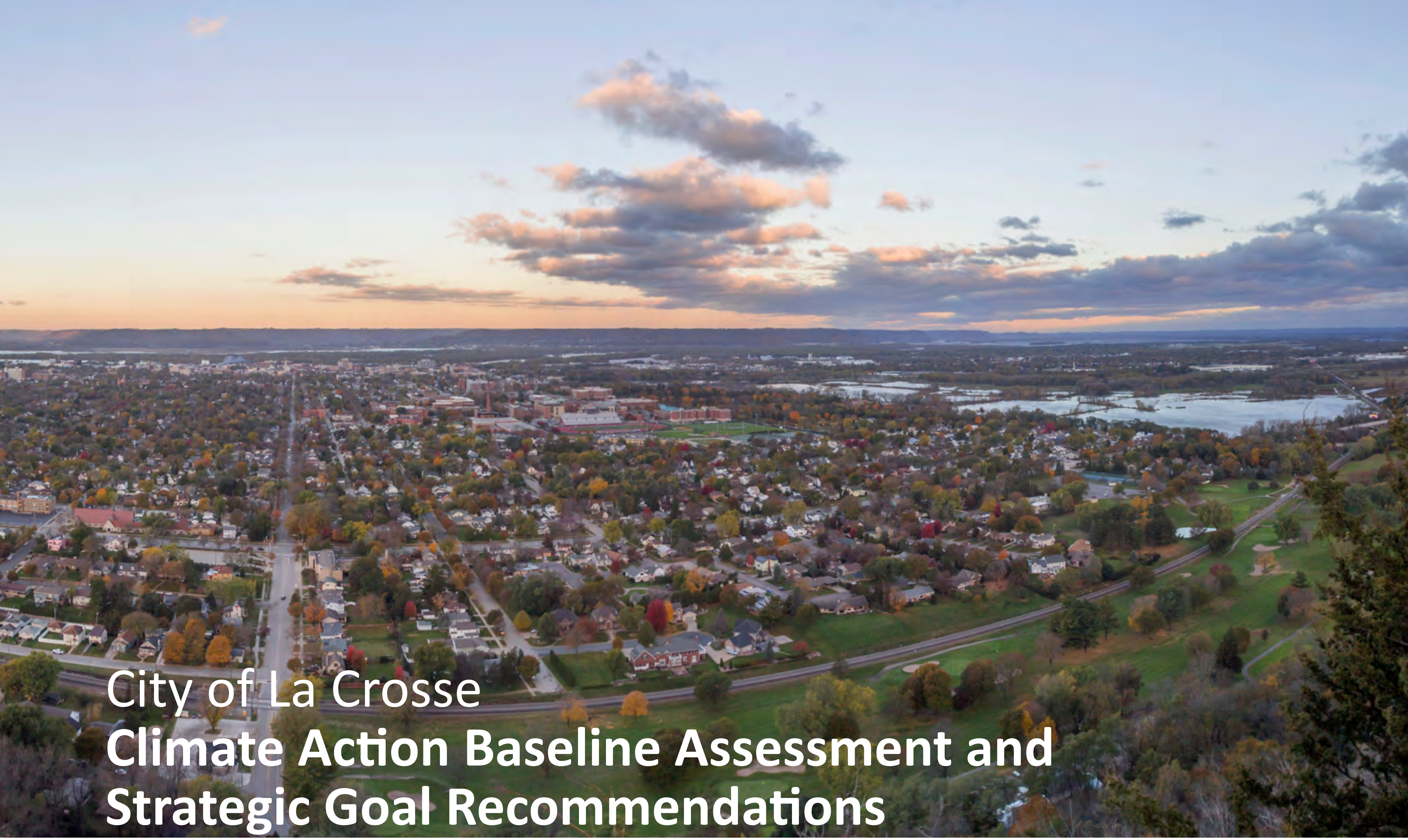

City of La Crosse

Climate Action Baseline Assessment and Strategic Goal Recommendations

February 2022

LA CROSSE WISCONSIN

Prepared by:

making change personal paleBLUEdot LLC

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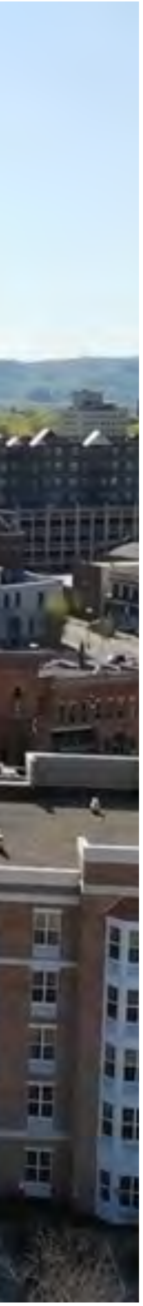


Introduction

Background

The City of La Crosse is developing its first Climate Action Plan for the community. The plan, which identifies climate resilience strategies and actions through 2030, will help those who live and work in La Crosse imagine and achieve a future where the earth and all who live on it thrive.

In 2019, the City of La Crosse Common Council passed a resolution which set a goal of reaching carbon neutrality community wide, in both energy and transportation by 2050. The City's intent for the Climate Action Plan are to establish reduction targets that establish a path toward the City's carbon neutrality goal while aligning with recommendations from the Intergovernmental Panel on Climate Change, and to establish actions which will be the City's roadmap for achieving the reduction goals.

This La Crosse Climate Action Baseline and Strategic Goals document is intended as a tool to support the La Crosse Climate Action Planning team in collaboratively exploring, creating, refining, and finalizing the goals and strategies of the La Crosse Climate Action 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 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.

Climate Action Sectors

The La Crosse Climate Action Plan will include the following community-wide sectors:

- Transportation and Mobility
- Buildings and Energy
- Land Use and Housing
- Waste Management
- Water and Wastewater
- Local Food and Agriculture
- Greenspace, Trees, and Ecosystems
- Health and Safety
- 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 La Crosse 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)

Adaptation
(Addressing Flooding, Extreme Weather/Temp, Food Security, Mobility, etc)

GHG Reduction Goals in Global Context

Considering a climate action plan's 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.

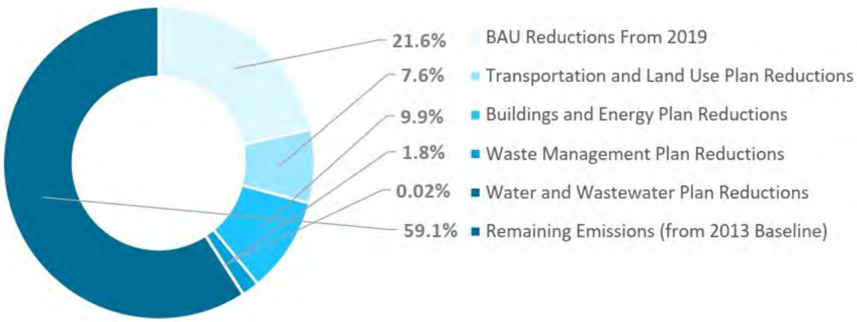
To be in alignment with the City's Carbon Neutral by 2050 goal and these IPCC recommendations, then, we recommend an interim 2030 community-wide GHG emission reduction goal of 25-55% below 2019 levels.

Introduction

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 City emission reduction goal of carbon neutrality by 2050.

Share of Total Projected Potential Emission Reductions by Sector by 2030 from 2019 Baseline:



The following summarizes the community wide GHG reductions from the 2019 baseline year by 2030 likely supported by the preliminary strategic recommendations included in the report:
Based on the illustrated potential reductions included in this document, we recommend the following as a preliminary Climate Action Plan goal statement for consideration by the planning team:

La Crosse GHG Reduction Goals:

"To reduce community-wide GHG emissions by 40% below 2019 levels by 2030, and achieve carbon neutrality by 2050"

Section

02

Transportation and Mobility

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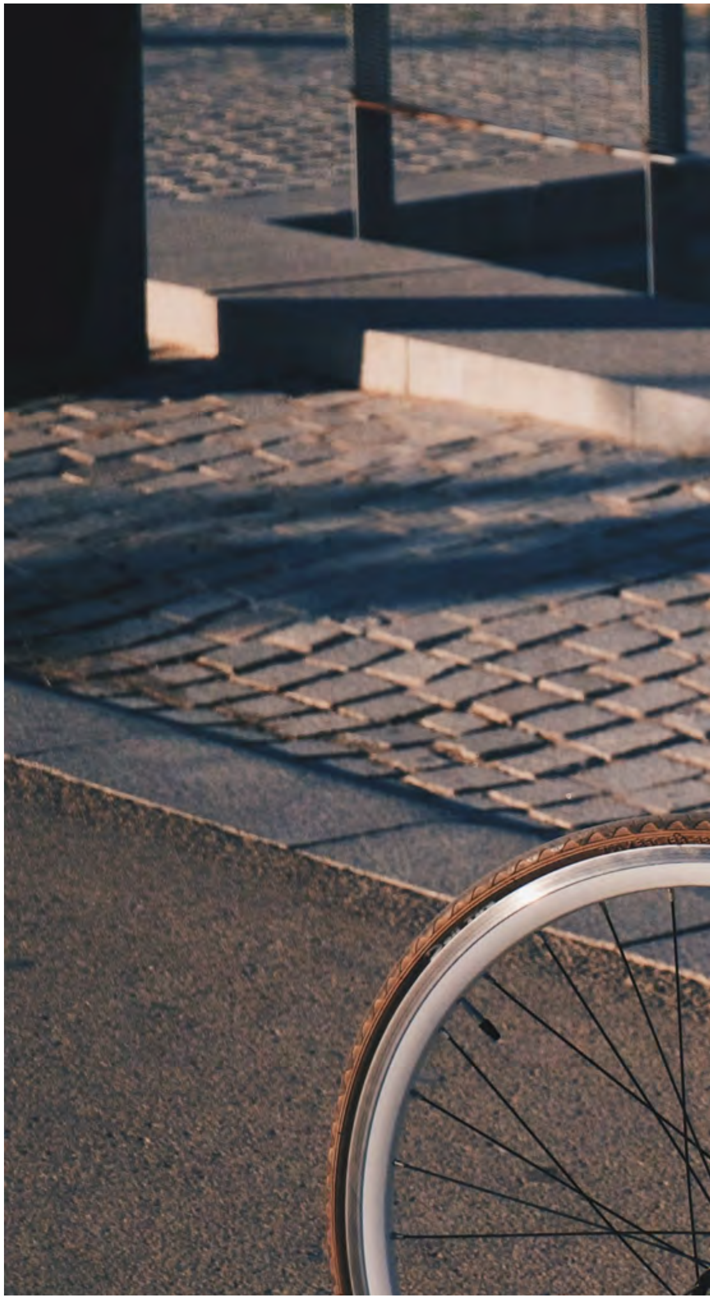
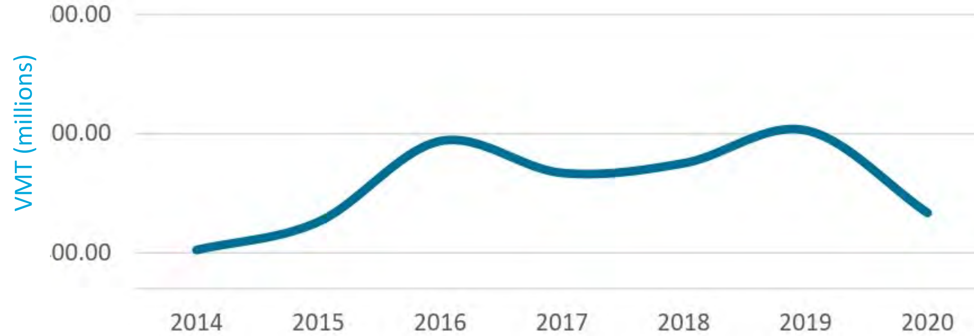
Moving ourselves and our goods and services from place to place is very energy intensive while the vehicles we use for that mobility are very material resource intensive. In addition to transportation vehicles, off-road equipment like construction, recreational and lawn equipment also consume significant 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 La Crosse, the Transportation and Mobility sector accounts for 37.5% of citywide GHG emissions and are projected to decrease as the transportation sector electrifies.

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.



Transportation and Mobility



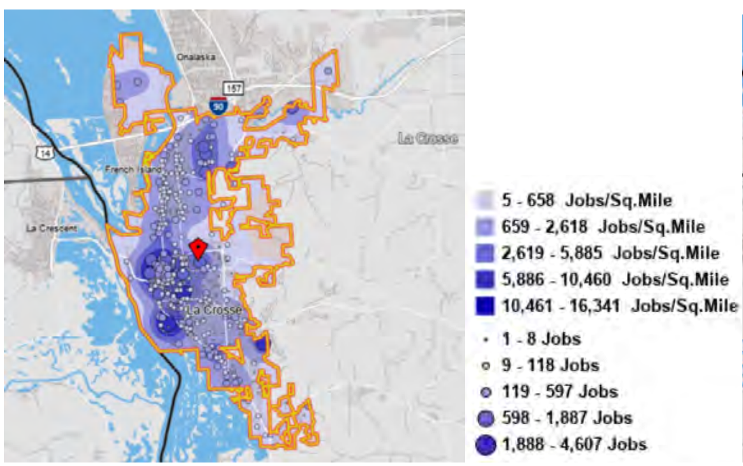
La Crosse Vehicle Miles Traveled History

As outlined in the chart above, the total vehicle miles traveled (VMT) in La Crosse in 2020 was 433 million miles. This is a decrease of almost 70 million miles from the year previous—likely due to COVID. From 2014 to 2019, however, the 5 years averaged a 5% annual increase.

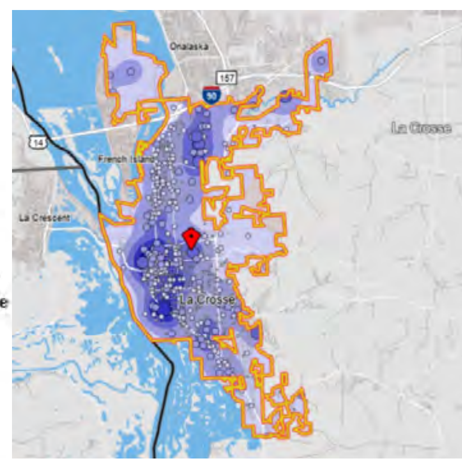
La Crosse Jobs Heat Mapping

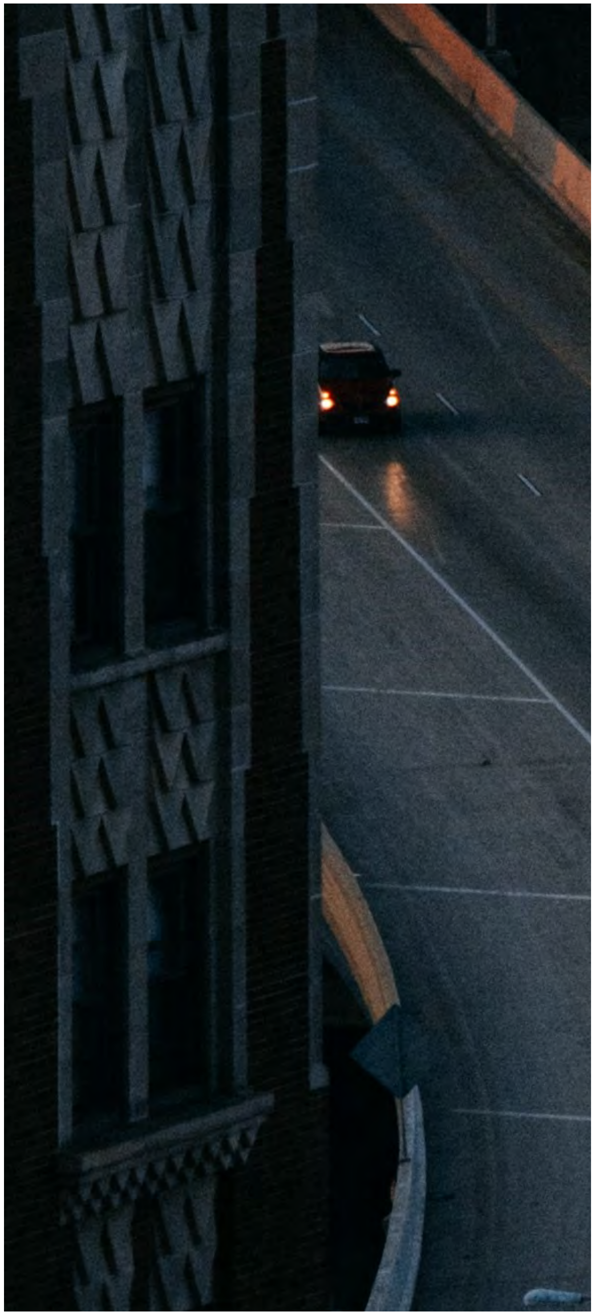
According to US Census data, the La Crosse has seen a 5.6% increase in total jobs within the community from 46,688 jobs in 2014 to 49,316 in 2019. Job density has also experienced a slight shift with jobs increasing slightly in the Mormon Coulee Rd / Losey Blvd South area. This increase may be a contributing factor in the increasing VMT trend.

Employment Heat Map 2014



Employment Heat Map 2019



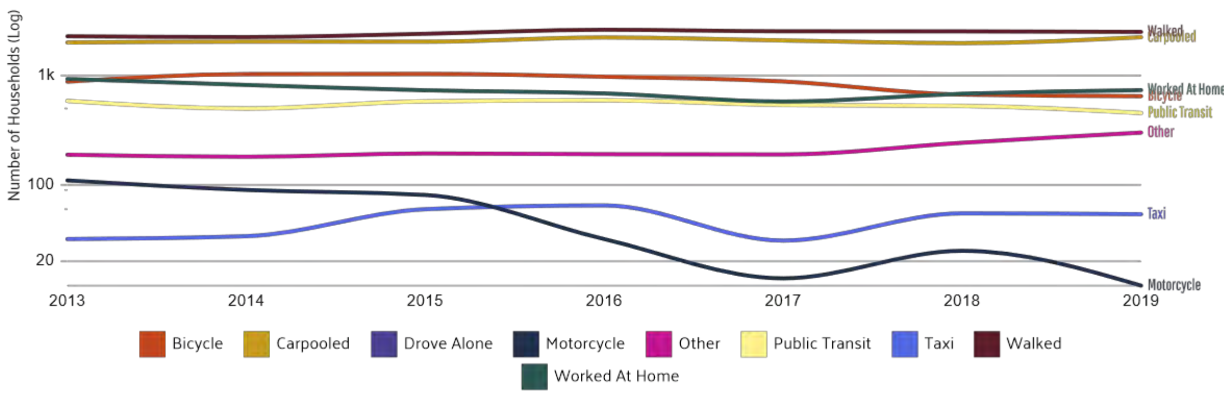


Transportation and Mobility

City of La Crosse Commute

Since 2013, overall average commute time in La Crosse increased from 24.4 to 25.5 minutes with 72% of those employed in La Crosse commuting from outside the City. La Crosse has also seen a steady trend in commuter modes with 74.8% commuters driving alone. These trends indicate that strategies to focus job development nearest sections of residential density and to encourage alternative commute modes like public transit and working at home may decrease transportation emissions..

