

SCHOOL DISTRICT OF
LA CROSSE



Climate Action Plan



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Land Acknowledgement

The School District of La Crosse occupies ancestral lands of the Ho-Chunk, who have stewarded this land since time immemorial.

The City of La Crosse occupies land that was once a prairie that was home to a band of Ho-Chunk. In 1830, President Andrew Jackson signed the Indian Removal Act in an attempt to forcibly, and often violently, remove Indigenous peoples from their ancestral lands located east of the Mississippi River to reservations in Iowa, northern Minnesota, southwest Minnesota, South Dakota, and finally to Nebraska. The historic steamboat landing where this took place is now Spence Park in downtown La Crosse.

Many of La Crosse's Ho-Chunk found their way back to their homeland here in La Crosse. Eventually, the federal and local governments moved on to new strategies to eradicate Indigenous people and culture from the newly established United States of America. Today, Wisconsin is home to over 8,000 members of the Ho-Chunk Nation, approximately 230 of whom live in La Crosse County.

Letter From the Superintendent

I am excited to present this climate action plan as a step forward in our continual commitment to our community and future generations. I am thankful to the members of the committee that spent long hours and to develop this plan on behalf of our school District and our community.

Our school District has a long-standing commitment to environmentally friendly practices and environmental education. For decades our administrative policies have stated our commitment to energy efficient strategies and we have consistently pursued opportunities in this area. Examples of our work in this area are exemplified by the installation of energy efficient boilers, geothermal heating and cooling, and the addition of solar panels at a number of schools. Energy efficiency is just one element however of a comprehensive strategy to address environmental stewardship in our community and I am excited to see our work expand across other areas.

Our community has expressed a strong value of protecting our environment. As a result, our School Board has also established a long-standing commitment to ensuring our students are educated about the environment. To this end one of our Results policies for students states “Students will demonstrate an understanding of good stewardship towards the environment.” We have made great strides in this area through the incredible work of our teachers and staff. Environmental clubs, integrated environmental lessons, and a whole environmental elementary school exemplify some of our efforts at providing a comprehensive education in this area. Ensuring our students understand the components and importance of protecting our environment is crucial for our students' development as community members and is seen as a key outcome of our educational system in the School District of La Crosse.

Expanding on our operational and educational commitment to our environment through this climate action plan is the next step in our ongoing support of our community. I look forward to what comes next!

Sincerely,

A handwritten signature in black ink that reads "Aaron Engel". The signature is written in a cursive, flowing style.

Aaron Engel, Ph.D.
Superintendent

Statement from the Sustainability Committee

The sustainability team brings a wealth of experience and perspectives including: city council, elementary and middle school teachers, principal, environmental scientists, healthcare policy, school nutrition, sustainability professor, Solar on La Crosse Schools, and Our Climate Alliance, the Sierra Club.

We are inspired and guided by the City of La Crosse's Climate Action Plan, recognizing our shared responsibility to work collaboratively toward the city's climate and sustainability goals. As part of this great city, we have a responsibility to work together on these shared goals.

Our team is honored to build on the work of other organizations and to set an example of a school district climate action plan for our region. We have particularly drawn inspiration from the Denver Public Schools Climate Action Plan because of its clear, accessible format and actionable strategies.

The students in our District inspire us to ensure environmental and health education is not only taught, but drives our effort to set goals, measure progress, and implement strategies that make our school district more sustainable, more efficient with our resources, and increase the quality of life of our students, staff, and greater community.

Vision Statement

The School District of La Crosse (SDLX) envisions a District that minimizes its environmental impact while building resilience for the effects of climate change. This plan aims to reduce the District's carbon footprint through sustainable operations and foster a healthier, more sustainable future for students, staff, and the community. By taking action today, we strive to protect our environment and ensure a vibrant, climate-conscious legacy for future generations.

Letter From the Students

A Letter from the Logan High School Ecology Club

All of us affect and are affected by the environment and its deterioration due to climate change. Small, seemingly insignificant actions accumulate over time and create lasting negative consequences for the environment. Climate change has already impacted our everyday lives—through things like extreme weather, loss of biodiversity, increasing cases of mosquito-borne viruses—and will continue to impact more and more of the population if no action is taken.

This information is widely known and acknowledged, but, so far, change is not coming quickly enough. The global average surface temperature has been steadily increasing since the Industrial Revolution, with no end in sight. Climate change is something humanity has dismissed in the past as not their problem to solve, particularly if they do not recognize its effects on their life. Only if we accept these issues, and acknowledge that cooperation is the only path to change, will things improve. Bringing together consumers, corporations, and whole communities to work side by side to combat the climate crisis is our best hope. These actions will create momentum for even larger, societal changes, making an impact on nations around the world.

As the Logan High School Ecology Club, we have started taking steps to combat these issues as well as improving our ecological footprint at our school. To benefit our ecosystem, we have been working with the invasive buckthorn species around the school to limit its reproduction and growth to allow for native vegetation and biodiversity to develop. Planting our own lettuce and spinach for the Family and Consumer Sciences classes reduces emissions from food imports as well as reducing waste from food packaging. Creating a designated area for unopened, unwanted food free for others to take reduces food waste, decreasing greenhouse gas emissions from landfills. Implementing a food waste dehydrator would help us reuse the approximately 66 pounds of food waste Logan High School goes through a day. These changes appear small compared to the seemingly impossible task of reversing past actions of the entire planet, but the small differences make an impact in our community, and put in motion similar changes around the world.

We have the privilege of sharing the responsibility for the wellbeing of future generations. This fight for climate action begins at the local level and therefore the Logan High School Ecology Club fully supports the founding and implementation of environmental advocacy groups such as the Sustainability Committee for the School District of La Crosse.

Executive Summary



Scope of the Plan

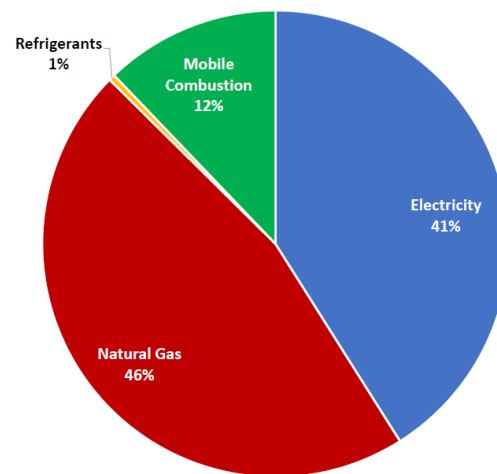
The School District of La Crosse's (SDLX) Climate Action Plan encompasses the operations carried out by the District that contribute, or could contribute, to environmental degradation or the emission of greenhouse gases (GHGs). The ultimate, long-term, goals of the plan are the net zero emission of GHGs and a 50% reduction in landfilled waste by 2050.

Metric tons CO₂e

Electricity	2,350
Natural gas	2,656
Vehicles	696
Refrigerants	24

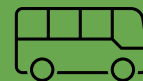
Greenhouse Gas Inventory

The 2022-2023 GHG inventory provides the benchmark for this plan. By continuously tracking the District's GHG emissions, the effectiveness of strategies and gaps in performance can be measured. The 'Buildings and Energy' sector makes up a majority (87%) of SDLX's GHG emissions, with the remaining ~14% attributed to student bussing and District vehicle emissions.



Buildings and Energy

Buildings and energy make up the majority of the emissions that the District is responsible for. By shifting to on-site, renewable, energy generation and electrifying fossil energy uses like heating and cooking, the District can phase out fossil fuels and decrease its energy costs.



Transportation

Transportation-related emissions include District contracted bussing, District owned vehicles, and commuting. Reducing the emissions of contracted busses and encouraging active and low-carbon methods of commuting are central strategies to reducing mobile-source emissions.

Resource Management

Resource management refers to the lifecycle emissions and environmental impacts of goods and services consumed and contracted by the District. Mindful waste diversion strategies like prevention, recycling, and composting will help the District reduce its impact.



Quality of Life

Quality of life refers to the quality of the built environment that is provided for students and staff, how climate science and sustainability are taught to students, and how students are being inspired to be mindful of the natural environment rather than passive observers.

Goals and Implementation

This plan contains 5-year, 2030 goals related to each of the four focus areas. These 2030 goals are not intended to bring the District all the way to its long-term 2050 goals on their own but are meant to be steppingstone actions that the District can implement and reflect on by the next plan's update. As the economic, technological, and social landscape changes, so too will the steps toward implementation of this plan's long-term vision and goals.

Plan Goals for 2030

Buildings and Energy

Energy consumption will be reduced by 20% from the 2022-2023 school year baseline.

75% of total electricity consumption will be sourced from renewables. (Including the Xcel Energy certified renewable %)

30% of electricity consumed by the school district will be generated on site

75% of SDLX buildings will have solar in 5 years

10% reduction in fossil-gas usage over the next five years

10% reduction in total gas-powered appliances. (i.e. Gas stoves in kitchens)

All new and renovated buildings will meet LEED or equivalent design standards and include on-site renewable energy production.

All new capital improvement projects will include an energy audit.

Transportation

Decrease total transportation emissions by 10%.

Reduce CO2e emissions of contracted buses by 10%.

All staffed district buildings will have EV charging stations for operational and staff use.

Create an incentive program to encourage alternative modes of commuting to district buildings for staff.

Support the implementation of active transportation initiatives/programs like Safe Routes to School

Increase the share of students commuting to school by transit, rideshare, or active modes.

Reduce the impact of large impervious surfaces with measures such as adding rain gardens and additional trees.

Develop a Transportation Demand Management Plan and parking study

Resource Management

Reduce water consumption by 5%

Complete a feasibility study to explore opportunities to divert food waste such as composting, donating, and prevention.

Revisit Waste Management/Recycling policy to support preferential procurement of carbon neutral products and consumables. This policy should include language specifying electronic waste recycling as well. Draft and adopt a sustainable purchasing policy.

Support/Expand the existing Farm to School Program as an educational opportunity, resilient food supply chain, and program that contributes to the local economy.

Quality of Life

Complete a comprehensive building operations and health study that includes assessing air quality, presence of hazardous materials, ventilation performance, inventorying sensors and monitors, reviewing pest management processes, reviewing cleaning processes and policies and conducting occupant surveys.

Ensure adequate ventilation based on ASHRAE Standard 62, monitor indoor airflow, radon, and carbon dioxide.

Complete a calibration standards plan to regularly calibrate sensors or implement smart ventilation and calibration systems.

Conduct custodial effectiveness assessment and develop and implement a green cleaning policy.

The district Science Department will include Climate Curriculum within the preK-12 Scope and Sequence

All schools utilize an outdoor learning space in their curriculum.

All new elementary and middle school science teachers participate in professional development on climate change.

All 8th grade students engage in career exploration and green career opportunities.

6th-12th grade students will have an annual climate change project-based learning opportunity.

The District will collaborate on a climate change education event open to the public each year.

The District will designate a sustainability coordinator and science/sustainability teaching coach.

All high school students engage in career exploration and green career opportunities. Additionally, juniors and seniors have the opportunity to attend a career expo/Wisconsin Education Fair which includes environmental career opportunities.

Why Do We Need a Climate Action Plan?

Climate Action Planning

Climate action planning is not a new practice: since the late 1990's various carbon reduction plans have been adopted by organizations, cities, and states. These plans are built on the wealth of knowledge and expertise provided by decision makers, stakeholders, scientists, businesses, and the public. Climate action planning has become a familiar part of city and organizational operations as the general awareness of our changing climate increases. Across the country, school districts are writing their own climate action plans and committing to a future that we all want to live in.

Climate action is important to mitigating the negative effects caused by unchecked greenhouse gas emissions. Greenhouse gases that collect in the atmosphere are able to retain more heat for longer than other abundant gases that make up our atmosphere like nitrogen, oxygen, and argon. Small changes in the thermal energy in the atmosphere can have cascading secondary effects on weather patterns, health impacts, and ecosystems.

SDLX's Role in Climate Action

As a public institution, the District has a responsibility to provide a safe, nurturing environment where students can learn and grow and where communities can come together. By implementing strategies in this plan, the District will not only lower our operating emissions, we will also increase the health of our students and staff, and use our limited resources more efficiently, thus reducing cost. School districts can lead by example, integrating climate-friendly practices into their operations so the next generation inherits a planet that is as healthy as the learning spaces we create for them.

The purpose of a climate action plan is to guide the implementation of strategies that contribute to a healthier environment and reduce the impacts on global climate that the District is directly responsible for. Climate action plans can also serve the larger community by creating an awareness of the environmental issues that affect District-level operations and transparency regarding what the District is doing to address those issues.

This plan is inspired by the success and vision of pioneering climate action planning efforts, drawing from successful strategies while tailoring our approach for our District. In writing this plan, the local context and perspectives of students, teachers, staff, and residents have been central to the development of our goals. This plan seeks to not only address the urgent need for environmental responsibility but also reflects the values and priorities of the community. This approach ensures the La Crosse School District Climate Action Plan will be practical, impactful, and supportive of the future we hope to achieve together.

SDLX's Long-Term Vision

The District's long-term vision for climate action is aligned with the City of La Crosse's community-wide goal of achieving carbon neutrality¹ by 2050. In addition to supporting this community-wide goal, SDLX wants to reduce the amount of landfilled waste by 50% compared to the 2022-2023 benchmark school year. By aligning with the City's goals, the District can better assist, and be assisted, with climate-related project planning and action.

The District's commitment to this vision requires actionable short-term milestones to ensure steady progress toward its long-term goals. As part of this commitment, SDLX has identified the first five-year goals to be met by 2030. The five-year goals outlined in this plan are implementation milestones marking progress in increments toward 2050. The School District Sustainability Committee will view progress annually, update the implementation plan accordingly, and update the plan every 5 years.

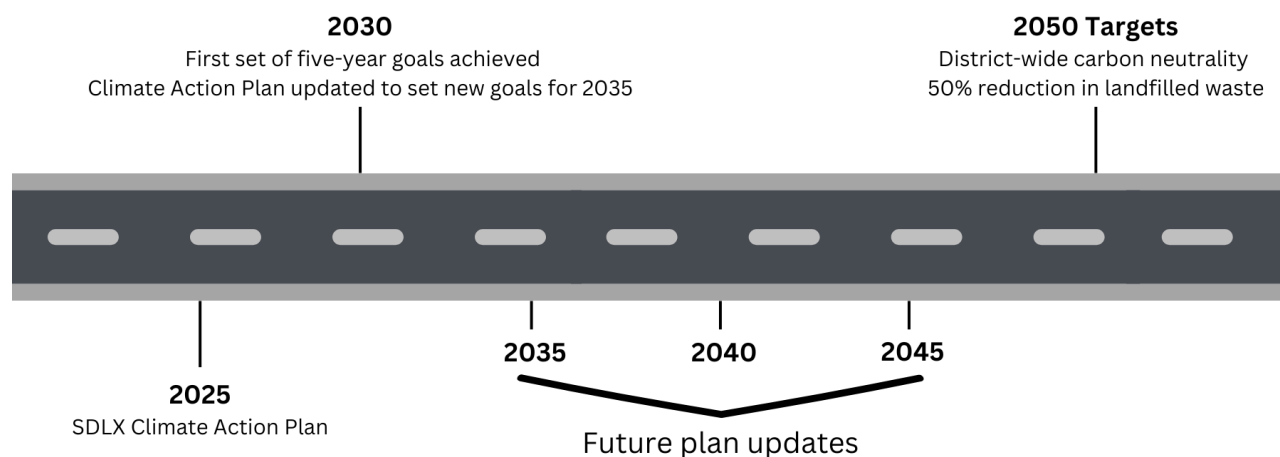


Figure 1. High-level roadmap of SDLX's Climate Action Plan.

¹ Carbon neutrality is defined by the La Crosse Climate Action Plan as a zero net emission of human caused or influenced greenhouse gases either through the reduction of emission sources or increase in greenhouse gas sequestration (removal) from the atmosphere.

How This Plan is Organized

This plan identifies specific focus areas for the District and creates actionable objectives towards minimizing the School District of La Crosse's (SDLX) impact on the climate. Together, these focus areas form the scope of the SDLX Climate Action Plan covering Buildings and Energy, Transportation, Resource Management, and Quality of Life. The goals and objectives from this plan are arranged similarly to fit within the supporting narrative. Given the wide reach that climate action planning covers, the delineation between each focus area is simply an organizational one and should not restrict implementation as there are many cross-cutting actions and solutions.

In developing each focus area, the District researched existing, effective strategies for reducing greenhouse gas emissions. Leading up to the creation of this plan, sustainability and resource efficiency has been an increasingly driving factor behind decisions regarding District operations and curriculum. Each focus area has goals and objectives that SDLX feels are realistic given the limitations the District, and many other school districts, face such as staffing and budget.

SDLX understands that as technology and funding availability rapidly evolve, this plan and its objectives must also adapt. The strategies employed by staff in implementing this plan will remain flexible in order to better fit this constantly evolving landscape. However, the primary function and commitment of this plan will always remain the same and will continue to guide future decision making.

Environmental Justice

The effects of climate change are far-reaching and felt by all communities. However, it is well understood that the first to feel its effects are communities of color, tribal nations, low-income, and other vulnerable populations ([EPA](#)). Climate change compounds these communities' existing systemic inequities that already affect quality of life, quality of environment, and economic opportunities. Environmental justice is a lens through which we view climate action so that we can prioritize helping our communities that are most likely to experience the worst effects of climate change. This is a guiding principle to the District's goal setting and the development of this plan. This plan and its goals reflect the District's commitment to supporting environmental justice through its operations and implementing its goals.

SDLX's Previous Sustainability Efforts

This climate action plan is a continuation of SDLX's climate action and sustainability efforts. In fact, there are numerous projects and initiatives that have been pushing the District toward a more sustainable future.

- ☐ All of the SDLX buildings were constructed or retrofitted to be EnergyStar certified, meaning the buildings are more efficient than 75% of all other buildings of its type. This certification takes into account differences in operating conditions and regional weather into its calculations.
- ☐ In 2006, the District hired a full-time energy manager to manage energy reduction and lead an environmental stewardship program. The energy manager also oversees transportation for all students.
- ☐ In 2010, Summit Elementary officially incorporated environmental and sustainability education as a major part of its instructional program. At Summit, outdoor learning opportunities and environmental concepts are intertwined with the curriculum to develop students' understanding of the world.
- ☐ The District passed an administrative policy in 2010 that set minimum and recommended best-practice for energy use and conservation (Appendix 1).
- ☐ In 2011, an administrative policy making resource conservation an integral part of District operations and curriculum was adopted. This policy encouraged the reduction of consumable materials and use of non biodegradable products (Appendix 2).
- ☐ "Smart Eats" initiative designed to incorporate fresh, locally grown produce into students' diets. As part of this initiative, the District hosts a farm-to-school program, fresh fruit and vegetable snack program, school gardens, and student and adult cooking classes.
- ☐ The District's indoor transition to LED lighting, meaning District buildings will be 100% lit by energy efficient means.
- ☐ 4 out of 16 school District buildings now have solar panels on them, resulting in a total annual generation of 264,670 kWh. This is equivalent to an average monthly generation of 22,055 kWh.
- ☐ All District buildings' utility data is tracked in Fusebox, a software that tracks energy, gas, and water usage for all District owned meters, providing data that helps identify areas for improvement and long-term progress.

- ☐ SDLX has budgeted and planned to build an additional greenhouse at Central High School and is exploring potential educational components that can benefit.
- ☐ The District formed a Sustainability Committee in 2024 to guide the District's sustainability efforts. This committee meets monthly and is proactive in seeking opportunities to make District operations more sustainable (Appendix 3).
- ☐ By the end of the 2025-2026 school year, Full Option Science System (FOSS) Pathways curriculum will be fully incorporated within the core science program for prekindergarten through 8th grade classes. FOSS Pathways is an innovative, research-based curriculum developed by the University of California, Berkeley.



Figure 2. Students at Summit Elementary being read to at one of Summit's outdoor classrooms.

Greenhouse Gas Inventory

The School District's Climate Action Plan using baseline data to inform goals and strategies. This greenhouse gas inventory is an assessment of SDLX operations and its resulting emissions, such as energy consumption, vehicle use, etc. The School District of La Crosse conducted greenhouse gas inventories through Sustainability Analytics, LLC covering the 2014-2015 and 2022-2023 school years. The greenhouse gas (GHG) emissions data cited within this plan are from the most recent inventory contracted by the District (2022-2023), which serves as baseline data for our goals. (Appendix 4)

The School District and its operations were responsible for 5,725 metric tons of CO₂e² in the 2022-2023 school year alone. Figure 2 separates the sources of these emissions into four categories. *Mobile combustion* sources refer to emissions from fossil fuel-powered transportation, such as buses and District vehicles. *Electricity* represents emissions produced by fossil fuel-based power that the District consumes but is generated by Xcel. *Natural gas* accounts for emissions resulting from the District's natural gas usage. Lastly, *refrigerants* refer to various hydrofluorocarbons (HFCs) that leak from air conditioning and refrigeration systems.

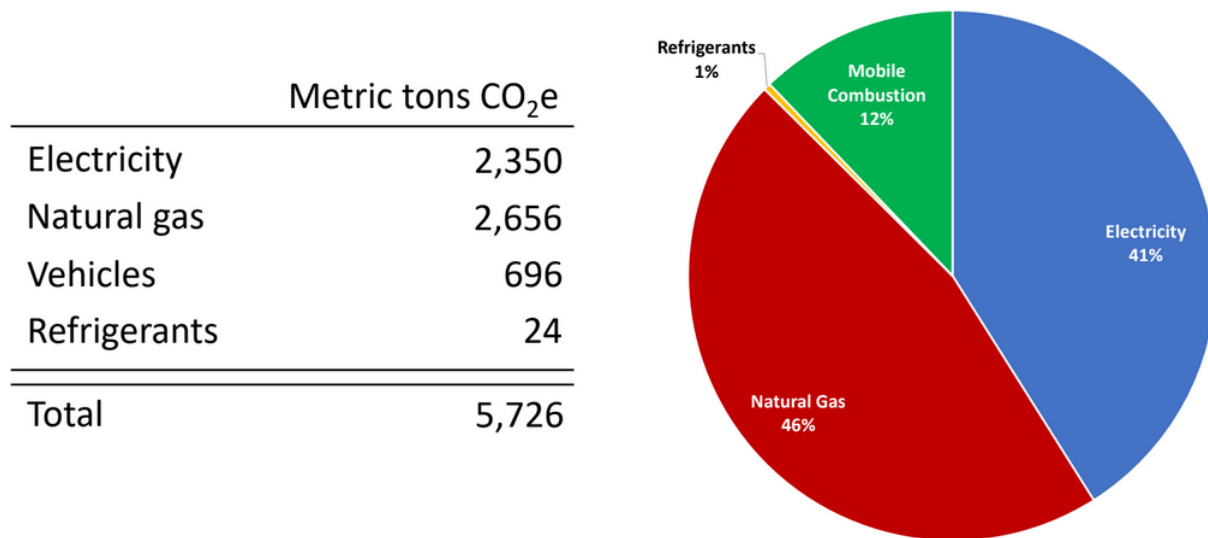


Figure 3. Breakdown of emission sources from La Crosse School District operations from the 2022 - 2023 greenhouse gas inventory. Source: Anders Olson, Sustainability Analytics

Understanding the sources of District emissions helps determine prioritization within our implementation plan. This GHG inventory determined that District buildings are responsible for the majority (87%) of its emissions.

Significant emissions reductions were realized between the 2014-2015 and 2022-2023 school year GHG inventories. Despite an increase in purchased electricity, emissions fell due to Xcel Energy's emissions rate reduction during that period (Figure 3).

² Carbon Dioxide Equivalent is a unit of measurement that compares the climate impact of various greenhouse gasses (e.g. methane, nitrous oxide, hydrofluorocarbons, etc.) to the amount of carbon dioxide that would have an equivalent effect on global climate.

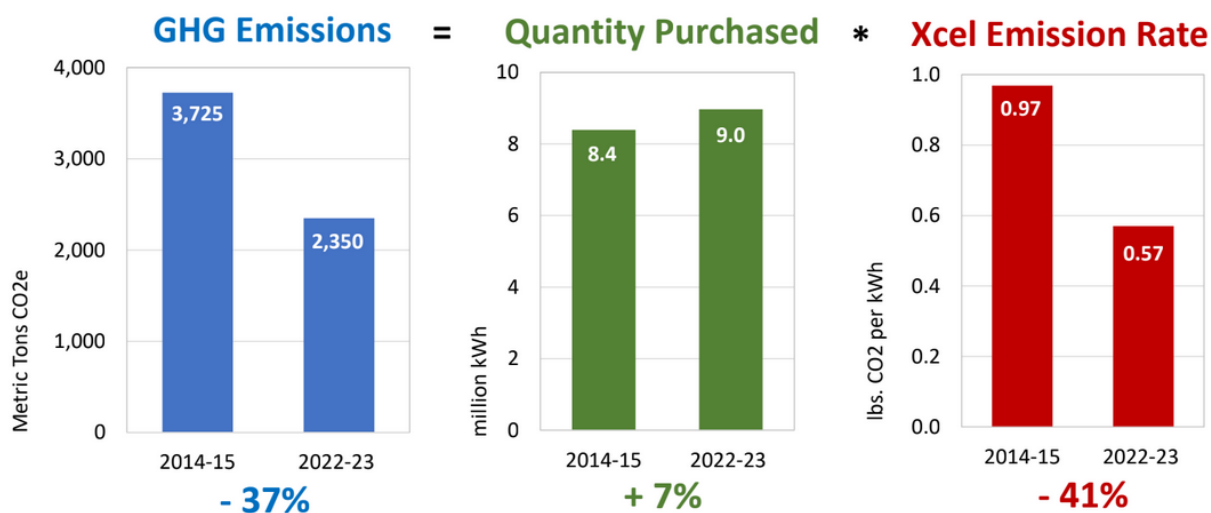


Figure 4. Comparison of greenhouse gas emissions, quantity of electricity purchased, and the rate of emissions/ kiloWatt hour between the 2014 - 2015 and 2022 - 2023 greenhouse gas inventories. Source: Anders Olson, Sustainability Analytics.

Regularly updating and assessing the District's greenhouse gas emissions enables the District to set data-informed targets that are specific, achievable, and relevant to our unique emissions profile. With buildings identified as the most significant emissions source, the District can prioritize energy efficiency upgrades, implement renewable energy projects, and explore sustainable building practices. Looking forward, the District plans to conduct greenhouse gas inventories annually to track progress and adjust strategies as needed.

Not included within the greenhouse gas assessment are emissions that are not immediately a result of District operations. Emissions sources such as employee and student commuting, waste product disposal, and production of goods consumed by the District. For instance, the District is unable to control commuting patterns of staff, however we recognize the importance of high performing schools as a major contributor building vibrant communities and thus drawing employees to live in La Crosse. We continue to work with the City of La Crosse to support their development and transportation goals. As the landscape evolves and additional energy solutions become available, these inventories will serve as an essential reference point, allowing the District to measure the success of past initiatives and identify new areas for improvement. Each inventory will help refine the path toward a carbon neutral La Crosse School District.

Buildings and Energy



Buildings and energy encompass the facilities owned and operated by the district and the energy they consume. This section discusses the potential consequences climate impacts will have on district facilities and operations, and how SDLX can adapt. As the largest segment of greenhouse gases the district is responsible for, facilities have the greatest opportunity to make positive change towards carbon reduction goals.

Adapting to Climate Change

Climate action involves strategies of mitigation and adaptation where mitigation is the process of reducing GHG emissions and adaptation is the process of adjusting to the effects of climate change. Adaptation, in addition to mitigation, proactively invests in infrastructure that is resilient to the far-reaching effects of climate change like extreme weather, temperature and flooding. As a public institution, the District must consider the impacts that a changing climate will have on the services it provides and the ability to provide those services for future generations. In the midwest region, climate impacts that can be expected to directly affect the population are

- warmer temperatures and extreme heat,
- increase in extreme precipitation, storms, and flooding events,
- and increased drought ([Hilberg, 2022](#)).

In the *City of La Crosse Climate Change Vulnerability Assessment*, key vulnerabilities are outlined regarding climatic impacts on vital infrastructure and human life (Appendix 5). For example, excessive heat will increase the need for indoor air conditioning and strain the power grid. However, by supplementing onsite energy generation with onsite energy storage, the District can maintain operations through primary and secondary impacts from climate change like extreme heat and blackouts.

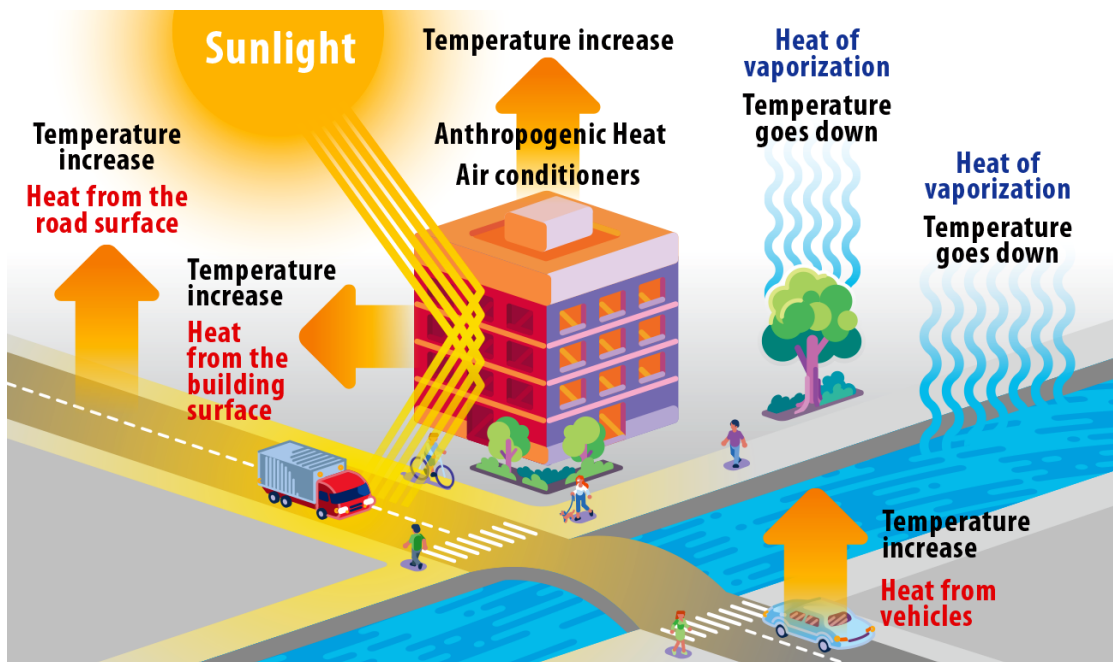


Figure 5. Simplified diagram showing how the urban heat island effect is created and the factors that worsen or lessen the effect. Image credit: Pavement Technology Inc.
“<https://www.pavetechinc.com/uhi-mitigation/>”

With an increase in extreme heat events, it's necessary to find a variety of solutions to address them. Natural solutions can help mitigate extreme heat. For example, increasing tree coverage, especially in urban areas, can combat the heat island effect caused by sun absorption by concrete and asphalt. A tree cover of 40% or more in urban areas can reduce air temperature by as much as 10°F when compared to areas with no tree coverage ([Ziter, C., et al. 2019](#)). Converting conventional lawns, often dominated by non-native grasses, into native grasses or wildflower spaces can further reduce urban heat, while also decreasing noise pollution, improving stormwater management, and cutting turf maintenance costs.

