CLIMATE ACTION PLAN
FOR THE CHICAGO REGION

2021

Metropolitan Mayors Caucus | NOAA

MMC NOAA

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The Climate Action Plan for the Chicago Region is built on a solid foundation of work by the Metropolitan Mayors Caucus (Caucus) to lead local and regional climate action. This opportunity to undertake one of the pioneering regional climate plans in the United States is possible due to the assistance and leadership of the European Union through its International Urban Cooperation (IUC) program. The Global Covenant of Mayors for Climate and Energy contributes the framework for regional climate action and the opportunity to join with some 10,000 global cities and regions in addressing the climate crisis. The Chicago Metropolitan Agency for Planning (CMAP) generously contributed staff assistance to support stakeholder engagement and to advise the Caucus on elements of this plan. Technical assistance was provided by Buro Happold.

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The regional greenhouse gas (GHG) inventory for the year 2015, completed by CMAP in 2018, provided the essential foundation that allowed the mitigation planning process to move forward quickly. CMAP's robust analysis of regional climate risks (especially the flood susceptibility index[1] and socioeconomic vulnerabilities[2]) facilitated the completion of the Climate Risk and Vulnerability Assessment used in this plan. CMAP staff helped integrate this work to develop this climate action plan.

The mayors and municipal leaders who pledge to support the sustainability goals of the Greenest Region Compact (GRC) and choose to accelerate their actions and sharpen their focus to address climate change provide the spark and inspiration for this plan.

The GRC Framework, which itself draws from 30 local and nine regional or national sustainability plans, provided an abundant library of mitigation and adaptation strategies that informed the final climate objectives and strategies. Strategies are also drawn from 22 climate action plans and frameworks from the Chicago region, across the U.S., and from European regions, as well as other tools, such as the UN Sustainable Development Goals, UN Disaster Resilience Scorecard, and CMAP's Climate Adaptation Guidebook for Municipalities. See Appendix A.

Climate scientists from the University of Illinois and Argonne National Laboratory contributed expert knowledge that supported modeling and mitigation target-setting.

Stakeholder input was vital to the plan development. A total of 270 people from 175 organizations including representatives of 53 municipalities and counties participated in workshops and contributed to the development of this plan. See Appendix B.

A generous gift from Crown Family Philanthropies supported a portion of this work.

1 Chicago Metropolitan Agency for Planning (CMAP). 2018. Regional Flood Susceptibility Index https://www.cmap.illinois.gov/programs/water/stormwater/flood-index. Accessed February 2021.

2 CMAP. 2018. Economically Disconnected and Disinvested Areas. https://www.cmap.illinois.gov/2050/maps/eda. Accessed February 2021.