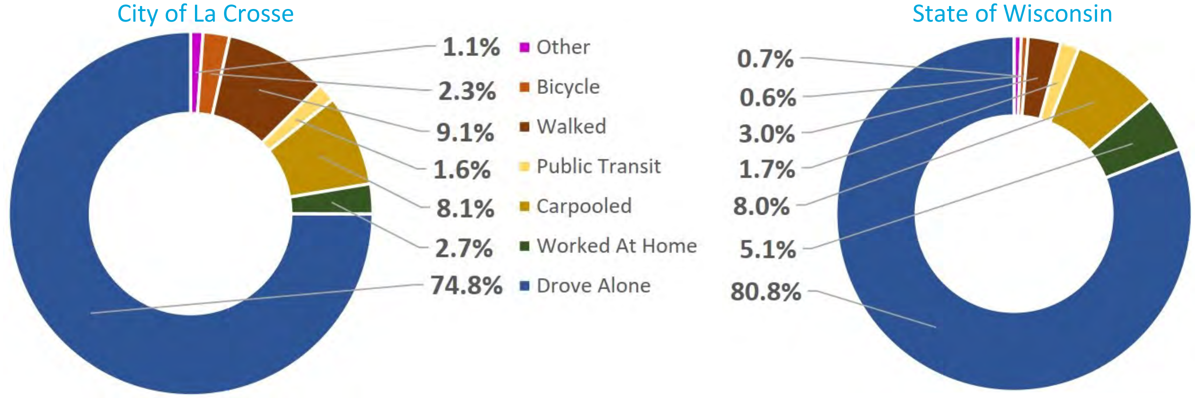
City of La Crosse Commuter Transport by Mode Since 2013

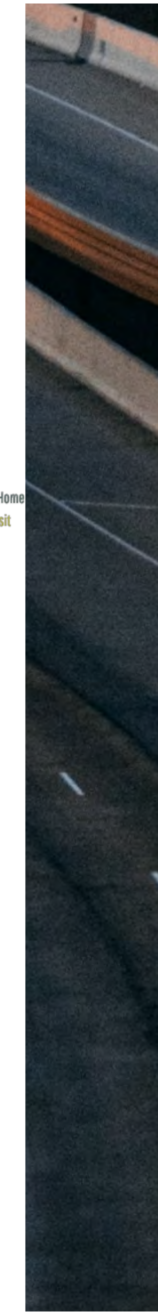


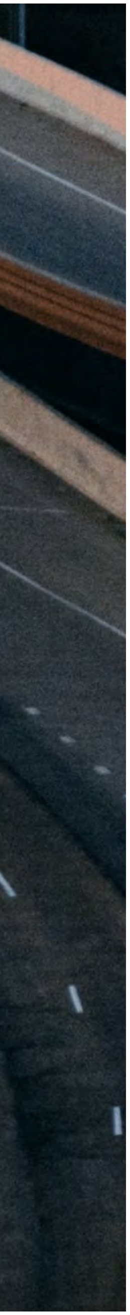
Commuter Transport Share by Mode 2019

City of La Crosse

State of Wisconsin



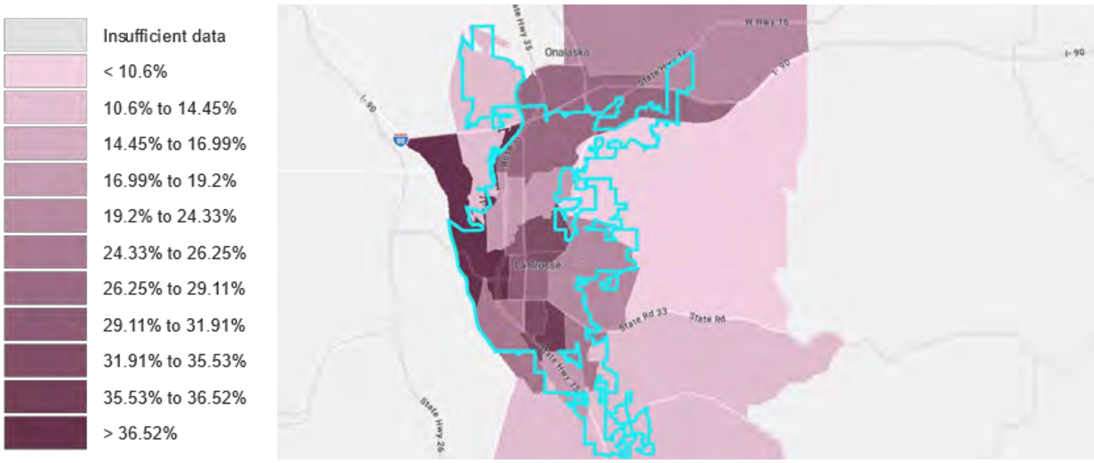




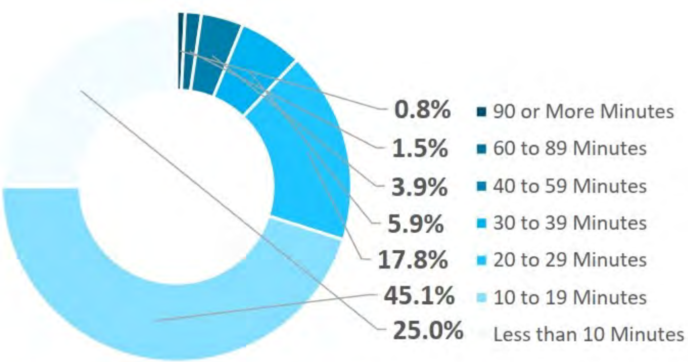
Transportation and Mobility

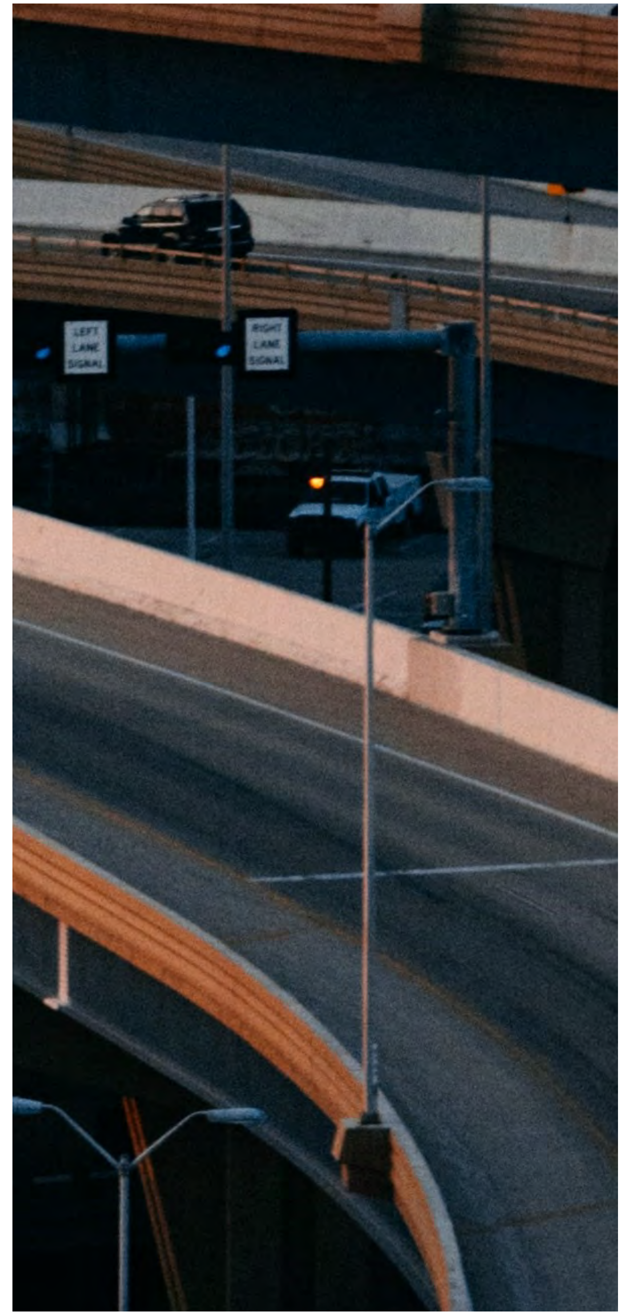
One in four commuters in La Crosse, over 9,700 workers, have a commute time of less than 10 minutes. Due to the shorter commute time, the distances traveled by these works may lend itself well to alternative transportation modes like walking or biking. Decreasing commuters driving alone by 5%, through increase of alternative modes of transportation, carpooling, working at home and other strategies, would decrease vehicle miles traveled by up to 5 million miles, saving an estimated $3,000,000 and eliminating up to **(2,400)** metric tons of GHG emissions annually.

City of La Crosse Workers with 10 Minute or Less Commute Time



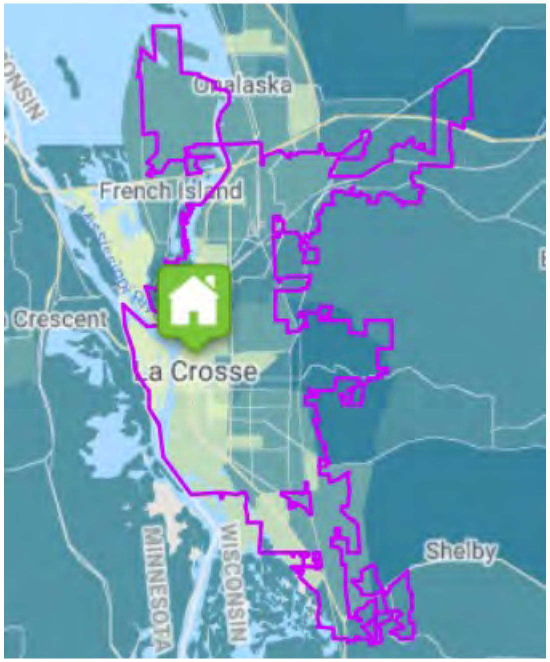
Commuter Share by Commute Time





Transportation and Mobility

Housing and Transportation Affordability



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

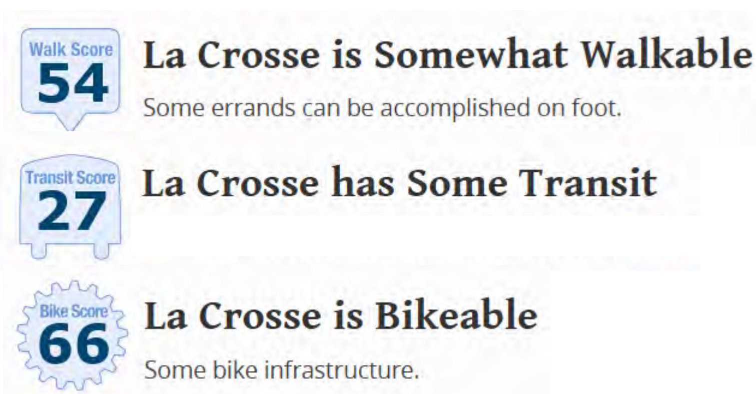
	Households
< 24%	0
24 - 36%	1,643
36 - 45%	6,735
45 - 54%	9,647
54 - 66%	1,542
66 - 78%	363
78 - 87%	0
87% +	0

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 to the right, from Center for Neighborhood Technology, indicates the average Housing and Transportation affordability index for each of the census blocks within the City of La Crosse. The Citywide average housing and transportation burden (H+T) is 46% (23% on housing and 22% on transportation). As shown on the household count by H+T income share, over 1,900 households in La Crosse have a combined H+T burden that is *more than* 54% 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.

Walkability and Bikeability

The measure of a community's walkability and bikeability are an important metric of the community's ability to advance sustainable transportation. Bike and walk scores will very across the city based on location specific parameters. Below are transit, walk and bike scores for the France Ave area City of La Crosse (Source: WalkScore.com). For this location, though the scores can be improved—particularly for public transit - the existing levels indicate a supportive environment for increasing alternative mobility options such as walking and biking. Every 0.5% increase in commuter utilization of biking or walking in La Crosse may decrease vehicle miles traveled by 470,000, saving an estimated $300,000 and eliminating **(280)** metric tons of GHG emissions.



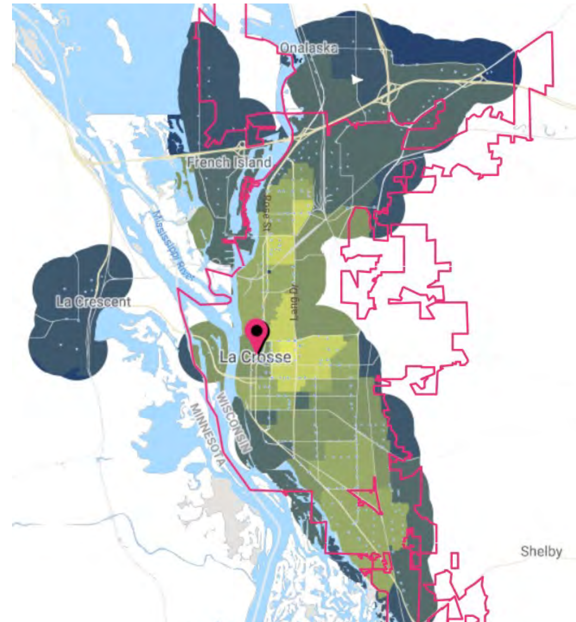
Transportation and Mobility

Public Transit Indicators

The map to the left illustrates the community area served by transit options (Advance Transit) 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 La Crosse is 25.5 minutes, or approximately 21 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 La Crosse may decrease vehicle miles traveled by 940,000 miles, saving an estimated $650,000 million and eliminating **(552)** metric tons of GHG emissions annually.

Public Transit Performance Map



Overall transit score rating at connectivity, access to jobs, and frequency of service (Source: AllTransit)

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

JOBS

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

89.2%

35,113 jobs are near transit

ECONOMY

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

16,736

Households within a 30 minute transit commute.

HEALTH

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

9.19% Walk

3.23% 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% Around the Clock

0% Full Day

20% Rush Hour

MOBILITY

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

4

Transit Routes

AllTransit ™ Performance Score

4.9

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

On Average Households have:

525	Transit Trips per Week within ½ Mile
4	Transit Routes within ½ Mile
39,753	Jobs Accessible in 30-minute trip
1.90%	Commuters Who Use Transit

Transportation and Mobility

Vehicle Ownership in La Crosse

According to the US Census, nearly 47% of all households own two vehicles, over 24% own 1 vehicle, 15.8% own three vehicles, nearly 10% own four vehicles, and about 3% own five or more vehicles. Community wide, 4.7% are households with no vehicles. According to census data there are 54,600 vehicles total in the city.

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 approximately 1,600 metric tons of GHG emissions can be eliminated annually (including emissions associated with increased electricity consumption).

Existing La Crosse Electric Vehicles and Infrastructure

The chart to the right illustrates the total number of electric vehicles and charging infrastructure in La Crosse compared with the State of Wisconsin. As of December 2020, La Crosse had 77 battery electric vehicles (BEV), and 56 plug-in electric vehicles (PHEV). Comparing the city of La Crosse's EV rolling stock against Statewide vehicle counts (9,714 BEVs and 5,701 PHEVs), the city's adoption rate is roughly equal to its share of Statewide population. The city currently has no DC Fast charging ports, but does have a few public Level II chargers.

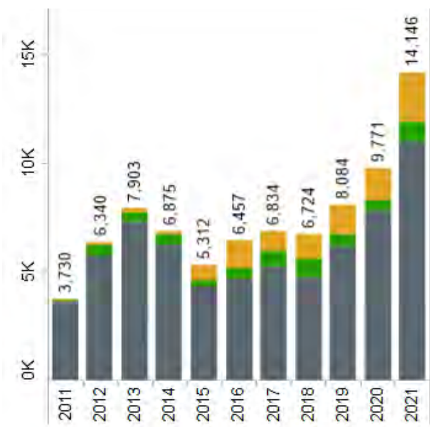
EV Adoption Rates in Wisconsin

The graph to the right illustrates the new EV purchase adoption rates in Wisconsin since 2011. The trends illustrate a clearly increasing EV share of new vehicles purchased from <1% in 2011 to 15% in 2021.