In addition to heat, the District must also prepare for the expected increase in annual precipitation, which will lead to more frequent flooding events in La Crosse ([Hilberg, 2022, p. 8](#)). Flooding poses a significant threat to infrastructure and operations, but implementing solutions like rain gardens can help to mitigate these risks. Rain gardens are vegetated areas that are designed to absorb excess rainwater from surrounding impermeable surfaces and can alleviate localized flooding and enhance stormwater management. Preparing for these impacts is a vital part of climate action and SDLX is committed to remaining resilient within a changing climate.



Figure 6. The Rain garden at Summit Environmental School. Image credit: La Crosse Area Waters
“<https://www.lacrosseareawaters.org/featured-properties/summit-environmental-school/>”

Building Energy

Buildings and the associated electricity and natural gas consumption comprised the majority (87%) of greenhouse gas emissions that the School District was responsible for in the 2022-2023 school year. Energy efficiency and transitioning to renewable energy sources is a core component of greenhouse gas reduction. Increasing energy efficiency doesn't only reduce GHG emissions and improve air quality, but also saves the District money in energy costs.

Qty. purchased: 9.0 MWh

GHG Emissions: 2,350 mt CO₂e

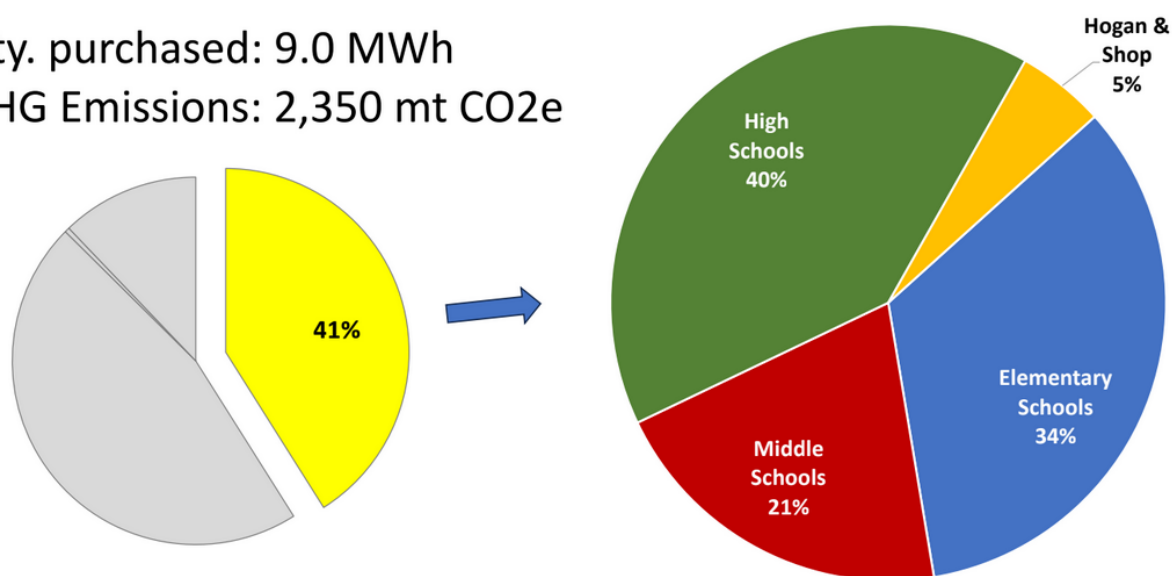


Figure 7. Quantity of purchased electricity broken down by elementary, middle, high schools, and facilities/administration buildings. Source: Anders Olson, Sustainability Analytics.

The School District purchases its energy and natural gas for its buildings through Xcel Energy, the primary utility provider for the region. Xcel Energy regularly audits emissions from its electricity generation for the public. As of Xcel Energy's 2023 Community Energy Report, 37.35% of electricity consumed in the City of La Crosse is generated by certified renewable sources (Appendix 6).

Xcel Energy has adopted a goal of [100% renewable electricity generation by 2050](#) and is well underway with its energy transition. If completed, this will mean that not only the District's electricity, but all Xcel Energy customers will be served by 100% renewable electricity. However, the most effective strategy is source reduction. Decreasing energy use and demand is a key component of reaching carbon neutrality. In other words, keeping demand at baseline usage or even increasing demand, will put our goal and Xcel's goal out of reach, in addition to being fiscally inefficient. Utilizing on-site renewables and storage also ensures District operations are energy-independent and resilient.

Currently, SDLX is able to track individual building energy usage through a software called Fusebox. Fusebox provides facility managers at SDLX with detailed energy use derived from utility data to get a high level view of the District's energy footprint at any given time.

This data is able to help the District understand the impacts of its strategies and identify underperforming buildings and prioritize implementing energy reduction strategies. Fusebox can show which buildings are using the most energy and how energy use varies throughout the year. Additionally, Fusebox can monitor the performance of energy-saving initiatives. For example, if the District implements a new lighting system, Fusebox can be used to track the resulting energy savings. This information can then be used to evaluate the initiative's effectiveness and make adjustments as needed.

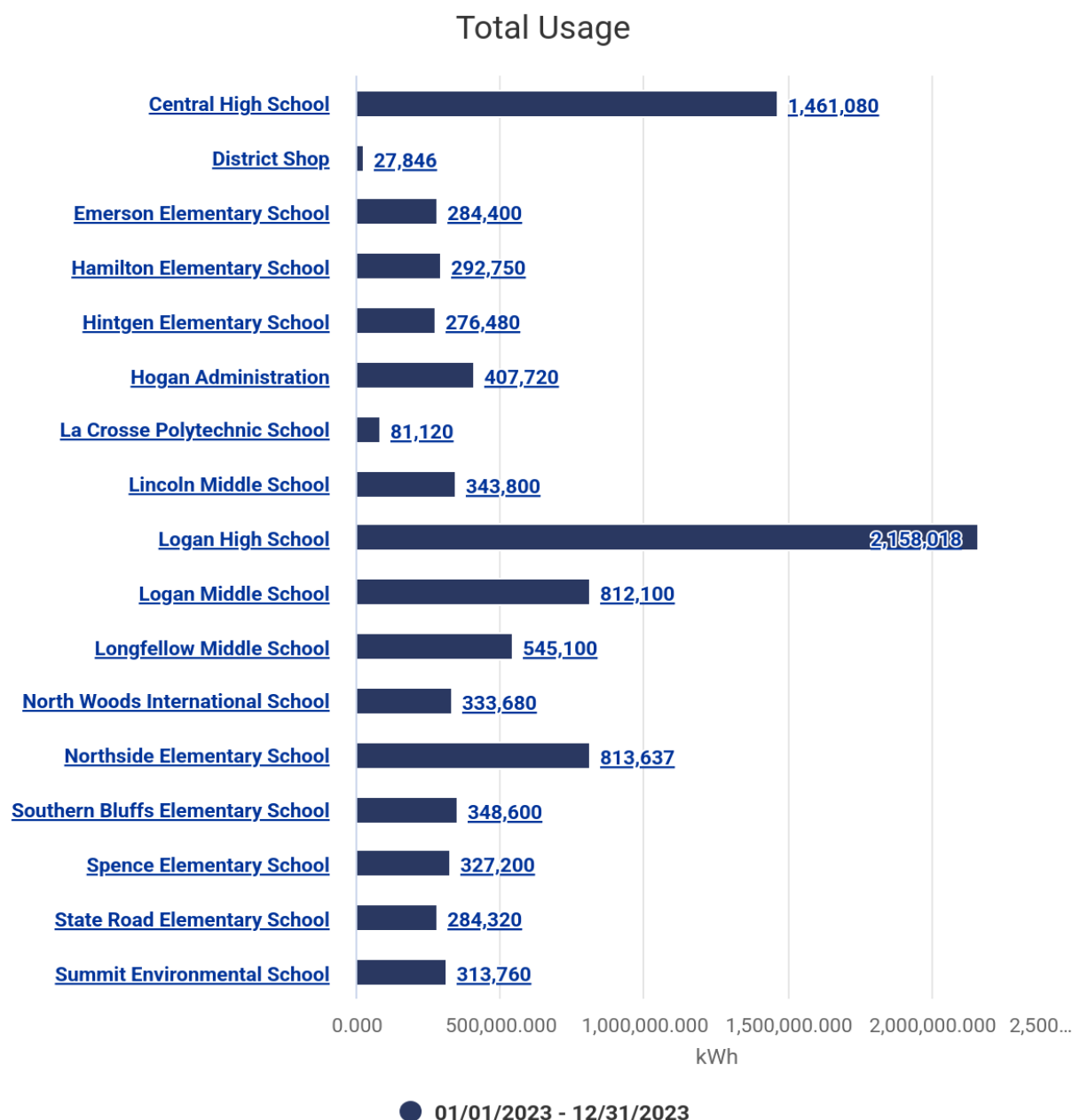


Figure 8. Comparison of total electricity consumption at each metered La Crosse School District building in 2023.

Solar & Renewable Energy

Already, the District has been enthusiastically pursuing on-site solar panel installations to provide a cleaner, lower cost, more resilient power grid for our schools and operations. Thanks to the fundraising efforts of Solar on La Crosse Schools (SOLS), four solar projects have been completed at Hamilton, Northside, Summit, and Polytechnic schools.

Hamilton Elementary	At Hamilton Elementary, there are 264 solar panels producing 98kW of electricity to the school and providing ~47% of the total electricity consumed there.
Northside Elementary	The 130 kW, 292 panel, solar installation at Northside Elementary is slated to provide 30% of the total energy consumption at this school and reduce electricity costs by about \$3,000 a month.
Summit Elementary	A new outdoor classroom will feature a 60 panel, 32 kW panel system that will form the roof of the classroom. Another solar panel also powers the Marquee at Summit, an installation that is primarily used as an educational opportunity for students.
Polytechnic School	The 16 kW, 32 panel, solar installation on the La Crosse Polytechnic School offsets approximately a quarter of Polytechnic's electricity consumption with clean energy.



Figure 9. Solar panels on top of Hamilton Elementary School.

The next school to receive a solar array will be Southern Bluffs Elementary, which will be the site of a ~130kW array. Following this effort, SOLS will be moving away from a fundraising role but will continue to provide educational opportunities for students and the community. The rapid deployment of renewable energy for the District would not have been possible without the help of the SOLS non-profit organization, its volunteers, and its contributors.

Even as the District rapidly shifts to using renewable energy for its electricity, natural gas made up over half of the GHG emissions from the buildings and energy sector in the 2022-2023 school year. Natural gas is used as fuel primarily for heating buildings during the winter months, heating water, and for gas stoves in school kitchens. To eliminate fossil fuel, the District needs to move away from natural gas. For heating purposes, heat pumps offer a fully electric alternative to typical gas heated boiler systems. In a [Berkeley Lab report](#), researchers modeled electricity, natural gas, CO2 emissions, and annual utility cost savings of elementary and secondary schools after implementing various 'retrofit packages' including full electrification. In the La Crosse climate zone (Climate zone 6), a cost savings of ~33% was estimated for full electrification (Shackelford, J. et al., 2024).

Programs like [Focus on Energy](#) offer incentives, rebates, and discounts for energy efficiency upgrades and retrofits. SDLX will be taking full advantage of the resources made available to it and will actively seek out opportunities to accelerate the transition away from fossil fuels. The District is excited about the cost saving opportunities provided by more on-site solar installations and the transition towards a cleaner and more resilient power grid.

Buildings and Energy 2030 Goals

Renewables and On-Site Power Generation

- ☐ 75% of total electricity consumption will be sourced from renewables.
- ☐ 30% of electricity consumed by the school District will be generated on site.
- ☐ 75% of SDLX buildings will have solar.
- ☐ All new and renovated SDLX buildings will meet LEED or equivalent design standards and include on-site renewable energy production.

Energy Efficiency, Monitoring, and Consumption

- ☐ Energy consumption will be reduced 20% from the 2022-2023 school year baseline.
- ☐ 10% reduction in fossil-gas usage over the next five years.
- ☐ 10% reduction in total gas powered appliances (i.e. gas stoves).
- ☐ All new capital improvement projects will include an energy audit.

Transportation



Greenhouse gas emissions from transportation including contracted school buses, vans, and district owned vehicles make up the second largest share of SDLX emissions behind buildings and energy. Key strategies for carbon reduction in this sector include encouraging the electrification of contracted buses, electrification of district-owned vehicles, an evaluation of land dedicated to parking, and encouraging staff, students, and parents to consider alternative modes of transportation in their commutes.

Vehicle Emissions Data

Transportation related emissions or ‘mobile source’ emissions are typically a significant source of greenhouse gasses and airborne particulate matter. This category makes up only 12% of the School District’s total GHG emission sources and includes District owned vehicles and contracted bus operations through GoRiteway. Total carbon emissions from mobile sources reached 696 metric tons of CO₂e from the 2022-2023 school year. The transportation sector is among the fastest currently electrifying. Electric vehicles have marked improvements over their fossil fuel counterparts, including little-to-no GHG emissions, longer intervals between maintenance, and cheaper fuel cost ([US Department of Energy](#)).

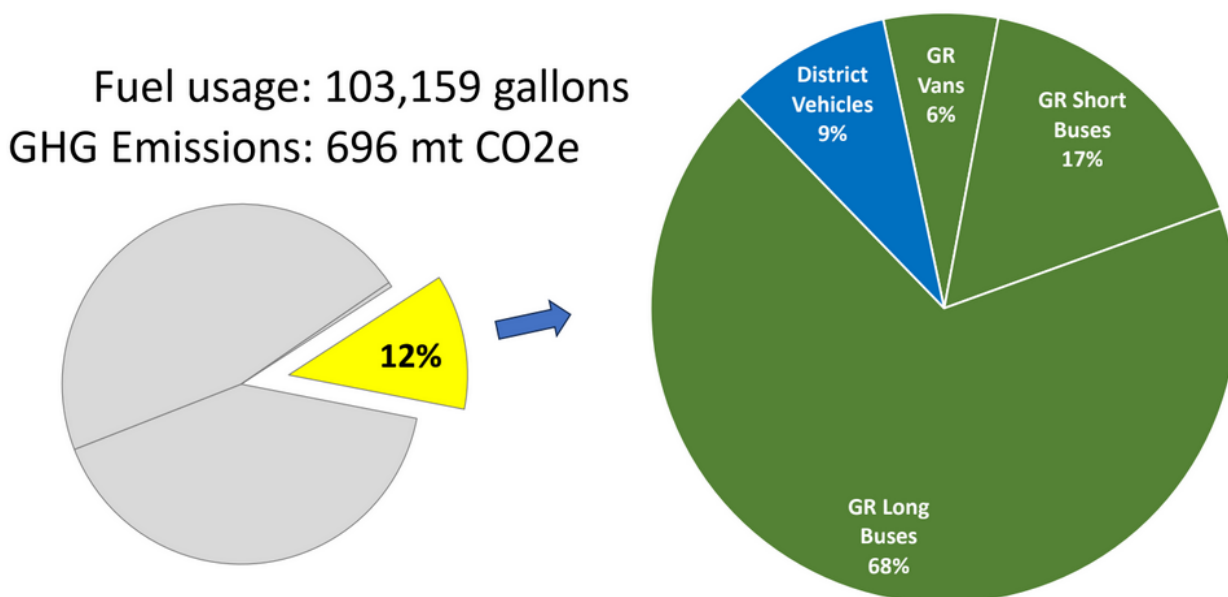


Figure 10. Visualization of the share of transportation or ‘mobile source’ emissions. Transportation emitted 12% of district emissions included in the 2022 - 2023 greenhouse gas inventory. Source: Anders Olson, Sustainability Analytics

District Fleet

Though the District’s own fleet is a small portion of SDLX’s mobile source emissions (~9%), electrifying fossil fuel vehicles is a vital step towards the complete transition to renewable energy sources. Additionally, transitioning to electric vehicles can provide a return on investment over as few as 5 years ([US Department of Energy](#)). It would be beneficial to conduct a comprehensive fleet analysis to strategize priority vehicles for electrification.

Currently, the District owns 5 heavy duty and 4 medium duty vehicles (Appendix 7). Light and medium duty vehicles are more fuel efficient and contribute less emissions than their heavy duty counterparts. Unfortunately, heavy duty electric vehicle alternatives are, at the time of writing, prohibitively expensive. However, interim adoption of alternative fuel variants of heavy duty vehicles, such as compressed natural gas or biodiesel may delay future electrification. Because of the cost to establish infrastructure for each alternative fuel, including electric, SDLX will carefully consider the total lifecycle cost of adoption.

GoRiteway

The School District of La Crosse contracts bus transit services for students through the private service provider, GoRiteway. The associated GHG emissions from contracted GoRiteway operations make up the remaining 91% of mobile source emissions generated by District operations. GoRiteway supplies three fleet categories to District operations: the long bus, short bus, and van fleets.

GoRiteway is making efforts towards a cleaner fleet service, including transitioning to alternative fuels and electrification. It is unknown the timeline by which GoRiteway is pursuing their carbon reduction goals, but the District will support the transition to cleaner fuels and encourage carbon neutral alternatives in this contract and in future contracts.

Commuting

The emissions related to employee or student personal commuting were not included in the 2022-2023 school year GHG assessment. However, the District recognizes the potential impact of reducing transportation emissions and seeks to encourage the use of alternative modes of transportation to and from District buildings where practicable. The District is mindful of the varied transportation needs of its staff and students and will continue to consider new ways to support commuters and empower them to make their commuting decisions with autonomy and support.



Figure 11. Students cycling on a 9-person side-by-side bike.

Currently, most staff members commute by personal automobile. To reduce reliance on single-occupancy vehicles, motorized alternatives such as the La Crosse MTU are worth considering. MTU provides year-round transit services within the City of La Crosse and offers discounted options like the 'Max Pass' for K-12 students, which covers an entire semester of bus fares for \$45. Collaborations with local institutions, such as the 'U-Pass' program for college students, further demonstrate the potential to lower barriers to public transit through subsidies and partnerships. Expanding similar initiatives for District staff and students could significantly enhance access to sustainable transportation.



Figure 12. Students bicycling to school at Summit Elementary. Photo Credits: Randi Pueschner.

Another challenge is the congestion and idling emissions caused by student pickup and dropoff practices near District buildings. Rather than imposing restrictions, the District aims to diversify and enhance commuting options to alleviate pressure on any single mode of transport. Alternatives such as carpooling, public transit, and active modes like walking or biking are central to this strategy. The Safe Routes to School program seeks to improve safety conditions for pedestrians and bicyclists near schools to encourage more walking and cycling to school. In 2021, the City of La Crosse adopted its *La Crosse Safe Routes to School Plan* which analyzed each of the school 'neighborhoods', or areas around each school, and recommended infrastructure improvements within these neighborhoods that would make walking and biking safer and more comfortable. By supporting a variety of commuting options, the District seeks to empower staff, students, and parents with greater

freedom in choosing how they travel, contributing to reduced emissions and a more sustainable community.

Parking

Many of the La Crosse School District's buildings are accompanied by large impervious parking lots. Parking lots serve staff, students, parents, and visitors driving to school. There is a need for parking to be available for those that have no other option because of distance, weather conditions, or lack of alternatives. However, large surface lots have significant impacts on surface water runoff, water quality, and the heat island effect. Additionally, there is an opportunity cost to hosting large parking lots. Opportunities to provide additional services or natural areas are restricted when swathes of land are reserved for parking personal vehicles. In alignment with this plan, it is prudent to reassess the current level of parking service and determine whether the existing availability exceeds actual needs. For example, promoting alternative transportation options or shared parking strategies could reduce demand for parking spaces while advancing sustainability goals.

There are strategies to mitigate the negative effects of large parking lots like adding rain gardens and trees to improve stormwater permeability and absorption. Some District schools already have rain gardens like Summit Elementary and Logan Middle. Additionally, a tree canopy coverage of 40% or more can significantly reduce air temperatures in areas with extensive paved surfaces, mitigating the urban heat island effect and further increasing stormwater absorption.



Figure 13. Students at the Coulee Montessori Adolescent Program participate in their annual Chalk the Walk event.

Transportation 2030 Goals

Employee and Student Commuting

- ☐ Develop a Transportation Demand Management plan and parking study.
- ☐ Create an incentive program to encourage alternative modes of commuting to District buildings for staff.
- ☐ Support the implementation of active transportation initiatives/programs like Safe Routes to School.
- ☐ Increase the share of students commuting to school by transit, rideshare, or active modes.

Carbon Reduction and Climate Change Adaptation

- ☐ Decrease total transportation emissions by 10%.
- ☐ Reduce CO₂e emissions of contracted buses by 10%.
- ☐ All staffed District buildings will have EV charging stations for operational and staff use.
- ☐ Reduce the impact of large impervious surfaces with measures such as adding rain gardens and additional trees.

Resource Management



Resource management is concerned with the products and materials the district consumes and the waste generated. While greenhouse gas emissions from these sources are not included in the district's GHG inventory, actions to reduce their negative impacts are being considered.

Lifecycle Emissions

The entire lifecycle of the goods and resources SDLX utilizes should be considered when evaluating its impacts on the climate. Whether or not the goods consumed by the District are sourced from sustainable producers matters, as do the ways the District disposes of its waste. From printer paper, to electronics and software, these goods have upstream and downstream emissions and costs. While product emissions are not accounted for in our GHG inventory, the District recognizes source reduction, or reduction in demand and usage, is key to reducing upstream emissions and downstream emissions linked to waste disposal. Source reduction of products also reduces waste generation and therefore disposal.



Figure 14. A holistic view of the steps and processes involved in the production of goods. Each of these steps contributes to the total 'lifecycle emissions' of a product. Image source: European Commission

Waste Management

According to the City of La Crosse Climate Action Plan, an estimated 12.7% of waste generated in La Crosse was recycled, 30.4% of waste was incinerated at Xcel Energy's refuse-derived energy plant into electricity, and the remaining 56.9% was landfilled. The District aims to improve its share of recycled materials to prevent its waste from ending up in the landfill.

In addition to increasing the share of recycled waste, organic waste diversion practices like composting are a way to reduce the emissions associated with waste decomposition. Organic materials emit methane as they decompose anaerobically, or without oxygen, such as in a typical landfill environment. Alternatively, composting decomposes organic waste aerobically as CO₂ rather than methane, a much more potent greenhouse gas (U.S. EPA, 2023). Because methane is such a potent greenhouse gas, but doesn't last as long in the atmosphere, composting represents one of the most effective ways to quickly reduce GHG emissions.

Composting organic waste also reduces the tonnage of waste hauled away for disposal each year, therefore reducing hauling costs. The logistics of implementing a comprehensive food waste diversion program in a school are complicated as it requires a high-level of

participation from students and involved staff. However, the District is determined to pursue this initiative by assessing barriers and determining education on proper disposal.

Resource conservation is another critical area of focus. Reducing water waste aligns with the District's climate goals because excessive water use has hidden energy costs associated with it. Every gallon of water consumed requires energy to pump, heat, and clean. By promoting water-saving behaviors, installing low-flow fixtures, and improving leak detection and repair, the District can reduce resource and energy waste.

Procurement of Materials

Not all operations can be electrified or made more efficient to reduce emissions. The materials used by District operations range from paper to computers and electronics. The emissions and environmental impacts from material extraction, various supply chain factors, and end-of-life waste streams are much more complicated and difficult to quantify. However, these impacts should not be ignored if our approach to sustainability is to be comprehensive. For example, the District can choose from various vendors for paper. Under a sustainable purchasing policy, the District would choose to purchase paper from a vendor that has a demonstrably lower environmental impact, determined by a reputable, third party, certification of a vendor's action towards sustainable production, and the sources of the materials used to create their products, among other factors.

At present, the District has an administrative policy dictating the practice of consumption and waste management within District operations (Appendix 2). This policy can go further to reduce the impacts of District waste and should be revisited to cover the associated GHG emissions with products and include terms for electronic waste and recycling.



Figure 15. Students of the Coulee Montessori Charter School engage in hands-on learning about sustainable agriculture and environmental preservation.

Resource Management 2030 Goals

Waste Reduction

- ☐ Reduce water consumption by 5%.
- ☐ Complete a feasibility study to explore opportunities to divert food waste such as composting, donating, and prevention.

Sustainable Procurement

- ☐ Revisit Waste Management/Recycling policy to support preferential procurement of carbon neutral products and consumables. This policy should include language specifying electronic waste recycling as well. Draft and adopt a sustainable purchasing policy.
- ☐ Support and expand the existing Farm to School Program as an educational opportunity, resilient food supply chain, and program that contributes to the local economy.

Quality of Life



By emphasizing sustainability in the curriculum, we can enhance the learning experience of students through experiential learning and relating what they learn to the world around them.

Quality of Life

The School District of La Crosse provides an indoor and outdoor environment for students and staff who spend hundreds of hours annually on our campus to learn, play, eat, and work. The School District recognizes that the quality of our environment deeply impacts physical, mental, and emotional health and well-being. The Quality of Life category of this plan includes the physical indoor and outdoor spaces on our campus, as well as education and engagement as foundational pieces of our School District community.

Students and staff spend the majority of their days at school. Indoor conditions of a building include air quality, lighting, thermal conditions, hazardous materials usage, and other components that impact occupants. While these items may not have obvious emissions associated with them, we recognize climate action as a holistic approach that strives to promote energy and resource efficiency, water conservation, waste reduction, and ensure buildings make people feel good, perform well, reduce stress and prevent injuries.

The School District has new and older buildings which have varying levels of building materials such as lead paint or pipes, operable windows, ventilation systems, cleaning policies, and pest management. In order to increase comfort and health of building occupants, the School District Sustainability Committee identified first steps including assessing ventilation systems, monitoring airflow, inventorying sensors and monitors, conducting a custodial effectiveness assessment, using integrated pest management processes, and conducting regular occupant surveys. Practices such as using daylighting, changing the color temperature of light fixtures, providing ergonomic furniture, and incorporating acoustic design can dramatically increase occupant experience of being in buildings. The School District is committed to providing spaces and learning environments for students and staff to thrive and are eager to assess our current performance to drive our strategies and goals.

Learning From the Environment

Learning in an outdoor environment has been shown to have a demonstrably positive impact on learning outcomes and improvements in student's wellbeing ([Kuo M., et al., 2018](#)). Using the natural environment as an additional tool in education instills the importance of the environment and a “sustainable mindset” ([Stuart, n.d.](#)).



Figure 16. Group photo taken at the grand opening of Summit Elementary's Natural Playscape. An innovative environment for play that connects students with nature.

The Summit Environmental School is an excellent example of how the District can use the environment as a tool to stimulate curiosity. At Summit, the environment is used to augment the learning experience and connect what they learn in the classroom to the world around them. In 2010, a huge effort by Summit's staff, School Board, Parent-Teacher Organization (PTO), and state and local agencies worked to make sustainability and the environment a major part of the instructional program.

Learning from the environment directly connects students to nature, building a foundation of appreciation and respect for the world around them. Gardens at District schools will allow students the opportunity to learn and take part in natural cycles, nutrition, and sustainable agriculture. School gardens serve as living classrooms where students can engage in science and health and experience the benefits of their work. The District's partnership with GROW La Crosse has already greatly benefited students thanks to GROW's commitment to connecting youth to healthy food and nature. By cultivating these spaces, students develop a personal connection to sustainable practices that may lead to lifelong environmental mindfulness.

Teaching Sustainability

SDLX has a strong foundation in teaching topics like climate science, resource management, and renewable energy. Building on this, the District would like to incorporate more opportunities for students to participate in climate action. By linking classroom learning with District-wide climate goals, we're equipping students with practical, research-based knowledge on how they can contribute to and impact the wider environment. This will enrich students' understanding of sustainability, offering them ways to explore environmental stewardship and support the District's long-term vision.

As part of SDLX's effort to enrich its climate education curriculum, it has incorporated Full Option Science System (FOSS) into its science education program. By the end of the 2025-2026 school year, FOSS Pathways, an updated version of FOSS, will be fully implemented in PreK through 8th grade classrooms. FOSS Pathways is a core science curriculum that allows students to flex their curiosity and conduct research of their own to uncover the scientific understanding behind natural phenomena. Each grade level is taught at least three lessons that relate to the Earth's climate and the factors that influence it. Relating topics in science back to the real environment helps students to retain core concepts and deepen their understanding. Students can connect scientific principles to tangible experiences like in an outdoor learning activity that fosters a stronger appreciation for the environment and its intricate systems.



Figure 17. The Frog Pond Classroom, an area where students can be immersed in a piece of nature regardless of season.

Engaging the Public

Active community engagement is essential to the success of this plan and to creating a culture of sustainability within the District. Involving parents, community members, and local organizations can bring valuable insights and resources into our schools, supporting student learning and connecting classroom projects to real-world applications. SDLX already has plans to invest in public-facing facilities to meet modern needs³.

Schools have the unique privilege and responsibility of teaching the next generation. The goal of the education system has always been to empower students and encourage critical, creative, and innovative thinking. These skills enable students to give back to their community and leave behind a positive impact of their own. Integrating sustainability into our curriculum is an opportunity to instill a sense of environmental stewardship that aligns with the District's climate goals. By connecting students, teachers, and the broader community to these initiatives, we aim to inspire sustainable habits and practices that will carry forward well beyond the classroom.



Figure 18. Superintendent Engel serving students up at The Bobcat Cafe during National School Breakfast Week at Southern Bluffs Elementary.

³ In the SDLX Long Range Facility Plan 2050 (Appendix 8), key task #3 is to invest in gathering places and public-facing facilities to better accommodate students and the public.

Quality of Life 2030 Goals

Indoor Environmental Quality

- ☐ Complete a comprehensive building operations and health study that includes assessing air quality, presence of hazardous materials, ventilation performance, inventorying sensors and monitors, reviewing pest management processes, reviewing cleaning processes and policies and conducting occupant surveys.
- ☐ Ensure adequate ventilation based on ASHRAE Standard 62, monitor indoor airflow, radon, and carbon dioxide.
- ☐ Complete a calibration standards plan to regularly calibrate sensors or implement smart ventilation and calibration systems.
- ☐ Conduct custodial effectiveness assessment and develop and implement a green cleaning policy.