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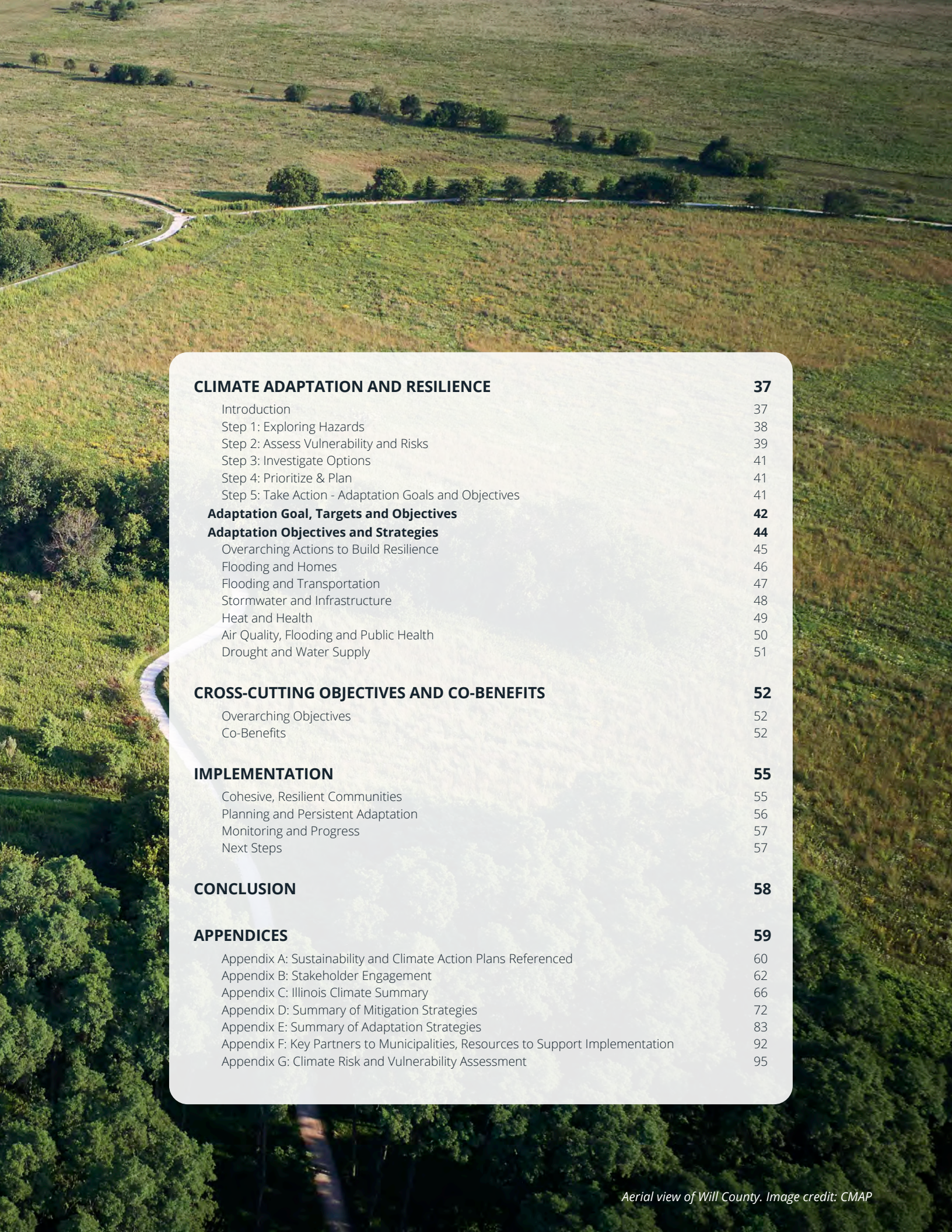

Aerial view of Will County. Image credit: CMAP

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MESSAGE FROM MAYOR KEVIN BURNS

Throughout our region's circuitous and celebrated history oftentimes our most important efforts to enhance our collective well-being were met with skepticism.

By their very nature, transitions are challenging. Owing to the irrefutable impact of climate change, however, if we embrace the opportunities before us, we will likely discover, through trial and error, that our new approach will yield undeniable benefits. The rising chorus of "there has to be a better way" tips the balance toward a better future.

Moving our weight in the same direction we always have most assuredly guarantees a rapid descent toward cataclysmic disruption of every aspect of our lives. Shifting our weight, however, in a conscious, collaborative and strategic way toward a more environmental, economic and socially equitable manner will decidedly yield a healthier future in every form and fashion.

We acknowledge that a transition of this magnitude will yield disruptions of existing power structures yet, in due course, produce a more balanced and redeemable power dynamic that strengthens all people, all places and all communities.

We pursue the inaugural Climate Action Plan for the Chicago Region with full knowledge that our work will be years in the making and our success may not be achieved in our lifetimes. Regardless, we must begin and begin now.

When all is said and done about our contributions in this life, let the accolades and awards be secondary to what is the most cherished and humble accomplishment we can ever hope for: to be considered good ancestors.

Therefore, I ask that you engage your civic leaders to join in this endeavor and make the Climate Action Plan for the Chicago Region a cornerstone of your community's decision making.

Thank you for actively and passionately participating in this journey.

My best,

KEVIN BURNS
Mayor, City of Geneva

Chairman, Environment Committee
and Energy Subcommittee,
Metropolitan Mayors Caucus

LIST OF ACRONYMS

CDP	Carbon Disclosure Project
CH_4	Methane
CMAP	Chicago Metropolitan Agency for Planning
CO_2	Carbon dioxide
CURB	Climate Action for Urban Sustainability Tool
FEJA	Future Energy Jobs Act
FSI	Flood Susceptibility Index
GCoM	Global Covenant of Mayors for Climate and Energy
GHG	Greenhouse gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GRC	Greenest Region Compact
IECC	International Energy Conservation Code
IPCC	Intergovernmental Panel on Climate Change
IUC	International Urban Cooperation
MMC	Metropolitan Mayors Caucus
MMTCO2e	Million metric tons of carbon dioxide equivalent
NOAA	National Oceanic and Atmospheric Administration
N_2O	Nitrous oxide
RCP	Representative Concentration Pathway
RPS	Renewable Portfolio Standard

Cyclists ride along Lake Shore Drive during a Bike the Drive event in Chicago. Image credit: Active Transportation Alliance

EXECUTIVE SUMMARY

Climate Action Plan for the Chicago Region

We have begun the ***decisive decade***: climate action must reduce greenhouse gas emissions, and we must adapt equitably to changes that are inevitable. This plan for the Chicago metropolitan region—one of the first regional climate plans in the United States—is our call to action. We will address global and local climate challenges via municipal leadership.