Vehicle Ownership by Household

Existing La Crosse Electric Vehicles and Infrastructure

Type of Electric Vehicle	Vehicles in State	Vehicles in City	EV % of All Vehicles in City	City Share of State	City Share Compared to Population Share
BEV	**9714**	**77**	**0.1%**	**0.8%**	**1x population**
PHEV	**5701**	**56**	**0.1%**	**0.9%**	**2.2x population**
Electric Vehicle Charging	**Chargers in State**	**Chargers in City**		**City Share**	**City Share Compared to Population Share**
DC Fast Ports	197	0		-	N/A
Level II Ports	661	8		1.2%	1.25x population



EV Adoption Rates in Wisconsin

FCEV BEV PHEV HEV

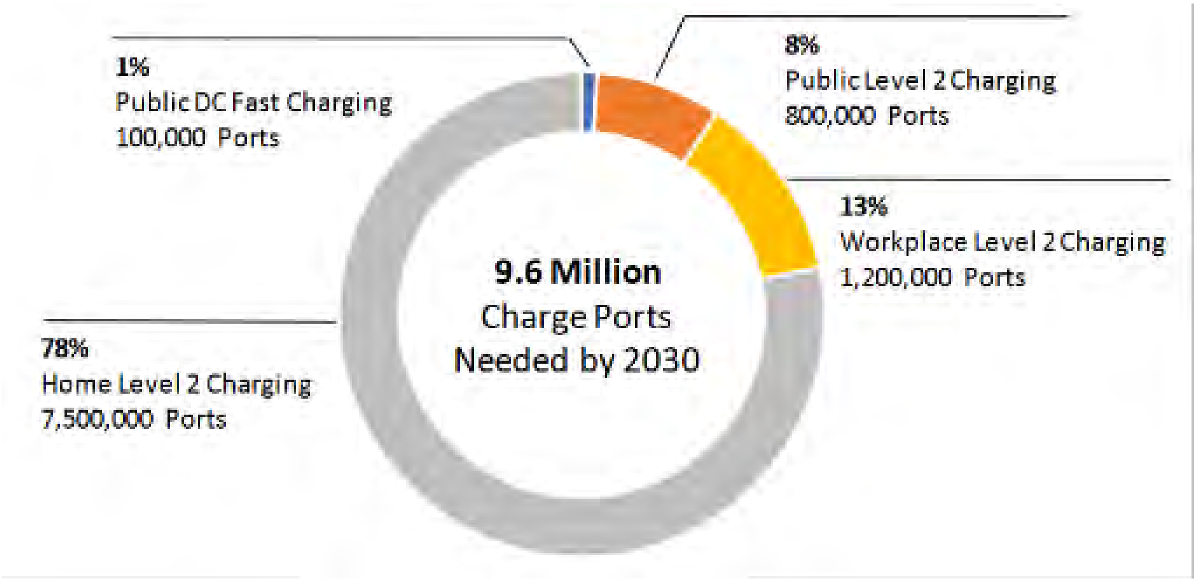
FCEV = Fuel Cell Electric Vehicle
BEV = Battery Electric Vehicle
PHEV = Plug-in Hybrid Electric Vehicle
HEV = Hybrid Electric Vehicle

(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 La Crosse 2030

For La Crosse, the Edison Foundation's EV charging infrastructure need projections mean anticipating at least 2,900 EV's owned and operated by La Crosse residents by 2030 in addition to the increased EV utilization by visitors to the city and commuters who work in the city but live elsewhere. These EV's will require a minimum of 121 public level II charging ports, 197 workplace level II charging ports, and 15 public CD Fast Charging ports.   This will require a minimum increase of 304 level 2 charging ports and 15 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 and Mobility

DIRECT IMPACTS ON TRANSPORTATION AND MOVILITYOF CLIMATE STRESS-	
Climate Stressor	**Likely Impacts on Transportation and Mobility**
Air temperature	• Reduced interest in walking and biking during increasingly hot summers, increasing dependence on cars and public transportation systems with air conditioning • Reduced interest in waiting for public transportation on hot days • Eventual reduction in the need for winter snow removal and road salting, decreasing costs and road damage and improving winter mobility for residents
Extreme heat	• Damage to road surfaces (e.g., softening or buckling) and increased potential for vehicles to overheat • Increased stress on electrical grids, potentially resulting in power outages that can impact traffic lights and electric vehicle charging • Increased heat stress in residents navigating lengthy public transportation routes, or those who live farther from the nearest bus stop
Precipitation	• Increases in localized street flooding during heavy rain events, particularly in low-lying areas or where stormwater infrastructure is inadequate • Increased cost of road maintenance, repairs, and replacement due to more frequent inundation
Extreme precipitation, storms, & flooding	• Increased frequency and severity of damage to roads and other infrastructure during flood events, particularly where culverts and bridges are not designed to accommodate future conditions • Road blocks and disruption of traffic due to debris, which may also delay needed construction activities to repair damages to roads • Inundation and damage to ports, marinas, and docks due to river flooding
Drought	• Decreased river flows, potentially impacting river transportation and commerce

Transportation and Mobility

Strategic Goal Recommendations
Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Transportation and Mobility Strategic Goals:

Pathway 1—Reduction

TM 1: Decrease commuter and community wide VMT by 5% by 2030.

TM 2: Increase public transit access and ridership from 1.6% to 3% by 2030.

Fuel Switching

TM 3: Increase battery electric vehicle (BEV) utilization to 15% of community wide rolling stock (from approximately 77 vehicles to 8,850 vehicles community-wide).

TM 4: Establish viable biodiesel sources to serve community by 2025. Achieve 5% diesel consumption replacement with biodiesel by 2030.

Adaptation

TM 5: Improve the comfort and safety of walking and biking within the City of La Crosse

Strategic Goal Recommendations
Municipal Operations

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Transportation and Mobility Strategic Goals:

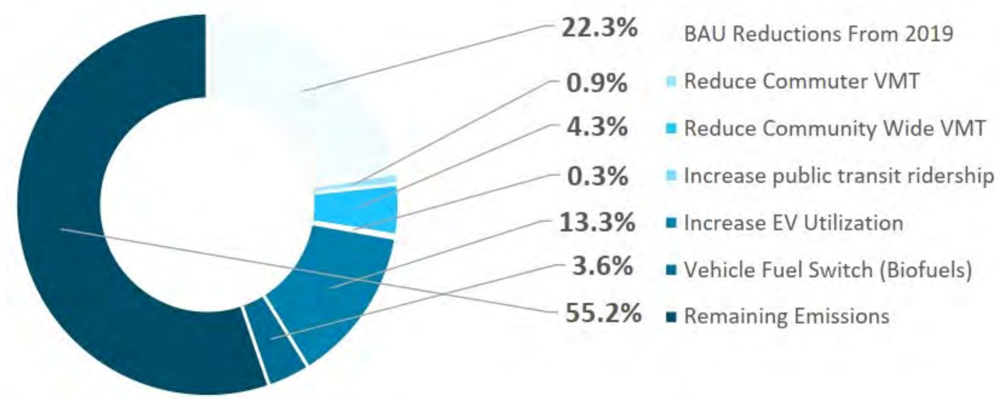
Fuel Switching

TM 6: Achieve 30% conversion of municipal operations gasoline and e10 gasoline vehicles and equipment within municipal fleet to EV's by 2030. Achieve 100% conversion by 2040.

TM 7: Convert all municipal operations diesel fuel utilization to biodiesel fuel by 2027.

TM 8: Increase fuel efficiency of remaining combustion engine fleet by 10% by 2030.

Projected Sector Emission Reductions Achieved by Draft Strategies



Section 03 Land Use and Housing

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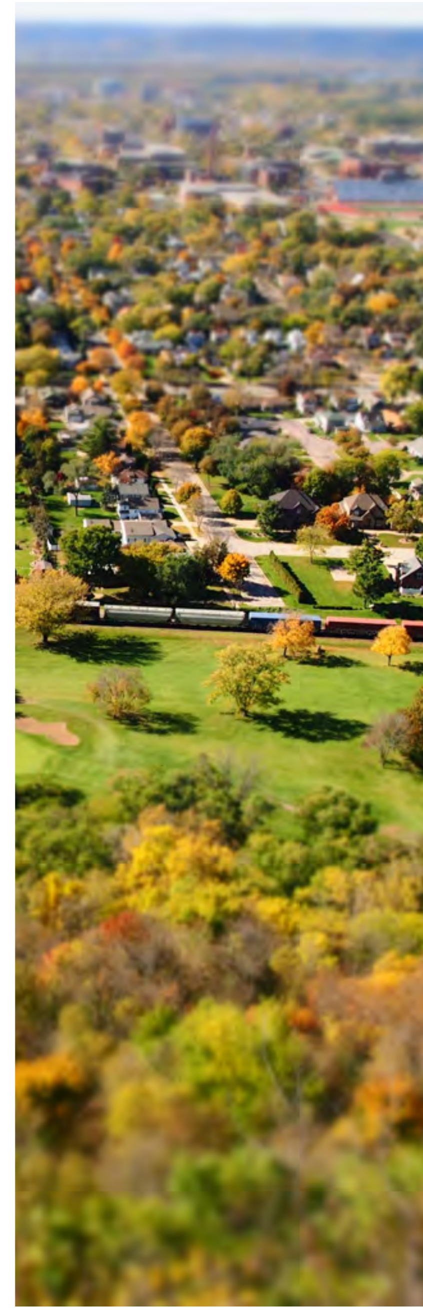
Land use refers to the pattern of development and redevelopment of public and private property within a community for residential, commercial, industrial, agricultural, and other uses. This includes factors related to the supply and demand of land for various uses, the price of land and costs associated with development, opportunities for development and redevelopment, and existing or potential land-use conflicts.

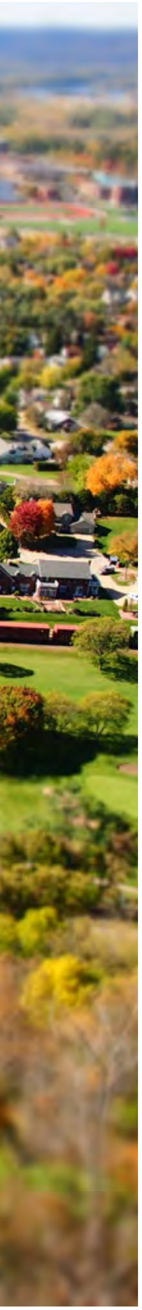
Land use patterns and policy within a community are foundational and impact—and sometimes limit—how we move ourselves, goods, and services as well as the accessibility of goods and services. Land use patterns and choices directly impact the GHG emissions in our transportation sector, indirectly impact our GHG emissions within our building sector, and influence, impact, or even limit the resilience of our greenspace, trees, and ecosystems sector.

Housing refers more specifically to the availability of residential units within the community (including the availability of affordable housing), as well as the quality and condition of housing units, access to residential areas, and maintenance of necessary utilities and comfortable conditions in and around housing units. A community's housing stock directly contributes to GHG emissions through the energy that is required to heat and cool our homes, while the condition of the housing stock directly contributes to a community's resilience to climate change stressors.

There are implications of climate change for land use and housing due to all climate stressors, including some due to interactions with other existing stressors. Climate stressors impacting the La Crosse land use and housing sector are reviewed later in this section. For La Crosse, important existing stressors that may interact with climate change to impact land use and housing include:

- Changes in population dynamics and a limited supply of vacant land for development
- Aging/deteriorating infrastructure and housing stock
- Lack of affordable housing and homelessness





Land Use and Housing

Energy Burden In La Crosse

A household's energy burden—the percentage of household income spent on energy bills—provides an indication of energy affordability. Researchers define households with a 6% energy burden or higher to experience a high burden. Factors that may increase energy burdens include the physical condition of a home, a household's ability to invest in energy-efficient upgrades, and the availability of energy efficiency programs and incentives.

The charts on the right illustrate the distribution of households with high energy burden based on:

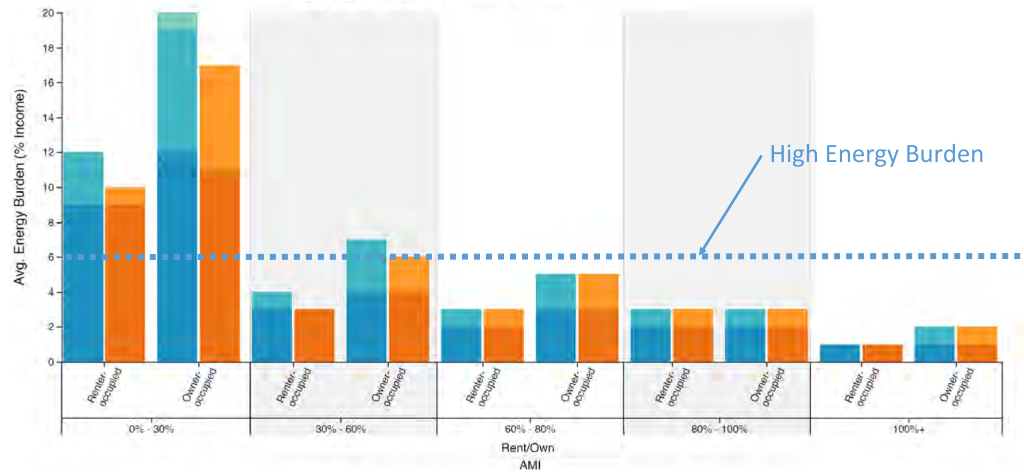
- Renter vs Owner by Income Level
- Building Age by Income Level

These charts indicate that both renter and home owner low income community members are far more likely to live under high energy burdens regardless of building age. This data can be used to design energy efficiency and renewable energy programs to reduce energy burden while reducing GHG emissions within the community.

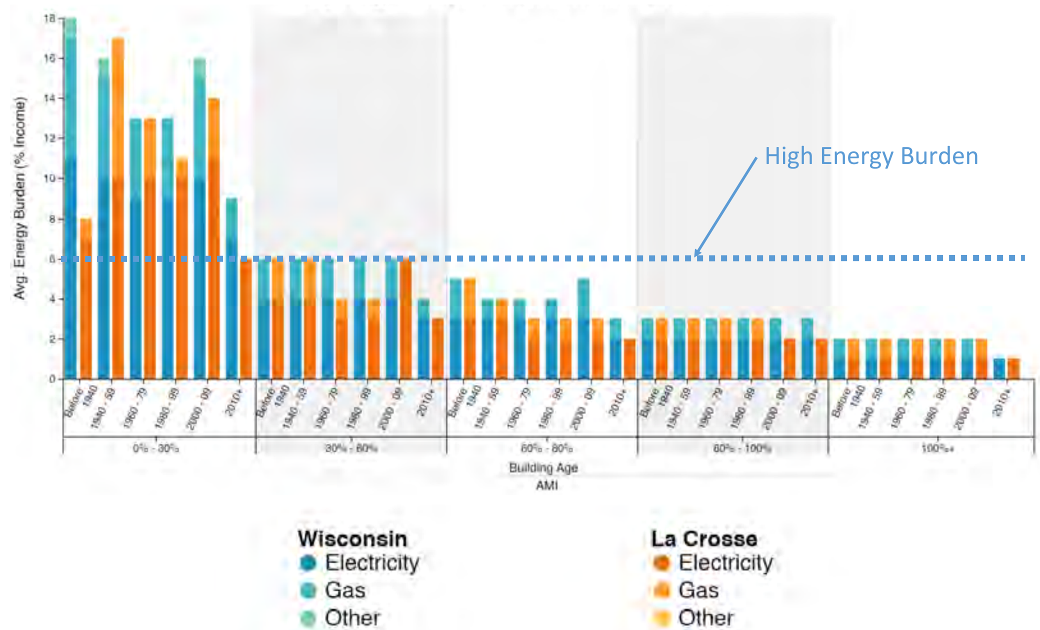
Potential total households living with high energy burden
(See La Crosse Renewable Energy Potentials Study for more):

3,519 (16.4%)

Energy Burden by Occupant Ownership and Income Level



Energy Burden by Building Age and Income Level



Land Use and Housing

The Opportunity for Low and Moderate Income Solar

Solar PV systems provide a wide range of potential benefits, including long-term energy cost savings, energy resilience, and reductions in air pollution including particulate matter and greenhouse gas (GHG) emissions – with positive implications for environmental and human health. Currently, most of the solar customers in the United States are in the same demographic -middle to upper class, middle-aged, and usually male. "Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States", a recent study by NREL, found that the median income of households that install solar panels in some states was roughly $32,000 higher than the median household income in those states.

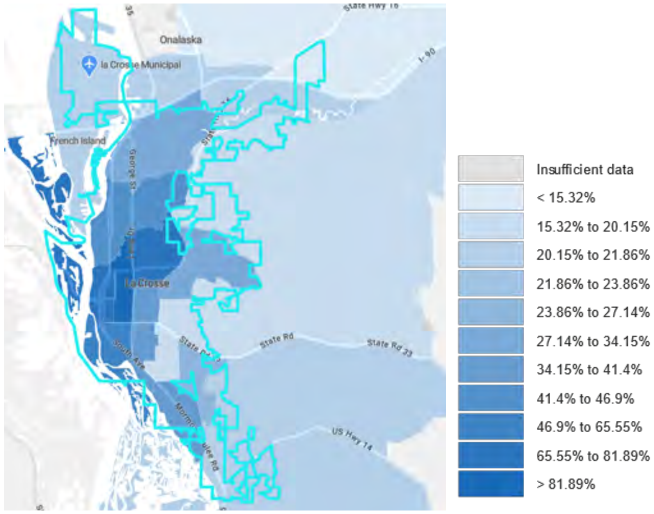
The growth of solar in the United States provides a tremendous opportunity to address some of the greatest challenges faced by lower-income communities: the high cost of housing, unemployment, and pollution. Solar can provide long-term financial relief to families struggling with high and unpredictable energy costs, living-wage jobs in an industry where the workforce has increased 168% over the past seven years, and a source of clean, local energy sited in communities that have been disproportionately impacted by traditional power generation. Yet, access to distributed solar power remains elusive for a significant slice of the U.S. population, particularly low- and moderate-income (LMI) communities— households whose income is 80% or less of the area's median.

Although solar PV costs have dropped significantly in recent years, upfront installation costs are still persistently out of reach for most LMI populations, which, by definition, have less disposable income. Beyond having limited cash-on-hand for solar power purchases, LMI populations face other obstacles in pursuing distributed solar systems, including:

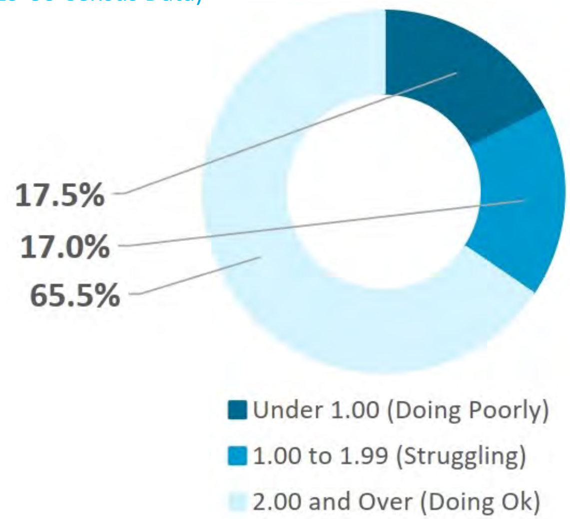
- frequently lower credit scores, making it difficult to attain a loan for solar investments;
- insufficient tax burden to benefit from state and federal solar tax incentives; and
- lower rates of homeownership and higher likelihood of living in multifamily housing units—making for limited control over decisions about utilities, especially rooftop solar.

The solar potential for LMI communities is a critical market that must be developed within any community seeking to significantly advance renewable energy, energy resilience, or Climate Action goals. Increasing access for LMI communities is important not only in order to help address some of the challenges outlined above, it is likely necessary in order to meet long-term community-wide renewable energy goals. Half of all residential solar potential is on LMI households. Solar capacity on LMI households could total 320 GW—over thirty times the total new solar in 2017.