Curriculum and Engagement: Linking Learning and Sustainability

- ☐ The District Science Department will include Climate Curriculum within the preK-12 Scope and Sequence.
- ☐ All schools utilize an outdoor learning space in their curriculum.
- ☐ All new elementary and middle school science teachers participate in professional development on climate change.
- ☐ All 8th grade students engage in career exploration and green career opportunities.
- ☐ All high school students engage in career exploration and green career opportunities. Additionally, juniors and seniors have the opportunity to attend a career expo/Wisconsin Education Fair which includes environmental career opportunities.

- ☐ 6th through 12th grade students will have an annual climate change project-based learning opportunity.

Sustainability and Climate Action

- ☐ The District will designate a sustainability coordinator and science/sustainability teaching coach.
- ☐ The District will collaborate on a climate change education event open to the public each year.

Implementation

The Buildings and Grounds Department will be the primary implementation lead for this plan. However, the participation and inclusion of many departments, staff, and community members will ultimately decide the success of the District's climate goals. The writing of this plan has been a process involving people from within the school District and from the community that are passionate about sustainability and want to see the School District of La Crosse have a lasting positive impact on the environment and on the students that come to learn and play here.

To implement the goals, recommendations, and strategies laid out in this plan, the District will need the continued support of its partners, staff, and the community. It is recommended that representatives from each of the departments within the District are included in implementation of this plan so that the goals and strategies within remain grounded and actionable.

Goals and Recommendations

Under this plan, the School District of La Crosse aims to have carbon neutral District operations and a 50% reduction in District waste sent to the landfill by 2050. As a member of the greater La Crosse community, these goals align with the city of La Crosse climate goals and aim to support their efforts.



Carbon neutral district operations by 2050.



Halve landfilled waste produced by the school district by 2050.

Our 2050 goals are supplemented with short-term 5 year goals with the purpose of creating steppingstone actions towards the goal of eliminating the District's contribution to climate change. These goals are meant to be achieved within the given timeframe and built upon in later renditions of this plan. Future versions of this plan will likely look very different as 2050 approaches and as the economic, social, technical, and political landscape changes.

Future Updates to This Plan

To maintain momentum and adapt to changing circumstances, regular updates to this plan are essential. Continuous evaluation will help ensure that the District's climate action efforts remain effective, realistic, and aligned with its long-term goals. As the implementation team works towards the 2030 goals, annual summary reports of progress will be a part of this ongoing effort. Below are recommendations that will support the implementation of this plan going forward.

- **Annual Greenhouse Gas (GHG) Assessments:** Annually conduct GHG assessments to measure progress towards carbon reduction goals.
- **Collaboration with the City of La Crosse:** In addition to implementing SDLX's climate action plan, support the City of La Crosse's climate action plan.
- **Regular Updates:** Revise the content, goals, and recommendations of this plan at least every five years. Updates should integrate lessons learned, address unforeseen challenges, and incorporate new technologies and methods.

By committing to regular updates and ongoing collaboration, the School District of La Crosse ensures that this plan remains a living document – capable of evolving alongside the District's priorities and the world's changing landscape.

References

- EPA (2024, November 26). *Climate Change and the Health of Socially Vulnerable People*. <https://www.epa.gov/climateimpacts/climate-change-and-health-socially-vulnerable-people>
- Pager, F. (n.d.). *2023 Sustainability Report*. <https://corporate.my.xcelenergy.com/s/about/report>
- Hilberg, LE. 2022. City of La Crosse Climate Change Vulnerability Assessment. EcoAdapt, Bainbridge Island, Washington.
- paleBLUEdot LLC. 2022, City of La Crosse Climate Action Plan. <https://www.lacrosseclimateactionplan.org/the-plan>
- Ziter, C. D., Pedersen, E. J., Kucharik, C. J., & Turner, M. G. (2019). Scale-dependent interactions between tree canopy cover and impervious surfaces reduce daytime urban heat during summer. *PNAS*. <https://doi.org/10.1073/pnas.1817561116>
- Shackelford, J., Dutton, S., Regnier, C., Chan, W., & Robinson, A. (2024). Modeled Retrofit Package Performance for Schools. *Lawrence Berkeley National Laboratory*. <https://doi.org/10.20357/B7N318>
- Focus on Energy (n.d.). *Education*. Focus on Energy. <https://focusonenergy.com/business/education>
- Office of Energy Efficiency and Renewable Energy. (2023). *Electric Vehicle Basics* (Report No. DOE/GO-102023-6050). U.S. Department of Energy https://afdc.energy.gov/files/u/publication/electric_vehicles.pdf?4efbe6d174
- Stuart, P. (n.d.). *Outdoor Classrooms*. <https://gba.org/resources/green-healthy-schools-resources/outdoor-classrooms/>
- Kenny, S. AND J. Dixon. From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways (Part 2) . U.S. EPA Office of Research and Development, Washington, DC, 2023.
- Kuo M, Browning MHEM and Penner ML (2018) Do Lessons in Nature Boost Subsequent Classroom Engagement? Refueling Students in Flight. *Front. Psychol.* 8:2253. doi: 10.3389/fpsyg.2017.02253

Appendices

- 1) SDLX Energy Conservation Administrative Policy
- 2) SDLX Waste Management/Recycling Administrative Policy
- 3) Sustainability Committee Purpose and Intent
- 4) Greenhouse Gas Inventory Presentation
- 5) City of La Crosse Climate Change Vulnerability Assessment
- 6) Standard Community Energy Report - Xcel Energy
- 7) SDLX - Vehicle Inventory
- 8) SDLX Long Range Facility Plan 2050
- 9) Historical Collaborators in Previous SDLX Sustainability Efforts



Book	2 - Administrative Policies and Regulations
Section	7000 Support Services
Title	Energy Conservation
Code	7330
Status	Active
Adopted	September 8, 2010
Last Revised	May 11, 2016
Last Reviewed	May 11, 2016

School District of La Crosse Administrative Policies and Regulations

7330

ENERGY CONSERVATION

The School District of La Crosse herein establishes energy conservation as a major priority of the School District of La Crosse. The School District of La Crosse recognizes that the conservation of energy is in the best interest of our total society, as well as our local community. This policy is intended to reduce the use of energy in school-owned facilities without adversely affecting program operation.

The implementation of this policy is the joint responsibility of all employees and students and its success is based on cooperation at all levels.

The energy conservation program in the School District of La Crosse shall be organized to provide comprehensive energy operation regulations, practices and procedures that minimize the use of all forms of energy and natural resources in the District's facilities.

7330

ENERGY CONSERVATION - REGULATIONS

I. The Objective of the Program

- A. Eliminate energy waste and promote effective energy use
- B. Ensure comfort for the students and staff
- C. Ensure indoor air quality per accepted standards

II. Responsibilities

- A. Every person is expected to be a wise "energy saver" as well as a wise "energy consumer."
- B. Every employee is responsible for implementing the guidelines during the time they are present in their work area. All employees are responsible for conserving energy in common areas.

- C. The Energy Manager performs routine audits of all facilities and communicates the audit results to the appropriate personnel.
- D. The Energy Manager provides regular reports to the Building and Grounds Supervisor and building administrators indicating performance with regards to energy savings.

III. General

- A. All unnecessary lighting in unoccupied areas will be turned off. All staff should make certain that lights are turned off when leaving an empty classroom, office or other work areas. Utilize natural lighting where appropriate.
- B. All outside lighting should be off during daylight hours.
- C. All gym lights should be off when the gym is not utilized.
- D. All lights will be turned off when students and teachers leave school. Custodians will turn on lights only in the areas in which they are working or that have activities.
- E. Refrain from turning lights on unless definitely needed. Remember that lights not only consume electricity but also give off heat that places an additional load on the air condition equipment and thereby increases the use of electricity necessary to cool the room.
- F. Classroom doors shall remain closed when HVAC is operating. Ensure doors between conditioned space and non-conditioned space remain closed at all times.
- G. Exhaust fans should be turned off during unoccupied hours.
- H. All office machines (copy machines, laminating equipment, etc.) shall be switched off each night and during unoccupied times. Fax machines and any networking equipment should remain on.
- I. All computers should be turned off each night. This includes the monitor, local printer, and speakers. It is requested that computer surge protection should also be shut off.
- J. All capable PC's should be programmed for the "energy saver" mode using the power management feature. If network constraints restrict this for the PC, ensure the monitor "sleeps" after 15-minutes of inactivity during the day.
- K. Lighting in commercial advertising, such as in vending machines, will be discouraged.

IV. Space Temperature Regulations

- A. Cooling Season Occupied Temperature 75°F – 78°F
- B. Heating Season Occupied Temperature 68°F – 72°F

V. Air Conditioning Equipment

- A. During unoccupied times the air conditioning equipment shall be off. The unoccupied period begins when the students or activity participants leave the area at the end of the day. It is anticipated that the temperature in the classroom will be maintained long enough to afford comfort for the period that staff remains in the classroom after the students have left.
- B. Air conditioning start times may be adjusted (depending on weather) to ensure classroom comfort when school begins.
- C. Ceiling fans should be operated in all areas that have them.
- D. Where possible to control, relative humidity levels shall not exceed 60% at any time.

E. Air conditioning should not be utilized in classrooms during the summer months unless the classrooms are being used for summer school or activities. Relative humidity levels should be monitored to verify level remains below 60%. Air conditioning may be used by exception only in those school areas that are involved in a team cleaning.

F. Natural cooling will be used whenever possible.

VI. Heating Equipment

A. The unoccupied temperature setting shall be 55°F (i.e. setback).

B. The unoccupied time shall begin when the students or activities leave an area and end 1/2 hour before classes or activities resume.

C. During the spring and fall, when there is no threat of freezing, all steam and forced air heating systems should be switched off or to "keep warm" during unoccupied times. Hot water heating systems should be switched to off using the appropriate loop pumps and boilers.

D. Ensure all domestic hot water systems are set no higher than 120°F or 140°F.

E. Kitchen dishwashing equipment are set no higher than 140°F .

F. Water heaters serving only kitchens should be shut off during unoccupied times unless an activity using the kitchen will occur during the unoccupied period.

G. Dishwashing booster heaters shall be off when not in use.

VII. Personal Appliances

A. Personal appliances will be discouraged. This includes, but is not limited to, refrigerators, microwaves, coffee pots, toasters, and air purifiers.

B. Appliances with standby heating elements, such as coffeemakers, must be shut off or unplugged during non-use hours (includes non-school days and holidays).

C. Disposal of maintenance of personal appliances is the responsibility of the owner.

Reviewed and revised by the Superintendent's Advisory Team: 05/11/16
Board of Education Informed: 05/13/16

Appendix Item #2

Book	2 - Administrative Policies and Regulations
Section	7000 Support Services
Title	Waste Management/Recycling
Code	7430
Status	Active
Last Revised	December 14, 2011
Last Reviewed	May 11, 2016

School District of La Crosse Administrative Policies and Regulations**7430****WASTE MANAGEMENT/RECYCLING**

The School District of La Crosse will act to make resource conservation an integral part of the physical operation of the school district and of the school curriculum. The practice of discarding materials used in school facilities is wasteful of natural resources, energy and money. It is also the function of the schools to set an example of stewardship of our natural resources and to develop responsible citizenship in our students.

It will be the policy of the School District of La Crosse to implement the following actions:

The school district will integrate the concept of resource conservation, including waste reduction and recycling, into the environmental education curriculum at all levels of the school system.

The school district will strive to decrease the amount of waste of consumable materials by:

1. Reduction of the consumption of consumable materials wherever possible.
2. Full utilization of all materials prior to disposal.
3. Minimization of the use of nonbiodegradable products wherever possible.

The school district will cooperate with, and participate in, recycling efforts being made by the City of La Crosse and La Crosse County. As systems for the recovering of waste and recycling are developed within the City and County, the school district will participate by appropriately separating and allowing recovery of recyclable waste products.

The school district will purchase, where financially viable, recycled products. The school district will also encourage suppliers, both private and public, to make recyclable products and unbleached paper products available for purchase by public schools.

Reviewed with no revisions by the Superintendent's Advisory Team: 05/11/16

Board of Education Informed: 05/13/16



SCHOOL DISTRICT OF LA CROSSE

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Climate Action Plan Committee

Purpose

The purpose of the Climate Action Plan (CAP) Committee is to create a climate action plan for the School District of La Crosse that:

1. Aligns with public education's primary purposes - to educate children;
2. Supports school district's desired ultimate results for students which is to "discover and develop their talents and abilities and be prepared to pursue their dreams and aspirations while contributing effectively to their local, state, national, and global communities," and;
3. Identifies opportunities and priorities to reduce greenhouse gas emissions in support of the City of La Crosse [Climate Action Plan](#).

Guidance

The K12 Climate Action [Plan](#) from [Planet Ed](#) of the [Aspen Institute](#) will provide the foundation for the development of the school district's climate action plan. School Board and administrative policies that will inform and guide this committee's work are:

- [R-3 Involved Citizenship](#)
- [OE-5 Financial Planning](#)
- [OE-12 Facilities](#)
- [3410.8 Curriculum Development](#)
- [6100 Fiscal Management Goals](#)
- [9100 Facilities Development](#)

Membership

The CAP Committee membership will be made up of key representatives from school district staff and representatives from community environmental advocacy groups. A member of the CAP Committee will be sought from the City of La Crosse to promote alignment with the City of La Crosse Climate Action Plan.

Timeline

The CAP Committee will meet monthly from October 2023 through May 2024 with a recommended plan brought to the School Board for consideration in July 2024. A tentative schedule of topics for meetings is as follows:

- February Establish committee and review past and ongoing efforts
- February Review the City of La Crosse Climate Action Plan
- March Review the K12 Climate Action Plan from Planet Ed
- April Explore curricular goals for the climate action plan
- May Evaluate curricular goals and explore emissions reduction opportunities
- June Refine curricular goals and evaluate emissions reduction opportunities
- July Refine emissions reduction opportunities and identify priorities
- August/Sept Develop Climate Action Plan report
- October Finalize Climate Action Plan report
- November Finalize Climate Action Plan report
- December Present the Climate Action Plan to School Board for consideration

SCHOOL DISTRICT OF
LA CROSSE



Greenhouse Gas Inventory
2022-23 Fiscal Year

June 18, 2024

Anders Olson



What is a GHG Inventory?

- Quantifies an organization's GHG emissions with defined scope and time period
 - Informs climate action planning and goal setting
 - Tool for assessing future performance/progress
- Includes multiple greenhouse gases
 - Carbon dioxide (CO₂)
 - Methane (CH₄)
 - Nitrous Oxide (N₂O)
 - Refrigerants (HFCs)

metric tons CO₂-equivalent (mt CO₂e)



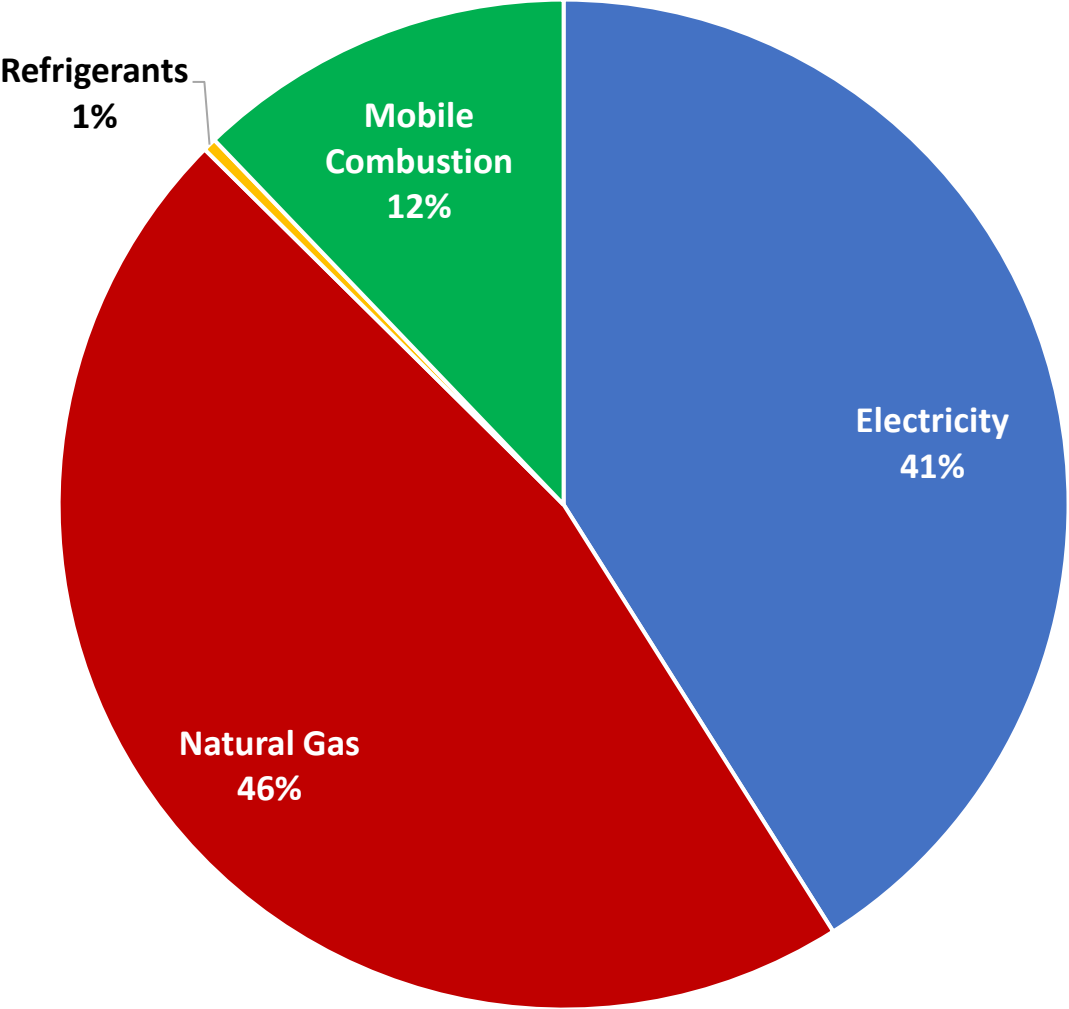
What does the GHG Inventory include?

Inventory Category	Sources in District Inventory
Purchased energy	Grid electricity usage
Stationary combustion	Natural gas usage
Mobile combustion	Vehicle fuel usage (District & Go Riteway)
Fugitive refrigerants	HFCs leaked from HVAC/R systems

Time period: July 2022 – June 2023 (District's FY 2022-23)

District GHG Emissions in FY 2022-23

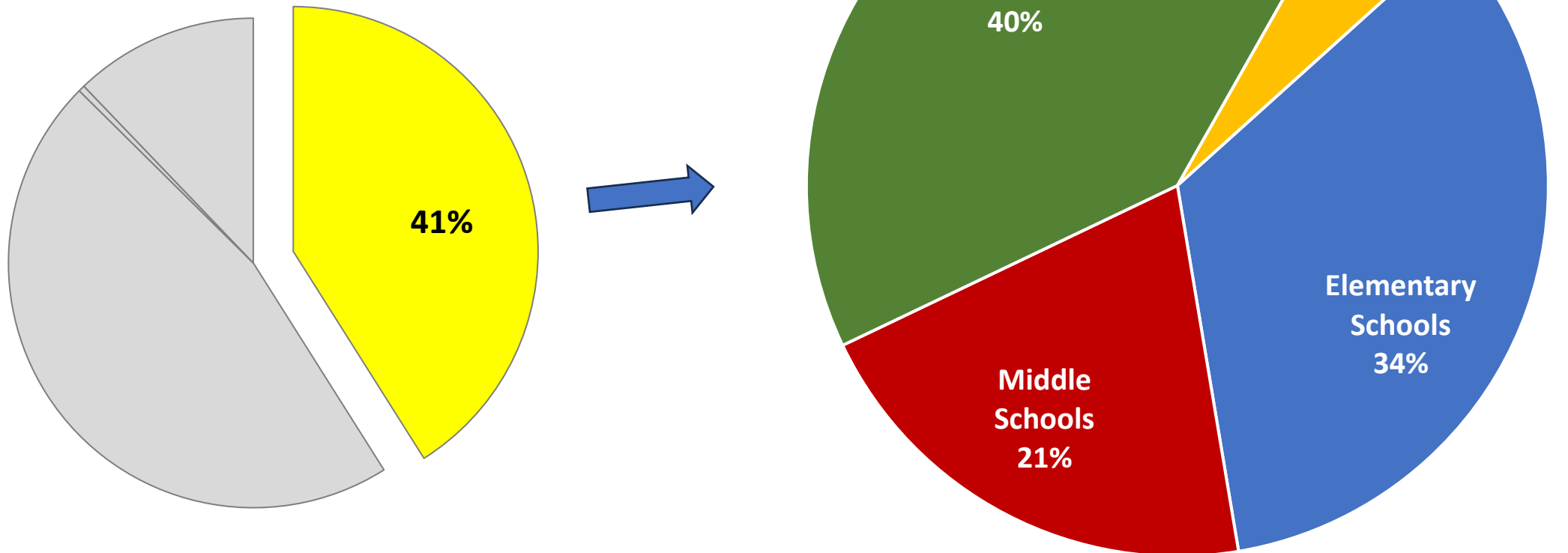
	Metric tons CO ₂ e
Electricity	2,350
Natural gas	2,656
Vehicles	696
Refrigerants	24
Total	5,726



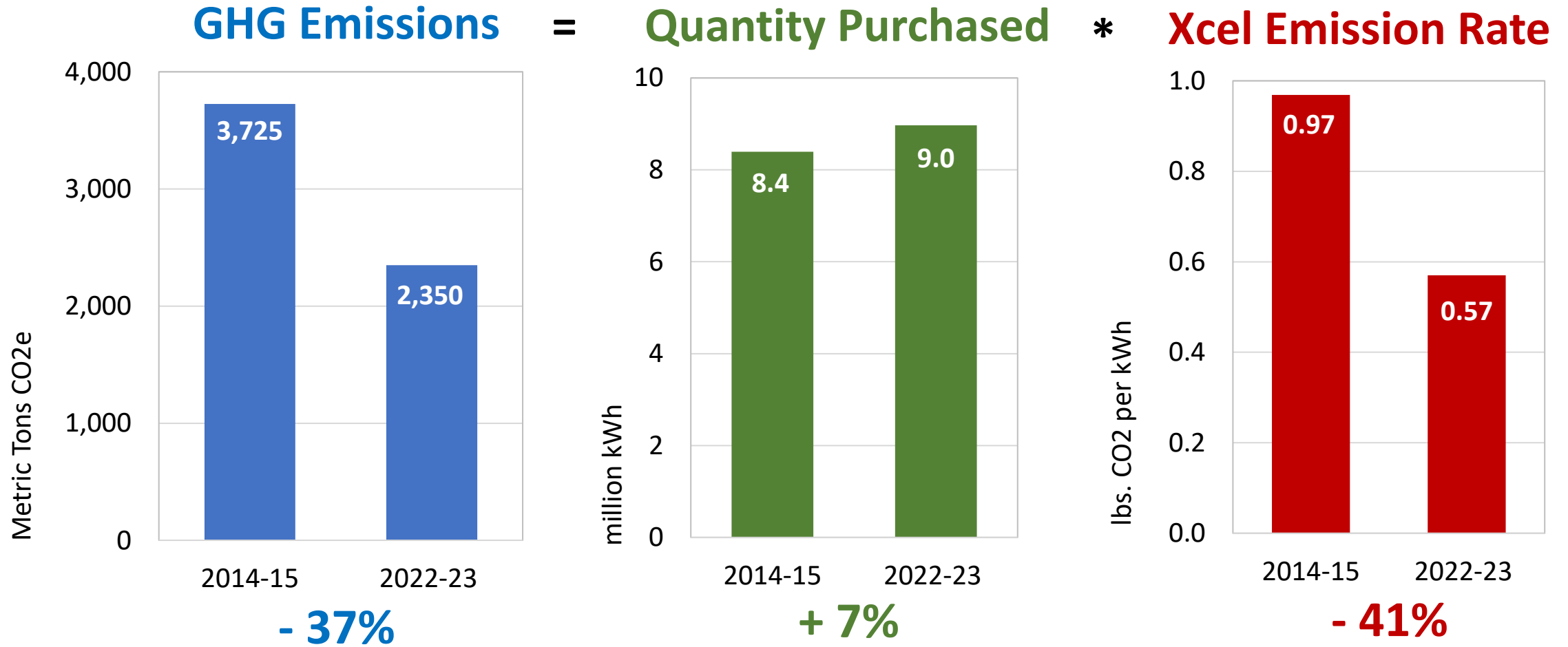
Electricity: GHG Emissions in FY 2022-23

Qty. purchased: 9.0 MWh

GHG Emissions: 2,350 mt CO₂e

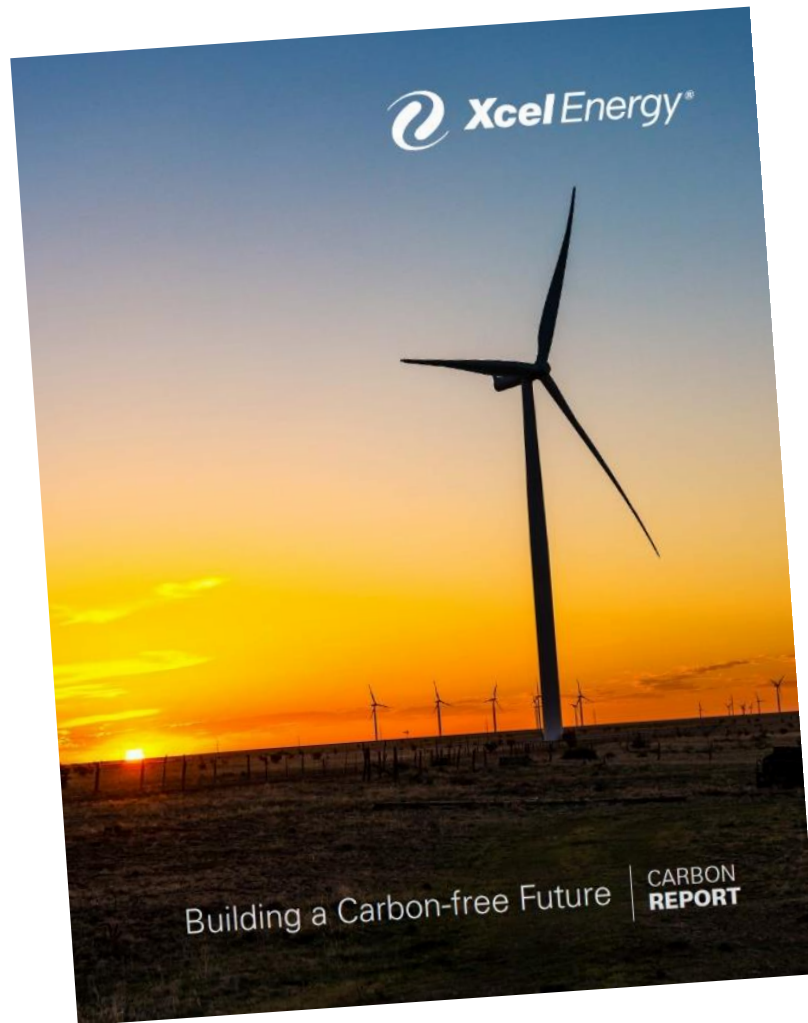


Electricity GHG Emissions: 2014-15 vs. 2022-23

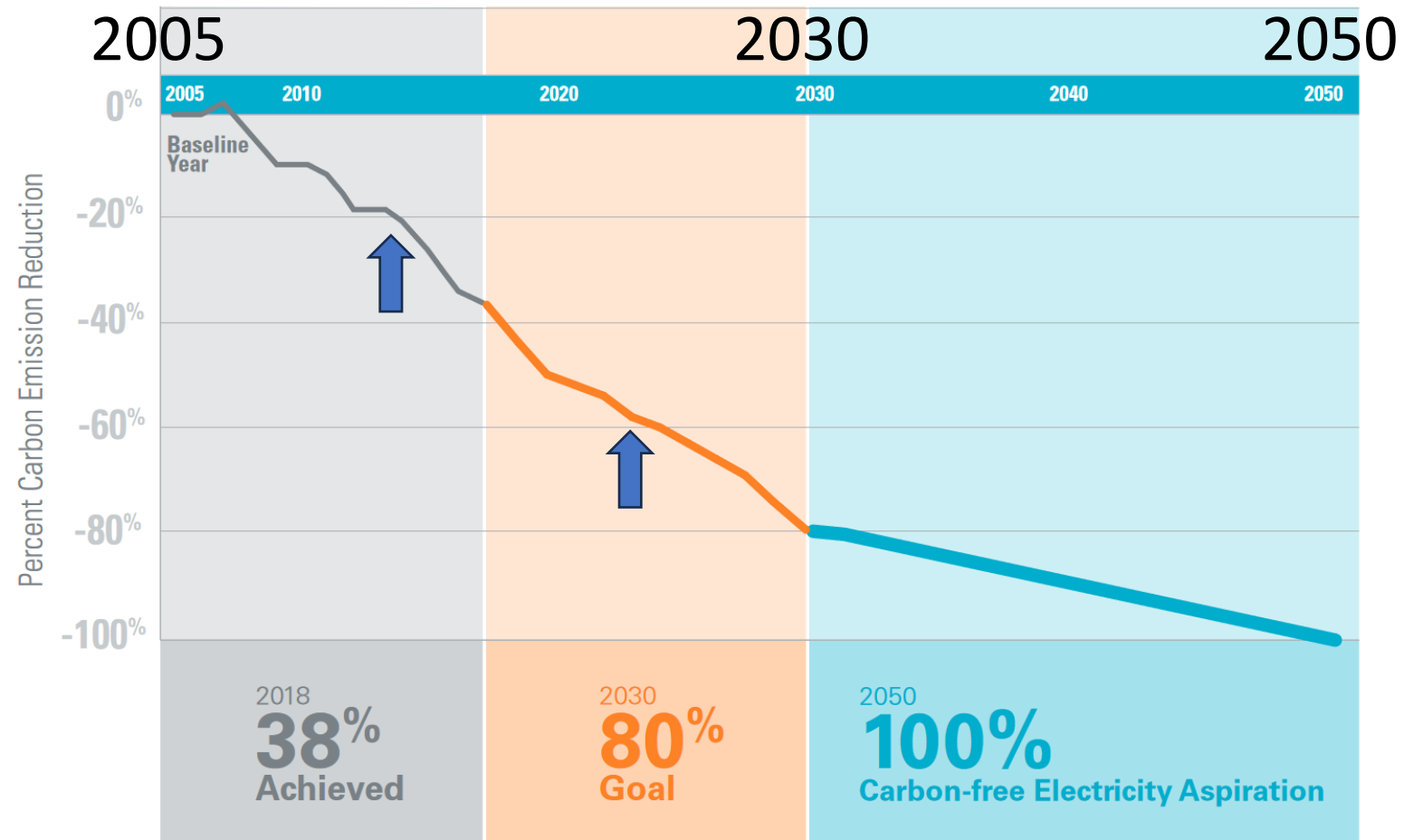


- Polytechnic started after 2014-15, and Northside during
- More than offset by solar