Over a 16-month period, beginning in August 2019, **the Caucus brought together 270 people from 175 organizations, including representatives of 53 municipalities and counties**. Three workshops demonstrated how the Greenest Region Compact (GRC) can help municipalities reduce greenhouse gas (GHG) emissions. Four workshops focused on identifying and adapting to regionally important climate-related hazards, especially flooding and heat, using the U.S. Climate Resilience Toolkit's *Steps to Resilience*[3] and while centering actions on social equity. As a result of these engagements, **the GRC has augmented its library of municipal-scale actions for both climate mitigation and adaptation**.

The strategies contained in this plan are specifically tailored for action at the municipal scale. Municipal governments are uniquely positioned to **lead**, **enact** policies, and **encourage** others to take action. These three roles are prominent throughout the plan because they reflect actions that municipalities can take independently. The Caucus will work with its membership, starting with its 136 GRC signatories, to immediately undertake these common sense strategies so that, **collectively, we may address the depth and complexity of the climate crisis**.

A multi-jurisdictional approach is needed for addressing the climate crisis. Each community must link its work to that of others to address the regional and global scope of the global climate challenge. If one municipality reduces GHG emissions but the larger region makes no progress, climate change and its related impacts will accelerate. The same can be said at broader scales. If Chicagoland reaches net zero emissions but the state and nation take no action, the climate crisis will worsen. **This plan positions us as leaders in the national effort to mitigate that crisis**.

Climate adaptation also requires coordination. Building resilience must address social inequity to meet our shared objectives across all communities. **Municipalities must urgently coordinate action to both mitigate and adapt to climate change**.

Our region begins its mitigation efforts with a clean energy advantage, but **we must swiftly complete the transition to 100% clean energy sources. The greatest opportunities to reduce GHG emissions come from electrifying transportation, optimizing building energy, and enacting clean energy policies.**

Fostering healthy ecosystems to capture and store carbon will enhance quality of life, recreation, flood protection, and a multitude of other benefits. **Mitigation and adaptation go hand-in-hand**.

Planners, scientists, and engagement with GRC signatories spotlighted **six high-priority climate hazards and their potential impacts to people, assets, and resources**: **Heat and Health; Flooding and Homes; Flooding and Infrastructure; Flooding and Transportation; Drought and Water Supply; and Air Quality, Flooding, and Public Health**.

This plan identifies particular municipal strengths in community engagement and collaboration to address hazards for equitable outcomes. Overarching actions to confidently build community resilience, such as local assessment and planning, require cooperation across the region. The impacts and strategies in this plan are important, but **building resilience is an iterative process that will require sustained effort** given the fact that the climate system will continue to vary (for natural reasons) and to change (due to past decisions).

Municipal leaders may now take strategic actions to build cohesive, resilient communities and meet urgent targets to halt greenhouse gas emissions. Strategies are anchored in the Greenest Region Compact, informed by dozens of preceding climate action plans and tools, and ultimately aligned with global targets through the powerful Global Covenant of Mayors for Climate and Energy.

3 *NOAA. U.S. Climate Resilience Toolkit. 2018. https://toolkit.climate.gov/#steps. Accessed February 2021.*

The Climate Action Plan for the Chicago Region encompasses two goals, each with its own interim targets and objectives, to reduce future impacts and adapt to a changing climate: **(1) net zero GHG emissions** and **(2) persistent, equitable climate adaptation.**

CLIMATE MITIGATION GOAL
Net zero greenhouse gas emissions

INTERIM TARGETS

2030 Reduce GHG emissions 50% from 2005 levels

2040 Reduce GHG emissions 65% from 2005 levels

2050 Reduce GHG emissions at least 80% from 2005 levels

MITIGATION OBJECTIVES

1. Demonstrate leadership to reduce emissions.
2. Decarbonize energy sources.
3. Optimize building energy.
4. Implement clean energy policies.
5. Decarbonize transportation.
6. Reduce vehicle miles traveled.
7. Manage water and waste sustainably.
8. Sustain ecosystems to sequester carbon.