Low Income Households In La Crosse (based on 2019 US Census Data)



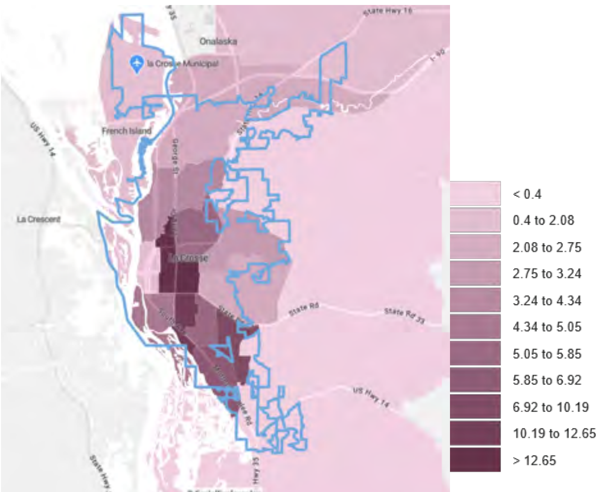
Income Distribution of Households In La Crosse (based on 2019 US Census Data)



Land Use and Housing

La Crosse Residential Density

According to US Census data, the city's developed land use totals 8,622 acres—52% of the total area of the city. This land supports a population of 52,680 for an average of 6.1 residents per developed land use acre. The city's community wide density, including all land use classifications is 3.2 residents per acre.
(calculations exclude tracts 104.1, 105, 106, 107)



La Crosse Land Use Density Emissions Reduction Potential

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 and codes guiding future growth into options which increase the density of existing developed land rather than increasing the quantity of developed land is likely to have positive impact on decreasing total community wide emissions per household.

Using the city's population growth rate since 2010 as a basis for projecting future population, the City's population may be over 54,000 in 2030. If policies are established which guide that future population growth towards increased residential land use density, the potential population increase could result in an increase of residential land use density of 2.7%. Applying the figures established in the Lee study, this could equate to an emissions reduction of up to 1.5% for transportation and 1% for residential energy use related emissions.

GHG emissions reduction associated with a 2.7% increased residential land use density by 2030: **(3,700)** Metric Tons.

Land Use and Housing

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	***Likely Impacts on Land Use and Housing***
Air temperature	• Changes in patterns of energy use and associated costs due to warmer winters and hotter summers, with potentially significant increases in summer energy demand due to the greater need for air conditioning, increasing the cost of affordable housing • Increased water demand for residential/commercial and agricultural uses (e.g., landscaping, crop irrigation) due to higher temperatures
Extreme heat	• Increased heat stress in developed areas, particularly in areas where impervious surfaces and lack of vegetation create heat islands • Increased risk of heat-related health impacts and potential changes in patterns of use for businesses, public facilities, parks, and public transportation, among others (e.g., heavier use of recreation sites with water features or public spaces with air conditioning) • High energy demand during heat waves, increasing costs and the potential or power outages • Greater risk of extreme heat impacts in low-income neighborhoods and other vulnerable communities that are more likely to experience heat island effects and lack access to cooling systems
Extreme precipitation, storms, & flooding	• Increased risk of severe flooding along waterways, in floodplains and low-lying areas, and where drainage is poor (either naturally or as a result of impermeable surfaces) • Reduced suitability of some areas (e.g., high-risk riverfront properties) for residential/commercial land uses due to severe flooding along waterways, floodplains, and low-lying areas with poor drainage • Changes in floodplain extent and distribution over time, potentially impacting existing zoning allowances • Damage or loss of existing homes and businesses due to flooding or related impacts (e.g., mold), particularly for older, low-quality, and/or poorly-sited buildings • Reduced access to more isolated residential areas due to road flooding, potentially hindering evacuation efforts or emergency response • Increased cost or availability of flood insurance for homeowners, renters, and businesses, as well as rising costs of repair following water damage to the structures and the infrastructure that services them (e.g., roads, utilities) • Greater risk of flooding impacts in low-income neighborhoods and other vulnerable communities that are more likely to occur in floodplains or areas with poor drainage • Increased risk of impact to water quality due to run-off from contaminated land, roads or sewer overflow
Drought	• Reduced water availability and increased water demand for agricultural and residential/commercial use • Increased risk of impact to water quality due to concentration of contaminants through evaporation and/or harmful algal blooms

Land Use and Housing

Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Land Use and Housing Strategic Goals:

Pathway 1—Reduction

LH 1: Increase average population per developed acre by 2% by 2030.

Adaptation

LH 2: Increase community resilience to increased flooding and flash flooding caused by Climate Change

LH 3: Update community plans, zoning, and design standards to increase housing and community resilience to the impacts of climate change, including flooding and extreme temperatures.

LH 4: Update community plans, zoning, and design standards to mitigate heat island and micro-heat island impacts, particularly for populations most vulnerable.

LH 5: Reduce share of population living in high energy poverty from 16.4% to 11.4% by 2030.

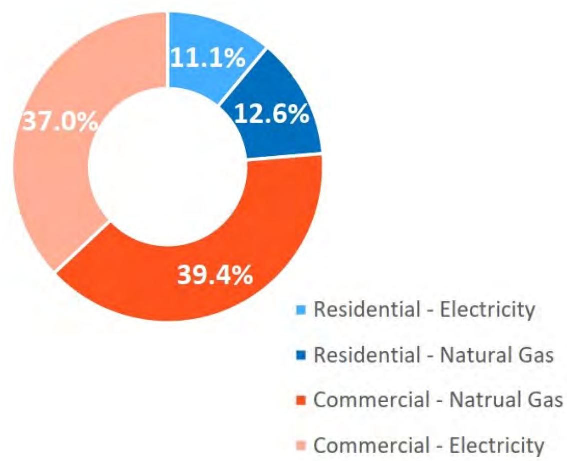
Section 04

Buildings and Energy

Click here to return to TOC

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 La Crosse 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 2020 GHG Emissions by Sub-Sector



Buildings and Energy

La Crosse Energy Use Profile—Community Wide

Residential:

According to 2020 community wide data, the residential sector in La Crosse consumes nearly 164.8 million kWh annually. This is equal to 7,800 kWh per household. The sector also consumes over 9.6 million therms of natural gas annually. Residential energy GHG emissions total over 95,000 metric tons annually, approximately 23% of citywide buildings energy sector emissions.

Commercial and Industrial:

The La Crosse commercial and industrial sector in 2019 consumed nearly 334.2 million kWh, equal to 7,885 kWh per job. These sectors also consume over 19.5 million therms of natural gas annually. Commercial and industrial energy GHG emissions total over 307,000 metric tons annually, approximately 76% of citywide buildings energy sector emissions.

Potential for Change in La Crosse

According to US Census data, less than 2% of the city's housing stock was built in the last ten years while over 65% is more than forty years old. Based on the age of the city's building stock, significant renovations and new construction replacement projects may increase in the coming years. This means that a significant portion of the city's building infrastructure could be positively impacted and influenced through climate action strategies that guide increased energy efficiency and increased renewable energy adoption.

Buildings and Energy

La Crosse's Building Stock Efficiency

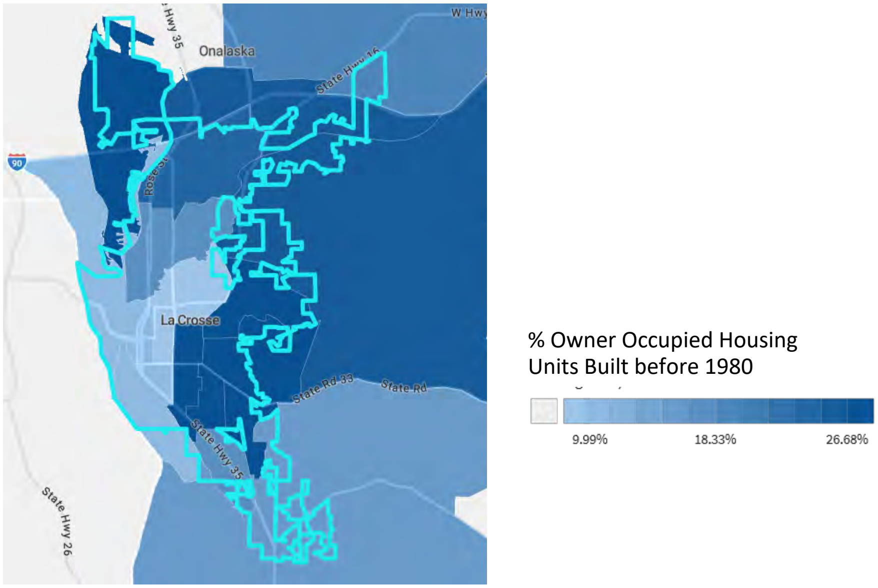
The measure of a community's existing building stock, certified high performance buildings, and housing characteristics provides a basis for determining the current and potential energy efficiency gains for the community. Energy and water efficiency upgrades are one of the simplest and most effective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

Residential Energy Efficiency Potential:

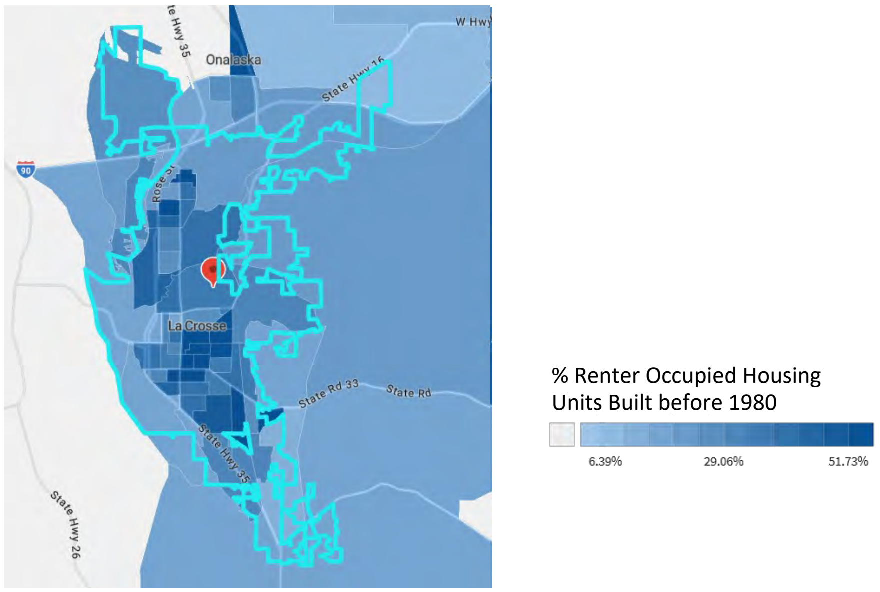
New building technology has increased energy efficiency significantly in recent decades. Although newer U.S. homes are 30 percent larger, they consume a similar amount of total energy as older homes - meaning they are more energy efficient per square foot of space.   According to the US Energy Information 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 La Crosse.

La Crosse Owner Occupied Homes Built Before 1980



La Crosse Renter Occupied Homes Built Before 1980



The chart below outlines the estimated annual energy savings potential for households within the City. Anticipating an energy efficiency participation of 6,115 of the city wide total 30,576 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 17.87 million kWh of electricity and 1,040,000 therms. This reduction would achieve an annual GHG reduction of **(2,855)** metric tons by 2030. Note, this reduction model anticipates a participation focus for residential units built prior to 1980.

La Crosse Residential Building Stock Energy Efficiency Potential (based on 2018 US Census Data)

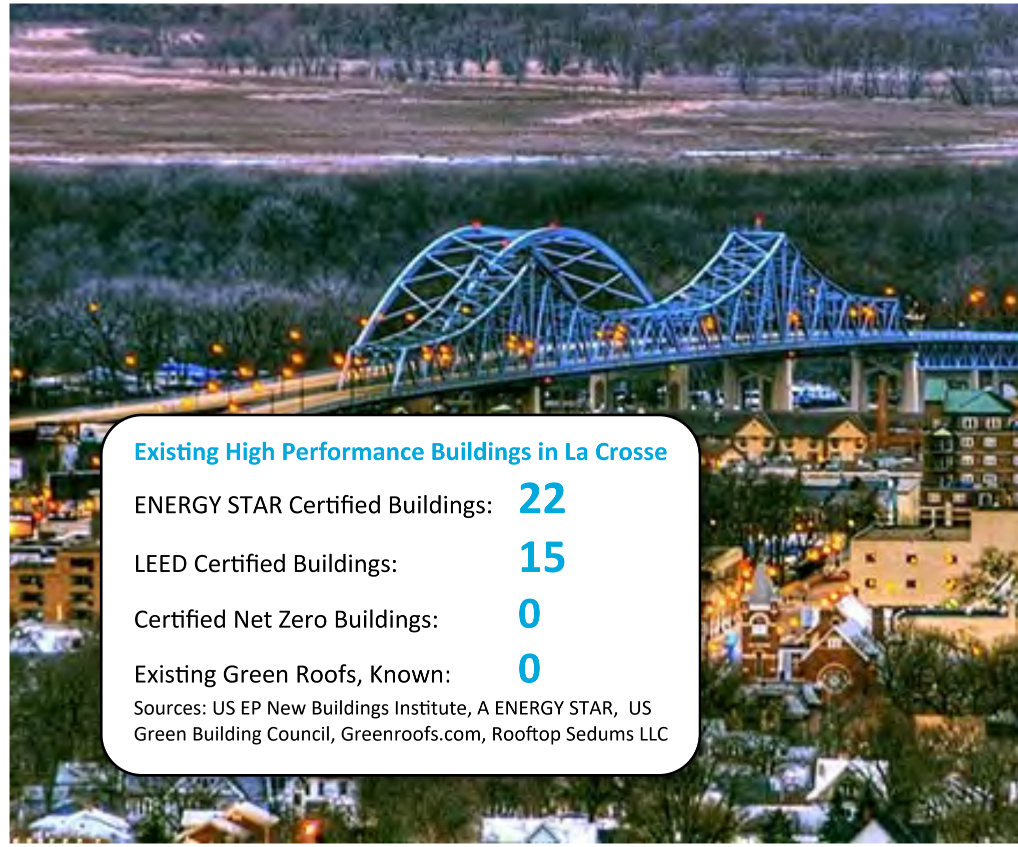
Home Age and Occupancy	Total Estimated Housing Units		Est Electricity Consumption (Million kWh)	Potential Electric Savings at 15% Improvement (Million kWh)	Est Thermal Energy Consumption (Million Therms)	Potential Thermal Energy Savings at 15% Improvement (Million Therms)	Targeted Energy Improvement 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	30,576						6,115			
Owner Occupied	17,699	72.3%	**119.14**	**17.87**	**6.91**	**1.04**	**3,540**	**3.52**	**0.20**	**(1,653)**
Built 2010 or Later	183	0.8%	1.32	0.20	0.08	0.01				
Built 2000 to 2009	1,684	4.5%	7.42	1.11	0.43	0.06				
Built 1980 to 1999	3,282	10.7%	17.63	2.64	1.02	0.15				
Built 1960 to 1979	4,455	25.0%	41.20	6.18	2.39	0.36	302	0.42	0.02	(141)
Built 1940 to 1959	4,391	24.3%	40.04	6.01	2.32	0.35	1,756	2.40	0.14	(820)
Built 1939 or Earlier	3,704	7.1%	11.70	1.75	0.68	0.10	1,482	0.70	0.04	(692)
Renter Occupied	12,877	27.7%	**45.64**	**6.85**	**2.65**	**0.40**	**2,575**	**1.07**	**0.06**	**(1,202)**
Built 2010 or Later	323	1.0%	1.65	0.25	0.10	0.01				
Built 2000 to 2009	1,240	1.6%	2.64	0.40	0.15	0.02				
Built 1980 to 1999	3,757	7.0%	11.53	1.73	0.67	0.10				
Built 1960 to 1979	3,547	14.1%	23.23	3.49	1.35	0.20	570	0.56	0.03	(266)
Built 1940 to 1959	2,034	3.4%	5.60	0.84	0.33	0.05	1,017	0.42	0.02	(475)
Built 1939 or Earlier	1,976	0.7%	1.15	0.17	0.07	0.01	988	0.09	0.01	(461)
Total Reduction Potential								**4.59**	**0.27**	**(2,855)**

**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 City of La Crosse.

Anticipating an energy efficiency participation of 20% of commercial buildings by 2030 based (approximately 619 of a total estimated 3,093 commercial establishments) with an average energy efficiency improvement of 15% should yield an annual community-wide energy reduction of 81 million kWh of electricity and 4.5 million therms of thermal energy. This reduction would achieve an annual GHG reduction of **(9,281)** metric tons by 2030.



La Crosse Commercial Building Stock Energy Efficiency Potential (based on 2018 US Census Data)

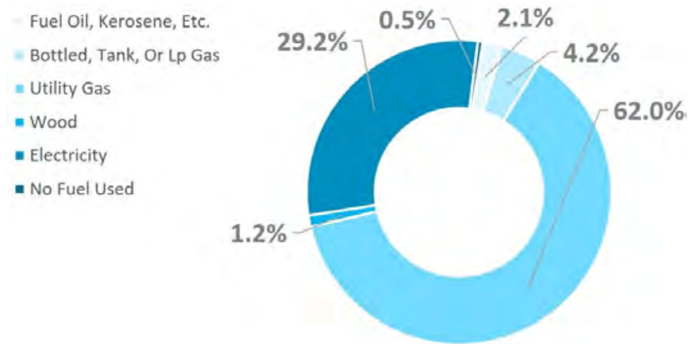
Commercial Building Stock	Total Estimated Commercial Establishments		Est Electricity Consumption (Million kWh)	Potential Electric Savings at 15% Improvement (Million kWh)	Est Thermal Energy Consumption (Million Therms)	Potential Thermal Energy Savings at 15% Improvement (Million	Targeted Energy Improvement 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	3,093	100.0%	543.11	81.47	29.90	4.49	619	16.29	0.90	(9,218)
Total Reduction Potential								**16.29**	**0.90**	**(9,218)**

**Includes estimated emissions associated with increased electrical use.

Buildings and Energy

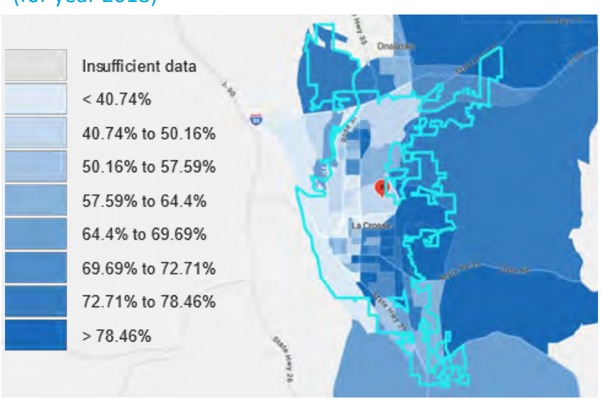
Residential and Commercial Building Heating Fuel Switching Potential

According to the US Census, approximately 62% of residential heating is provided by natural gas, 29.2% by electricity, 4.2% by propane gas, 2.1% by fuel oil and 1.2% by wood. Approximately 0.5%, or 137 households, have no heat of any type in their home.