Xcel Energy: Carbon-free Electricity



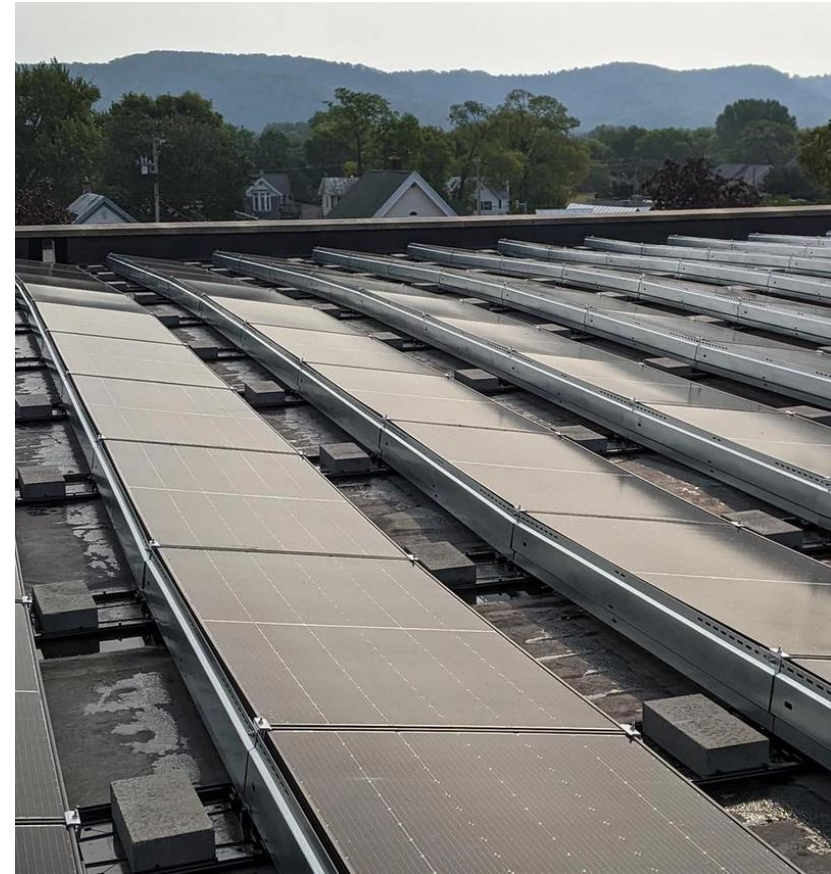
Xcel Energy Carbon Reduction Trajectory



Ways to Reduce Electricity GHG Emissions

- Reduce usage with efficiency
 - LED lighting
 - variable speed drives
 - smart building controls
- On-site solar PV production
 - Hamilton: ~40%
 - Northside: ~15%

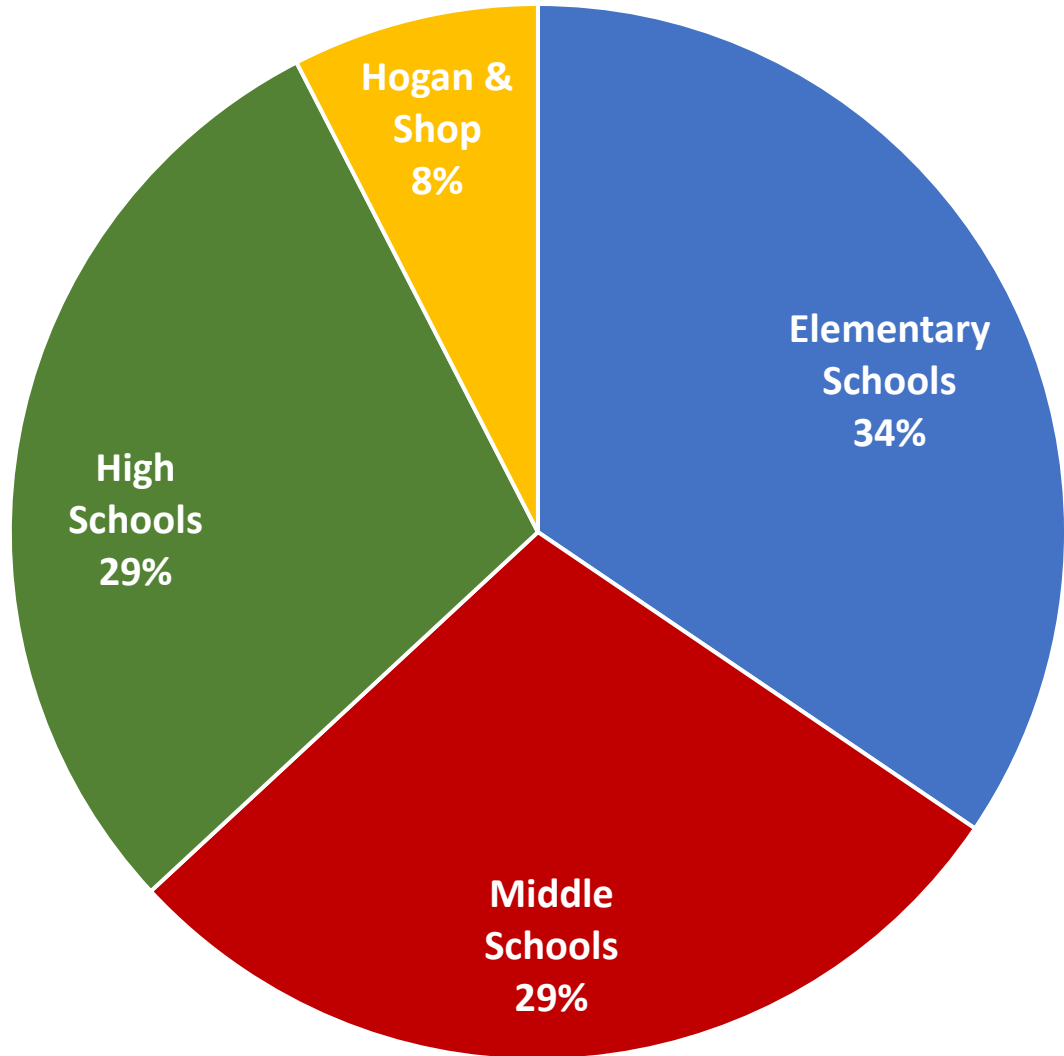
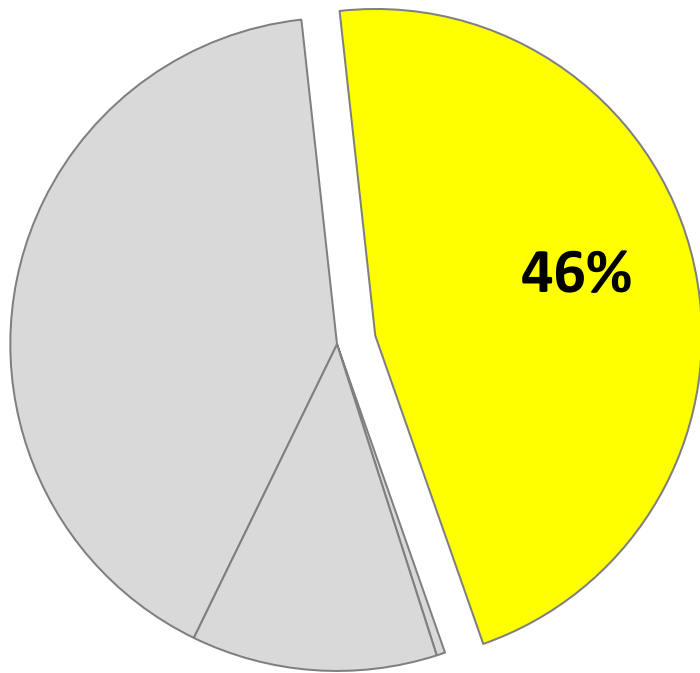
Northside Elementary Rooftop PV Array



Source: Solar on La Crosse Schools

Natural Gas: GHG Emissions in 2022-23

Quantity used: 499,999 therms
GHG Emissions: 2,656 mt CO₂e



Ways to Reduce Natural Gas GHG Emissions

- Improve building envelopes
 - Increase insulation
 - Eliminate air leaks
- Replace gas eqpt. with electric alternatives
 - Ground-source – need to drill boreholes
 - Air-source – improved cold-climate efficiency
 - Heat pump water heaters
 - Cooking appliances

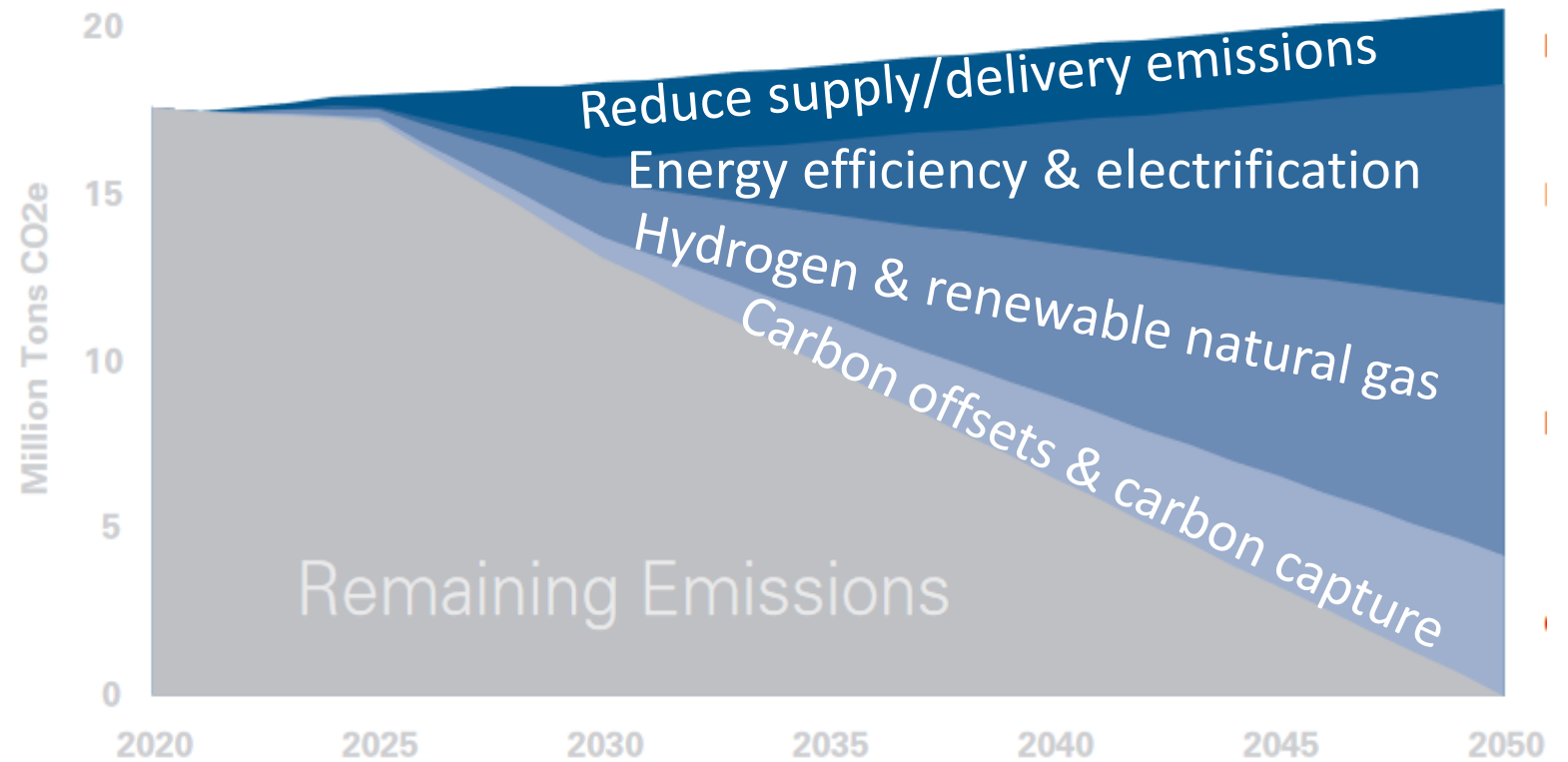


Source: US Department of Energy, Office of Energy Efficiency and Renewable Energy

Xcel : Net-Zero Vision for Natural Gas



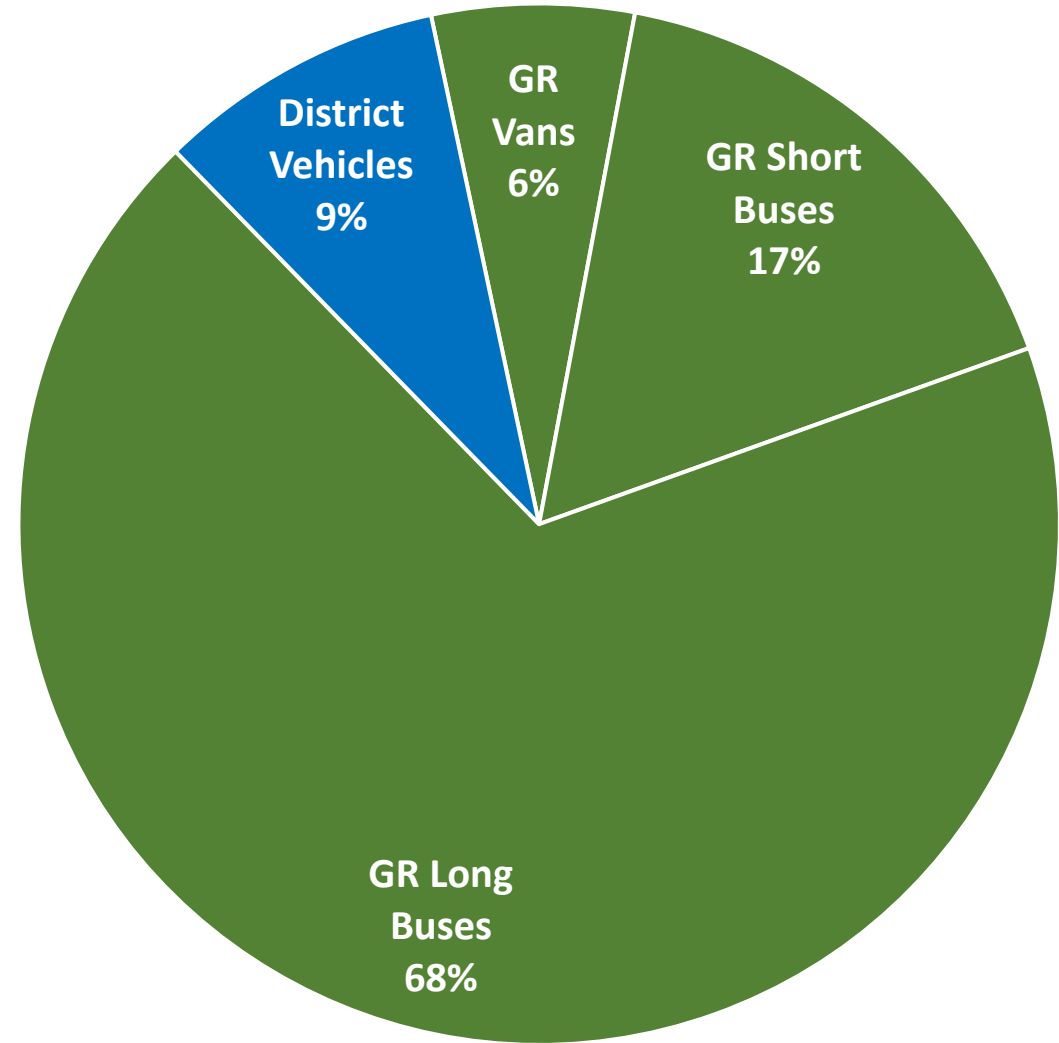
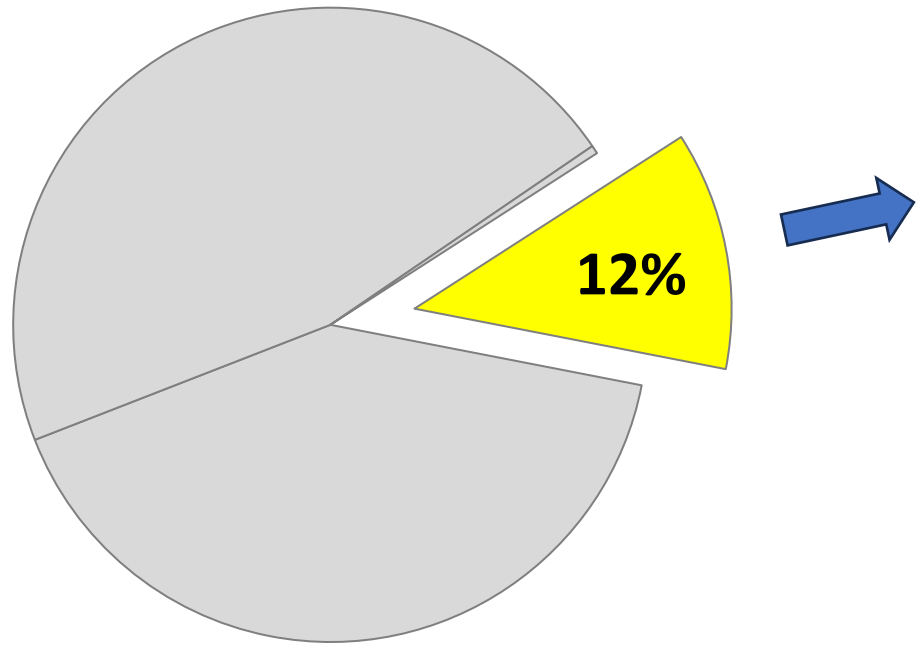
Xcel GHG Emissions from Natural Gas



Source: Xcel Energy (2)

Transportation: GHG Emissions in 2022-23

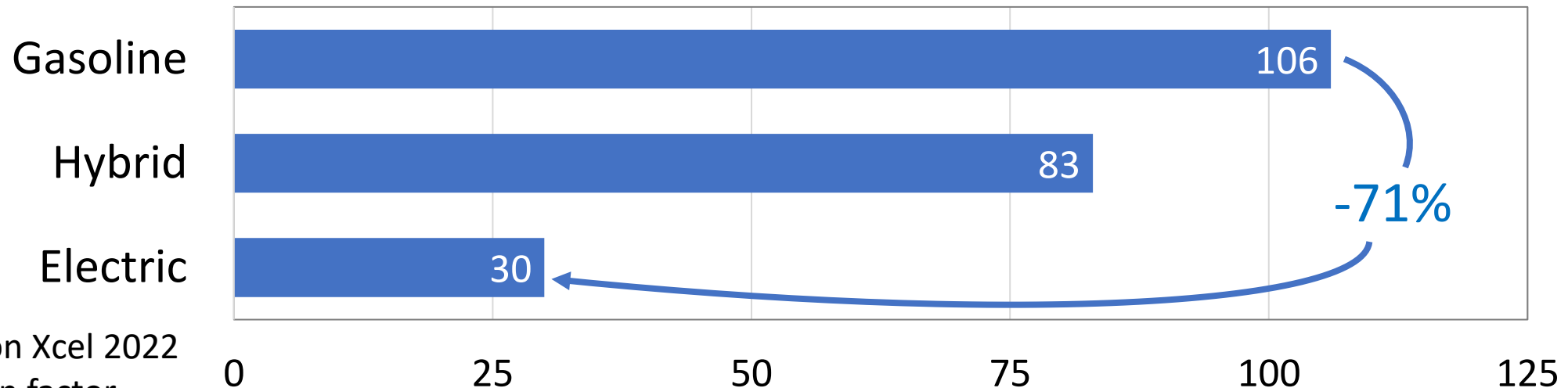
Fuel usage: 103,159 gallons
GHG Emissions: 696 mt CO₂e



Ways to Reduce Transport GHG Emissions

- Increase alternative commute options for students and staff
 - carpool, bus
 - bike, walk
- Replace vehicles with lower-emitting alternatives

2023 Ford F-150: GHG emissions per 100 miles (lbs CO₂e)



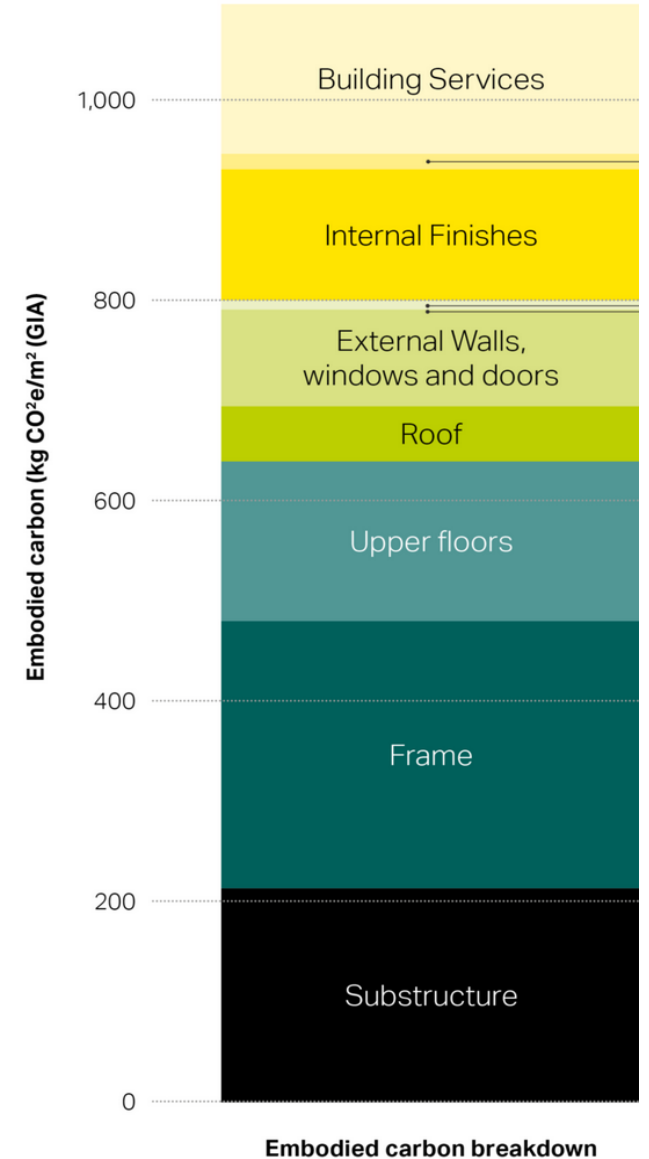
Based on Xcel 2022
emission factor

Other Considerations

- Emission sources excluded from inventory
 - Commuting, work travel
 - Food served in schools
 - Solid waste management
 - “Embodied” emissions *

* GHG emissions from building materials manufacturing, transport, installation, maintenance, disposal

- Represents ~28% of a building’s lifetime emissions



Source: Cheshire and Burton (Aecom) 2020

Sources Cited

- Carbon Visuals. *Actual volume of one metric ton of carbon dioxide gas*. <https://www.flickr.com/photos/carbonquilt/8228691679>. Accessed 2024-06.
- Center for Corporate Climate Leadership, US EPA. <https://www.epa.gov/climateleadership>. Accessed 2024-06.
- Cheshire, Dave and Mike Burton. 2020. *The carbon and business case for choosing refurbishment over new build*. <https://aecom.com/without-limits/article/refurbishment-vs-new-build-the-carbon-and-business-case/>. Accessed 2024-06.
- Solar on La Crosse Schools. *Northside Elementary & Coulee Montessori*. <https://www.solaronlacrosseschools.org/nothside-coulee-montessori>. Accessed 2024-06.
- US Department of Energy, Office of Energy Efficiency and Renewable Energy. *Heat Pump Systems*. <https://www.energy.gov/energysaver/heat-pump-systems>. Accessed 2024-06.
- Xcel Energy (1). 2019. *Building a Carbon-Free Future: Carbon Report*. <https://xcelnew.my.salesforce.com/sfc/p/#1U0000011ttV/a/8b000002YwZB/GJQhCw09l7O6JsQipWvNzk83NoIUnx0AzSkx1F32HKE>. Accessed 2024-06.
- Xcel Energy (2). 2022. *Net-Zero Vision for Natural Gas*. <https://www.xcelenergy.com/staticfiles/xcel-response/Net-Zero-Vision-for-Natural-Gas.pdf>. Accessed 2024-06.

City of La Crosse

Climate Change Vulnerability Assessment

February 2022

Laura Hilberg, EcoAdapt

Photo by Fern M. Lomibao via Unsplash



Recommended Citation:

Hilberg, LE. 2022. City of La Crosse Climate Change Vulnerability Assessment. EcoAdapt, Bainbridge Island, Washington.



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Introduction

Climate change is a global process, driven by emissions of greenhouse gases that impact long-term trends in temperature and precipitation as well as the likelihood and severity of extreme events such as droughts, floods, and wildfires. These changes are felt at global, national, regional, and local scales, and they are already being observed in La Crosse, where winters have become significantly warmer and wetter and localized flooding is increasingly common during heavy rain events. Over the coming century, these changes are likely to become even more significant, resulting in wide-reaching impacts across all sectors of the community.

Photo by Erin Larson via Unsplash

Climate change **adaptation** is focused on preparation for and response to climate changes that are already occurring, or will occur in the future. Along with climate change **mitigation**, adaptation plays a critical role in comprehensive community plans for addressing climate change. The adaptation planning process (Figure 1) is focused on systematically evaluating the likely impacts of climate change on the community and identifying strategies that can be implemented to increase resilience to those changes. The result of this process is intentional integration of climate change into plans, programs, projects, and operations across the community, ensuring a healthy, thriving city that is well-equipped to cope with the challenges of climate change but also able to take advantage of any opportunities that arise. While there are many different climate adaptation planning frameworks, they generally consist of the same steps: (1) define project scope, (2) assess vulnerability, (3) identify adaptation strategies, (4) implement strategies, and (5) monitor, evaluate, and adjust strategies, as needed (Figure 1).

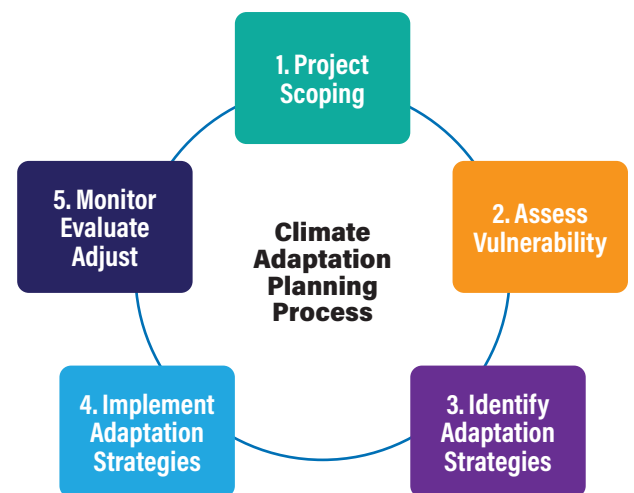


Figure 1. Steps in a basic climate adaptation planning process.

Definitions of Key Terms¹

Adaptation focuses on adjustments in natural or human systems in response to changing climate conditions. Adaptation is how we prepare for, respond to, and recover from changes that we are already experiencing or are anticipated to experience. These efforts can occur at individual, community, and societal scales through approaches such as home weatherization, the use of green infrastructure, changes to zoning or permitting requirements, and climate-informed emergency preparedness and hazard mitigation planning, among many others.

Mitigation focuses on reducing the magnitude and rate of climate change through measures that reduce greenhouse gas emissions or increase carbon sequestration and storage. Examples include reducing vehicle miles traveled, using renewable energy sources, or expanding urban tree canopies.

Vulnerability is the degree to which natural, built, and human systems are susceptible to harm. Vulnerability assessments include consideration of the following three components of vulnerability:

- **Likelihood** is the degree to which a community is exposed to significant changes in climate, and considers both the anticipated direction and magnitude of change.
- **Consequence** is the degree to which a community is affected by exposure to a changing climate, and considers both the anticipated impacts of climate stressors as well as the impacts of pre-existing conditions.
- **Adaptive capacity** is the ability to adjust to climate change to minimize potential damages, take advantage of opportunities, or cope with consequences.

¹ Definitions based on the IPCC Data Distribution Centre Glossary: <https://www.ipcc-data.org/guidelines/pages/glossary/glossary—a.html> (IPCC 2007, 2014)

Vulnerability assessments are the second step in the adaptation planning process, after establishing project goals, geographic boundaries, the time frame of interest, and other foundational planning considerations. The vulnerability assessment step of the adaptation planning process involves evaluating the impacts of climate change on a community; characterizing the community's ability to minimize or cope with impacts; assigning likelihood, consequence, and adaptive capacity rankings; and summarizing overall vulnerability based on rankings, impacts, and adaptive capacity information. Vulnerability assessments improve understanding of how climate change is likely to impact a community, and they include consideration of the likelihood of exposure to climate change, the consequence of those changes, and the community's capacity to adapt to those changes. Likelihood and consequence together give an estimation of risk which, when combined with adaptive capacity, provides an overall picture of vulnerability (Figure 2). It is important to evaluate all three components – likelihood, consequence, and adaptive capacity – in order to gain a holistic perspective on the factors that are driving vulnerability [1].

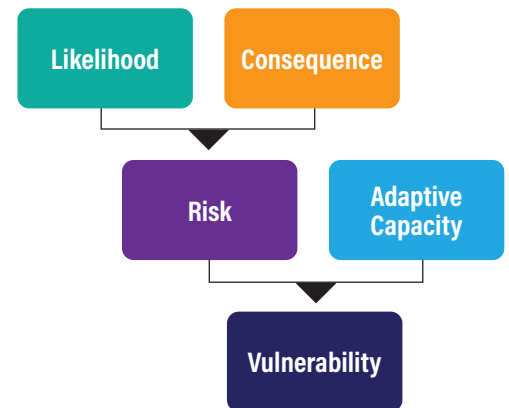


Figure 2. The three components of vulnerability.