CLIMATE ADAPTATION GOAL
Persistent, equitable climate adaptation

INTERIM TARGETS

2030 Climate-resilient governance

2040 Resilience across jurisdictions

2050 Cohesive, resilient communities

ADAPTATION OBJECTIVES

1. Engage and educate the community about climate resilience and adaptation.
2. Incorporate equity and inclusion into climate adaptation efforts.
3. Collaborate and build capacity for a more resilient community.
4. Enact plans and policies focused on adaptation and resilience.
5. Adapt operations and investments for future climate conditions.


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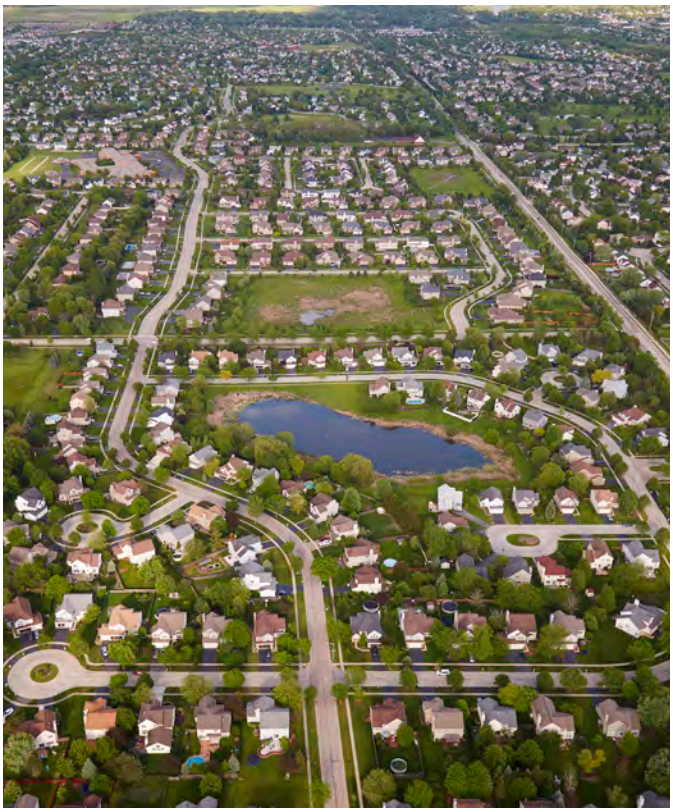


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INTRODUCTION

Climate change threatens human health, infrastructure, natural resources, agriculture, transportation, and the economy as a whole. No single community can solve these issues on its own. Action to mitigate the root causes of climate change through emissions reductions and to adapt to the effects of climate change must be taken at a scale and speed that can only be accomplished through regional and international collaboration. Municipalities and counties in our region are exposed to a common set of threats and opportunities related to climate change. By working together we give ourselves the best chance of achieving our collective goals, building a prosperous and sustainable Chicago region, and improving the quality of life for all of our citizens.

The Metropolitan Mayors Caucus (Caucus) and 175 organizations who contributed to the creation of this plan bring a strong sense of cohesion to meet this enormous challenge at a regional level. This climate action plan, the first for the Chicago metropolitan region and one of the first regional-scale plans of its type in the United States, acknowledges the threats of a changing climate while laying a foundation for climate mitigation and for equitably building our region's strong and collaborative resilience through municipal leadership.

This project galvanizes planning being done at the regional level as well as action being taken by municipalities at the local level. It builds on existing knowledge about greenhouse gas sources and current climate hazards that communities are already facing. This plan considers climate mitigation and adaptation challenges and opportunities at the regional level but aims to empower municipalities to take strategic action. It considers the most threatening climate-related hazards and impacts, predominantly heat and flooding, and proposes actions that can help the region adapt to these conditions while creating opportunities for communities to thrive.

THE CASE FOR MITIGATION AND ADAPTATION

Our region (Figure 1) must join countries, other cities, businesses, and organizations around the world in halting the emission of greenhouse gases (GHG), the root cause of climate change. Burning carbon-based fossil fuels for transportation, building energy and electricity generation are the most significant sources of GHG in the atmosphere. To make necessary and drastic cuts in energy consumption and use cleaner, carbon-free sources of energy like wind and solar, we must make changes to the way people and goods move about the region. We must also alter the way we power buildings and manage land use and waste.