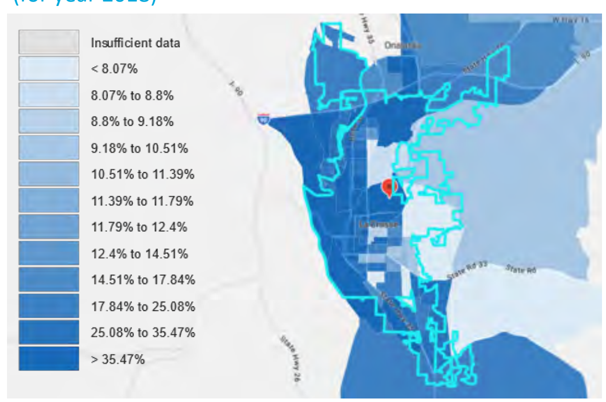


As La Crosse's electric grid nears carbon neutrality, building heating fuel will become an increasingly important target for emission reductions. Reduction, and ultimately the elimination of all fossil fuel heating (oil, propane, natural gas) will be required in order to achieve community wide carbon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

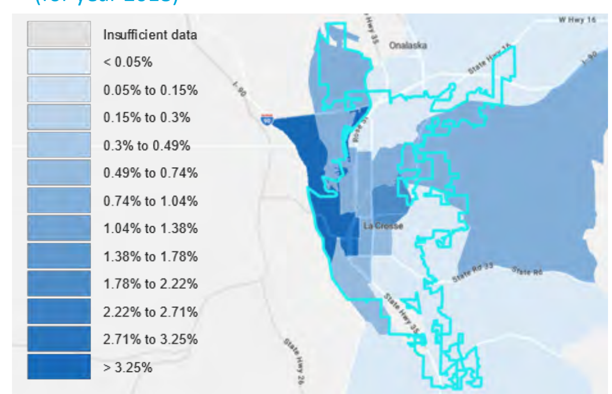
La Crosse Homes with Utility Gas Heat
(for year 2018)



La Crosse Homes with Electric Heat
(for year 2018)



La Crosse Homes with No Fuel Used
(for year 2018)



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 La Crosse households and commercial establishments by 2030. These reductions would achieve a reduction in GHG emissions equal to **(4,902)** metric tons for residential and **(8,151)** 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	30,576					
Owner Occupied	17,699	72.3%	**119.14**	**35,741**	**1769.9**	**(3,566)**
Built 2010 or Later	183	0.8%	1.32	405	18.3	(40)
Built 2000 to 2009	1,684	4.5%	7.42	2,279	168.4	(227)
Built 1980 to 1999	3,282	10.7%	17.63	5,420	328.2	(541)
Built 1960 to 1979	4,455	25.0%	41.20	12,588	445.5	(1,256)
Built 1940 to 1959	4,391	24.3%	40.04	11,872	439.1	(1,184)
Built 1939 or Earlier	3,704	7.1%	11.70	3,228	370.4	(322)
Renter Occupied	12,877	27.7%	**45.64**	**13,391**	**1287.7**	**(1,336)**
Built 2010 or Later	323	1.0%	1.65	507	32.3	(51)
Built 2000 to 2009	1,240	1.6%	2.64	810	124	(81)
Built 1980 to 1999	3,757	7.0%	11.53	3,546	375.7	(354)
Built 1960 to 1979	3,547	14.1%	23.23	7,000	354.7	(698)
Built 1940 to 1959	2,034	3.4%	5.60	1,469	203.4	(147)
Built 1939 or Earlier	1,976	0.7%	1.15	109	197.6	(11)
Total Reduction Potential				**49,132**	**3,058**	**(4,902)**

**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	**3,093**	**100.0%**	**543.11**	**81,868**	**309**	**(8,151)**
Total Reduction Potential						

**Includes estimated emissions associated with increased electrical use.

Buildings and Energy

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

Due to Xcel Energy's "Carbon Free by 2050" commitment (https://wi.my.xcelenergy.com/s/our-commitment/carbon-reduction-plan), the GHG emissions associated with electricity use will 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 City of La Crosse. 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.

City of La Crosse's Solar Share Based on 2021 Data:	State	La Crosse	La Crosse's
Population	5,822,000	51,666	**0.89%**
Number of Solar Installations	9,223	204	**2.21%**
Average Solar Installations / 1,000 households	1.28	0.02	**1.64%**
Estimated Solar Generating Capacity (MW)	624.80	1.53	**0.24%**
Average Array Size (KW)	67.74	7.50	**11%**
Solar Industry Businesses	150	1	**0.67%**

Buildings and Energy

Total City Wide Optimized Rooftop Solar PV Potential

			Flat	Low Tilt	Mid-Low Tilt	Mid-High Tilt	High Tilt
Subtotal Flat							
Suitable Buildings	3,683	33.48%	**3,683**	-	-	-	-
Suitable Roof Planes	6,776	33.48%	**6,776**	-	-	-	-
Square Footage	2,142,165	33.49%	**2,142,165**	-	-	-	-
Capacity (KW dc)	21,887	33.49%	**21,887**	-	-	-	-
Generation (KWH)	27,315,505	37.35%	**27,315,505**	-	-	-	-
Subtotal South Facing							
Suitable Buildings	3,615	32.87%	-	**817**	**2,300**	**495**	**3**
Suitable Roof Planes	6,652	32.87%	-	**1,504**	**4,232**	**911**	**5**
Square Footage	2,102,901	32.87%	-	**475,425**	**1,337,879**	**287,987**	**1,610**
Capacity (KW dc)	21,486	32.87%	-	**4,858**	**13,670**	**2,942**	**16**
Generation (KWH)	23,882,348	32.65%	-	**5,218,962**	**15,170,708**	**3,474,030**	**18,648**
West + Southwest							
Suitable Buildings	3,002	27.29%	-	**700**	**2,302**	-	-
Suitable Roof Planes	5,523	27.29%	-	**1,288**	**4,235**	-	-
Square Footage	1,745,733	27.29%	-	**407,076**	**1,338,657**	-	-
Capacity (KW dc)	17,837	27.29%	-	**4,159**	**13,678**	-	-
Generation (KWH)	17,947,160	24.54%	-	**4,081,794**	**13,865,367**	-	-
East + Southeast							
Suitable Buildings	699	6.35%	-	**699**	-	-	-
Suitable Roof Planes	1,286	6.35%	-	**1,286**	-	-	-
Square Footage	406,453	6.35%	-	**406,453**	-	-	-
Capacity (KW dc)	4,153	6.35%	-	**4,153**	-	-	-
Generation (KWH)	3,992,051	5.46%	-	**3,992,051**	-	-	-

Grand Total		**Subtotal: Flat Roof**		**Subtotal: Low Tilt**		**Subtotal: Mid-Low Tilt**		**Subtotal: Mid-High Tilt**		**Subtotal: High Tilt**	
Suitable Buildings	10,999	3,683	33.48%	2,216	20.15%	4,602	41.84%	495	4.50%	3	0.02%
Suitable Roof Planes	20,237	6,776	33.48%	4,078	20.15%	8,467	41.84%	911	4.50%	5	0.02%
Square Footage	6,397,252	2,142,165	33.49%	1,288,953	20.15%	2,676,536	41.84%	287,987	4.50%	1,610	0.03%
Capacity (KW dc)	65,363	21,887	33.49%	13,170	20.15%	27,347	41.84%	2,942	4.50%	16	0.03%
Generation (KWH)	73,137,063	27,315,505	37.35%	13,292,807	18.18%	29,036,074	39.70%	3,474,030	4.75%	18,648	0.03%

Solar PV Rooftop Market Absorption Scenario

paleBLUEdot then explored potential new solar PV market absorption scenarios through 2030 building on the existing 1.5 MW of installed capacity within the city. The market projection we recommend using for guidance on potential new solar installations within La Crosse uses La Crosse's share of State population and applies that to the statewide new solar PV projections. The resulting scenario outlined to the right anticipates a 49% initial growth rate, steadily reducing to a 10% growth rate by 2040. This scenario would result in approximately 2-3% of current citywide electrical consumption being met through rooftop solar PV by 2030.

Ground Mounted and Carport Capacity

In addition to roof mounted solar PV potential, the City of La Crosse has significant solar PV potential associated with ground mounted arrays as well as arrays mounted over parking—known as "Carport" arrays. The 2022 City of La Crosse 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 solar projection by 2030: **(8,200)** Metric Tons based on projected electric grid emission factors (-10,000 metric tons based on current grid emission factors).

Scenario B: Share of Projected Statewide Annual Increase Based on Population Share

Year	Cumulative Installed (KW)	Annual Generation (KWH)	% of City Electric Consumption	This is Equivalent to adding (x) Average Residential Arrays Annually:	Or Equivalent to adding (x) Commercial Arrays Annually:
2025	5,058	5,659,660	**0.79%**	**104**	**17.6**
2030	15,130	16,929,227	**2.35%**	**296**	**42**
2040	39,243	43,910,054	**6.09%**	**355**	**60**

Total Distributed Renewable Energy Potentials Projection—2030

Source Potential	Cumulative Installed	Annual Generation Estimate	% of Demand
Scenario B Rooftop	15,130 KW	16,929,227 KWH	2.35%
Carport	4,896 KW	6,168,000 KWH	1%
Ground Mounted	8,477 KW	10,680,000 KWH	1.5%
Total Potential	**28,503 KW**	**33,777,227 KWH**	**4.85%**

Buildings and Energy

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Buildings and Energy**
Air temperature	• Changes in patterns of energy use due to warmer winters and hotter summers, with potentially significant increases in summer demand due to the greater need for cooling systems
Extreme heat	• Increased degradation of buildings and associated infrastructure, requiring more frequent and/or more expensive repairs, replacements, or retrofits • Increased demand for electricity, straining capacity and leading to higher costs and potential power outages
Extreme precipitation, storms, & flooding	• Increased damage to buildings and associated infrastructure, power outages, and disruption to critical services (e.g., utilities, stormwater, health care, transportation)
Drought	• Reduced generation of hydroelectric power, increasing demand on natural gas/coal-fired power plants (given current grid configuration) and causing associated increases on electrical costs as well as greenhouse gas emissions

Buildings and Energy

Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Buildings and Energy Strategic Goals:

Pathway 1—Reduction

BE 1: Improve total Community wide residential, commercial, educational, and industrial building energy efficiency by 15% by 2030 (electricity and natural gas).

BE2: Increase adoption of high performance building construction technology, achieving 1/2% Net Zero households and commercial properties community wide by 2030.

Fuel Switching

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

BE 4: Increase renewable energy from 0.24% to 5% of citywide residential and commercial electric use by 2030.

Adaptation

BE 5: Increase resilience of city-wide building stock to the impacts of climate change.

Strategic Goal Recommendations—Municipal Operations

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following municipal operations Buildings and Energy Strategic Goals:

Pathway 1—Reduction

BE 5: Improve total municipal building energy efficiency by 15% by 2030 (electricity and natural gas).

Fuel Switching

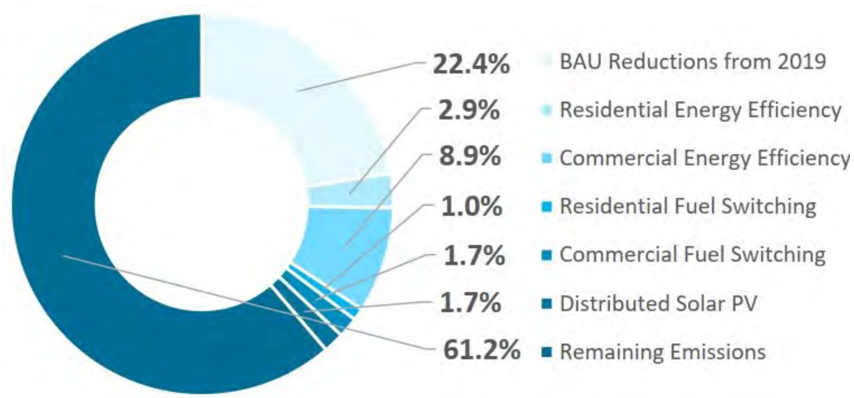
BE 6: Achieve 10% municipal building thermal “fuel switching" from on-site fossil fuel combustion to electrification by 2030.

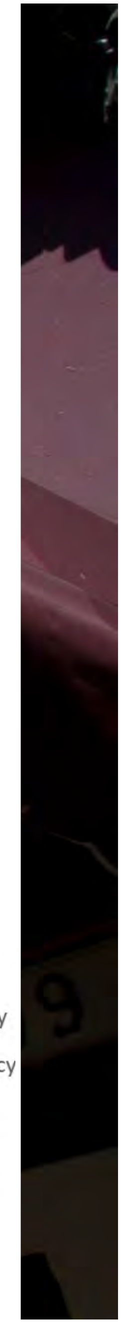
BE 7: Increase on-site renewable energy from 0.57% to 7.5% of City operations electricity consumption by 2030.

Adaptation

BE 8: Increase resilience of City facilities to the impacts of climate change.

Projected Sector Emission Reductions Achieved by Draft Strategies





Section

05 Waste Management

Click here to return to TOC

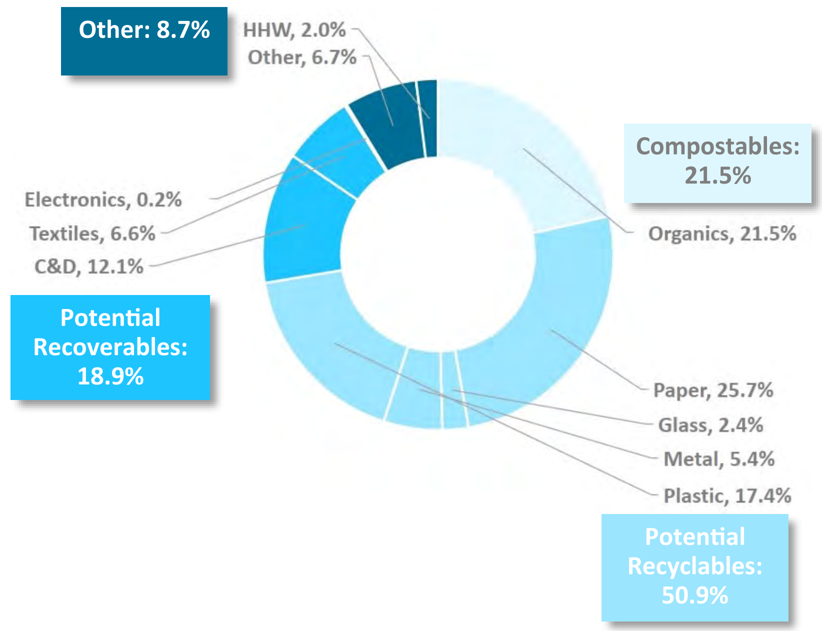
Waste Management

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

Citywide municipal solid waste (MSW) handled has been estimated based on the city's pro-rata share of La Crosse County-wide solid waste collected. In 2020, citywide MSW totaled 67,224 tons. Of the MSW handled an estimated 8,590 tons (12.8% of total) were recycled, 65 tons (0.1%) were organics collection, 20,632 tons (30.7%) were managed as refuse derived fuel (RDF), and the remaining 37,937 tons (56.4%) were landfilled.

State of Wisconsin Waste Characterization Study

In 2021, the State of Wisconsin initiated a comprehensive, quantitative evaluation to understand the make up of the current waste stream (materials not diverted through recycling or organics collection) statewide. The study assessed solid waste characteristics in facilities in each region—including the La Crosse Landfill as one of three facilities in the West Central region. In the graph to the right, the findings of the composition of the waste characterization study are shown for the West Central region. This graph groups the classifications of waste defined in the 2021 study into broad categories based on their diversion potential including: Compostables, Potential Recyclables, Potential Recoverables, and Other.



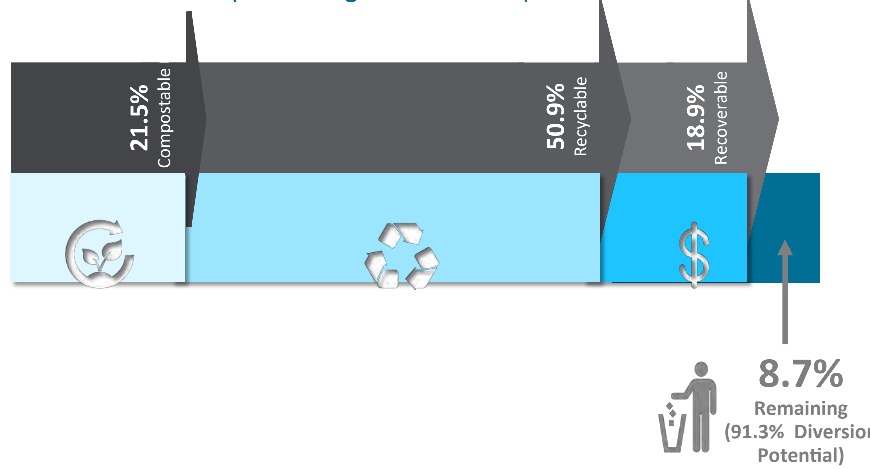
Waste Management

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Waste Management**
Air temperature	• Increased maintenance needs and costs • Increased need for odor abatement
Extreme heat	• Increased potential for overheating of sorting equipment and collection vehicles • Increased pest activity and altered waste decomposition rates
Precipitation	• Increased need for enclosed or protected facilities • Increased leakage and run-off, potentially impacting local water quality
Extreme precipitation, storms, & flooding	• Flooding and destruction of dumpsites, collection systems, drainage systems and management facilities, leading to decrease in capacity and management options • Impact to delivery of waste and transport infrastructure, closure of facilities • Increased waste generation due to debris and other damage
Drought	• Concentration of waste-related pollutants due to reduced river levels • Potential increased risk of fire at disposal sites (usually if coupled with extreme heat)

Waste Diversion Potential

Based on the State of Wisconsin Waste Characterization Study, there may be waste diversion potential of up to 78.7% in the current land-filled materials (idealized maximum). Below is the breakdown of the estimated total maximum potential waste diversion (excluding waste reduction):

Compostables 21.5%
Potentially Recyclable Materials 50.9%
Potentially Recoverable Materials 18.9%
Other Materials (remaining landfill waste) 8.7%



Waste Management

Strategic Goal Recommendations

Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Waste Management Goals:

Pathway 1—Reduction

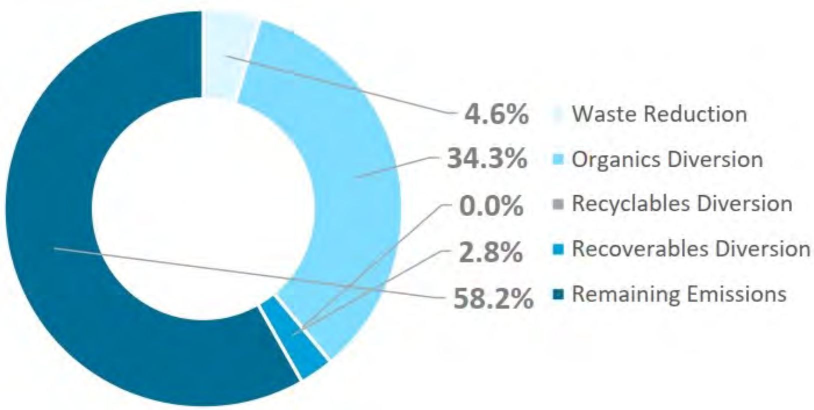
WM 1: Decrease total per capita municipal solid waste handled by 5% by 2030.