This Climate Change Vulnerability Assessment has been developed as part of the broader City of La Crosse Climate Action Plan project effort, and is designed to (1) provide up-to-date information on climate changes that are expected for La Crosse; (2) describe how those changes may impact the community across nine different sectors, or topic areas, and for populations that may be most vulnerable to climate change; and (3) based on this information, identify key vulnerabilities to support the establishment of strategic goals and actions in the City's Climate Action Plan. Information from this vulnerability assessment and the resulting climate action plan can be incorporated into updates of the City's Comprehensive Plan and other community planning efforts, and can also be used more generally to increase climate-informed decision-making by the City and the broader community.

SECTORS CONSIDERED IN THIS ASSESSMENT:



Land Use and Housing



Transportation and Mobility



Buildings and Energy



Waste Management



Water and Wastewater



Health and Safety



Local Food and Agriculture



Greenspace and Tree Canopy



Economy

Climate Trends and Projections for La Crosse

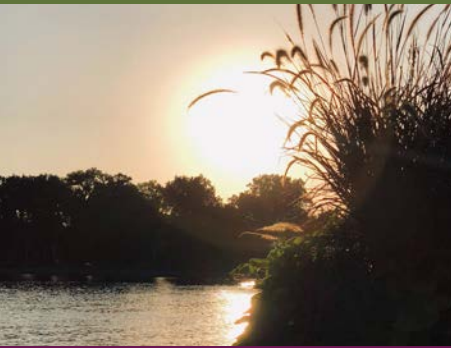


Photo by Adrian Korpai via Unsplash

In La Crosse:

Since 1950:

+3°F increase in annual temperatures (+6°F in winter lows, +1°F in summer highs)

By 2060:

+6°F increase in annual temperatures (+7°F in winter lows, +5°F in summer highs)

14% decrease in frost-free nights

By 2100:

+11°F increase in annual temperatures (+12°F in winter lows, +10°F in summer highs)

29% decrease in frost-free nights

Prior to evaluating community vulnerability to climate change, it is important to understand the changes that have already occurred as well as those that the City of La Crosse is likely experience over the next 30–80 years. The following information summarizes historical trends and future projections in climate factors that are likely to impact the community, which include air temperature, extreme heat, precipitation (rain and snow), extreme precipitation, storms, flooding, and drought.²

Air Temperature

Over the past 70 years, the average annual temperature (i.e., average daily temperature averaged over the whole year) for Wisconsin has increased by 2–3°F (Figure 3). Seasonal changes in temperature have been more extreme, with much larger changes (3–7°F) observed in winter low temperatures (i.e., minimum daily temperature averaged for the months of December, January, and February) and relatively little change (0–2°F) observed in summer high temperatures (i.e., average maximum daily temperatures for June, July, and August).

By mid-century (average of 2041–2060), average annual temperatures in Wisconsin are likely to increase by 5–6°F compared to 1981–2010, and by late-century (2081–2100) annual temperatures are likely to be 10–12°F higher than the 1981–2010 average (Figure 4). Historical trends in seasonal temperatures are likely to continue, with winter low temperatures increasing more rapidly than summer high temperatures for both mid-century (6–8°F for winter lows compared to 5–6°F for summer highs) and late-century (11–12°F compared to 9–12°F) time frames.

Frost-free nights are expected to increase significantly over the coming century as well. From 1981–2010, the majority of the state experienced 120–180 nights of frost (i.e., nights when low temperatures dip below 32°F) per year (Figure 5). However, by mid-century the number of nights per year with frost will decline to 100–160, and by the end of the century there may only be 80–120 nights of frost annually, representing an average decline of 33%.

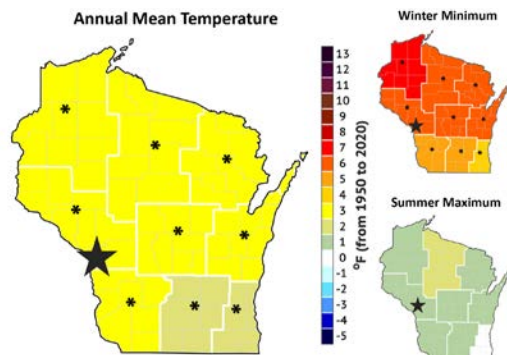


Figure 3. Historical change in annual mean temperature (left), winter minimum temperature (top right), and summer maximum temperature (bottom right) between 1950 and 2020. Asterisks indicate the trend for that area is statistically significant, and the larger star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: NOAA NCDC nClimDiv.

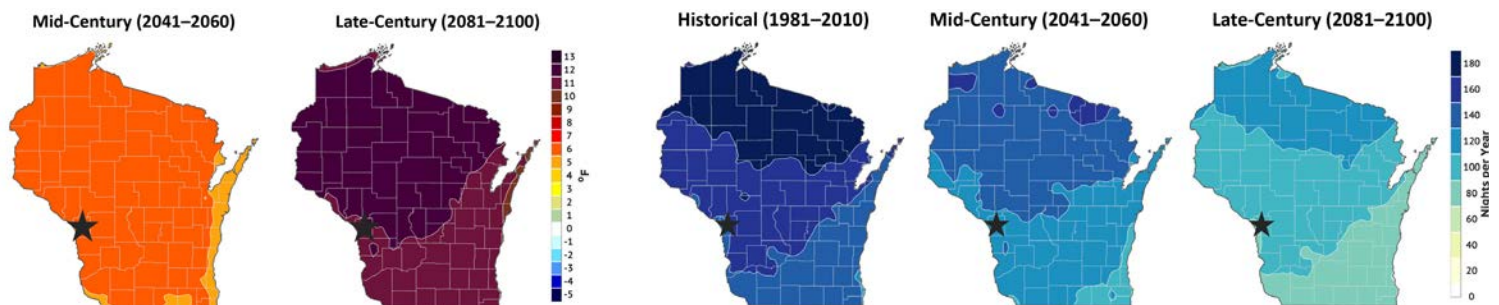


Figure 4. Projected change in annual mean temperature for mid-century (average of 2041–2060 conditions; left) and late-century (2081–2100; right) compared to 1981–2010 conditions. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

Figure 5. Number of nights per year with minimum temperatures below 32°F for historical (average of 1981–2010 conditions; left), mid-century (2041–2060; center), and late-century (2081–2100; right) timeframes. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

² All projections presented in this document use a high-emissions scenario (RCP 8.5), which represents the current trajectory and reduces the risk of underestimating future changes in municipal planning efforts. Maps and climate data were obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI) except where otherwise specified.

Climate Trends and Projections for La Crosse

In La Crosse:

By 2060:

250% increase in days over 90°F

By 2100:

350% increase in days over 90°F

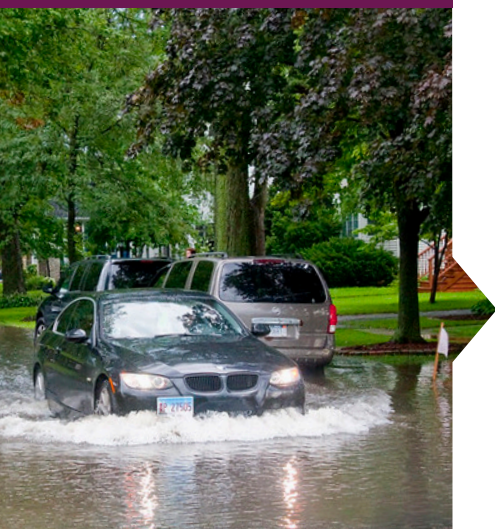


Photo by Charles Edward Miller via Flickr

In La Crosse:

Since 1950:

+20% increase in annual precipitation (+20% in spring, +15% in summer, +20% in fall and winter)

By 2060:

+5% increase in annual precipitation (+10% in spring, 0% change in summer, +5% in fall, +15% in winter)

By 2100:

+10% increase in annual precipitation (+15% in spring, 0% change in summer, +10% in fall, +20% in winter)

Extreme Heat

Extreme heat events are likely to increase significantly over the coming decades. The number of days in Wisconsin with maximum temperatures over 90°F are likely to increase from an average of 5–15 per year from 1981–2010 to 15–45 days per year by mid-century (Figure 6). By the end of the century, the vast majority of the state will experience an average of 45 days per year with high temperatures over 90°F, representing a 200–800% increase in extreme heat days annually.

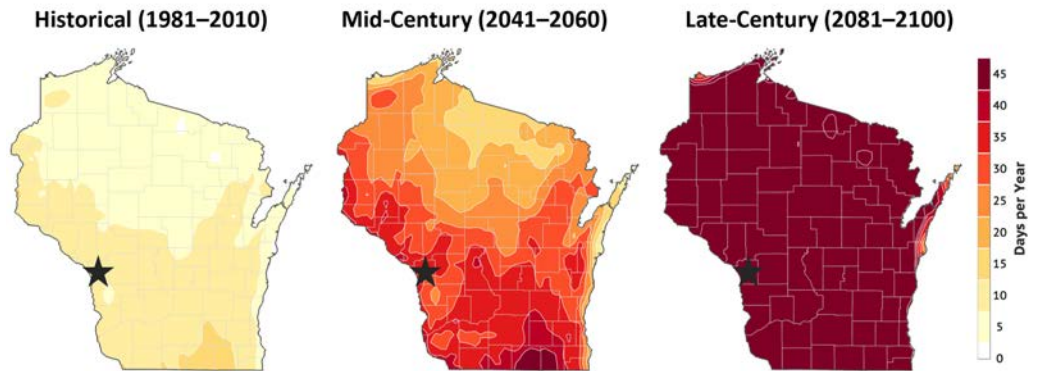


Figure 6. Number of days per year with maximum temperatures of at least 90°F for historical (average of 1981–2010 conditions; left), mid-century (2041–2060; center), and late-century (2081–2100; right) timeframes. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

Precipitation

Annual precipitation in Wisconsin has increased by 5–20% over the past 70 years, with more extreme increases occurring in the southern half of the state (Figure 7). Around La Crosse, precipitation has increased significantly year-round, though the changes have been slightly less in the summer (~15%) compared to other seasons (~20%).

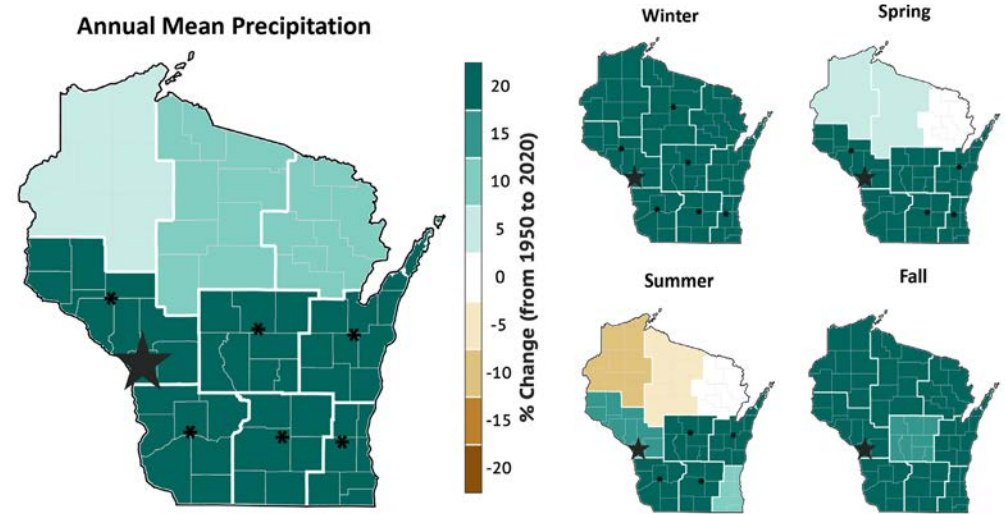


Figure 7. Historical change in annual (left) and seasonal (right) mean precipitation between 1950 and 2020. Asterisks indicate the trend for that area is statistically significant, and the larger star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: NOAA NCDC nClimDiv.

Climate Trends and Projections for La Crosse



By mid-century (average of 2041–2060), annual mean precipitation in Wisconsin is likely to increase by 5–10% compared to 1981–2010, and by late-century (2081–2100) annual precipitation are likely to increase by 10–15%, with expected changes in La Crosse falling towards the lower end of that range (Figure 8).

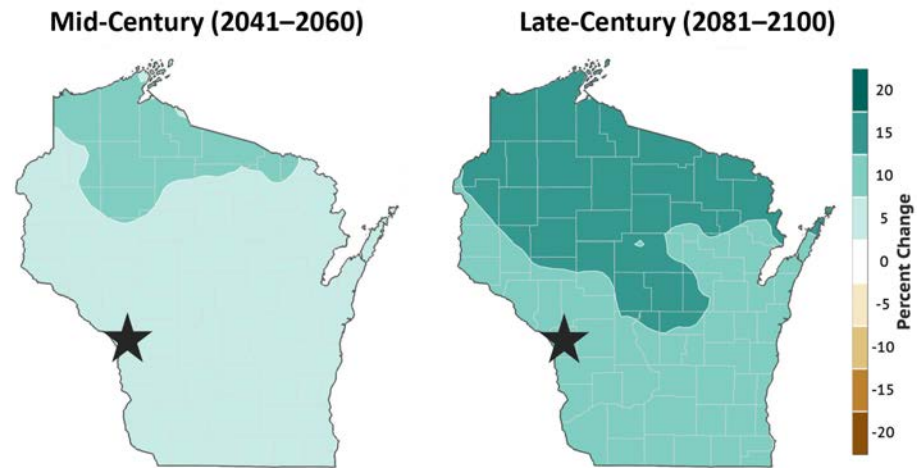


Figure 8. Projected change in annual mean precipitation for mid-century (average of 2041–2060 conditions; left) and late-century (2081–2100; right) compared to 1981–2010 conditions. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

Seasonal precipitation changes are likely to continue to be greatest in the winter, particularly by late-century when an additional 20% increase in precipitation is expected across the state (Figure 9). In contrast to historical trends that showed greater increases in the southern half of the state, changes by the end of the century are expected to be most significant in the northern half of the state, where increases range from 5–20% depending on the season (5% in the spring, 15% in the fall, and 20% in winter and spring). The southern part of the state is expected to see the greatest increases in precipitation in the winter (20%), somewhat smaller increases in the spring (15%) and fall (10%), and little to no change in the summer. Mid-century conditions show similar but less extreme trends as expected.

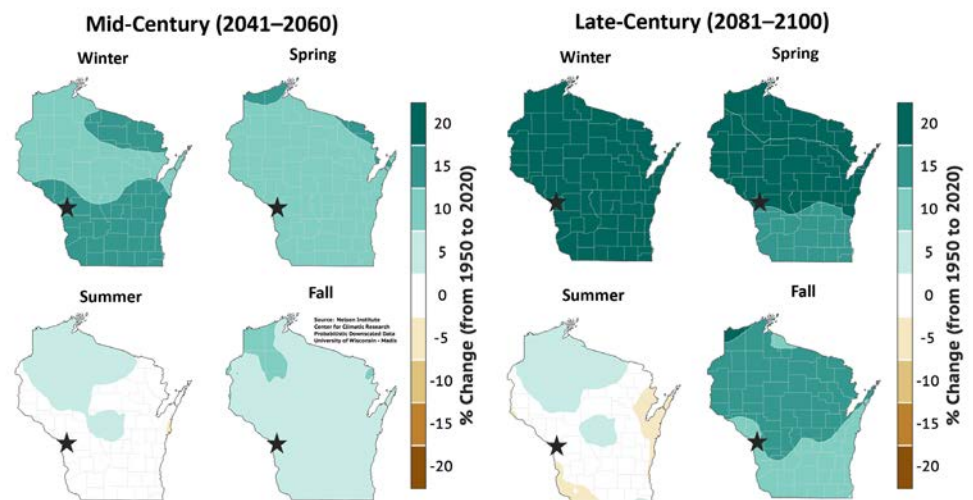


Figure 9. Projected change in seasonal mean precipitation totals for late-century (average of 2041–2060 conditions; left) and late-century (2081–2100) compared to 1981–2010 conditions. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

The projected increases in winter precipitation are likely to occur more often as winter rain rather than snow, particularly as winter temperatures continue to rise rapidly. By the end of the century there is expected to be significant decreases in the amount of snow that falls each year, as well as in the frequency, intensity, and duration of snowstorms [2].

Climate Trends and Projections for La Crosse

In La Crosse:

By 2060:

25% increase in days with precipitation over 2"

100% increase in days with precipitation over 5"

By 2100:

50% increase in days with precipitation over 2"

400% increase in days with precipitation over 5"

Drought

Although annual precipitation is projected to increase in Wisconsin over the coming century, summer rainfall is expected to remain relatively consistent. Because warmer temperatures increase rates of evapotranspiration (i.e., the amount of water that is lost to the atmosphere through evaporation and plant transpiration), there may be an overall net loss of water in the ecosystem during these periods of time. Additionally, a greater proportion of annual rain is expected to fall during increasingly extreme precipitation events, suggesting that the swings between wet periods and dry periods will also become more extreme. Thus, it is likely that droughts will become more common in the region, even as overall annual precipitation increases.

Extreme Precipitation, Storms, and Flooding

Extreme precipitation, which is strongly associated with severe flooding events, has been increasing over the last several decades. For instance, rainfall totals from the wettest 1% of days increased by 42% in the Midwest between 1958 and 2016 [3]. In Wisconsin, the frequency of heavy precipitation days is also projected to increase significantly. The number of days with precipitation totals over 2 inches are expected to increase from an average of 6–14 per year from 1981–2010 to 8–18 days per year by the mid-century and late-century time periods (Figure 10). By the end of the century, the western half of the state is expected to experience an average of 18 days per year with precipitation totals over 2 inches, representing an increase of around 150%.

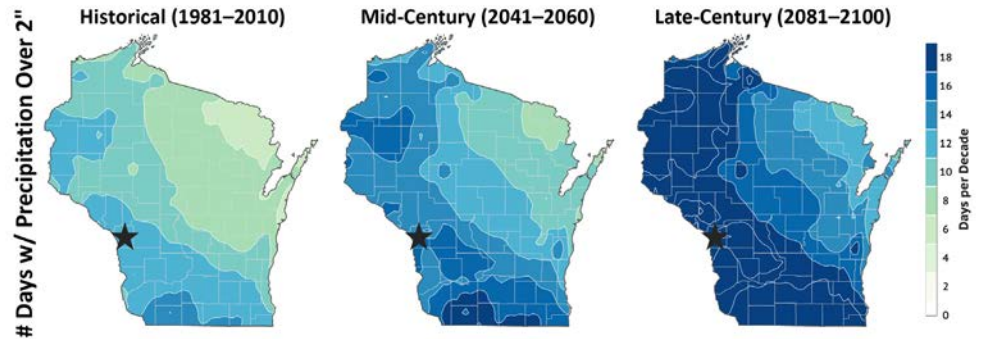


Figure 10. Number of days per year with 24-hour precipitation totals over 2 inches for historical (average of 1981–2010 conditions; left), mid-century (2041–2060; center), and late-century (2081–2100; right) timeframes. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

Proportional increases in days with extremely high precipitation totals (over 5 inches) are expected to be even more significant (Figure 11). Historically, 24-hour precipitation totals over 5 inches occurred 1–4 times per year, on average. However, this is expected to increase to 1–7 days per year by mid-century and up to 9 days per year by the end of the century, representing increases of up to 300%.

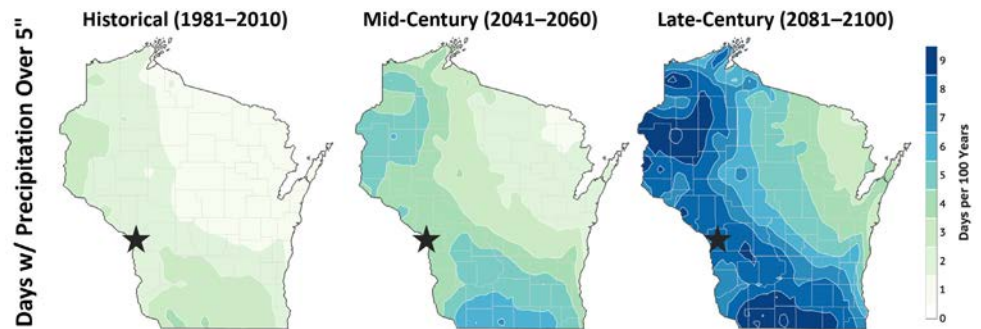


Figure 11. Number of days per year with 24-hour precipitation totals over 5 inches for historical (average of 1981–2010 conditions; left), mid-century (2041–2060; center), and late-century (2081–2100; right) timeframes. Star shows the location of La Crosse. Maps obtained from the Wisconsin Initiative on Climate Change Impacts (WICCI). Source: Nelson Institute Center for Climatic Research. Data: Probabilistic Downscaled Data v2.0, University of Wisconsin – Madison.

There are relatively few projections for storm activity, as the drivers of these processes are complex and difficult for scientists to model. However, one study found that the amount of precipitation associated with spring storms increased by 25% per decade from 1979 to 2014, largely due to increases in the frequency, intensity, and duration of mesoscale convective systems (i.e., large complex of thunderstorms) [4]. In general, it is highly likely that spring storms will continue to increase in frequency, intensity, and duration, and that changes in temperature and humidity will generally support more extreme weather events. Continued increases in extreme precipitation will likely increase the risk of severe floods, particularly in the spring when these events are more likely to occur.

Vulnerable Populations in La Crosse



Photo by Rochelle Hartman via Flickr

Within the City of La Crosse, there are an estimated 6,820 people of color comprising 9.0% of the population (Figure 12). The density of people of color is highest in census tracts in the northern and western parts of the City, making up over 15% of the population in these areas.

The impacts of the climate changes described above are likely to be significant and wide-reaching, affecting people across social, economic, and political boundaries. However, vulnerability to climate change is not evenly distributed within a community. Rather, climate risks reflect broader, pre-existing patterns of inequity, placing greater burdens on people of color, low-income residents, people with disabilities, non-English speakers, young children, and the elderly, among others [5]. Understanding the disproportionate impacts likely to be experienced by these populations is critical to ensuring that the benefits of climate adaptation and mitigation efforts are justly distributed [6–8].

The following sections summarize factors that may contribute to the disproportionate impacts of climate change likely to be felt by each group. They also provide maps to illustrate the density of these populations within City of La Crosse census tracts,³ which can be used by City officials and the Climate Action Plan Team to aid recognition of the potential for inequities as well as the conditions that contribute to them. It is important to note that these maps reflect demographic variables that have been correlated with climate change vulnerability (e.g., race, socioeconomic status), and so they may suggest areas of the City where climate change may be more likely to have disproportionate impacts on vulnerable populations. However, they do not provide information about the specific constellation of factors that cause those disparities in each community, nor do they reflect the factors that contribute to resilience within these communities. Thus, this information should be used only as an indicator of areas where special attention should be paid to potential disparities in climate-related hazards (e.g., flooding, extreme heat, air pollution) and/or to ensuring just distribution of the benefits of actions designed to address these climate impacts.

People of Color

Black, brown, Latinx, and Indigenous communities have faced decades of discriminatory zoning and other urban planning policies, a lack of investment in their communities, an increased risk of chronic medical conditions, and many other impacts of systemic racism, all of which may be exacerbated by climate change [9]. For instance, people of color are more likely to live in areas at higher risk of flooding, heat island effects, and air pollution or other environmental contaminants [8]. Older or poorly-maintained infrastructure within communities of color can also exacerbate climate impacts, along with limited transportation, health care access, and food insecurity, among other factors [10].

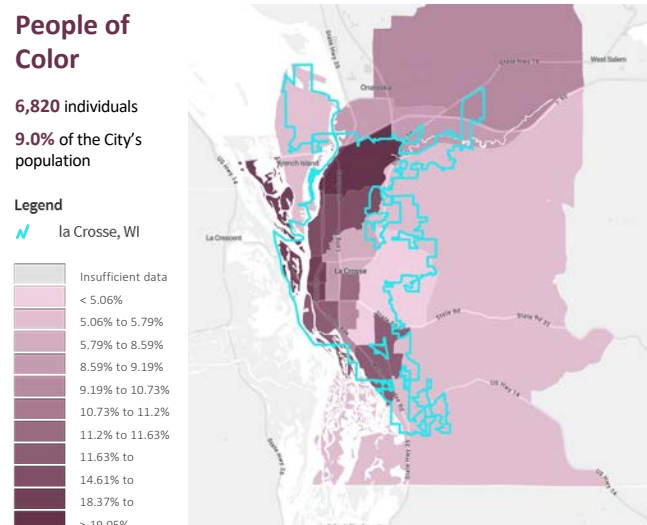


Figure 12. Population density of people of color within City of La Crosse census tracts, defined as all of those who did not identify their race as “white alone”. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

³ All maps and population estimates for La Crosse vulnerable populations were obtained from www.socialexplorer.com, which uses data from the 2018 American Community Survey.

Vulnerable Populations in La Crosse



La Crosse Residents By Race (%)

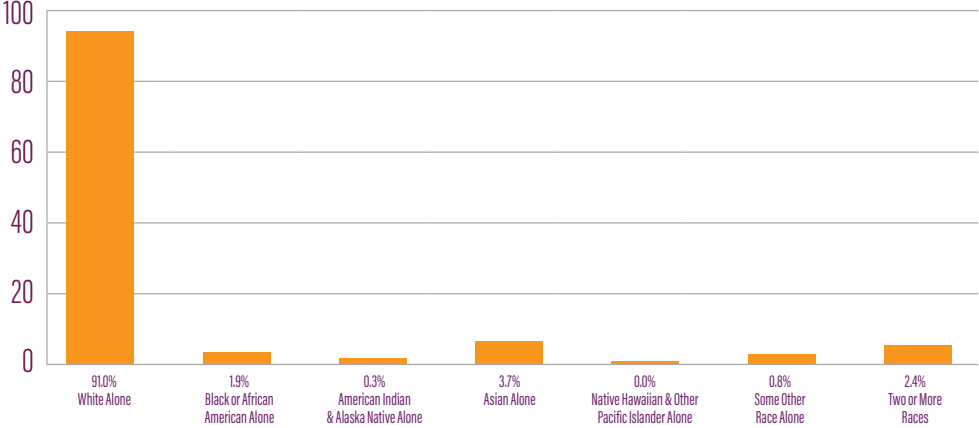


Table 1. Percentage of La Crosse residents by race. Information obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Low-Income Residents

Low-income residents, defined here as individuals making up to 200% of the federal poverty level, may lack access to the resources necessary for coping with the impacts of climate change. Low-income residents are more likely to depend on public transportation, experience food insecurity, and may lack the financial resources necessary to prepare for or recover from extreme events [10, 11]. For instance, the loss of food in the refrigerator or freezer following a power outage can result in significant financial hardship. Similarly, these individuals are more likely to experience significant harm because they may not have the resources to live in an area that is less exposed to flooding or air pollution, maintain their home in good repair, or obtain preventative healthcare [12].

Within the City of La Crosse, there are an estimated 24,449 low-income residents comprising 32.4% of the population (Figure 13). The density of low-income residents is highest in census tracts in the central and western parts of the City, making up 44–80% of the population in these areas.

Low-Income Residents

24,449 individuals
32.4% of the City's population

Legend

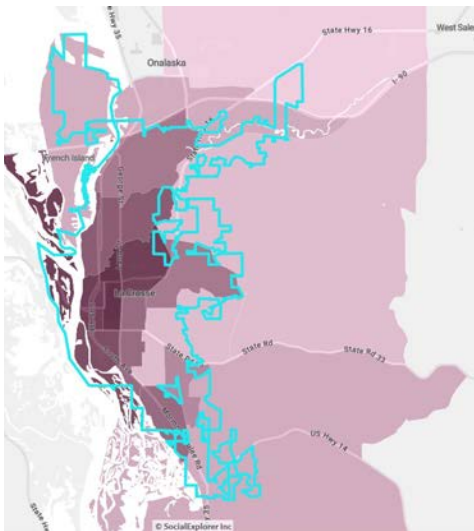
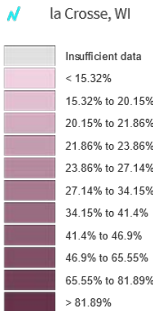


Figure 13. Population density of low-income residents within City of La Crosse census tracts, defined as people making up to 200% of the federal poverty level. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Vulnerable Populations in La Crosse

Children 5 and Under

Young children are less able to regulate their temperature and can be more vulnerable to severe illness from disease or toxins, placing them at greater risk of diseases such as asthma [9]. Young children are also less able to independently respond to stressful conditions or extreme events (i.e., by walking or driving to another location), and may be unable to verbalize discomfort or pain that can be an early indicator of illness or injury. Examples of climate-related impacts that young children are particularly sensitive to include heat stroke, asthma or other health problems as a result of air pollution, vector-borne and water-borne diseases, food insecurity, power failures, and flash floods [5, 13].

Within the City of La Crosse, there are an estimated 3,611 children 5 years of age or younger comprising 4.8% of the population (Figure 14). The density of young children is highest in census tracts in the northern and eastern parts of the City, making up 5.8–10.1% of the population in these areas.

Seniors 65 and Over

Older adults (defined here as seniors 65 years of age and older) are particularly vulnerable to health impacts associated with climate change, including high temperatures and heat waves, air pollution, severe flooding and associated risks (e.g., waterborne illness, mold), and infectious diseases [5, 8]. Because older adults may no longer have earned income, they are also more likely to depend on public transportation, live in older or deteriorating housing, and/or experience food insecurity [10]

Within the City of La Crosse, there are an estimated 11,717 seniors 65 years of age or over comprising 15.5% of the population (Figure 15). The density of seniors is highest in census tracts in the northern and southern parts of the City, making up over 20% of the population in many of these areas.

Individuals with Disabilities

People with disabilities may be more vulnerable to impacts from climate change and extreme events due to the direct effect of limited mobility or chronic health conditions, but they are also more likely to experience poverty and experience stressful conditions related to ongoing discrimination and lack of necessary accommodations. As a result, people with disabilities are particularly sensitive to climate-related impacts associated with extreme heat, flooding, air pollution, vector-borne and waterborne disease, food insecurity, and power outages [9, 14, 15].

Within the City of La Crosse, there are an estimated 8,557 individuals with disabilities comprising 11.3% of the population (Figure 16). The density of individuals with disabilities is highest in census tracts in the northern and western parts of the City, making up over 15% of the population in these areas.