WM 2: Achieve 50% organics landfill waste diversion by 2030 (11% of total MSW).

WM 3: Increase recycling from 12.8% to 20% of total MSW handled by 2030.

WM 4: Increase diversion of potential recoverables by 15% by 2030 (decreasing from 18.9% of city mixed waste to 16%)

Projected Sector Emission Reductions Achieved by Draft Strategies



Section 06 Water and Wastewater

Click here to return to TOC

Water and Wastewater

Water and Energy Nexus

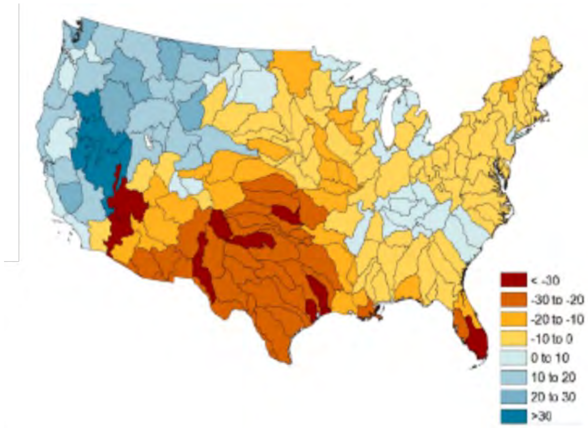
Water and energy are fundamental components of our 21st century life. Production, distribution, consumption, and treatment of water consumes energy. Production of energy - particularly those generated through fossil fuel use - consumes water. The water-energy nexus is the relationship between how much 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

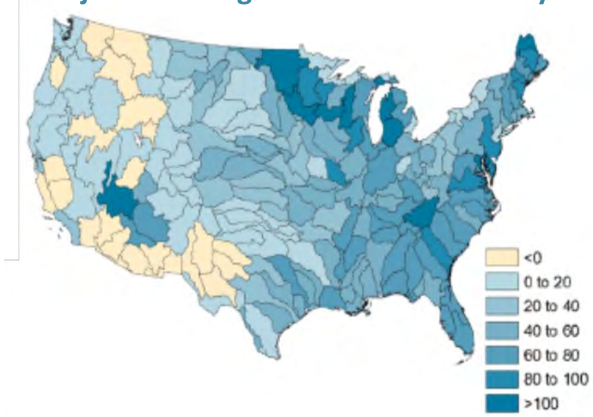
By 2025, an estimated 1.8 billion people will live in areas plagued by water scarcity, with two-thirds of the world's population living in water-stressed regions. Since 1985 the La Crosse region has had a reduction in water yield of approximately 10%. Through 2050, the City can anticipate an increase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

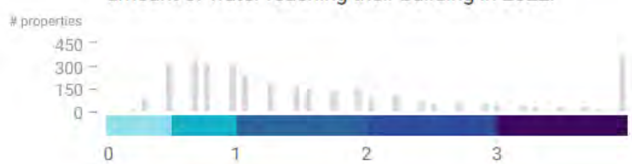
According to the US National Climate Assessment, the ten rainiest days can contribute up to 40% of the annual precipitation in the Wisconsin region. By 2070, the La Crosse area can anticipate an increase of up to 15% in the total annual precipitation. In addition, the timeframe between rains is expected 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 City with flood risk and to review current storm water management capacity against future extreme rainfall event projections.

The map shows the flood risk areas throughout the City 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. The charts to the left show the number of properties in the city currently at risk of flood damage, the projected change in properties at risk due to climate change, and the historical flood damage value reported in La Crosse.

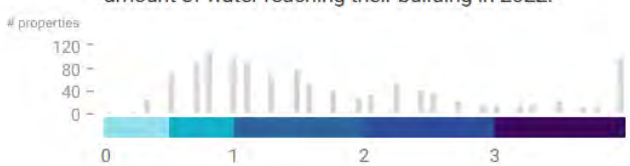
(Source: FEMA, FM Global, National Flood Services)

Approx. 5,841 properties have a **0.2% chance** of some amount of water reaching their building in 2022.

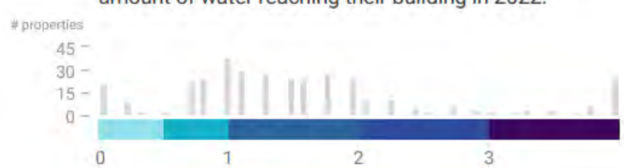
Approx. 3,634 properties have a **1% chance** of some amount of water reaching their building in 2022.

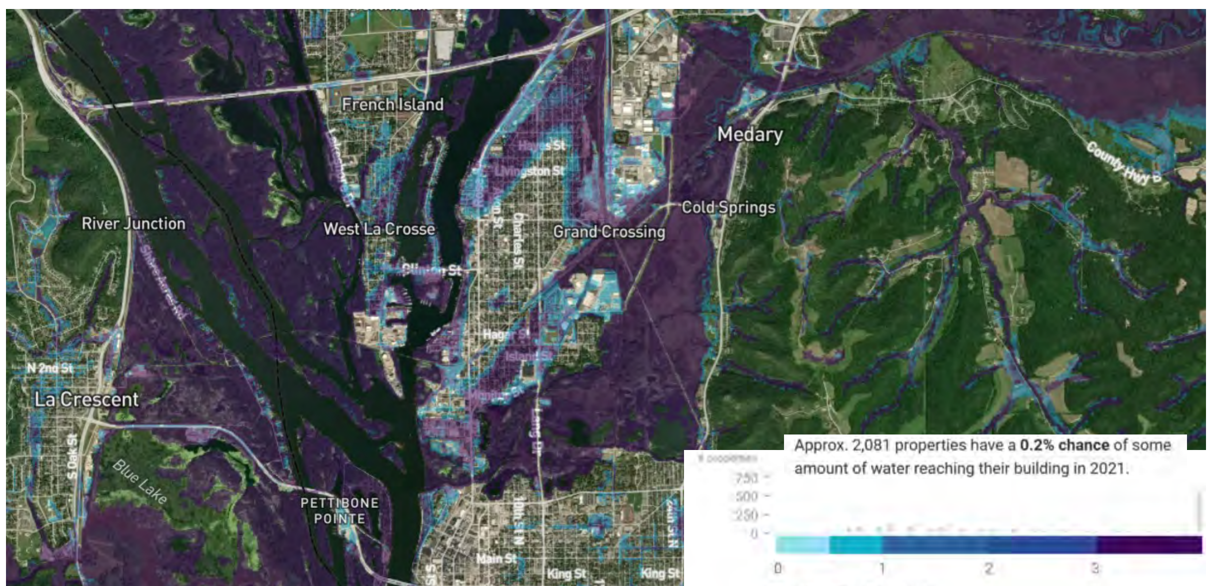


Approx. 1,186 properties have a **5% chance** of some amount of water reaching their building in 2022.



Approx. 369 properties have a **20% chance** of some amount of water reaching their building in 2022.





Source: Floodfac-

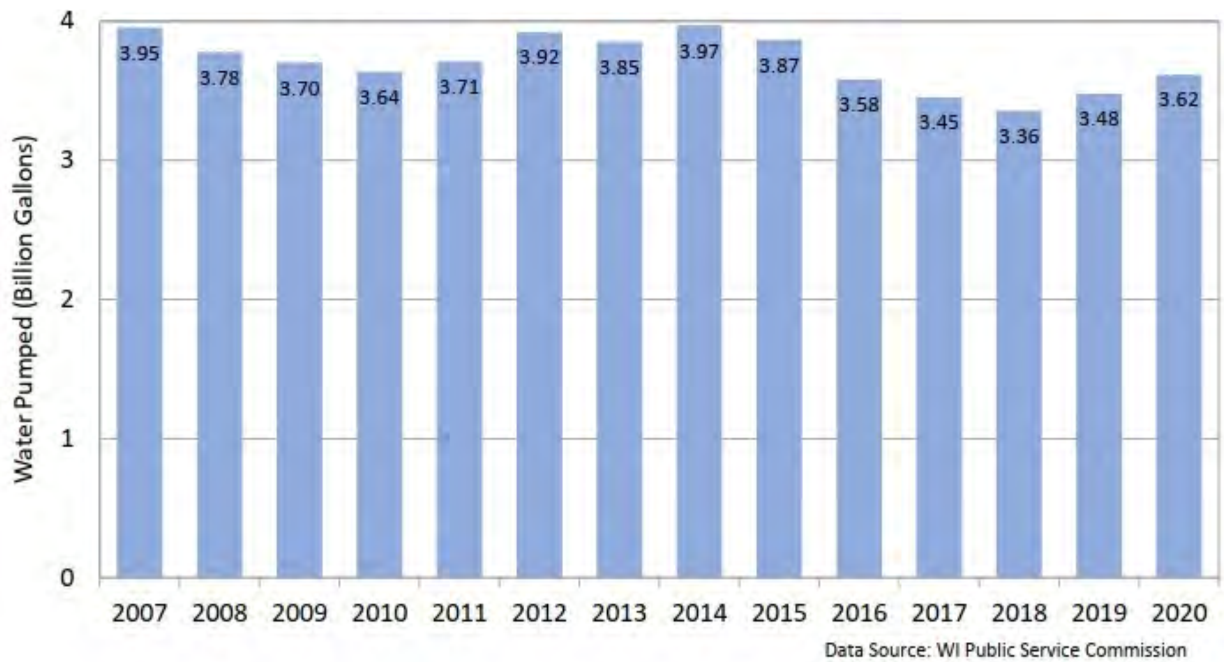
Water and Wastewater

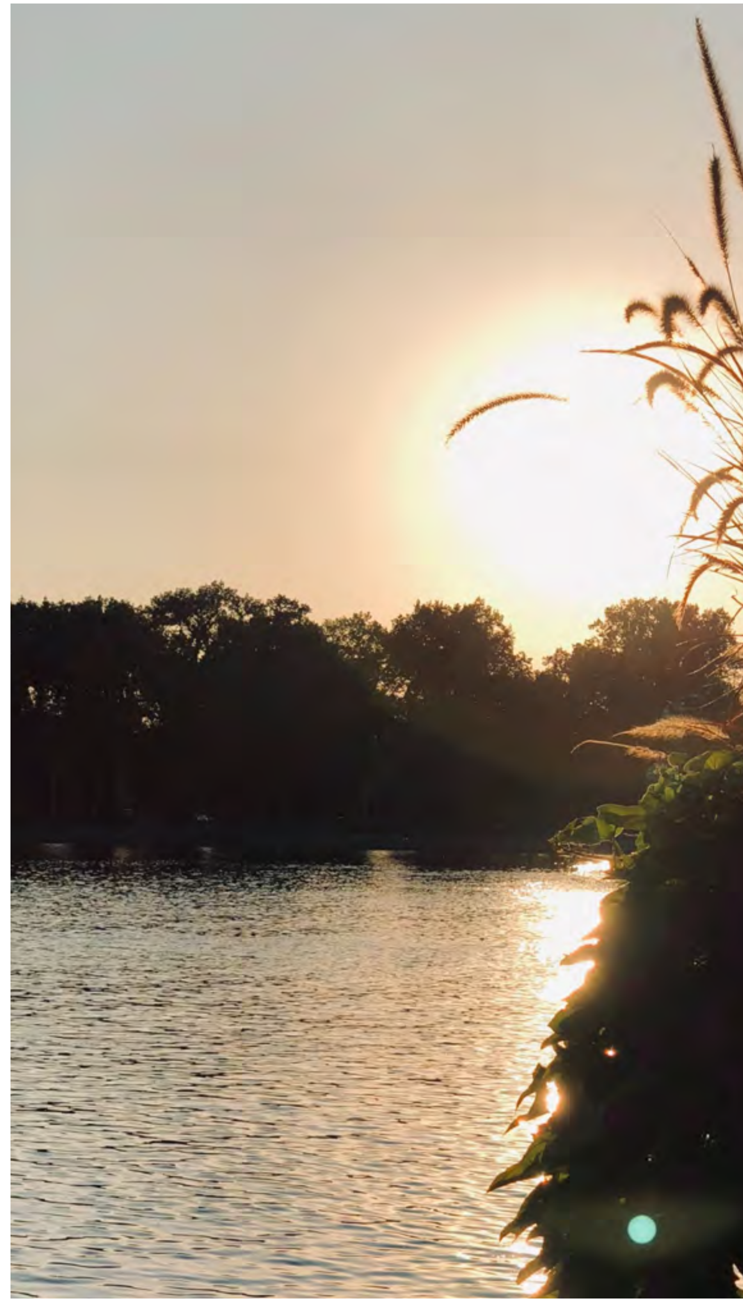
Water Conservation Potential

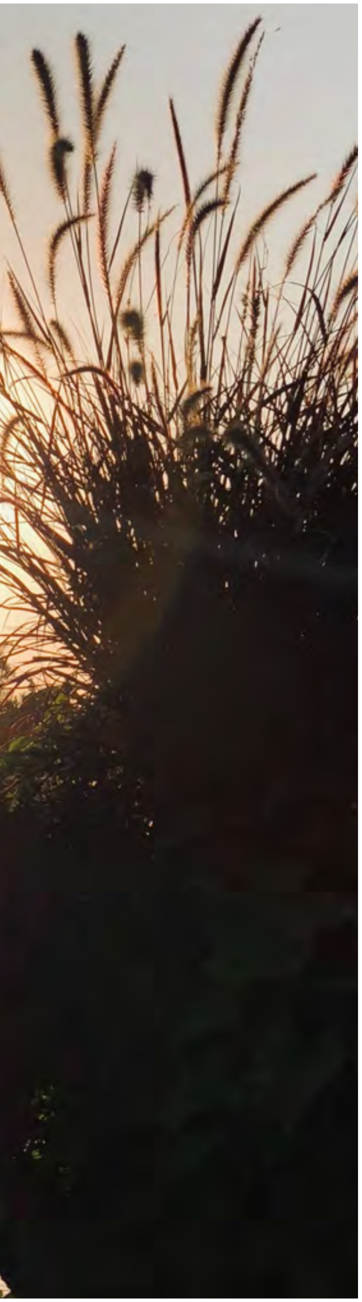
Based on City of La Crosse data, water consumption citywide decreased an average of 0.65% annually for a total of 8.5% from 2007 to 2020. Though the reported water reduction is significant, there is likely additional water conservation potential. According to the Water Research Foundation, on average, 12-14% of municipal water distribution is lost through leaks in water mains and water pipes on private property. For La Crosse, this could represent up to 500 million gallons of water annually.

For every 1% of water and wastewater consumption reduction made, citywide GHG emissions can be decreased up to 120 metric tons annually. Perhaps more importantly, increased water conservation can help maintain healthy aquifers as the region's water demand increases and improve resilience through precipitation variations exacerbated by climate change.

Water Use Trends in La Crosse







DIRECT IMPACTS OF CLIMATE STRESSORS

Climate Stressor	Likely Impacts on Greenspace and Tree Canopy
Air temperature	• Increased evaporation rates, which may impact water supply and quality
Extreme heat	• Increased water demand for municipal and agricultural use • Reduced water quality due to high water temperatures and increased risk of harmful algal blooms
Precipitation	• Localized flooding during periods of heavy rain, particularly where the City's stormwater infrastructure is inadequate for increased volumes or impermeable surfaces prevent infiltration • Impacts on groundwater recharge rates and soil infiltration, likely affecting the City's aquifer functionality • Impact on stormwater retention ands effects on stormwater discharge compliance • Increased soil erosion and nutrient runoff into rivers, reducing water quality • Effects on function of septic and sewage systems
Extreme precipitation, storms, & flooding	• Degraded water quality due to stormwater inundation, localized flooding, and non-infiltrated runoff • Increased occurrence and mobility of waterborne disease
Drought	• Depletion of aquifer and reservoirs, reducing drinking water supplies even as demand for water increases • Increased risk of harmful algal blooms in warm, slow-moving water bodies • Potential for concentration of contaminants due to evaporation, impacting water quality • Effects on function of septic and sewage systems

Water and Wastewater

Strategic Goal Recommendations
Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Water and Wastewater Strategic Goals:

Pathway 1—Reduction

W 1: Promote increased water conservation citywide with a targeted reduction of 6.5% by 2030.

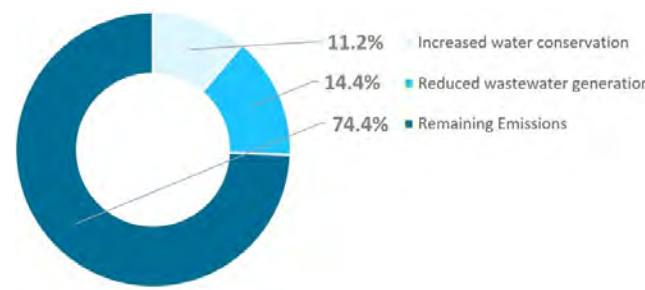
W 2: Reduce wastewater generation City Wide with a targeted reduction of 5% by 2030.

Adaptation

W 3: Plan for how to meet water needs with increasing demand and changing aquifer recharge rates

W4: Improve the resilience of the City's water and wastewater infrastructure to flooding, particularly in high-risk areas.

Projected Sector Emission Reductions Achieved by Draft Strategies



Section 07

Local Food and Agriculture

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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.

There are implications of climate change for local food and agriculture due to all climate stressors. These stressors are outlined later in this section.