Children 5 and Under

3,611 children
5.8% of the City's population

Legend
la Crosse, WI

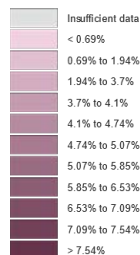


Figure 14. Population density of children 5 and under within City of La Crosse census tracts. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Seniors 65 and Over

11,717 seniors
15.5% of the City's population

Legend
la Crosse, WI

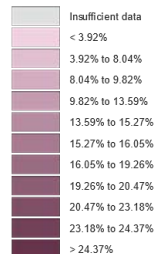


Figure 15. Population density of seniors 65 and over within City of La Crosse census tracts. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Individuals with Disabilities

8,557 individuals
11.3% of the City's population

Legend
la Crosse, WI

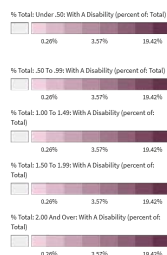


Figure 16. Population density of individuals with disabilities within City of La Crosse census tracts, mapped according to the ratio of income to poverty level in the past 12 months. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Vulnerable Populations in La Crosse

Individuals with Limited English Skills

Individuals with limited English skills are often less connected to the community, and are less able to benefit from community resources or programs that primarily provide services in English. These individuals also are at greater risk during extreme events, as they may not be able to access information related to preparation or evacuation instructions [9, 16].

Within the City of La Crosse, there are an estimated 1,245 individuals with limited English comprising 1.6% of the population (Figure 17). The density of limited English speakers is highest in census tracts in the central area of the City, making up to 6.4% of the population in the densest tract.

At-Risk Workers

Some occupations place workers at greater risk of exposure to climate changes and extreme events that can impact their health and safety. These can include hotter temperatures and longer, more severe heat waves, low air quality, extreme flooding, waterborne and/or vector-borne diseases, and exposure to contaminants or toxins that may be exacerbated by climate change. Many occupations that place workers at greater risk of climate-related hazards are also low-wage jobs, where employers may not offer adequate safety precautions or paid time off [12, 17].

Within the City of La Crosse, there are an estimated 9,138 at-risk workers comprising 12.1% of the population (Figure 18). The density of at-risk workers is highest in census tracts in the northern and southern parts of the City, making up over 15% of the population in these areas.

Individuals with No Vehicle Access

Individuals with no access to a personal vehicle may have limited mobility that prevents quick evacuation during extreme events, reduces their ability to reach cooling stations during heat waves, or limits access to health care and other needed services [11].

Within the City of La Crosse, there are an estimated 5,510 individuals with no vehicle access comprising 7.3% of the population (Figure 19). The density of individuals with no vehicle access is highest in census tracts in the western part of the City, making up over 20% of the population in this area.

Individuals with Limited English

1,245 individuals
1.6% of the City's population

Legend

la Crosse, WI

% Total: Spanish Limited English Speaking Household (percent of: Total)

0.37% 2.21% 4.05%

% Total: Other Indo-European Languages: Limited English Speaking Household (percent of: Total)

0.37% 2.21% 4.05%

% Total: Asian And Pacific Island Languages: Limited English Speaking Household (percent of: Total)

0.37% 2.21% 4.05%

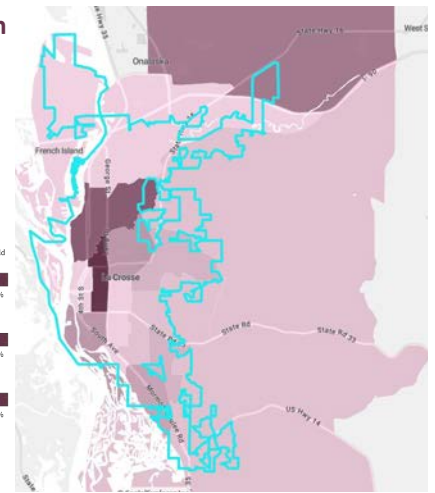


Figure 17. Population density of individuals with limited English skills within City of La Crosse census tracts. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

At-Risk Workers

9,138 individuals
12.1% of the City's population

Legend

la Crosse, WI

% Employed Civilian Population 16 Years and Over: Building and Grounds Cleaning and Maintenance Occupations (percent of: Employed Civilian Population 16 Years and Over)

1.10% 2% 3%

% Employed Civilian Population 16 Years and Over: Farming, Fishing, and Forestry Occupations (percent of: Employed Civilian Population 16 Years and Over)

1.10% 2% 3%

% Employed Civilian Population 16 Years and Over: Construction, Extraction, and Maintenance Occupations (percent of: Employed Civilian Population 16 Years and Over)

1.10% 2% 3%

% Employed Civilian Population 16 Years and Over: Transportation and Material Moving Occupations (percent of: Employed Civilian Population 16 Years and Over)

1.10% 2% 3%

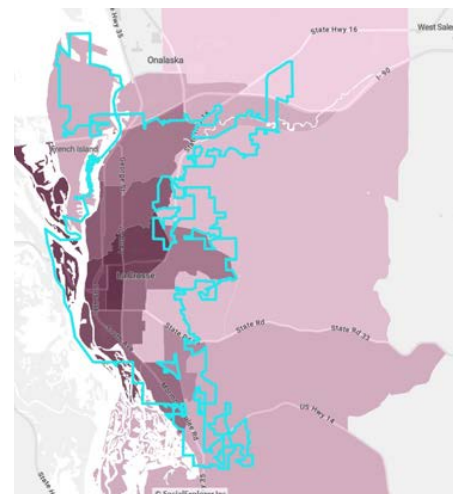


Figure 18. Population density of at-risk workers within City of La Crosse census tracts, including occupations related to building and grounds cleaning and maintenance; farming, fishing, and forestry; construction, extraction, and maintenance; production; and transportation and material moving. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

People with No Vehicle Access

5,510 individuals
7.3% of the City's population

Legend

la Crosse, WI

Insufficient data

< 1.73%

1.73% to 2.19%

2.19% to 2.82%

2.82% to 3.59%

3.59% to 5.02%

5.02% to 5.6%

5.6% to 9.52%

9.52% to 11%

11% to 11.39%

11.39% to 14.48%

14.48% to 18.23%

> 18.23%

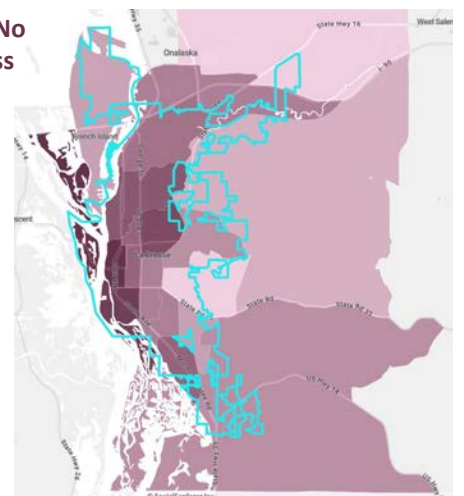


Figure 19. Population density of individuals with no vehicle access within City of La Crosse census tracts. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

Vulnerable Populations in La Crosse

Summary of Vulnerable Populations

The chart below (Figure 20) summarizes the number of individuals in each vulnerable population category by census tract. Note that the “Total Instances of Vulnerability” row is the sum of this number, but does not represent the total number of potentially vulnerable individuals in each tract because people may be counted within more than one vulnerable population category. For instance, a given individual may be an adult over the age of 65 and also have an income below 200% of poverty level, which would result in them being counted within both the “Seniors Over 65” and the “Low-Income Residents” categories.

Within the chart below, "Vulnerability Coefficient" is calculated by dividing the total instances of vulnerability by the total population of the census tract, with high vulnerability coefficients representing areas where a greater proportion of residents are likely to be members of one or more vulnerable populations. "Share of Total

Vulnerability" represents the census tract's share of community-wide instances of vulnerability, without consideration of the overall population within that tract. Note that a census tract with a lower Vulnerability Coefficient may still have a large share of the total instances of vulnerability, particularly in tracts with relatively high total populations. Finally, the "Composite Rank Score" is an average of the Vulnerability Coefficient and the Share of Total Vulnerability for each census tract (the tracts with composite rank scores in the highest two quartiles are highlighted in dark orange; see Figure 21 for the composite rank score represented on a map of La Crosse). In order to ensure that the City's adaptation efforts are prioritizing populations that are likely to experience disproportionate impacts of climate change, these neighborhoods should be considered critical starting places for implementation of actions that are designed to reduce climate vulnerability.

Tract / Block Group	Census Tract 1, La Crosse County, Wisconsin	Census Tract 2, La Crosse County, Wisconsin	Census Tract 3, La Crosse County, Wisconsin	Census Tract 4, La Crosse County, Wisconsin	Census Tract 5, La Crosse County, Wisconsin	Census Tract 6, La Crosse County, Wisconsin	Census Tract 7, La Crosse County, Wisconsin	Census Tract 8, La Crosse County, Wisconsin	Census Tract 9, La Crosse County, Wisconsin	Census Tract 10, La Crosse County, Wisconsin	Census Tract 11, La Crosse County, Wisconsin	Census Tract 12, La Crosse County, Wisconsin	Census Tract 13, La Crosse County, Wisconsin	Census Tract 14, La Crosse County, Wisconsin	Census Tract 15, La Crosse County, Wisconsin	Census Tract 16, La Crosse County, Wisconsin	Census Tract 17, La Crosse County, Wisconsin	Totals	Percentage of City Pop.	
Ex	1,409	2,118	1,234	5,163	1,634	998	1,892	1,412	5,155	1,437	377	966	992	1,329	1,625	1,389	1,107	64,800	32.6%	
People of Color	109.9	17.7%	15.9%	18.0%	5.0%	7.8%	31.7	6.8%	3.7	1.7%	1.9%	4.3%	29.2	7.6%	3.6	1.8%	4.8	11.8%	21.7	2.6%
Low Income Residents	1,409	17.7%	15.9%	18.0%	5.0%	7.8%	31.7	6.8%	3.7	1.7%	1.9%	4.3%	29.2	7.6%	3.6	1.8%	4.8	11.8%	21.7	2.6%
Children 5 and Under	348	7.1%	3.4%	4.5%	0.7%	1.2%	4.7%	1.2%	4.7%	1.2%	0.3%	0.9%	1.1%	0.3%	0.4%	0.2%	0.3%	0.8%	2.9%	1.5%
Seniors 65 and Over	627	13.5%	6.4%	5.5%	2.3%	3.9%	15.0	3.2%	3.4%	0.8%	0.6%	1.3%	2.8%	0.5%	0.9%	0.2%	0.8%	1.4%	1.7%	1.5%
Individuals with Disabilities	731	15.8%	6.6%	14.3%	261	9.0%	561	8.7%	193	4.1%	155	7.0%	308	7.3%	252	7.2%	602	17.3%	85.07	13.1%
Individuals with Limited English Skill	298	6.3%	2.8%	3.6%	0.6%	1.0%	3.9	1.0%	3.9	1.0%	0.2%	0.5%	0.6%	0.2%	0.3%	0.1%	0.2%	0.5%	1.2%	1.8%
At-Risk Workers	793	17.2%	9.6%	20.7%	391	12.2%	597	12.2%	259	5.5%	191	8.7%	397	8.8%	353	10.1%	489	14.2%	512	13.3%
Individuals with No Vehicle Access	487	10.7%	6.2%	13.3%	281	8.4%	594	9.2%	262	5.0%	97	4.4%	80	1.8%	165	4.5%	717	21.5%	5,510	7.9%
Total Instances of Vulnerability	5,473	116.1%	6,214	132.7%	3,028	136.4%	6,205	126.7%	2,829	60.0%	1,588	72.1%	3,041	67.4%	3,013	86.5%	4,743	116.5%	397	98.7%
Total Population in Tract	4,615	4,682	2,352	6,476	4,669	2,203	4,510	3,482	4,343	3,847	2,004	3,968	4,075	4,543	5,557	5,519	4,893	2,314	66.0%	94.1%
Vulnerability Coefficient	1.16	1.33	1.36	1.27	1.01	0.71	0.67	0.87	1.37	1.09	0.72	1.27	1.21	1.01	0.54	0.59	0.87	0.81	0.81	0.94
Share of total with Vulnerability	26.2%	28.3%	28.4%	23.8%	21.8%	17.8%	23.8%	25.0%	32.0%	28.6%	18.5%	30.8%	30.4%	26.4%	18.5%	12.6%	18.5%	36.4%	36.4%	36.4%
Share of total with Limited English Skill	7.6%	8.7%	4.5%	1.1%	1.2%	2.2%	0.9%	0.6%	5.3%	2.0%	0.6%	1.5%	5.2%	4.2%	0.8%	0.3%	3.6%	6.4%	6.4%	6.4%
Percentile Rank	90.0	95.0	90.0	100.0	90.0	80.0	80.0	90.0	95.0	90.0	80.0	95.0	90.0	90.0	80.0	75.0	70.0	70.0	70.0	70.0
Composite rank score	162.2	103.3	144.0	177.8	111.1	47.8	47.2	65.0	175.0	133.7	43.8	163.3	151.1	104.4	40.6	140.6	41.7	108.9	108.9	108.9

Figure 20. Summary of vulnerable populations in La Crosse by census tract. Chart obtained from www.socialexplorer.com using data from the 2018 American Community Survey.

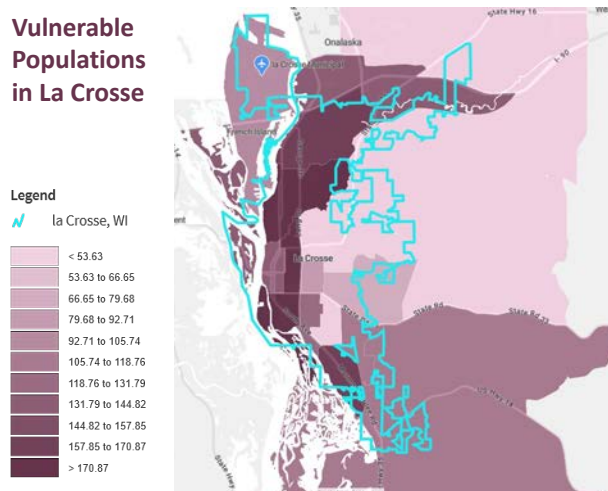


Figure 21. Vulnerable populations within City of La Crosse census tracts, based on census tract composite rank scores presented in Figure 20. Maps obtained from www.socialexplorer.com using data from the 2018 American Community Survey.



Photo by Dan from focusonplace.com via Flickr

Vulnerability Assessment Findings

The vulnerability assessment for the City of La Crosse was conducted by EcoAdapt through a process that included a review of relevant scientific literature and City planning documents, as well as the collection of stakeholder input on key vulnerabilities for the community.

During the first step of the process, EcoAdapt staff compiled a list of climate vulnerabilities for nine different sectors of interest based on existing resources and our experience with other communities [8, 18–24] as well as planning documents from the City of La Crosse [25–28]. The list of vulnerabilities generated for each sector included both direct impacts of climate change (e.g., increased risk of illness or injury as a result of heat stress) as well as ways that existing stressors in the community might interact with climate changes, either by exacerbating the impacts of climate change (e.g., greater risk of flood damage where aging infrastructure is inadequate to deal with increased stormwater volume) or being exacerbated by climate change (e.g., loss of usable riverfront area due to frequent flooding is likely to magnify existing challenges related to the limited supply of vacant land for development in La Crosse). The sectors selected are based on comprehensive plan elements required in the state of Wisconsin to enable the City to easily incorporate this information into their upcoming plan updates.

THE SECTORS EVALUATED FOR THIS ASSESSMENT INCLUDE:



Land Use and Housing



Transportation and Mobility



Buildings and Energy



Waste Management



Water and Wastewater



Health and Safety



Local Food and Agriculture



Greenspace and Tree Canopy



Economy

Vulnerability Assessment Findings

Next, members of the La Crosse Climate Action Plan Team participated in a virtual vulnerability workshop (February 2022), where they reviewed the vulnerability information for each sector and then chose two to three key vulnerabilities (i.e., vulnerabilities likely to be of greatest concern for the community over the coming decades). As time allowed, workshop participants also provided additional information about key vulnerabilities, including (1) locations and/or seasons where the impact is likely to be of particular concern, as well as populations that may be impacted to a greater degree; (2) whether the impact is already occurring in the community and whether it is already being addressed; and (3) whether there are factors that would make addressing this impact more difficult and/or community strengths that will make it more possible to address.

Finally, rankings for likelihood, consequence, and adaptive capacity were assigned for each key vulnerability based on a combination of climate projection data, existing planning documents for the City of La Crosse, and stakeholder input generated during the workshop. Ranking definitions and scales were drawn from the Rapid Vulnerability and Adaptation Tool for Climate-Informed Community Planning developed by EcoAdapt [1].

- **Likelihood** is the degree to which a sector is exposed to significant changes in climate. For this ranking, likelihood was assigned based on whether effects/impacts are anticipated to occur within a 30–80-year time frame (i.e., between 2050 and 2100). The following scale was used:

Almost Certain: >75% probability

Likely: 25–75% probability

Unlikely: <25% probability

Rare: Probability zero or close to it

- **Consequence** is the degree to which a sector is affected by exposure to a changing climate. Consequence rankings were assigned based on the degree of consequence that the anticipated effect/impact would have on the functioning of that sector in the community as a whole rather than on the individuals directly experiencing the impact (e.g., the scale of flood damage or heat-related illnesses was considered at the community level rather than the severity of consequences for a given individual who might have suffered damage or illness). The following scale was used:

Catastrophic: Service to community ceases to exist

Major: Service significantly impacted

Moderate: Service diminished

Negligible: Service not visibly or functionally affected

- **Adaptive capacity** is the degree to which a sector may be able to cope with or respond to a given impact of climate change. Adaptive capacity rankings were assigned based on an assessment of factors such as existing efforts to address the anticipated effect/impact, capacity to take further action (e.g., funding, staff time), existing policies or regulations that would support climate-informed actions, partnerships and stakeholder relationships that would support robust collaborative action, ability of to be flexible or respond quickly to changing conditions, and community willingness/desire to make changes, among other considerations. A scale of Low/Moderate/High was used for this ranking.

After assigning likelihood, consequence, and adaptive capacity rankings, the following matrices (Figure 22) were used to determine rankings for risk (i.e., the interaction of likelihood and consequence) and vulnerability (i.e., the degree to which the sector is susceptible to harm from the anticipated impact of climate change).

RISK CALCULATOR MATRIX

Likelihood	Consequence			
	Negligible	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Low
Unlikely	Low	Moderate	Moderate	High
Likely	Low	Moderate	High	Extreme
Almost Certain	Low	High	Extreme	Extreme

VULNERABILITY CALCULATOR MATRIX

Risk	Adaptive Capacity		
	Low	Moderate	High
Low	Low	Low	Low
Moderate	Moderate	Moderate	Low
High	High	Moderate	Moderate
Extreme	High	High	Moderate

Figure 22. Matrices used to assign risk and vulnerability rankings for each key vulnerability, taken from the Rapid Vulnerability and Adaptation Tool for Climate-Informed Community Planning developed by EcoAdapt [1].

Land Use and Housing

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. **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.

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. 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



Key climate-related considerations for land use and housing may include:

- Identification of land uses and/or locations that might be particularly impacted by climate changes (e.g., floodplains, riverfront properties, neighborhoods with large areas of impervious surfaces that exacerbate heat island effects)
- Impacts of climate change on the availability and affordability of housing stock, costs associated with home maintenance, habitation (e.g., utility costs, ease of access) and repair
- Impacts of climate change on the functioning or maintenance requirements of infrastructure necessary for particular land uses, including residential use (e.g., utility lines, sewers and septic systems, stormwater infrastructure)
- Access to safe and affordable transportation near affordable housing units, and overall community connectedness for pedestrians, bikers, and vehicles



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 2; **bolded bullet points** represent key vulnerabilities for the land use and housing sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

▼ Likely Impacts on Land Use and Housing

- **High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages (with potentially significant impacts on vulnerable residents such as those who are already under financial stress)**
- Increased water demand for residential/commercial and agricultural uses (e.g., landscaping, crop irrigation) due to higher temperatures
- Increased heat stress in developed areas, particularly in areas where impervious surfaces and lack of vegetation create heat islands
- Increased wear and/or damage to houses and associated infrastructure (e.g., buckling, deterioration)
- 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)
- 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

Increased extreme precipitation, storms, & flooding

▼ Likely Impacts on Land Use and Housing

- **Increased risk of flooding along waterways, floodplains and low-lying areas, and where drainage is poor (naturally or due to impermeable surfaces), with disproportionate impacts on vulnerable communities that are more likely to reside in those areas**
- 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
- Increased risk of road slides or landslides from surrounding bluffs, causing damage to roads and other infrastructure
- **Reduced access to more isolated residential areas due to road flooding (e.g., mobile home parks with only one road in and out), potentially hindering evacuation efforts or emergency response**
- Increased cost or reduced 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)
- Increased risk of impact to water quality due to run-off from contaminated land, roads or sewer overflow

Increased drought

▼ Likely Impacts on Land Use and Housing

- 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

Table 2. Summary of likely direct impacts of climate stressors on the Land Use and Housing sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

INTERACTIONS WITH EXISTING STRESSORS

Changes in population dynamics and a limited supply of vacant land for development

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Increased migration of “climate refugees” from more impacted communities into La Crosse, exacerbating existing challenges related to the lack of vacant land for development
- Expansion of areas vulnerable to severe flooding (e.g., floodplains and riverfront areas) may result in additional locations that become inappropriate for development or redevelopment, or may increase costs associated with development (i.e., due to increased cost of insurance, repair, or construction in flood-prone areas)

Aging/deteriorating infrastructure and housing stock

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Increased risk of damage or structural failure in deteriorating infrastructure and homes during severe flood events
- Greater cost of retrofitting older homes and buildings with modern, energy-efficient heating and cooling systems or other measures that reduce the impacts of extreme heat and flooding (compared to incorporating those systems into new construction)
- Potential for increased issues with rodents, insects, or other wildlife seeking refuge in homes from high temperatures or extreme conditions

Lack of affordable housing and homelessness

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Increased risk of injury or death for people living in homeless communities in highly flood-prone areas (e.g., floodplains)
- Further reduction in affordable housing availability due to the loss of housing units to flooding and/or decreases in areas suitable for development as a result of increased flooding risk

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	Moderate	Moderate

Key Vulnerability: Increased risk of flooding along waterways, floodplains and low-lying areas, and where drainage is poor (naturally or due to impermeable surfaces), with disproportionate impacts on vulnerable communities that are more likely to reside in those areas

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

Key Vulnerability: Increased risk of flooding along waterways, floodplains and low-lying areas, and where drainage is poor (naturally or due to impermeable surfaces), with disproportionate impacts on vulnerable communities that are more likely to reside in those areas

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Likely	Major	High	Low	High

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for land use and housing.

Transportation and Mobility

The **Transportation** and **mobility** sector focuses on motorized and non-motorized modes of transportation (e.g., vehicles, bikes, pedestrians) by people of all abilities, as well as associated infrastructure (e.g., roads and highways, bridges). This includes consideration of public transportation systems such as La Crosse Municipal Transit Utility (MTU) and the Scenic Mississippi Regional Transit (SMRT), bicycle and pedestrian routes, river transportation, parking infrastructure, and equipment, staff, and facilities required for maintenance.

There are implications of climate change for transportation and mobility due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact transportation and mobility include:

- Location of transportation routes
- Aging infrastructure
- Dependence on regional/national supply chains



Key climate-related considerations for transportation and mobility may include:

- Impacts of climate change on infrastructure lifespan and need for maintenance and repair (e.g., frequency of required maintenance)
- Potential for transportation disruptions due to direct damage from extreme events (e.g., heat waves, floods)
- Impacts of climate change on ease of movement around the City and reliable access to neighborhoods, workplaces, and critical services
- Factors that could cause delays or interruptions in public transportation services, or make using public transportation more difficult and less desirable
- Impacts of climate change on the safety and comfort of pedestrians and cyclists of all abilities



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 3; bolded bullet points represent key vulnerabilities for the transportation and mobility sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

- Likely Impacts on Transportation and Mobility**
- **Reduced interest in walking/biking or using public transportation on hot days, increasing dependence on cars with air conditioning**
 - Increased heat stress in residents navigating lengthy public transportation routes, or those who live farther from the nearest bus stop
 - Damage to surfaces (e.g., softening or buckling) of roads and sidewalks 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
 - Changes in air density or other factors on very hot and humid days that impact airport requirements (e.g., fleet needs, runway length)
 - Increased freeze/thaw cycles that damage roads and increase costs of road maintenance
 - Increased potential for black ice due to melting and refreezing in the winter, increasing car accidents
 - Eventual reduction in the need for winter snow removal and salting, decreasing costs and road damage and improving winter mobility for residents
 - Potential for increased road rage incidents, increasing potential for traffic accidents and danger for bicyclists and pedestrians

Increased extreme precipitation, storms, & flooding

- Likely Impacts on Land Use and Housing**
- **Increased flooding and associated damage to streets, sidewalks/trails, and parking lots during heavy rain events, particularly in low-lying areas or where stormwater infrastructure is inadequate**
 - Increased cost of road maintenance, repairs, and replacement due to more frequent inundation
 - Road blocks and disruption of traffic due to debris, which may also delay needed construction activities to repair damages to roads
 - Damage to railroad tracks or possible derailment during extreme precipitation events
 - Inundation and damage to ports, marinas, and docks due to river flooding
 - Disruptions to air travel where more frequent and/or extreme storms require longer flight paths

Increased drought

- Likely Impacts on Land Use and Housing**
- Decreased river flows, potentially impacting river transportation and commerce

Table 3. Summary of likely direct impacts of climate stressors on the Transportation and Mobility sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for transportation and mobility.

INTERACTIONS WITH EXISTING STRESSORS

Location of transportation routes

- Likely Interactions Between Climate Stressors and Existing Stressors**
- Existing transportation routes leave some areas of the city isolated, increasing the risk of traffic disruptions and loss of access during extreme events (e.g., if there is an issue with the railroad, traffic disruptions/loss of access would occur in many areas)
 - **Historical investment in car-focused transportation has resulted in greater interest in suburban areas and reduced City walkability, complicating future changes to increase the ease and desirability of public and non-motorized transportation**

Aging infrastructure

- Likely Interactions Between Climate Stressors and Existing Stressors**
- Increased need to retrofit and/or replace transportation infrastructure that is unable to cope with future stormwater volume (and costs associated with those upgrades)
- Dependence on regional/national supply chains**
- Likely Interactions Between Climate Stressors and Existing Stressors**
- Increased fuel costs due to disruptions in fuel production or transport following extreme events, either locally or in other areas (e.g., as occurred in many places following the 2021 winter storms in Texas)

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

Key Vulnerability: Historical investment in car-focused transportation has resulted in greater interest in suburban areas and reduced City walkability, complicating future changes to increase the ease and desirability of public and non-motorized transportation

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Likely	Moderate	Moderate	Moderate	Moderate

Buildings and Energy

This sector focuses specifically on climate change vulnerability of publicly- and privately-owned **buildings** within the City, including those that provide critical services such as health care facilities, police/fire/rescue facilities, libraries, schools, community centers, and other governmental and public facilities. It also includes factors related to **energy** production and maintenance, energy demand, and diversification of energy services.

There are implications of climate change for buildings and energy due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact buildings and energy include:

- Changes in population dynamics
- Aging or poorly-designed infrastructure



Key climate-related considerations for buildings and energy may include:

- Whether buildings are in areas that are particularly vulnerable to climate-related hazards such as flooding, and if so the degree to which the building itself is likely to be impacted based on factors such as age and condition
- Climate change impacts that might affect infrastructure necessary for buildings to remain functional, including stormwater and utilities infrastructure
- Impacts of extreme heat and other climate changes on energy supply and demand, as well as potential impacts of power outages and damage to powerlines or other infrastructure in the event of an extreme event



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 4; bolded bullet points represent key vulnerabilities for the buildings and energy sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

▼ Likely Impacts on Buildings and Energy

- **High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages (with potentially significant impacts on vulnerable residents such as those who are already under financial stress)**
- Increased degradation of buildings and associated infrastructure (e.g., buckling, deterioration), requiring more frequent and/or more expensive repairs, replacements, or retrofits

Increased extreme precipitation, storms, & flooding

▼ Likely Impacts on Buildings and Energy

- Increased damage or loss of buildings due to flooding or related impacts (e.g., mold)
- Increased risk of power outages and/or damage to energy infrastructure following extreme storm events

Increased drought

▼ Likely Impacts on Buildings and Energy

- 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

Table 4. Summary of likely direct impacts of climate stressors on the Buildings and Energy sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for buildings and energy.

INTERACTIONS WITH EXISTING STRESSORS

Changes in population dynamics

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Changes in energy demands due to warmer temperatures and altered precipitation patterns, which may be strained further by increasing energy use associated with changing population dynamics

Aging or poorly-designed infrastructure

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- **Increased risk of damage or structural failure as a result of extreme events (e.g., heat, flood, wind) in buildings that are older and/or newer but poorly-designed**
- Greater cost of retrofitting older buildings with modern, energy-efficient heating and cooling systems or other measures that reduce the impacts of extreme heat and flooding (compared to incorporating those systems into new construction)

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	Moderate	Moderate

Key Vulnerability: Increased damage or loss of buildings due to flooding or related impacts (e.g., mold)

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

- Stormwater flooding is already occurring across the City. It is particularly severe within the floodplains, but these areas seem to be expanding.
- Flooding has historically been exacerbated by inadequate stormwater and sewer infrastructure, and more rain falling during extreme events overwhelms the capacity of marshes and other natural systems.
- Some infill projects and efforts to remove houses from the floodplain are already occurring. The City has also added two new pumping stations to divert water out of the La Crosse River and is continuing to work on sewer/stormwater upgrades (though these are extremely expensive and can only be done when roads are already being replaced)
- The City adopted a Complete Streets ordinance in 2012, which requires better landscaping, increased use of permeable pavement, and other improvements that address stormwater management whenever streets are replaced.

Key Vulnerability: Increased risk of damage or structural failure as a result of extreme events (e.g., heat, flood, wind) in buildings that are older and/or newer but poorly-designed

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

- Newer buildings often struggle during windstorms because they are not sturdy enough. However building codes were recently updated to require 16 inch corner supports that ensure greater stability.

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.