Buying food from local sources can reduce the carbon intensity of our diet while also increasing community resilience and supporting 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)

Community Gardens In La Crosse

Community Gardens Per 100,000 Residents

United States: **5.5**
18,000 Total (est)

City of Madison: **2.3**
6 Total

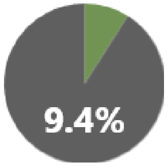
City of Milwaukee: **1.2**
7 Total

(Sources: American Community Gardening Association, Star Tribune, City of Burnsville, City of La Crosse)

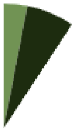
City of La Crosse: **3.9**
2 Total

LA CROSSE COUNTY **FOOD INSECURE PEOPLE: 11,070**

FOOD INSECURITY RATE



ESTIMATED PROGRAM ELIGIBILITY AMONG FOOD INSECURE PEOPLE



33%	Above SNAP, Other Nutrition Programs threshold of 200% poverty
67%	Below SNAP, Other Nutrition Programs threshold of 200% poverty

AVERAGE MEAL COST
$ 3.26

ADDITONAL MONEY REQUIRED TO MEET FOOD NEEDS
$ 6,165,000

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Local Food and Agriculture**
Air temperature	• Increased length of the growing season and potential increases in heat stress, disease, and insect pests, impacting growth and productivity of agricultural crops • Increased presence of weeds and fungi that compete with crops for light, water, and nutrients • Expansion of non-native invasive plants and insect pests as temperatures increase (particularly winter temperatures) • Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing
Extreme heat	• Reduced plant growth and increased mortality, decreasing crop production and sustainability • Increased need for supplemental watering
Precipitation	• Shifts in the size and location of floodplains, which may influence areas of land that are suitable for agriculture and/or the crops that can be grown there • Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing
Extreme precipitation, storms, & flooding	• Increased flooding and erosion of agricultural lands located near rivers and floodplains, resulting in crop failures and/or damage or destruction of infrastructure • Impaired water quality due to flooding
Drought	• Extreme conditions could increase risk of wildfires, destroying and impacting crops and food accessibility, and threatening open spaces • Degradation of soil health, threatening crop production and contributing to food price instability • Decreased water availability as well as diminished water quality

Local Food and Agriculture

A robust local food system establishes additional supply chains and resilience to distribution disruptions. Healthy local food systems can also play a critical role in addressing food access vulnerability and food insecurity within neighborhoods of higher vulnerability. Increased local food systems also tend to increase diversity and long-term food system resilience in food crops cultivated.

Strategic Goal Recommendations
Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Local Food and Agriculture Strategic Goals:

Adaptation

LF 1: Increase production of and access to local food, particularly serving low income and food insecure individuals.

LF 2: Reduce food waste and hunger, achieve a 50% reduction in food insecurity community-wide by 2030.

LF3: Protect and preserve agricultural land while increasing its resilience to climate shocks.

Section 08

Greenspace, Trees, 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)

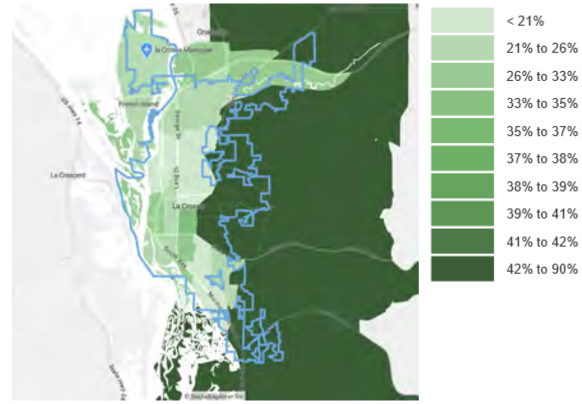
Greenspace, Trees and Ecosystems

Community-wide Land Cover Characteristics

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

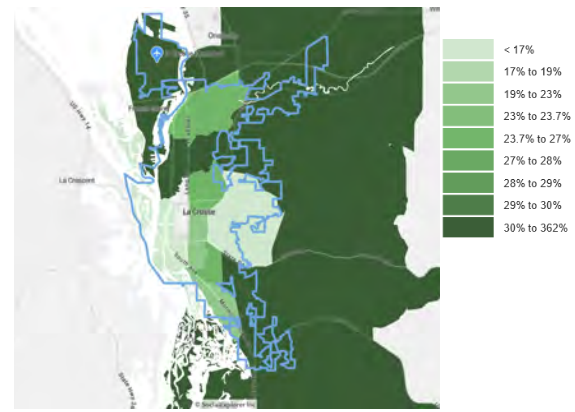
Tree Canopy Coverage

City Average: **30.0%**
(excluding tracts 104.1, 105, 106, 107)
Census Tract High: **68.7%** **Tract: 6**
Census Tract Low: **12.2%** **Tract: 11.01**



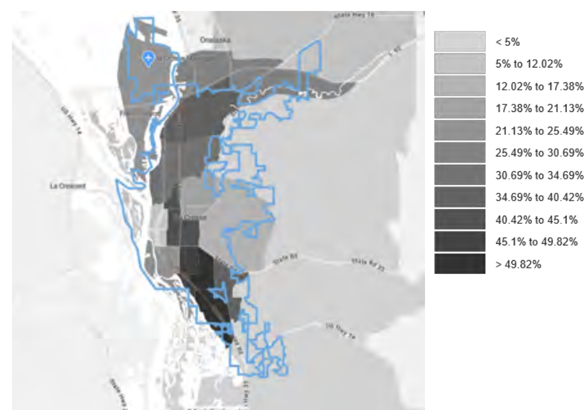
Lawns and Grass Coverage

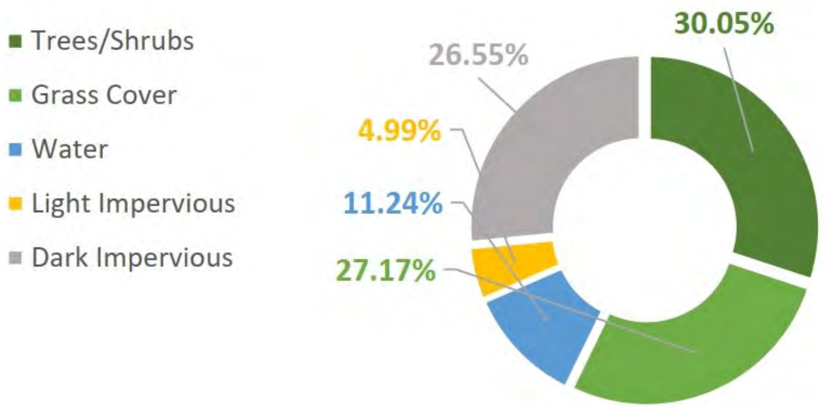
City Average: **27.2%**
(excluding tracts 104.1, 105, 106, 107)
Census Tract High: **45.0%** **Tract: 103**
Census Tract Low: **10.6%** **Tract: 3**

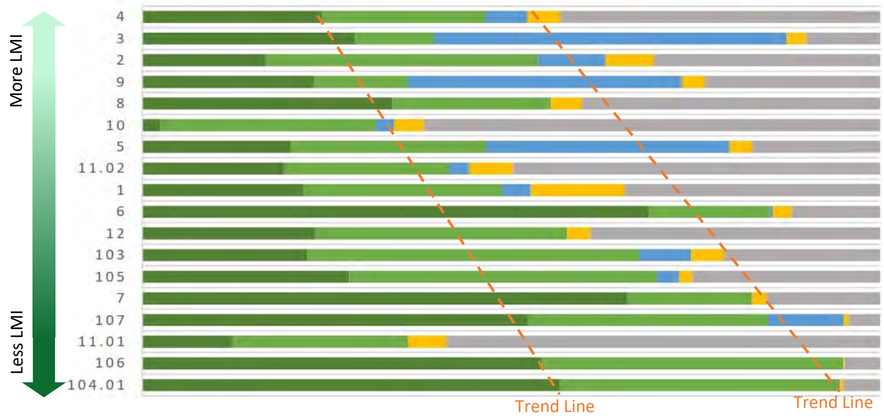


Dark Impervious Surface Coverage (buildings+pavement)

City Average: **26.6%**
(excluding tracts 104.1, 105, 106, 107)
Census Tract High: **58.8%** **Tract: 240.04**
Census Tract Low: **10%** **Tract: 3**







Ground Cover Breakdown by Type

(excluding tracts 104.1, 105, 106, 107)

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 less tree and grass coverage and more dark impervious surfaces.

Greenspace, Trees 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:

Weighted Priority Tree Canopy Increase

- 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

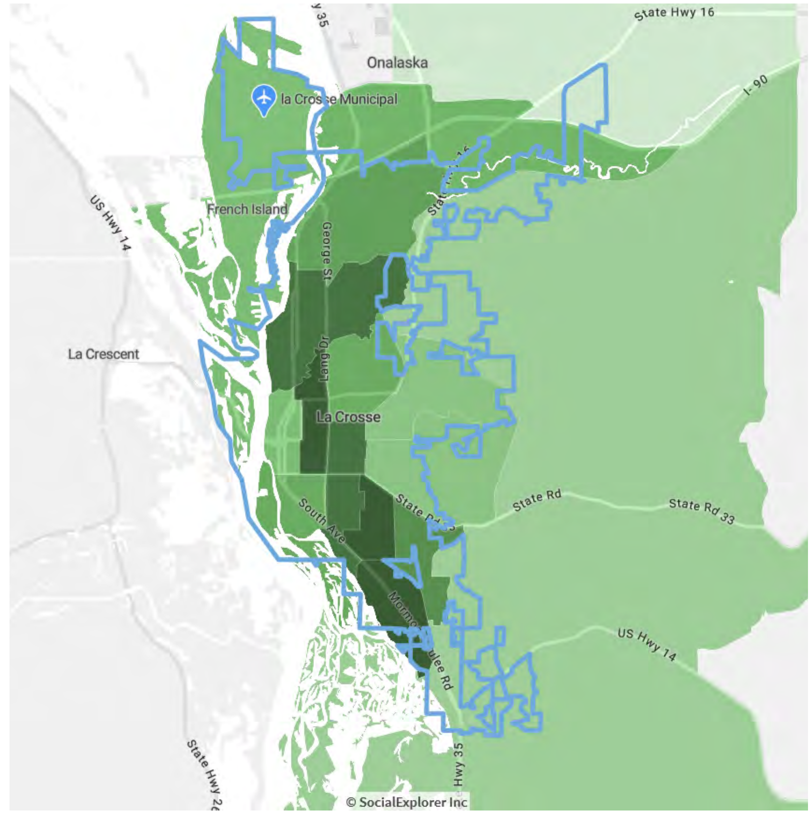
The weighted prioritization for tree canopy increase looks to balance the potential for increased tree canopy with the opportunity to improve tree canopy benefit equity, potential to positively impact as many households as possible, and the need for mitigation of heat island impacts. The priorities above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

< 0.11
0.11 to 0.11
0.11 to 0.16
0.16 to 0.27
0.27 to 0.35
0.35 to 0.38
0.38 to 0.46
0.46 to 0.51
0.51 to 0.53
0.53 to 0.6
> 0.6



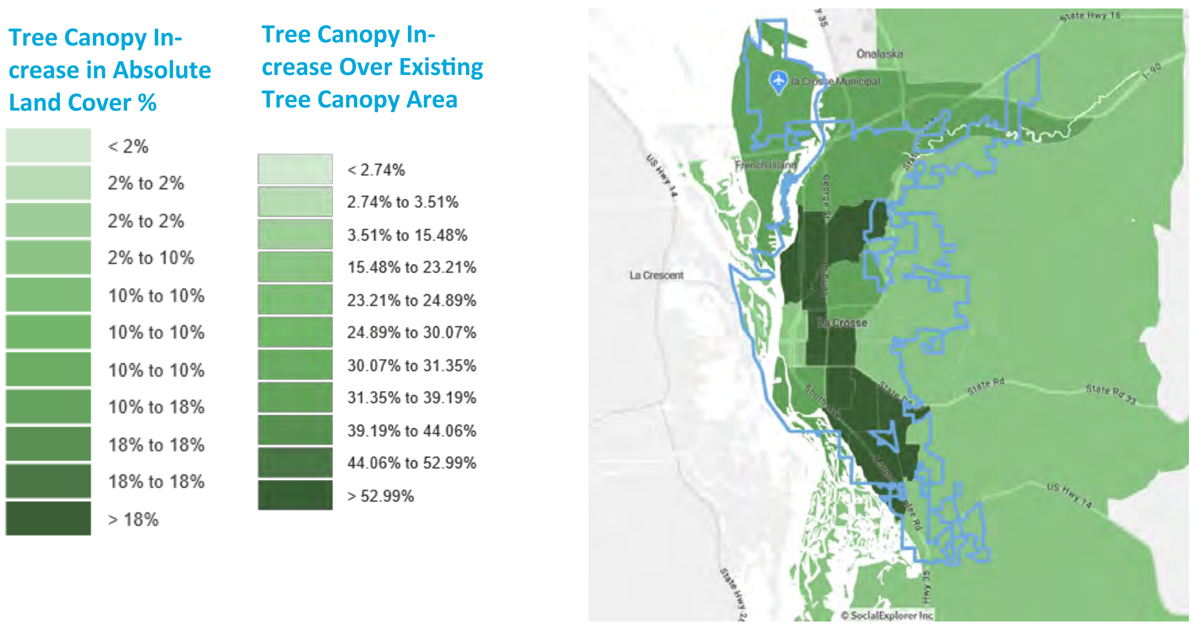
Greenspace, Trees and Ecosystems

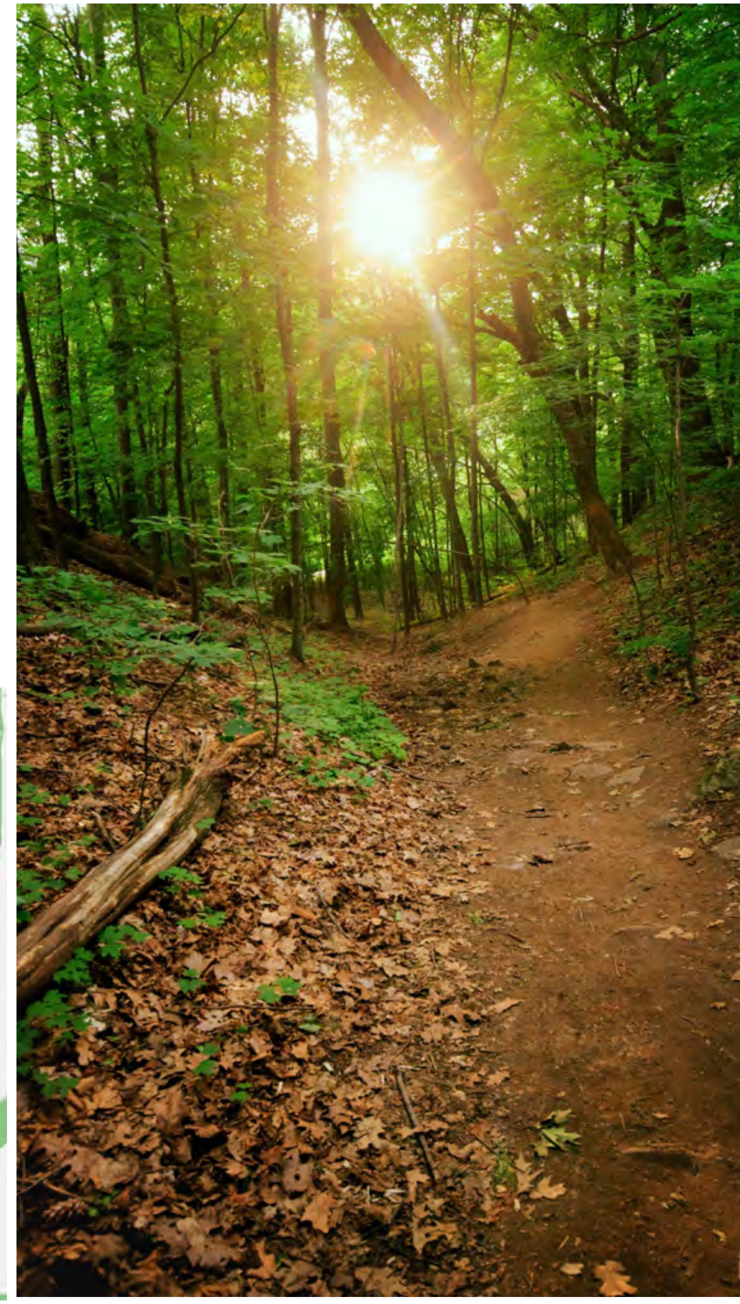
Calculating Tree Canopy Coverage Goals

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:	**18%**
For neighborhoods in middle 1/3rd Neighborhood Priority Ranking:	**10%**
For neighborhoods in bottom 1/3rd Neighborhood Priority Ranking:	**2%**





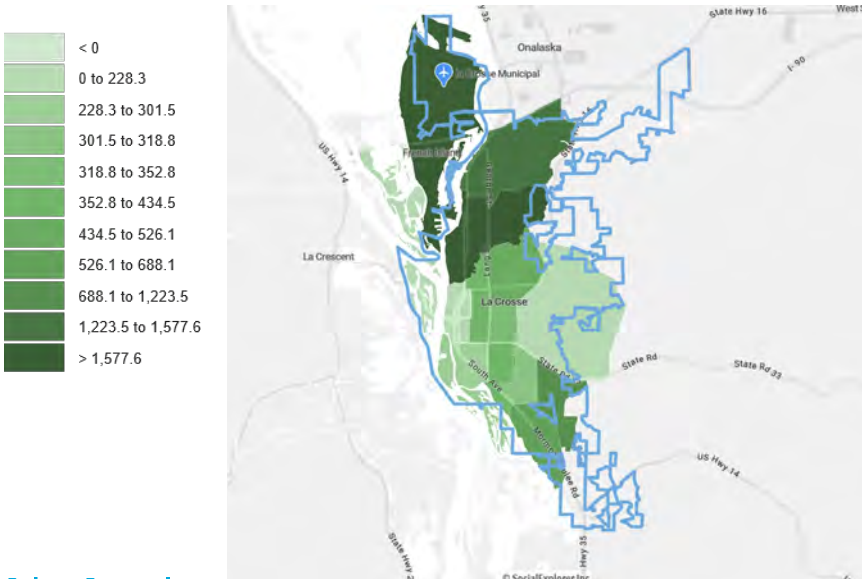
New Tree Planting Annual Target to Meet 2040 Tree Canopy Goal

Community-Wide Total (excluding tracts 104.1, 105, 106, 107):
Note, Acreage represents the canopy coverage at year of planting, with an assumed new tree crown radius of 5'):

6,004 New Trees **34** 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 city's tree canopy, the findings of the ground cover study as outlined in the the La Crosse 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, Trees and Ecosystems

Turf Reduction Potential

As illustrated in the chart to the below, 90.5% of grass lands in La Crosse are manicured lawns—representing a great opportunity for turf reduction. Turf reduction can increase stormwater uptake, reduce potable water use, and increase soil carbon.