There are implications of climate change for waste management due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact waste management include:

- Water pollution/water quality



Photo by Rajvinder Singh via Unsplash

Key climate-related considerations for waste management may include:

- Existing waste management infrastructure that may be particularly impacted by climate change, including facilities located in high-risk areas (e.g., close to the river)
- Potential climate change impacts on waste collection frequency and route length, as well as ways that climate impacts might be exacerbated by the current waste collection routines (e.g., less frequent collection could increase change of debris being spread and contamination into waterways)
- Cost of collection and transport of waste to transfer, recycling and dumpsite facilities as fossil fuel prices rise and climate impacts complicate existing processes



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 5; bolded bullet points represent key vulnerabilities for the waste management sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

▼ Likely Impacts on Waste Management

- Increased maintenance needs and costs
- Increased need for odor abatement
- Increased issues with air quality (beyond odor) and associated health impacts
- Increased pest activity and altered waste decomposition rates
- Increased potential for overheating of sorting equipment and collection vehicles
- Potential for shifts to earlier pick-up, and possible staffing challenges if this cannot be achieved

Altered precipitation patterns

Likely Impacts on Waste Management

- Increased need for enclosed or protected facilities (e.g., processing sites, multi-family waste facilities, college move in/out, curbside trash)
- **Increased leakage and run-off, potentially impacting local water quality**

Increased extreme precipitation, storms, & flooding

▼ Likely Impacts on Waste Management

- 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 (including inability to pick up) and increased potential for closure of facilities
- **Increased waste generation due to debris and other damage (including organic debris from vegetation damage), which is likely to be exacerbated by illegal dumping**
- Increased wind-driven dispersal (i.e., dumpster tipping, curbside cans)

Increased drought

▼ Likely Impacts on Waste Management

- Concentration of waste-related pollutants due to reduced river levels
- Increased risk of fire at disposal sites (usually if coupled with extreme heat)

Table 5. Summary of likely direct impacts of climate stressors on the Waste Management sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for buildings and energy.

INTERACTIONS WITH EXISTING STRESSORS

Water pollution/ water quality

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Existing concerns with the pollution and quality of city water may be exacerbated by the impacts that increased precipitation and extreme heat will have on the occurrence and mobility of waterborne diseases, debris and waste from dumpsites, and nutrient run-off

Key Vulnerability: Increased leakage and run-off, potentially impacting local water quality

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate

- These impacts are already occurring (e.g., dumpsters downtown release grease into rivers, and it is being addressed by replacing drain systems in older parts of town and educating renters on proper waste disposal).
- This is likely to be a year-round concern across the entire region (e.g., leaking into marshes and rivers as well as ground infiltration), but may be particularly impactful as winter rains increase; may be exacerbated in areas with high population density, especially around rentals.
- Infrastructure solutions are likely doable, but changing habitats through community education is more difficult.
- A communications director is being contracted to increase community engagement, and there is a similar position in water utilities. However, it can be challenging to reach a large proportion of the community because there are so many communication paths available to City residents.

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

- This is likely to be a year-round problem across the City.
- The City Recycling and Street Departments currently have a yard waste drop-off site that is open from March to Nov. (with additional openings after large storms) and is free to residents; the site takes organic yard waste (less than 8 inches diameter) and waste cooking oil. The Parks Department takes on tree damage clean-up for the Street Department, although this is somewhat variable. Wood waste currently goes to Excel Energy Incinerator via the county landfill. Other materials are recycled (e.g., roof shingles, road material) or go to the county landfill.
- In order to address this issue, there would need to be increased capacity to deal with tree damage (would need to assess ability of the landfill to take on additional material).

Water and Wastewater

This topic area includes drinking water, in terms of water quality and quantity and timing of supply, and wastewater, including stormwater runoff as well as municipal wastewater. Both drinking water and wastewater/stormwater require infrastructure for processing and distribution, which includes source water, underground water and sewer lines, culverts and stormwater management systems, and treatment facilities. Critically, this topic area must also include consideration of natural water resources that supply drinking water for the City (e.g., aquifers and reservoirs) and wetlands that provide water filtration and floodwater storage.

There are implications of climate change for water and wastewater due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact water and wastewater include:

- Water quality
- Limited freshwater supplies
- Aging or inadequate infrastructure

Photo by Enoch Leung via Flickr

Key climate-related considerations for water and wastewater may include:

- Impacts of current and projected future precipitation patterns on water resources, including processes that are critical for maintaining drinking water supplies (e.g., groundwater recharge and surface water runoff)
- Impacts of extreme events (e.g., heat waves, flooding, drought) on water quality and stormwater management systems
- Water resource conservation measures that are already being implemented in the City, as well as existing and potential areas that could be used for natural floodwater storage



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 6; bolded bullet points represent key vulnerabilities for the water and wastewater sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

More extreme heat

▼ Likely Impacts on Water and Wastewater

- Increased water demand for municipal and agricultural use
- Reduced water quality due to high water temperatures and increased risk of harmful algal blooms

Increased extreme precipitation, storms, & flooding

▼ Likely Impacts on Water and Wastewater

- **Increased 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 stormwater retention and effects on stormwater discharge compliance
- **Elevated groundwater tables due to frequent large storms, infiltrating the sanitary sewer system and increasing the cost of treatment**
- Increased soil erosion and nutrient runoff into rivers
- Reduced water quality due to stormwater inundation, localized flooding, and non-infiltrated runoff, potentially disrupting drinking water supplies where contamination occurs
- Increased occurrence and mobility of waterborne disease
- Increased community energy demand and costs to pump water out of flooded spaces

Increased drought

▼ Likely Impacts on Water and Wastewater

- Depletion of aquifer and reservoirs, potentially impacting drinking water supplies under extreme conditions (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, and increased odor complaints around the marsh when the water is low

Table 6. Summary of likely direct impacts of climate stressors on the Water and Wastewater sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	High	Moderate
• Increased flooding is already being observed in La Crosse, and efforts to address it are led by the Water and Sewer Department. • Stormwater modeling has been completed for the City, and has led to identification of key areas where improvements are needed; these include the north side of town where groundwater tables are already highest and intersection flooding occurs. • The City implemented a Stormwater Utility to fund needed infrastructure improvements, and is working towards grants and matchings. • There is also a Stormwater Coordinator that works with the community to encourage behaviors that reduce flooding vulnerability (e.g., don't blow grass clippings into the street, clean storm grates, remove ice from catch basins).				

INTERACTIONS WITH EXISTING STRESSORS

Water quality

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Existing concerns with the pollution and quality of city water may be exacerbated by the impacts of increased precipitation and extreme heat, which will increase the occurrence and mobility of waterborne diseases, debris and waste from dumpsites, and nutrient run-off
- Impacts to local economy, as fishing tourism relies on water quality and access

Limited freshwater supplies

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Severe drought and high temperatures may deplete local aquifers and reservoirs, potentially impacting drinking water supplies
- Fluctuations in population can increase water demand and extraction

Aging or inadequate infrastructure

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Increased potential for localized to widespread flooding as increased precipitation and more frequent/severe extreme precipitation events overwhelm the City's existing stormwater infrastructure, which is already inadequate for brief, intense rainstorms that are common in the summer
- Increasing issues with the City's existing sewer lines as precipitation increases, as these already fail frequently and need to be replaced
- Increasing issues with failing septic systems that were not designed for changing environmental conditions
- Infiltration and sink-holes (esp. with spring thaw) lead to sand in pipes and sewers, damage to property, cost of repair, and disruption of other services (waste pick up, transportation)

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate
• The most significant impacts are likely to be on the north side of the City, but all of the old clay tile pies are vulnerable to infiltration. The roots of street trees infiltrate sewers, and there are trees on top of most sanitary laterals; sump pumps also discharge into the sewer system. • Existing issues with infiltration are being addressed by relining sewers that are in otherwise acceptable condition, and replacing those that are in bad shape; these efforts are being led by the Water and Sewer Department, along with the Engineering Department and the Street Department (as sewer work is often paired with road repairs). The Water and Sewer Dept. is also working with the Park Dept. to avoid issues with street trees by planting in better locations and potentially selecting different species. • Year-by-year access to funding for needed improvements is an ongoing effort, but collaboration between City departments (e.g., Water/Sewer, Streets, Parks) reduces costs. The City is also trying to educate the community about ways to ensure that this problem is not being exacerbated.				

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for water and wastewater.

Health and Safety

Health and **safety** include potential hazards that directly or indirectly impact public health by exacerbating chronic health conditions, causing illness or disease, and increasing the risk of injury or death. This topic also considers emergency services (e.g., fire, rescue), social services, and public health programming.

There are implications of climate change for health and safety due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact health and safety include:

- Aging infrastructure
- Lack of adequate community healthcare services



Photo by Peg Lemkuil via Unsplash

Key climate-related considerations for **health and safety** may include:

- Emergency, health, and safety resources or services that may be affected by changing conditions, particularly those in high-risk areas that are more likely to be impacted by flooding or other extreme events
- Potential changes in patterns of demand for emergency and health care services as a result of climate change, including changes in the type, frequency, or location of emergency calls and health care services required
- Impacts of extreme events on ambulance access or other factors that would prevent emergency personnel from quickly and safely reaching those in need, or would otherwise limit operation/functioning of emergency systems (e.g., impacts to dispatch, vehicles or equipment, etc.)
- Potential ways that climate change could impact the type of public health programming or outreach/education that is required to meet the needs of the community



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 7; bolded bullet points represent key vulnerabilities for the health and safety sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

▼ Likely Impacts on Health and Safety

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

Altered precipitation patterns

▼ Likely Impacts on Health and Safety

- Increased incidence of mold in homes that may lead to health conditions
- Increased issues with disease vectors (e.g., ticks, mosquitos) as moisture levels increase

Increased extreme precipitation, storms, & flooding

Likely Impacts on Health and Safety

- Increased risk of injuries and increased demand on medical and emergency services due to damage and debris associated with extreme storms/flooding
- Increased demand for public shelter, emergency, and medical services**
- Disruption to medical and emergency services (supply, access, and dissemination)
- Decreased access to critical services, disruption to communication systems, and delayed emergency response due to impacts to road accessibility
- Displacement of 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
- Scarcity of basic goods (e.g., food) due to supply chain disruptions

Increased drought

▼ Likely Impacts on Health and Safety

- Water scarcity
- Increased concentrations of pollutants due to reduced river levels and flows
- Impact to subsistence (pea patches, fishing) and commercial (farmers market, fisheries) food sources

Table 7. Summary of likely direct impacts of climate stressors on the Health and Safety sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

INTERACTIONS WITH EXISTING STRESSORS

Aging infrastructure

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Water, energy, and transportation systems may not be able to handle increased demand during periods of extreme heat

Lack of adequate community healthcare services

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Emergency centers and critical services may not have the capacity to address increases in the community's needs as climate change exacerbate existing shortages
- Extreme events can cause a disruption in usual daily responsibilities and priorities in order to address emergencies, placing additional strain on healthcare staff

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate

- Increased illness and death is mostly likely to occur during the hottest months of the summer, as well as during the most extreme cold events (particularly when more winter rain and ice and less snow cover decreases insulation for infrastructure such as pipes, increasing the likelihood of damage); unsheltered community members are at particularly high risk.
- Extreme heat events have not yet caused spikes in illness or death, though older homes may not be comfortable.
- Weatherization programs for existing homes will be critical as extreme temperatures (both heat and cold) become more dangerous for human health and safety.

Key Vulnerability: Increased demand for public shelter, emergency, and medical services

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate

- Demand is likely to increase for all extreme events, including storms/flooding and extreme temperatures (heat and cold), particularly among unsheltered community members and where there is less access to transportation.
- It will be important to ensure that 24-hour availability of these services exists, and that emergency personnel preparedness efforts are coordinated.
- Modification of public buildings to serve as shelters may also play a role in preparedness for extreme events.

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for health and safety.



Local Food and Agriculture

This topic area considers **local food** and **agriculture** systems, including farms and associated infrastructure, food processing and distribution systems, and community food security.

There are implications of climate change for local food and agriculture due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact local food and agriculture include:

- Changes in population dynamics and limited supply of undeveloped land

Photo by Bob Nichols USDA via Flickr



Key climate-related considerations for **local food and agriculture** may include:

- Current impacts of climate conditions on existing agricultural/food systems, and how that may be altered by changes in temperature and precipitation in coming decades
- Extreme events that could lead to crop failure and associated impacts (e.g., economic losses, supply chain issues)
- Potential impacts of climate change on patterns of supply and demand of food, as well as impacts on factors related to food distribution (e.g., supply chain) and storage (e.g., increased spoilage)
- Climate-related impacts that may influence food prices and community food security, particularly for vulnerable populations (e.g., low-income and mobility-limited residents)



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 8; **bolded bullet points** represent key vulnerabilities for the local food and agriculture sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

▼ Likely Impacts on Local Food and Agriculture

- 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)
- Changes in pollinator populations due to warmer temperatures and associated phenological changes (potential for positive and negative impacts on local food and agriculture)
- **Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing**
- Possibility for more than one cropping per season due to warming temperatures, potentially increasing local food production
- Increased water temperatures, adversely impacting local trout fisheries
- Reduced plant growth and increased mortality during periods of extreme heat, decreasing crop production and sustainability
- Increased need for supplemental watering during periods of extreme heat
- Increased erosion and topsoil loss where extreme heat leads to loss of existing plant cover
- Potential for changes in nutritional value of crops
- Increased cost of refrigeration for food transport and preservation due to warming temperatures and energy/climate costs (e.g., chemicals)
- Increased health risks for agricultural workers exposed to extreme temperatures, vector-borne diseases, and other outdoor hazards exacerbated by climate change

Altered precipitation patterns and increased extreme precipitation, storms, & flooding

▼ Likely Impacts on Local Food and Agriculture

- **Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing**
- Changes in the timing of planting and harvest (e.g., farmers may not be able to plant crops early in the season and may have to wait in the fall to harvest corn) due to muddy fields, difficulty in accessing farms
- **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**
- **Increased flooding and erosion of agricultural lands located near rivers and floodplains, resulting in crop failures and/or damage or destruction of infrastructure**
- Loss of crops such as corn where extreme precipitation or storms/wind events (e.g., derechos) occur mid-season
- Greater need for expansion of underground infrastructure that drains farmed wetlands
- Impaired water quality due to flooding

Increased drought

▼ Likely Impacts on Local Food and Agriculture

- Reduced groundwater discharge and overall water availability as well as diminished water quality
- Increased water demand due to greater need for irrigation (and associated increases in cost)
- Degradation of soil health, threatening crop production and contributing to food price instability
- Increased flooding and erosion when heavy rains occur following periods of drought due to reduced ability of dry soil to absorb water
- Increased risk of wildfires during periods of severe drought, destroying and impacting crops and food accessibility, and threatening open spaces

INTERACTIONS WITH EXISTING STRESSORS

Changes in population dynamics and limited supply of undeveloped land

▼ Likely Interactions Between Climate Stressors and Existing Stressors

- Increased demand on agricultural systems and local food supplies and food transportation systems due to increasing populations and changes in patterns of demand (e.g., increases in animal consumption require more agricultural space to be used to feed those animals), which will be stressed further by climate change and more frequent extreme events that also impact patterns of supply and demand
- Because there are already very few areas of undeveloped land in the City, the loss of additional agricultural land as a result of expanding floodplains, contamination, or other climate-related hazards would be an enormous challenge
- Increasing development pressure is likely to place additional stress on agricultural areas, and may put some of them at risk of conversion (i.e., to housing)

Table 8. Summary of likely direct impacts of climate stressors on the Local Food and Agriculture sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

Key Vulnerability: Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Likely	Moderate	Moderate	High	Low

- Hmong, Amish, and indigenous farmers and communities are likely to experience the greatest impacts.
- Diversity is known to be a key driver for resilience, and the region is an epicenter for small, diversified farms. Small farmers may be better able to adapt, and farmers in the area may be able to learn from indigenous and Amish practices.
- It will be difficult to address this impact without further education for the community about where their food comes from, as well as willingness to adjust their eating habits.

Key Vulnerability: 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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Low	High

Key Vulnerability: Increased flooding and erosion of agricultural lands located near rivers and floodplains, resulting in crop failures and/or damage or destruction of infrastructure

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for local food and agriculture.

Greenspace and Tree Canopy

This topic area includes community **greenspace**, including parks, conservation lands, and other open space resources, as well as the urban **tree canopy**. Important aspects include the condition and management needs of these natural systems, which are associated with groundwater and surface water resources, recreation, native plants and wildlife (including threatened and endangered species), and other natural resources. The City of La Crosse already has over 40 parks and open spaces, many of which have been established since the early 1900s, and which occupy over 1,300 acres within the City boundary.

There are implications of climate change for greenspace and tree canopy due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact greenspace and tree canopy include:

- Availability of open space
- Insufficient capacity to maintain existing facilities



Photo by Andrew Haimertl via Unsplash

Key climate-related considerations for local food and agriculture may include:

- Current impacts of climate conditions on existing agricultural/food systems, and how that may be altered by changes in temperature and precipitation in coming decades
- Extreme events that could lead to crop failure and associated impacts (e.g., economic losses, supply chain issues)
- Potential impacts of climate change on patterns of supply and demand of food, as well as impacts on factors related to food distribution (e.g., supply chain) and storage (e.g., increased spoilage)
- Climate-related impacts that may influence food prices and community food security, particularly for vulnerable populations (e.g., low-income and mobility-limited residents)



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 9; **bolded bullet points** represent key vulnerabilities for the greenspace and tree canopy sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

Likely Impacts on Greenspace and Tree Canopy

- 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), likely resulting in the introduction of new invasive species into the area**
- Shifts in the composition and distribution of native plant communities due to warmer temperatures and associated impacts (e.g., loss of ash trees as emerald ash borer continues to expand)
- Changes in use of parks and recreational areas with more warm days (e.g., increased demand for areas with more shade and water features, reduced demand for areas like soccer fields when it is too hot for people to want to play)
- Reduced plant growth and increased mortality during periods of extreme heat, impacting street trees and native plant communities

Altered precipitation patterns and increased extreme precipitation, storms, & flooding

Likely Impacts on Greenspace and Tree Canopy

- Shifts in the composition and distribution of native plant communities due to wetter conditions and shifts in seasonal precipitation patterns
- Changes in the size and location of floodplains and wetlands
- Increased runoff of nutrients and contaminants from urban and agricultural areas, impacting water quality
- Changes in the size and location of floodplains and wetlands
- Increased flooding and erosion, impacting native plant communities (e.g., can result in loss of species such as ash) as well as access to and condition of parks and conservation areas (e.g., trail flooding in and around the La Crosse River Marsh)**
- Loss of trees and other native vegetation during windstorms (greenspace areas are very vulnerable to derechos), which are being observed more frequently in the winter months
- Increases in costs for repairs and cleanup due to damage (e.g., washouts)
- Increased use of de-icing chemicals, which may impact native vegetation

Increased drought

Likely Impacts on Greenspace and Tree Canopy

- Increased water demand for irrigation and other uses, as well as increases in associated costs
- 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)

Table 9. Summary of likely direct impacts of climate stressors on the Greenspace and Tree Canopy sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

INTERACTIONS WITH EXISTING STRESSORS

Availability of open space

Likely Interactions Between Climate Stressors and Existing Stressors

- Because there is already a limited amount of undeveloped land in the city, it is challenging to add new parks and open space
- Development pressure on existing open space is likely to increase over time, particularly if climate change impacts the suitability of other areas for development (e.g., limiting development within expanding floodplains)
- Loss of open space and tree cover exacerbates heat islands)

Insufficient capacity to maintain existing facilities

Likely Interactions Between Climate Stressors and Existing Stressors

- Increased need to maintain and clean up after storms will increase stress for the City, particularly in areas where there are many trails (e.g., Hixon Forest where trails are maintained by non-profit organizations with City oversight)
- Increased cost and maintenance needs for public pools as demand increases during hotter summers
- Overall, the city needs increased capacity to maintain its existing park and open space facilities, and future demand for land, increasing use of parks and open space, and the impacts from climate change will increase these stressors

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

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	Moderate	Moderate

Key Vulnerability: Increased flooding and erosion, impacting native plant communities (e.g., can result in loss of species such as ash) as well as access to and condition of parks and conservation areas (e.g., trail flooding in and around the La Crosse River Marsh)

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Major	Extreme	Moderate	High

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for greenspace and tree canopy.



Economy

This topic area includes various indicators of **economic activity and opportunities** within the community, including employment, ability to attract and retain businesses and local industries, and community support for the local economy.

There are implications of climate change for the economy due to all climate stressors, including some due to interactions with other existing stressors. For La Crosse, important existing stressors that may interact with climate change to impact the economy include:

- Costs and funding allocation
- Aging infrastructure



Key climate-related considerations for the **economy** may include:

- Impacts of current climate conditions (precipitation and temperature) that affect the City's economy and resources that drive it, and consideration of how local business and industry might be affected if these patterns change (e.g., hotter or colder days, less snow, etc.)
- Potential for climate-driven changes in either the supply or demand for products or services that are crucial to the local economy (e.g., tourism, agricultural or forest products)
- Impacts of action to address climate change – or inaction – on various aspects of the local economy, including direct costs or savings, job creation/employment rates, and vitality of the downtown areas and local businesses



In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 10; bolded bullet points represent key vulnerabilities for the economy sector).

DIRECT IMPACTS OF CLIMATE STRESSORS

Warmer temperatures and more extreme heat

- Likely Impacts on Economy**
- Altered consumer patterns due to changing temperatures (e.g., fewer winter shoppers and street traffic in downtown areas where windows reflect the sun and there is little shade)
 - **Increased demand on electrical grids, which increase costs associated with heating/cooling and could result in more frequent power outages that impact business and industry (e.g., manufacturing)**
 - Increased costs associated with maintenance (e.g., of parking lots and roofs), insurance, and continuity of services (e.g., air conditioning of stores and businesses)
 - 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
 - **Increased risks for outdoor workers who are more exposed to heat, potentially reducing labor productivity**
 - Increased costs of heat-related injuries or illness (i.e., increased use of medical services)
 - Changes in recreation and tourism that impact the economy due to reduced potential for winter sports (e.g., skiing, ice fishing, ice hockey) as well as temperature-driven losses of native fish (e.g., trout) valued for recreational fishing

Altered precipitation patterns and increased extreme precipitation, storms, & flooding

- Likely Impacts on Economy**
- Greater risk of flood/storm damage, causing economic stress due to lost revenue and increasing costs of repair/rebuilding, insurance, and continuity of service
 - Disruption of commercial and consumer activity during and after extreme events, depleting financial resources and reserves
 - Increased costs due to the agricultural economy due to greater energy use for drying wet corn

Increased drought

- Likely Impacts on Greenspace and Tree Canopy**
- Drops in Mississippi River water levels that create places for barges to run aground, which can lead to problems for travel and transport of goods locally and the supply chain regionally
 - Reduced ability to supply businesses and residents (e.g., the City, the brewery) with clean water or very high expenses associated with providing bottled water, which is likely to be exacerbated by contamination

Table 10. Summary of likely direct impacts of climate stressors on the Economy sector as well as potential interactions with existing stressors, with key vulnerabilities in bold type.

INTERACTIONS WITH EXISTING STRESSORS

Costs and funding allocation

- Likely Interactions Between Climate Stressors and Existing Stressors**
- Increases in cost of development due to higher insurance costs
 - Increased funding needed for retrofits and repairs/upgrades, straining local businesses that may already be struggling
 - Funds being used to address repairs following extreme events, rather than proactively retrofitting or replacing aging infrastructure that may be unlikely to cope with future conditions (e.g., retrofitting or replacing stormwater infrastructure that is unable to adequately handle future precipitation amounts); may result in need to increase local taxes to cover increasing expense

Aging infrastructure

- Likely Interactions Between Climate Stressors and Existing Stressors**
- Increased risk of damage and disruption to transportation and businesses due to infrastructure failure, and more extended time and cost needed for post-disaster recovery

Key Vulnerability: Increased demand on electrical grids, which increase costs associated with heating/cooling and could result in more frequent power outages that impact business and industry (e.g., manufacturing)

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	High	Moderate

Key Vulnerability: Increased risks for outdoor workers who are more exposed to heat, potentially reducing labor productivity

Likelihood	Consequence	Risk	Adaptive Capacity	Vulnerability
Almost Certain	Moderate	High	Moderate	Moderate

The likelihood, consequence, and adaptive capacity were ranked for each key vulnerability, resulting in risk and vulnerability evaluations for the impacts that were identified as being of particular concern for greenspace and tree canopy.

Conclusions

In the table below, both direct climate impacts and interactions between climate stressors and existing stressors are explored (Table 10; bolded bullet points represent key vulnerabilities for the economy sector).

SECTOR	KEY VULNERABILITIES
	• High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages (with potentially significant impacts on vulnerable residents such as those who are already under financial stress) ► MODERATE VULNERABILITY (temperature, extreme heat) • Increased risk of flooding along waterways, floodplains and low-lying areas, and where drainage is poor (naturally or due to impermeable surfaces), with disproportionate impacts on vulnerable communities that are more likely to reside in those areas ► HIGH VULNERABILITY (storms/flooding) • Reduced access to more isolated residential areas due to road flooding (e.g., mobile home parks with only one road in and out), potentially hindering evacuation efforts or emergency response ► HIGH VULNERABILITY (storms/flooding)
	• Reduced interest in walking/biking or using public transportation on hot days, increasing dependence on cars with air conditioning ► MODERATE VULNERABILITY (temperature, extreme heat) • Increased flooding and associated damage to streets, sidewalks/trails, and parking lots during heavy rain events, particularly in low-lying areas or where stormwater infrastructure is inadequate ► MODERATE VULNERABILITY (storms/flooding) • Historical investment in car-focused transportation has resulted in greater interest in suburban areas and reduced City walkability, complicating future changes to increase the ease and desirability of public and non-motorized transportation ► MODERATE VULNERABILITY (ALL)
	• High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages (with potentially significant impacts on vulnerable residents such as those who are already under financial stress) ► MODERATE VULNERABILITY (temperature, extreme heat) • Increased damage or loss of buildings due to flooding or related impacts (e.g., mold) ► HIGH VULNERABILITY (storms/flooding) • Increased risk of damage or structural failure as a result of extreme events (e.g., heat, flood, wind) in buildings that are older and/or newer but poorly-designed ► HIGH VULNERABILITY (extreme heat, storms/flooding)
	• Increased leakage and run-off, potentially impacting local water quality ► MODERATE VULNERABILITY (precipitation, storms/flooding) • Increased waste generation due to debris and other damage (including organic debris from vegetation damage), which is likely to be exacerbated by illegal dumping ► HIGH VULNERABILITY (storms/flooding)
	• Increased flooding during periods of heavy rain, particularly where the City's stormwater infrastructure is inadequate for increased volumes or impermeable surfaces prevent infiltration ► MODERATE VULNERABILITY (storms/flooding) • Elevated groundwater tables due to frequent large storms, infiltrating the sanitary sewer system and increasing the cost of treatment ► MODERATE VULNERABILITY (storms/flooding)
	• Increase in heat- or cold-related illness and death, which may be exacerbated by pre-existing medical conditions, age, occupation, and/or socioeconomic variables (e.g., access to a vehicle or regular health care) ► MODERATE VULNERABILITY (extreme heat) • Increased demand for public shelter, emergency, and medical services ► MODERATE VULNERABILITY (extreme heat, storms/flooding)
	• Current crops may not be suited for new conditions, requiring changes in crops and equipment needed for new crop cultivation and processing ► LOW VULNERABILITY (temperature, 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 ► HIGH VULNERABILITY (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 ► HIGH VULNERABILITY (storms/flooding)
	• Expansion of non-native invasive plants and insect pests as temperatures increase (particularly winter temperatures), likely resulting in the introduction of new invasive species into the area ► MODERATE VULNERABILITY (temperature) • Increased flooding and erosion, impacting native plant communities (e.g., can result in loss of species such as ash) as well as access to and condition of parks and conservation areas (e.g., trail flooding in and around the La Crosse River Marsh) ► HIGH VULNERABILITY (storms/flooding)
	• Increased demand on electrical grids, which increase costs associated with heating/cooling and could result in more frequent power outages that impact business and industry (e.g., manufacturing) ► MODERATE VULNERABILITY (temperature, extreme heat) • Increased risks for outdoor workers who are more exposed to heat, potentially reducing labor productivity ► MODERATE VULNERABILITY (extreme heat)



Conclusions

Across all sectors, storms/flooding and extreme heat emerged as the climate stressors of greatest concern. Key vulnerabilities that were very similar across multiple sectors included:

- Increased risk of damage or losses to infrastructure (e.g., roads, buildings) due to flooding, particularly along waterways, floodplains, and other low-lying areas or where stormwater infrastructure is adequate
- Shifts in the size and location of floodplains, resulting in the loss of areas suitable for certain uses (e.g., development, agriculture)
- Impacts to crops and native plant communities as a result of increased flooding and erosion
- High energy demand due to hotter summers and more extreme heat, increasing costs and the risk of power outages

Photo by Dave Hoefler via Unsplash.jpg

Key vulnerabilities identified in this report may be used as a starting point for discussion of strategic goals and actions that should be prioritized for implementation in the City of La Crosse, with particular attention paid to vulnerable populations that may be disproportionately impacted by these changes. Because climate adaptation is an iterative process and new research and modeling on projected climate change and its impacts are regularly released, it is important to revisit and/or revise the vulnerability assessments and adaptation strategies on a regular basis (e.g., every 5-10 years), as well as when additional topics of concern become priorities.

Adaptation efforts that effectively address these key vulnerabilities will not only reduce the negative impacts of climate change on La Crosse, but also have the potential to address underlying stressors and inequities that have long been an issue in the community (e.g., pollution, aging infrastructure). With careful attention and community willingness to invest time and resources into adaptation as well as mitigation efforts, the City of La Crosse can become more resilient and continue to grow and thrive over the coming decades.

Literature Cited

- [1] L. J. Hansen, J. M. Kershner, and E. E. Mielbrecht, "Rapid Vulnerability & Adaptation Tool for Climate-Informed Community Planning," EcoAdapt, Bainbridge Island, WA, 2021.
- [2] M. Notaro, D. Lorenz, C. Hoving, and M. Schummer, "Twenty-first-century projections of snowfall and winter severity across central-eastern North America," *Journal of Climate*, vol. 27, no. 17, pp. 6526–6550, Sep. 2014, doi: 10.1175/JCLI-D-13-00520.1.
- [3] D. R. Easterling et al., "Precipitation change in the United States," in *Climate Science Special Report: Fourth National Climate Assessment*, Volume I, D. J. Wuebbles, D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds. Washington, DC: U.S. Global Change Research Program, 2017, pp. 207–230. doi: 10.7930/JON29V45.
- [4] Z. Feng, L. R. Leung, S. Hagos, R. A. Houze, C. D. Burleyson, and K. Balaguru, "More frequent intense and long-lived storms dominate the springtime trend in central US rainfall," *Nature Communications*, vol. 7, no. 1, Art. no. 1, Nov. 2016, doi: 10.1038/ncomms13429.
- [5] K. L. Ebi et al., "Human Health," in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Volume II, D. R. Reidmiller, C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, and B. C. Stewart, Eds. Washington, DC: U.S. Global Change Research Program, 2018, pp. 539–571. [Online]. Available: <https://nca2018.globalchange.gov/chapter/14/>
- [6] J. Balbus et al., "Ch. 1: Introduction: Climate Change and Human Health," in *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, Washington, DC: U.S. Global Change Research Program, 2016, pp. 25–42. doi: 10.7930/JOVX0DFW.
- [7] City of Cleveland, "Cleveland Climate Action Plan—Appendix A: Racial Equity Tool," Sustainable Cleveland, Cleveland, OH, 2018. [Online]. Available: <https://www.sustainablecleveland.org/racial-equity>
- [8] EPA, "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts," U.S. Environmental Protection Agency, Washington, DC, EPA 430-R-21-003, 2021. [Online]. Available: www.epa.gov/cira/social-vulnerability-report
- [9] J. L. Gamble et al., "Ch. 9: Populations of Concern," in *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, Washington, DC: U.S. Global Change Research Program, 2016, pp. 247–286. doi: 10.7930/JOQ81B0T.
- [10] J. M. Jacobs et al., "Transportation," in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Volume II, D. R. Reidmiller, C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, and B. C. Stewart, Eds. Washington, DC: U.S. Global Change Research Program, 2018, pp. 479–511. [Online]. Available: <https://nca2018.globalchange.gov/chapter/12/>
- [11] K. Thomas et al., "Explaining differential vulnerability to climate change: A social science review," *WIREs Climate Change*, vol. 10, no. 2, p. e565, 2019, doi: 10.1002/wcc.565.
- [12] B. S. Levy and J. A. Patz, "Climate change, human rights, and social justice," *Annals of Global Health*, vol. 81, no. 3, pp. 310–322, 2015, doi: 10.1016/j.aogh.2015.08.008.
- [13] Council on Environmental Health et al., "Global climate change and children's health," *Pediatrics*, vol. 136, no. 5, pp. 992–997, 2015, doi: 10.1542/peds.2015-3232.
- [14] M. M. King and M. A. Gregg, "Disability and climate change: A critical realist model of climate justice," *Sociology Compass*, vol. 16, no. 1, p. e12954, 2022, doi: 10.1111/soc4.12954.
- [15] T. Dietz, R. L. Shwom, and C. T. Whitley, "Climate change and society," *Annual Review of Sociology*, vol. 46, no. 1, pp. 135–158, 2020, doi: 10.1146/annurev-soc-121919-054614.
- [16] E. Fussell, L. Delp, K. Riley, S. Chávez, and A. Valenzuela, "Implications of social and legal status on immigrants' health in disaster zones," *Am J Public Health*, vol. 108, no. 12, pp. 1617–1620, Dec. 2018, doi: 10.2105/AJPH.2018.304554.
- [17] M. Nilsson and T. Kjellstrom, "Climate change impacts on working people: how to develop prevention policies," *Global Health Action*, vol. 3, no. s3, p. 5774, 2010, doi: 10.3402/gha.v3i0.5774.
- [18] L. J. Hansen, S. J. Nordgren, and E. E. Mielbrecht, "Bainbridge Island Climate Impact Assessment," EcoAdapt, Bainbridge Island, WA, 2016.
- [19] EcoAdapt, "Climate Vulnerability and Adaptation Report for Santa Rosa, California," EcoAdapt, Bainbridge Island, WA, 2021.
- [20] EcoAdapt, "Climate Vulnerability and Adaptation Report for Johnson County, Iowa," EcoAdapt, Bainbridge Island, WA, 2021.
- [21] EcoAdapt, "Climate Vulnerability and Adaptation Report for Indian River County," EcoAdapt, Bainbridge Island, WA, 2022.
- [22] USGCRP, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, DC: U.S. Global Change Research Program, 2018. [Online]. Available: <https://nca2018.globalchange.gov/>
- [23] K. Gordon, M. Lewis, J. Rogers, and F. Kinniburgh, "Heat in the Heartland: Climate Change and Economic Risk in the Midwest," Risky Business Project, 2015. [Online]. Available: <https://riskybusiness.org/report/heat-in-the-heartland-climate-change-and-economic-risk-in-the-midwest/>
- [24] USGCRP, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Washington, DC: U.S. Global Change Research Program, 2016. doi: 10.7930/JOQ81B0T.
- [25] City of La Crosse, "Confluence: The La Crosse Comprehensive Plan," City of La Crosse, La Crosse, WI, 2002.
- [26] P. E. Lockwood and K. Ray, "La Crosse Transportation Vision Charrette," Toole Design Group, Boston, MA, 2015.
- [27] J. Eastwood, "Grand River Transit Service Enhancement & Policy Plan 2015–2025," Prepared for the City of La Crosse Municipal Transit Utility by Jackie Eastwood, Transportation Planner, La Crosse Area Planning Committee, La Crosse, WI, 2015.
- [28] City of La Crosse Planning and Development Department, "City of La Crosse Neighborhood Revitalization Strategy Area Plan," City of La Crosse Planning and Development Department, La Crosse, WI, 2015.

Appendix Item #6

ANNUAL COMMUNITY ENERGY REPORT BY XCEL ENERGY

Community:	City of La Crosse
Year of Data:	2023

Utility System Characteristics [1]

Electric	0.2510	metric tons CO2/ MWh [2]
Gas	0.0054	metric tons CO2/ Th

Resource Mix	Resource Contribution
Coal	12.70%
Gas	22.60%
Wind	29.40%
Hydro	5.90%
Solar	4.20%
Nuclear	23.60%
Bio Mass	1.10%
Other	0.00%

Certified Renewable Percentage [3]

Wisconsin	37.35%
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RES Retirements	Vintage	Vintage	Vintage	Vintage	Vintage	Bonus	WS	
Fuel Type	2019	2020	2021	2022	2023	RECs	Credit	Total
Solar	-	-	-	-	-	-	-	-
Wind	-	-	-	-	155,730.00	-	-	-
Biomass	-	-	-	-	-	569,372.00	-	-
Hydro	-	-	-	-	-	132,092.00	-	-
Total	-	-	-	-	155,730.00	701,464.00	-	-

CRP Retirements	Vintage	Vintage	Vintage	Vintage	Vintage	
Fuel Type	2019	2020	2021	2022	2023	Total
Solar	-	-	-	-	-	-
Wind	-	-	-	-	1,305,921.00	1,305,921.00
Biomass	-	-	-	-	-	-
Hydro	-	-	-	-	347,767.00	347,767.00
Total	-	-	-	-	1,653,688.00	1,653,688.00

Energy Consumption Data [4]

Electricity	Number of Customers [5]	Energy Consumption (kWh)	Carbon Emissions (metric tons CO2) [6]	Revenues Billed [7]	Customers Removed from Dataset [8]
Business	3,982	580,419,465	145,685	\$64,695,854	0
Residential	22,477	164,334,361	41,248	\$26,890,243	0
Street Lighting - Metered	n/a	777,759	195	\$73,874	-
Street Lighting - Non-Metered/Customer Owned	n/a	1,550,967	389	\$196,289	-
Street Lighting - Non-Metered/Xcel-Owned	n/a	393,677	99	\$301,639	-
Total:	26,459	747,476,229	187,617	\$92,157,898	

Natural Gas	Number of Customers [5]	Energy Consumption (therms)	Carbon Emissions (metric tons CO2) [9]	Revenues Billed [7]	Customers Removed from Dataset [8]
Business	2,244	30,311,422	163,682	\$15,454,043	0
Residential	15,955	9,905,135	53,488	\$12,883,507	0
Total:	18,199	40,216,558	217,169	\$28,337,550	

Programmatic Data [10]

Windsource	Number of Customers	Subscribed Energy (kWh)	Customers Removed from Dataset

Renewable*Connect	Number of Customers	Subscribed Energy (kWh)	Customers Removed from Dataset
Community - Business Total	10	2,516,001	n/a
Community - Residential Total	783	6,440,338	n/a
Wisconsin - Business Total	75	56,686,894	n/a
Wisconsin - Residential Total	6,201	53,815,951	n/a

On-site Solar (Solar*Rewards) [11]	Total Installations	Installations During Reporting Year	Total Capacity (kW)	Capacity Installed During Reporting Year (kW)	Total Energy Produced (kWh) [11]	Total Incentives Paid (\$) [12]	Customers Removed from Dataset
Community - Business Total					0	0	n/a
Community - Residential Total					0	0	n/a
Wisconsin - Business Total					0	0	n/a
Wisconsin - Residential Total					0	0	n/a

On-site Solar (non-Solar*Rewards)	Total Installations	Installations During Reporting Year	Total Capacity (kW)	Capacity Installed During Reporting Year (kW)	Total Energy Produced (kWh)	Customers Removed from Dataset
Community - Business Total	29	3	2,720.01	108	0	n/a
Community - Residential Total	171	38	2,164.54	226	1386018	n/a
Wisconsin - Business Total	239	25	76,917.93	60,022	43720013	n/a
Wisconsin - Residential Total	1,487	340	90,551.47	80,559	11055747	n/a

Solar Gardens (PV)	Number of Customers	Subscribed Capacity (kW)	Subscribed Energy (kWh)	Customers Removed from Dataset
Community - Business Total	8	814	838,358	n/a
Community - Residential Total	20	48	46,115	n/a
Wisconsin - Business Total	49	2,695	2,775,916	n/a
Wisconsin - Residential Total	103	308	312,111	n/a

Load Management (Demand Response)	Number of Customers	Available Capacity (kW)	Rebates or Incentives Paid	Customers Removed from Dataset [8]
AC Rewards - Residential	148	163	\$3,700	n/a
Electric Rate Savings - Business			0	11
Savers Switch -			0	n/a
Savers Switch - Residential	2,493	1,396	\$59,390	n/a

Electric Vehicle Programs [13]	Number of Customers	Electric Energy Savings (kWh)	Electric Demand Savings (kW)	Electric Rebates or Incentives Paid

Energy Efficiency Programs	Number of Projects	Electric Energy Savings (kWh)	Electric Demand Savings (kW)	Electric Rebates or Incentives Paid	Natural Gas Energy Savings (Th)	Natural Gas Rebates or Incentives Paid
Voluntary Community Conservation - Bus - WI	72	0	0	\$67,031	0	\$20,459.98
Voluntary Community Conservation - Residential - WI	12	0	0	\$9,371	0	\$1,785.00

Footnotes

[1] Available in the latest Energy and Carbon at a Glance Sheet at: https://www.xcelenergy.com/Environment/Policy/Carbon_Policy . See the table on page 3, which shows our latest CO2 intensity by region in metric tons/MWh and lbs/MWh, as calculated using The Climate Registry's electric power sector protocol. Note these are system-wide metrics and do not reflect differences between communities.
[2] Note that the CO2 emission factor for electricity and gas is a preliminary estimate, as calculated using The Climate Registry protocols but not yet third-party verified. This reflects the most accurate and current emissions information available, but sometimes emissions data changes slightly as our power suppliers send us revised information, as our emissions go through third-party verification, or as reporting protocols improve. Note also that this emission factor does not include biogenic CO2 from biomass power generation, which is reported separately under The Climate Registry protocols.
[3] The Certified Renewable Percentages are based on estimates and have not gone through third party verification as of publication of this report. For more information on the Certified Renewable Percentage please visit https://www.xcelenergy.com/CertifiedRenewablePercentage
[4] In the customer energy usage section, if minimum aggregation standards are not met (see note 8 below), Xcel Energy will combine Commercial and Industrial classes into one "Business" line before not presenting data. Commercial Customers are classified by 2-digit NAICS sector falling between 1 and 49, while Industrial Customers are classified by 2-digit NAICS sector falling between 50 and 98. These classifications are collected by Xcel Energy through a voluntary third party customer survey. Due to the fact that not all customers respond to this survey, where no other information is available, Xcel Energy assigns those customers to the Commercial class.
[5] The number of customers represents the number of active service connections during the reporting year. The number of actual business or residences within the jurisdiction is smaller than that shown due to the fact that more than one service connection can be assigned to one customer at a given location.
[6] Estimated total carbon emissions from electricity for a customer class are equal to the total kWh consumed by the customer class, multiplied by the CO2 emission factor for the Xcel Energy system in the applicable region. This does not account for transmission and distribution system line losses or for the fact that some customers within a class may be participating in voluntary renewable energy programs.
[7] Revenues are the bill components associated only with metered energy and demand
[8] To protect individual customer confidentiality, Xcel Energy applies the "15/15 rule" as an aggregation standard to the energy consumption section of this report. So long as a given aggregated value contains 15 or more customers and no single customer makes up 15 percent or more of the aggregated value, the value can be publicized in this report. If these conditions are not met, customers will be removed. The number of customers removed is presented for informational purposes. For the state of Minnesota Xcel Energy applies the "4/50 rule" as an aggregation standard to the energy consumption section of this report. So long as a given aggregated value contains at least four customers within the dataset and no single customer represents 50% more of the total energy usage in the data set., the value can be publicized in this report. If these conditions are not met, customers will be removed. The number of customers removed is presented for informational purposes. For more information about Xcel Energy's Privacy Policy, please visit: https://mn.my.xcelenergy.com/s/privacy/data-access
[9] Estimated total carbon emissions from natural gas for a customer class are equal to the total therms consumed by the customer class, multiplied by the standard CO2 coefficient of 11.7 lbs/therm. Informational purposes. For more information about Xcel Energy's Privacy Policy, please visit https://www.xcelenergy.com/billing_and_payment/customer_data_&_privacy/privacy_policy_&_customer_data_access
[10] This section simply reports participation by customer class, within the geographic boundaries of the community or state being reported, in various voluntary wind and solar programs. No representations are made as to the ownership of the renewable or CO2-free attributes of the electricity being purchased by those customers. In the case of Windsource, Xcel Energy retires Renewable Energy Credits (RECs) on behalf of the participating customer; treatment of RECs varies among the solar programs. In general, ownership of environmental attributes is either with the customer or remains with Xcel Energy, unless specifically transferred to the community, so cannot be claimed by the community. In addition, our accounting methods do not allow us to adjust the system CO2 emission factors for individual jurisdictions to remove the effects of any CO2-free kWh transferred to customers under our voluntary programs
[11] For Solar*Rewards customers, the energy production value shown reflects that of customers who have a dedicated production meter for their photovoltaic system as well as an estimated value for those that do not. For those customers that do not have a production meter, the estimated production value is based off of the average generation per nominal capacity of production-metered systems multiplied by the known nominal capacity of the customer system. Number includes Made in Minnesota production.
[12] Incentives Paid are those Solar Rewards incentives paid by Xcel Energy only. Does not include Made in Minnesota payments.
[13] For Clean Transportation Programs, all reporting data is reported as of March 1, 2024.
*As described in note 8 above, an asterisk represents a row of values for which one or more customers were removed due to implementation of Xcel Energy's Privacy Policy.
The information contained in this report relies on various assumptions, including some identified in footnotes, and is intended for general informational and instructional purposes only. The report is not to be relied upon for any other reason, including any litigated or other contested proceedings. Any customer data removed from the report is done so in compliance with Xcel Energy's Privacy Policy and applicable state commission customer information and data privacy requirements.

Appendix Item #7

Year	Make	Model	Vehicle Class
2016	Chevrolet	k3500	Heavy
2007	Ford	F350	Heavy
2020	Chevrolet	4500 HD	Heavy
2003	Winnebago	Itasca	Heavy
2012	International	Terrastar	Heavy
2011	Ford	F350 Super Duty	Medium
2017	Ram	Promaster	Medium
2019	Ford	Transit	Medium
2020	Honda	Odyssey	Medium



SCHOOL DISTRICT OF LA CROSSE

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Long Range Facility Plan 2050

This long range facility plan provides a framework for improvement of the physical facilities that students attend, staff work in, and our community utilizes. This plan builds on the last 20 years of facilities improvements and puts in place the first comprehensive long range facility plan in 15 years.

Enrollment. Enrollment in the School District of La Crosse has been on a 30 year decline. Since 1995, enrollment has fallen by 29% from 8,152 to 5,786 in 2023. The primary cause of declining enrollment is lower birth rates which have fallen by 30% since 1990 in La Crosse County. In the same 30 year timeframe, the total population within the boundaries of the school district has grown only 1%. Elementary enrollment was relatively stable between 2005 and 2015 but since 2015 has declined by 701 students, 20%.

Enrollment projections commissioned through the UW Applied Population lab, as well as locally developed projections using the cohort survival method show continued declining enrollment for the next five to ten years. The median, positive projection for enrollment over the next five years projects a loss of 746 students by 2028 with a decline of 284 elementary, 158 middle, and 289 high school students.

Financial Projections. School districts are funded on a per pupil basis. Fewer students results in less revenue for the operation of schools. Since 2019, the School District of La Crosse has lost \$5.7M in revenue limit authority due to declining enrollment with another loss of \$1.3M in revenue limit authority known for the 2024-2025 school year. Annual revenue limit reductions are anticipated to grow from -\$1.2M in 2025 to -\$2.0M in 2028 based on enrollment projections. Future enrollment declines will continue to have an impact on the district's revenue limit, limiting the financial resources naturally available to the school district.

Building Inventory and Condition. The School District of La Crosse has 16 buildings in its inventory including: 2 high schools (Logan and Central); 2 middle schools (Logan and Longfellow); 1, 6-12 charter school building (Polytechnic); 9 elementary schools (Emerson, Hamilton, Hintgen, Northside, North Woods, Southern Bluffs, Spence, State Road, and Summit); 1 district administration building (Hogan Administrative Center); and 1 facilities and grounds building located on Isle la Plume. Lincoln Middle School is still owned by the School District of La Crosse but is not currently used as an educational facility.

The average age of original construction of school district educational facilities is 1961 with a square foot average age of 50 years old. The district has identified \$23M of maintenance that would be best accomplished in the next five years to keep buildings in safe and usable condition as well as an additional \$95M in maintenance and capital projects anticipated over the following 15-20 years to maintain buildings and to create comparable opportunities for students.

Best Practice and Elementary Size. An ideal elementary size for both instructional best practice and economic efficiencies is a small school with a target size of 350-400 students. This size of an elementary school with the district's current class size guidelines allows for 18-20 sections with 3-4 sections per grade level. The efficiency of this size of an elementary school comes from providing an opportunity for full-time music, art, physical education, and library specialists as well as full-time support staff such as special education teachers, EL teachers, counselors, success coaches, and others. Additionally, providing buildings that have comparable economic status is desirable to best arrange resources and ensure similar experiences for students and families.

Facility Advisory Committee. Over eight months in 2023 a Facility Advisory Committee (FAC) made up of community members and led by an independent facilitator met to consider district facilities. The FAC reviewed a wide range of facility, fiscal, enrollment, and instructional information to address two primary tasks:

1. Explore, evaluate, and refine potential elementary school arrangement and facilities consolidation options.
2. Explore, evaluate, and refine middle and high school facilities improvements that result in comparable opportunities for students.

The FAC recommended the district develop a long range facility plan to replace/rejuvenate aging school district facilities through a process that might include referenda to replace older buildings or to make sufficient capital investments to bring the remaining buildings up to modern educational standards. The FAC recommendation to close two elementary schools to address declining enrollment was viewed as a necessary initial step in the strategy to improve the district's facilities as a whole. The FAC recognized that enrollment may continue to decline and recommended the district monitor the enrollment trend, revisit the issue periodically, and seek ways to stabilize or increase enrollment in the future.

The FAC developed consolidation parameters to guide recommendations related to elementary school building closure. The result of the FAC analysis and deliberation led to consensus around a recommendation to:

- Close two elementary schools to maximize the instructional benefit to students.
- Pair a north and south elementary school closure to address declining enrollment across the district and keep students together from elementary through high school.
- Close the North Woods International Elementary building.
- Close the Hintgen Elementary School building.
- Adjust elementary school boundaries in accordance with the recommendations of the administration.
- Retain the International Baccalaureate program at another site.

School Board Policy. School board policy outlines the board's values for how the school district should operate and the outcomes for students. Operational expectations policy, OE-12: Facilities, specifically addresses the board's expectations for school district facilities and states "the Superintendent shall ensure that physical facilities support the accomplishment of the Board's Results policies." OE-5: Financial Planning, indicates that "the Superintendent shall develop and present to the Board a multi-year financial plan that is related directly to the Board's Results priorities and Operational Expectations goals, and that avoids long-term fiscal jeopardy to the district." School board policies OE-7: Asset Protection and OE-11: Instructional Program provide additional guidance. Together these policies direct the district to ensure resources are available to provide excellence in education, a key element of the school board's mission statement.

Administrative Policy. Along with school board policy, administrative policies have been developed to guide short and long term facility planning. When addressing school facility needs, policy 9100 Facilities Development indicates what will be considered in construction, renovation, and maintenance of buildings and policy 9800 Retirement of Facilities outlines the considerations that must be taken into account when closing a building.

Facilities Mission

The School District of La Crosse provides physical facilities to support the accomplishment of the Board's Results policies.

Vision

The School District of La Crosse is the school district of choice.

Long Range Facility Plan Intent

The purpose of this long range facility plan is to ensure student access to modern facilities that support a comprehensive education, to efficiently use educational spaces to maximize staff support to students, to aid in efficient use of district resources, and to create a favorable impression of the school district.

Key tasks are:

1. Reduce the number of elementary buildings
2. Replace, renovate, or repurpose aging elementary facilities
3. Invest in public-facing facilities
4. Invest in underdeveloped career and technical education facilities
5. Adapt to future declining enrollment

The result of the long range facility plan is attractive, safe buildings and grounds that facilitate a world class education attracting families to the school district, facilities that are scaled to enrollment resulting in efficient use of resources to allow for continued investment in staff while avoiding fiscal jeopardy, and facilities that are the pride of La Crosse.

KEY TASKS

Key Task #1 - Reduce the Number of Elementary Buildings

Reduce the number of elementary buildings to ensure instructional resources are available to students and to create fiscal stability through efficient staffing. Currently, the district has low elementary enrollment that results in elementary buildings that are at 68% of capacity. Low enrollment in buildings creates part-time specialists and split classrooms leading to a loss of instructional capacity. Additionally, under enrolled buildings result in additional expense to support the building operation instead of support for instruction of students.

- Over the next 5 years, the school district should reduce the number of elementary schools by two to three. The primary buildings to consider are Emerson, Hintgen, North Woods, Spence, and Summit due to a combination of age and location.

Key Task #2 - Replace, Renovate, or Repurpose Elementary Facilities

Replace, renovate, or repurpose aging elementary facilities to extend the life cycle of facilities in the school district inventory and to provide instructional spaces that support modern instructional strategies for students. The average square foot age of the district's elementary buildings is 43 years old. Emerson, Spence, Summit, and Hintgen elementary schools have average square foot ages that exceed 50 years old which is prior to the implementation of disability and special education law, creating challenges in adapting spaces to meet modern educational expectations.

- Over the next 12 years replace or substantially renovate Emerson, Spence, and Summit elementary schools if kept in the inventory.
- Over the next 20 years renovate Hamilton and State Road to modernize older portions of the buildings.
- Over the next 25 years repurpose elementary facilities that are no longer used as schools for community benefit.

Key Task #3 - Invest in Public Facing Facilities

Invest available one-time funds in school district facilities that are public-facing or are gathering places that showcase the school district to internal and external audiences. Currently, the district's public facing spaces are outdated and insufficient for modern needs. As a result, the image that community members and visitors to the district have is a district that is outdated and does not meet students' needs.

- Over the next 5 years renovate performing arts and athletic facilities.
- Over the next 10 years renovate school entryways.
- Over the next 25 years build new or renovate other existing public spaces to benefit students and the community (e.g. gymnasiums, cafeterias, libraries, pools, auditoriums and conference spaces).

Key Task #4 - Invest in Underdeveloped Career and Technical Education Facilities

Invest in underdeveloped career and technical education (CTE) facilities to provide world class opportunities for all students. Currently, the district's CTE facilities are not sufficient to provide a comprehensive modern education. As a result, students are not exposed to, or prepared for, the full range of careers they may be interested in and are available in our community.

- Over the next 5 years renovate the Logan High School CTE facilities and construct an addition to Central High School for CTE facilities.

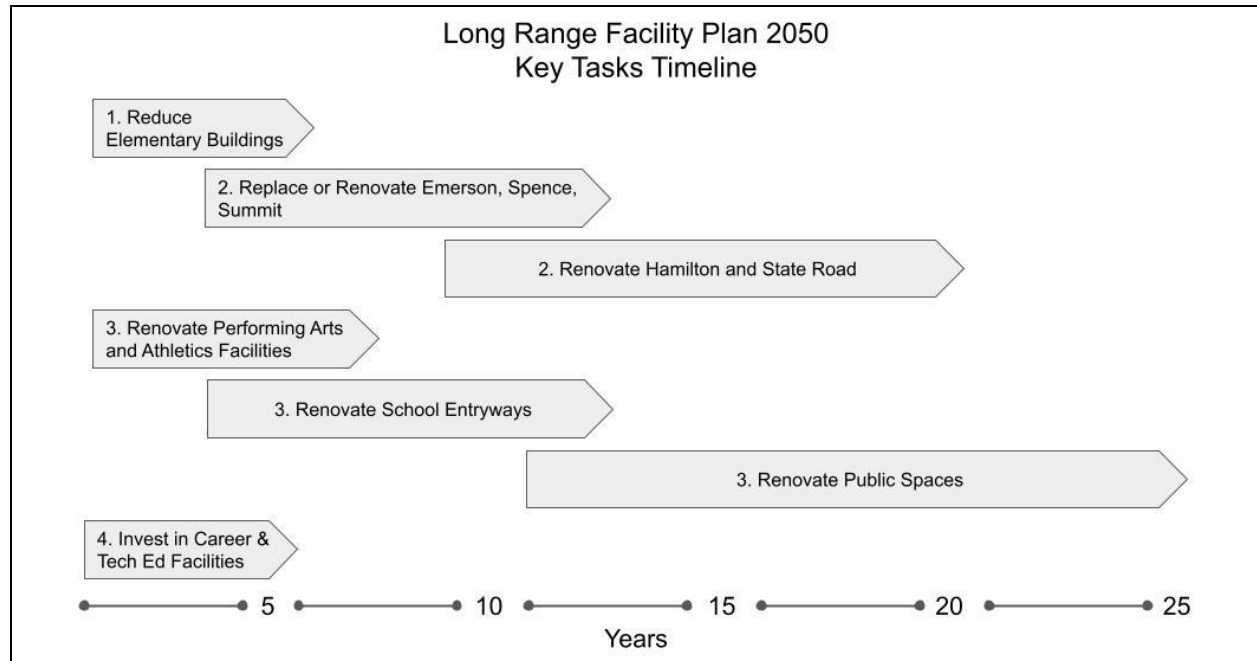
Key Task #5 - Adapt to Future Declining Enrollment

Create options to adjust to future declining enrollment so the district is prepared for future change. Enrollment projections indicate the school district will continue to shrink, likely down near 5,000 students in size over the next 5-10 years. As a result, to maintain the high quality education for students through building efficiencies, further consolidation of buildings should be considered.

- Over the next 25 years consider reducing the number of secondary facilities when secondary enrollment decline negatively impacts the availability of instructional resources and opportunities to students and when a reduction in secondary facilities is necessary to create efficiency through consolidated staffing to avoid fiscal jeopardy. Consider consolidation into existing secondary facilities when enrollment is less than capacity; Central High School capacity is 1,600 students, Logan High School capacity is 1,300 students.
- Over the next 25 years, consider future consolidation of elementary facilities if the low number of students in buildings negatively impacts the district's ability to ensure instructional resources are available to students and there is a financial need to create fiscal stability through more efficient staffing.

Additional Tasks

1. Retain property the school district currently owns to adapt to future school district needs. Future needs may include sites for new buildings or athletic facilities, temporary spaces for students while construction occurs, or space/sites for changing enrollment patterns in the future.
2. Acquire property near Central and Logan High Schools to provide additional parking and sites for student activities.
 - a. There is currently limited space for parking for public events and daily parking at both high schools. To accommodate these needs and not infringe on the spaces of other residents in the area, the district should acquire property to create space for parking.
 - b. Not all athletic facilities are located near high school sites which limits physical education opportunities and creates barriers for student participation in extracurricular activities. To provide a comprehensive physical education program and maximize opportunities for students, additional property should be acquired to create nearby athletic facilities.



Partners in Previous Sustainability Efforts

Climate action is a comprehensive endeavor and requires collaboration with organizations that can lend their expertise and support in various fields. Whether the collaboration is for a specific project or is an ongoing program, these relationships seek to be mutually beneficial. Listed here are examples of organizations that SDLX has had the privilege of working with in furthering the District's sustainability goals. This list is not comprehensive.

- [GoRiteway](#)
 - GoRiteway is a transportation service provider that offers various transit services. They are contracted for supplying bus services for students. Currently, the District is working with GoRiteway to transition to cleaner fuels and solve logistical challenges with EV buses.
- [Solar on La Crosse Schools \(SOLS\)](#)
 - SOLS is a nonprofit that educates, advocates, and fundraises to supply La Crosse schools with solar panels. SDLX's partnership with SOLS has been instrumental in building solar infrastructure. SOLS also directs funding to the District for its solar projects. SOLS also uses solar as an educational opportunity to teach students about green energy in the classroom.
- [Xcel Energy](#)
 - Xcel Energy is the primary utility provider for the La Crosse region, supplying electricity and natural gas service. Xcel has supplied SDLX with rebates on many energy efficiency upgrades. Xcel is currently upgrading SDLX's electrical meters to smart meters.
- [Coulee Region Ecoscapes](#)
 - Landscaping company that specializes in environmentally friendly landscaping services. Coulee Region Ecoscapes has helped SDLX with landscaping on District grounds to retain stormwater. Additionally, they have used this as a teaching tool and collaborated with students to design rain gardens.
- [The Nature Place](#)
 - The Nature Place's mission is 'To inspire and cultivate meaningful connections between people and nature, for the benefit of both.' The School District and the Nature Place have a long, 20-year, history together engaging students with meaningful outdoor experiences that enrich science education.
- [Harters](#)
 - Harters is a garbage and recycling company that operates within the greater Coulee region. SDLX contracts with Harters for garbage collection, and a pilot project for composting food waste is in the planning stages.

- [Habitat for Humanity - La Crosse](#)
 - Habitat is a non-profit organization that supports sustainability and affordability for home construction, rehabilitation, and furnishing. In addition to their housing initiatives, they also support the health and environment of the urban landscape through programs like their ReNew the Block program.
- [GROW La Crosse](#)
 - GROW is a non-profit organization with the mission to connect youth to healthy food and nature. GROW has championed multiple school gardens and helped supply students with opportunities to experience what GROW calls 'seed to table learning.'
- Safe Routes to School (SRTS) Program
 - SRTS is a program that seeks to improve safety conditions near schools and encourage students to walk and bike to school. This program is led by the La Crosse County Health Department and offers resources and program assistance to all interested schools in the County.