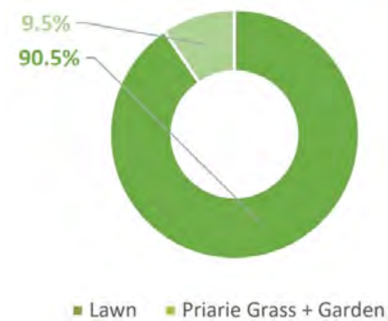
Impervious Surface Reduction Potential

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 67% of all impervious surfaces, followed by dark roof surfaces at 20%. These represent significant opportunities for decreasing heat island impacts in the community. For every 1% decrease in impervious surfaces in a neighborhood of La Crosse, that area's likely experience of summer time heat island temperatures may decrease 0.17° F

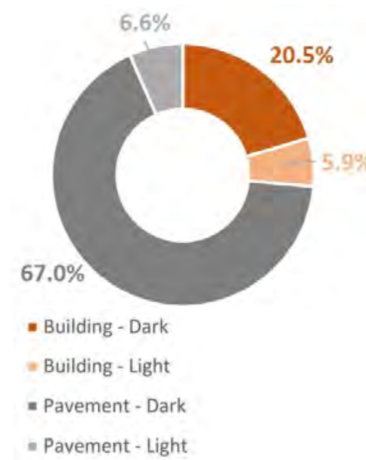
See La Crosse Ground Cover Survey and Carbon Sequestration study for more information: https://cutt.ly/5O9AjYQ

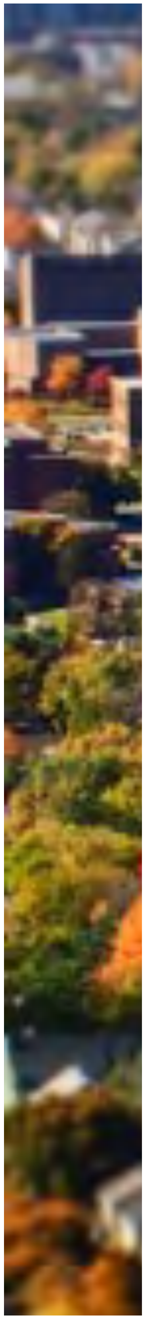
Existing Grass Coverage in La Crosse by Type

(excluding tracts 104.1, 105, 106, 107)



Existing Impervious Surface Coverage in La Crosse by





Greenspace, Trees and Ecosystems

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Greenspace and Tree Canopy**
Air temperature	• Increased length of the growing season and potential increases in heat stress, disease, and insect pests, impacting growth and productivity of trees and native vegetation • Expansion of non-native invasive plants and insect pests as temperatures increase (particularly winter temperatures) • Shifts in the composition and distribution of native plant communities due to warmer temperatures • Changes in use of parks and recreational areas with more warm days
Extreme heat	• Reduced plant growth and increased mortality, impacting street trees and native plant communities • Changes in demand for different aspects of greenspace (e.g, shade, water features)
Precipitation	• Changes in the size and location of floodplains and wetlands • Shifts in the composition and distribution of native plant communities due to wetter conditions and shifts in seasonal precipitation patterns • Increased runoff of nutrients and contaminants from urban and agricultural areas, impacting water quality
Extreme precipitation, storms, & flooding	• Increased flooding and erosion, impacting native plant communities as well as access to greenspace and potentially damage to built infrastructure associated with parks and conservation areas or harming people
Drought	• Increased risk of wildfire during severe droughts, impacting native plants and animals and potential damaging or destroying infrastructure • Increased risk of harmful algal blooms, impacting aquatic systems (e.g., rivers, lakes/ponds) and people (e.g., respiratory distress)

Greenspace, Trees and Ecosystems

Strategic Goal Recommendations

Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Greenspace, Trees and Ecosystems Strategic Goals:

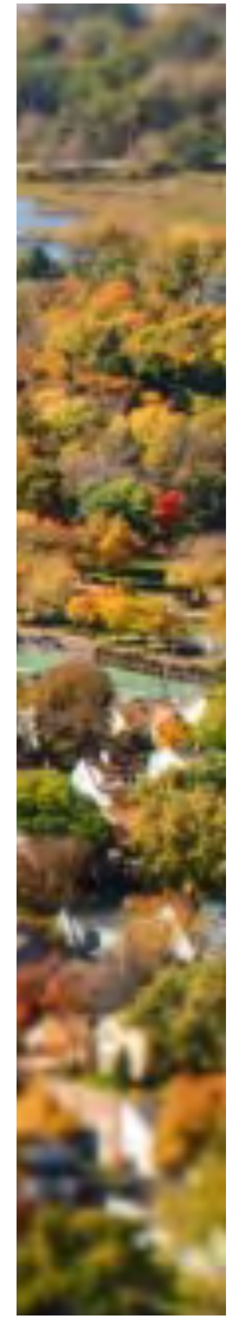
Adaptation

GC 1: Increase tree cover from 30% to 32.5% by 2030 and 35% by 2040. 35% Citywide by 2040 (calculation excludes tracts 104.1, 105, 106, 107).

GC 2: Increase pollinator supportiveness of lawns and grasslands in City of La Crosse and achieve a 5% turf replacement with native grasses and wildflowers by 2030.

GC 3: Reduce heat island effect through citywide "dark" impervious surface coverage from 10.4% to 8% by 2030 and 5% by 2040.

GS 4: Increase climate resilience of city's parks and open spaces.



Section

09

Health and Safety

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 City's 2020 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 public 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.

La Crosse Vulnerable Populations Risk Sensitivity Chart

The following identification of La Crosse population climate vulnerabilities is excerpted from the La Crosse Climate Vulnerability Assessment. Please see that report for additional information.

		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	3,611	3,611		3,611	3,611	3,611		3,611	3,611	3,611	3,611	3,611		
Seniors Over 65	11,717	11,717	11,717	11,717	11,717	11,717			11,717	11,717	11,717	11,717	11,717	
Individuals with Disabilities	8,557	8,557	8,557	8,557		8,557			8,557		8,557	8,557	8,557	
Est Total Low Income	24,449	24,449	24,449	24,449	24,449	24,449	24,449	24,449	24,449	24,449		24,449	24,449	24,449
People of Color	6,820	6,820	6,820	6,820	6,820	6,820	6,820	6,820	6,820			6,820	6,820	6,820
Limited English	1,245	1,245	1,245	1,245	1,245	1,245		1,245	1,245	1,245		1,245	1,245	1,245
At-Risk Workers	9,138	9,138	9,138	9,138	9,138			9,138						9,138
No Vehicle Access	5,510	5,510	5,510	5,510		5,510			5,510	5,510				
Total by category		71,047	67,436	71,047	56,981	61,909	31,269	45,264	61,909	46,532	23,885	56,400	52,789	41,653
percentage of Vuln pop		100%	95%	100%	80%	87%	44%	64%	87%	65%	34%	79%	74%	59%
Rank by Vulnerability		1	1	1	3	2	6	4	2	4	5	3	3	5
Percentage of Tot Pop		94.1%	89.3%	94.1%	75.5%	82.0%	41.4%	59.9%	82.0%	61.6%	31.6%	74.7%	69.9%	55.2%

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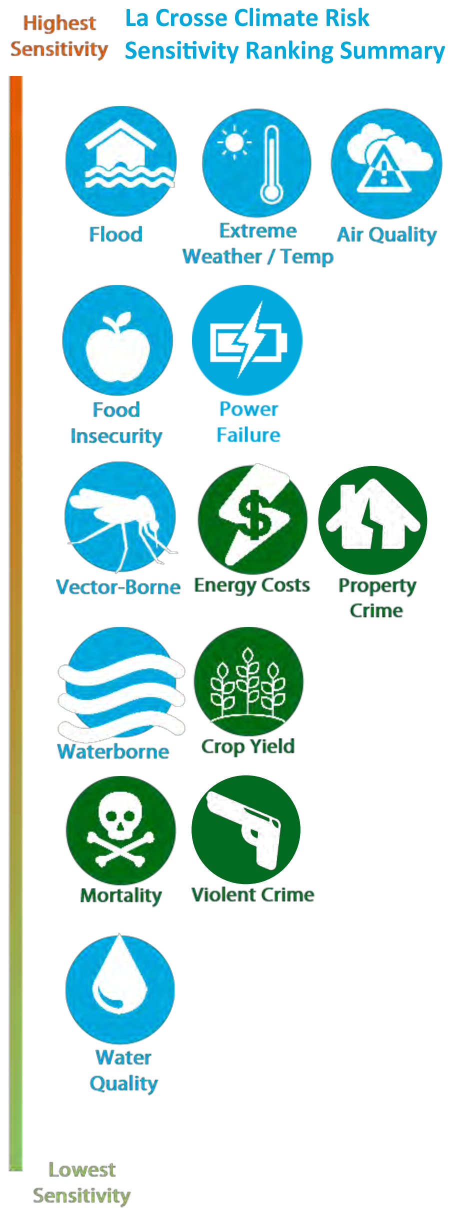

Health and Safety

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 City 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 City resources.

Based on the above review the City's adaptive efforts may be most effective by prioritizing strategies which address the climate risks of Flooding, Extreme Weather/Heat, Air Quality, Power/Infrastructure Failure, and Food Insecurity. Particular attention should be paid to strategies which are most effective for those in Economic Stress, Seniors, and at-risk workers.

Health and Safety

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Greenspace and Tree Canopy**
Air temperature	• Increased air pollution (e.g., fine particulate matter, ground-level ozone) that impacts respiratory and cardiovascular health, particularly for at-risk individuals (e.g., children, seniors, people with chronic health conditions) • Increased demand for public shelter, emergency, and medical services
Extreme heat	• Increase in heat-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) • Reduced ability for individuals to leave their home, participate in the community, and access critical services • Increased loss of cooling systems to prevent heat-related illness, risk of food spoilage, and loss of refrigeration for critical medications due to power outages • Increased potential for mental health impacts or violence/unrest associated with heat waves
Precipitation	• Increased incidence of mold in homes that may lead to health conditions
Extreme precipitation, storms, & flooding	• Increased risk of injuries and increased demand on medical and emergency services due to damage and debris associated with extreme storms/flooding • Decreased access to critical services, disruption to communication systems, and delayed emergency response due to impacts to road accessibility • Displacement for individuals whose homes are damaged, exacerbating inequities for lower-income individuals due to the cost of replacing or repairing their homes and belongings • Reduced water quality and increased risk of waterborne disease outbreaks
Drought	• Water scarcity • Increased concentrations of pollutants due to reduced river levels and flows

Health and Safety

Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Health and Safety Strategic Goals:

Adaptation

HS 1 : Assist the City's Flooding, Extreme Heat, Air Quality, Power/Infrastructure Failure, and Food Insecurity vulnerable population in preparing for and mitigating climate change impacts.

HS 2: Reduce the impacts of extreme heat on heat island impacts that will be exacerbated by rising temperatures and extreme heat

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

HS 4: Strengthen community response capacity and social support networks

Section 10 Economy

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Economy

Climate change and the 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 2020, Wisconsin state legislators proposed an initial cost of carbon in Assembly Bill 766 for the State of Wisconsin at $50. Using that figure, every 1% in community-wide emissions reductions will generate over $330,000 in social community benefits alone, not including other economic savings or revenue generation.

The economy is also directly linked to climate action as well. One common concern is that climate action damages the economy. However, climate action today avoids the future costs associated with unmitigated 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, 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 Climate 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 City-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 Economy illustrated that a $15 million investment in energy efficient City facilities, 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.

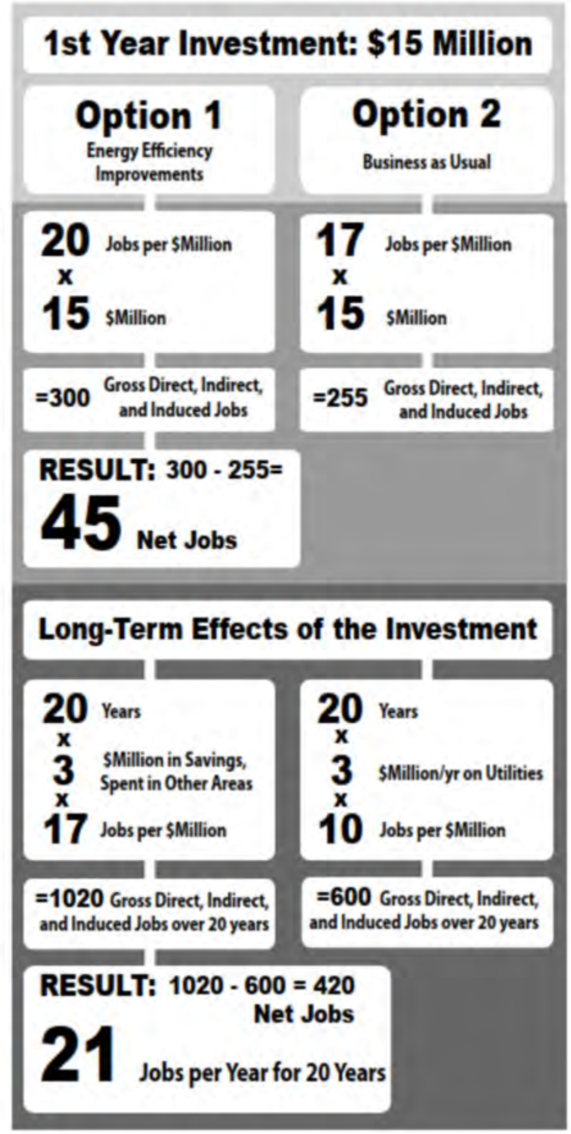
For the City of La Crosse, a program increasing residential energy efficiency targeting households constructed before 1980 (similar to potential outlined in the Buildings and Energy section of this report) and for every 100 households annually upgraded could result in 5-10 jobs or more. Similarly, a program increasing commercial building energy efficiency combined with a program focusing on commercial building retrocommissioning and achieving a coverage of 1-5% of the commercial building stock annually could result in 10-20 jobs or more.

Public Transit Jobs

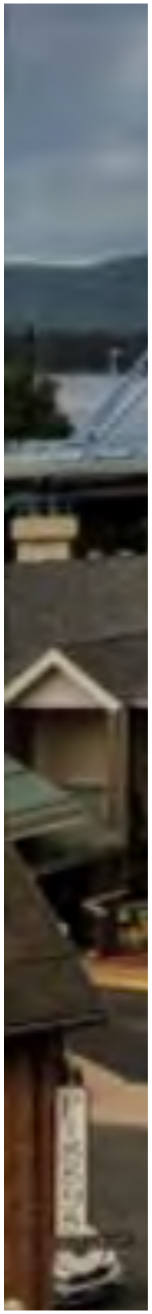
Transit is key to both creating jobs and increasing access to existing jobs. A study by Smart Growth America found that investments in public transit created almost twice the number of jobs than the same level of spending in auto-centric transportation systems. Cities with better public transportation 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 City.



Graphic Source: American Council for an Energy-Efficient Economy



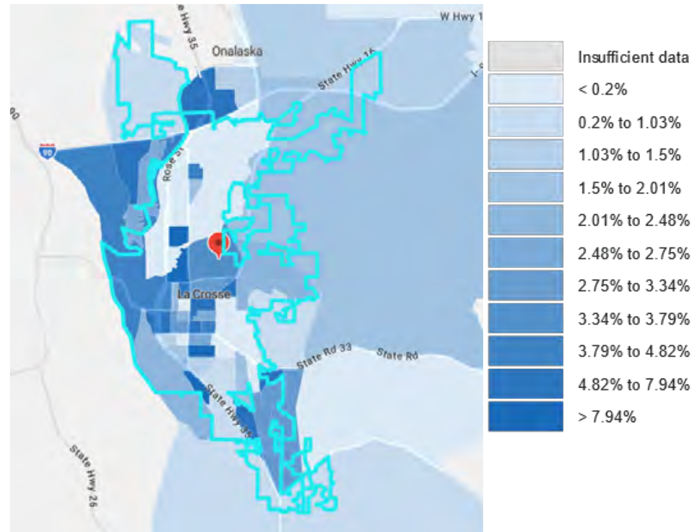
Economy

DIRECT IMPACTS OF CLIMATE STRESSORS	
Climate Stressor	**Likely Impacts on Greenspace and Tree Canopy**
Air temperature	• Changes in costs associated with heating/cooling, which may impact business expenses • Longer growing seasons and shifts in the suitability of climate conditions for plant growth and productivity could impact commercial agriculture and forestry, with potential implications on the supply chain • Altered consumer patterns due to changing temperatures
Extreme heat	• Increased costs of heat-related injuries or illness (i.e., increased use of medical services) • Increased risks for outdoor workers who are more exposed to heat, potentially reducing labor productivity • Increased demand on electrical grids, which increase costs and could result in more frequent power outages that impact business and industry (e.g., manufacturing)
Extreme precipitation, storms, & flooding	• Damage will increase maintenance, insurance, and continuity of service costs • Economic stress due to property damage • Disrupt commercial and consumer activity and deplete financial resources and reserves • Cost of rebuilding after an extreme event
Drought	• Mississippi River water levels dropping, creating places for barges to run aground – leading to problems for travel and transport of goods locally and the supply chain regionally

Economy

Unemployment in La Crosse

According to the US Census, in 2019, citywide unemployment averaged 2.6%. When viewed at the census block level, portions of the City had unemployment levels as high as 17%. Since that time, the impacts of the COVID-19 pandemic have almost certainly increased those numbers—particularly among the most vulnerable populations in the city. As noted earlier, the potential of local job creation associated with climate action strategies may provide a meaningful avenue for increasing employment opportunities and quality of life potential among La Crosse's most vulnerable.



Strategic Goal Recommendations— Community Wide

Based on the reviews outlined in this section, we recommend the City of La Crosse explore establishing the following Economy Strategic Goals:

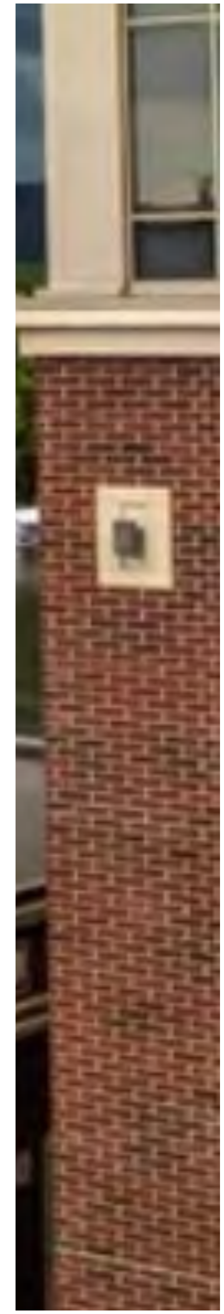
Adaptation

EC 1: Capture local economic potential of climate action.

EC 2: Support the development of the community's workforce to be well-positioned to pivot towards the shifting needs and new opportunities of the Climate Economy.

EC 3: Support local businesses and agricultural operations in building marketplace climate resilience

EC 4: Establish sustainable financing for the City's climate action implementation.



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