Globally, the severity of climate change impacts is dependent on the rate of carbon dioxide (CO_2) and other GHG emissions. Since industrialization, GHG emissions have already caused Earth to warm 1.0 degree Celsius, resulting in global disruption of natural systems. On the current trajectory, Earth will reach 1.5 degrees Celsius of warming between 2030 and 2050.[4] **This is the decisive decade for reaching regional and national commitments and goals. Urgent and effective climate mitigation is imperative.**

In 2015, 196 countries committed to the Paris Agreement, pledging to cut emissions to limit global average temperature rise in this century to well below 2 degrees Celsius while pursuing efforts to limit the temperature rise to 1.5 degrees. In January 2021, President Joe Biden recommitted the United States to the Paris Agreement. Between 2010 and 2015, GHG emissions in the Chicago region dropped 7%—an encouraging sign, to be sure, but insufficient to support national and global commitments to tackle the climate crisis. Action to cut emissions must be coordinated and greatly accelerated to meet the targets of this plan and the Paris Agreement. This plan proposes climate mitigation solutions, scaled for municipal action, that range from changing individual behaviors to implementing more sustainable land use policies and transitioning to clean energy sources. The regional climate mitigation goal is **net zero emissions.**

Climate change is already causing extreme weather events, such as extreme rain storms, which cause flooding and endanger people, places, and the assets we value. Plans, operations, investments, and adjusted expectations are needed to protect communities, absorb the climate shocks, and "build back better" when disasters occur. The regional climate adaptation goal is **persistent, equitable adaptation.**

THIS PLAN IS A RESPONSE TO THE CLIMATE CRISIS

The Caucus and its partners are ready to take action on the most complex part of predicting future climate: ***human decision-making***. Our member municipalities are home to 8.9 million people in one of the world's most economically vibrant regions. We can collectively make proactive decisions about energy supply, infrastructure, livelihoods and governance so that we all thrive in a changing world. The Caucus is committed to supporting the best decisions we can, given the information we have available today.

The Chicago region is home to many internationally recognized experts leading the study and documentation of the climate system. Simulations of Earth's climate system, called "coupled ocean-atmosphere models," have revealed that human choices have already altered the frequency and severity of climate-driven weather events, including heat, precipitation, cold, drought, ocean characteristics, seasons, and more.[4]

The greatest uncertainties in evaluating realistic future climate conditions are the decisions people might make. Those decisions, in turn, will affect the planet's future climate. Climate scientists simplify human decisions using distinct trajectories of GHG concentrations in the atmosphere. These "Representative Concentration Pathways" provide the boundary conditions for running physics-based models in supercomputers to evaluate the ways our planet might change in response to the collective decision-making of our species.

Comments made during climate adaptation webinar (May 2020) in answer to the question,

"Why does climate adaptation matter to you and your community?"

"Some climate impacts are already in motion and occurring. We have to prepare and begin adapting to moderate impacts—protecting people and valuable ecological systems in our region."

"We have a responsibility to our residents and the rest of the world."

"I care about the health, safety, and longevity of my community."

Below, we show figures that emphasize Representative Concentration Pathways 8.5 and 4.5. The former, also known as "RCP 8.5," is a trajectory of GHG concentrations that would produce an excess radiative forcing of 8.5 Watts over every square meter of Earth's surface by the year 2100. Current emissions track reasonably well with the RCP 8.5 trajectory; RCP 8.5 is often referred to as "business as usual" or a "higher" trajectory. Another trajectory referenced as "moderate" below (Figure 3) is "RCP 4.5"; this trajectory levels off after mid-century, producing excess radiation of 4.5 Watts per square meter for the entire planet by 2100. While it requires substantial emissions reductions, RCP 4.5 would greatly overshoot the aspirational goals of the Paris Accord.

The future is unwritten. The Caucus and its partners are seeking to reduce emissions to net zero to ***avoid the unmanageable*** impacts resulting from climate change under either RCP 8.5 or RCP 4.5. We seek to ***manage the unavoidable*** by adapting to climate variability and change that we anticipate will continue to threaten the people, places, and resources in our region.

The next few pages present recent findings about changing patterns of heat, cold, and precipitation in an effort to guide local decisions that will reduce GHG emissions and to adapt to the impacts that we ultimately do not prevent. We encourage the reader to dig deeper into the scientific literature about climate science by reading the reports we cite as well as new research, which is published continually by dedicated climate scientists.

4 IPCC. 2018. Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5 degrees Celsius above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.). World Meteorological Organization, Geneva, Switzerland, 32 pp. https://www.ipcc.ch/sr15/chapter/spm/.

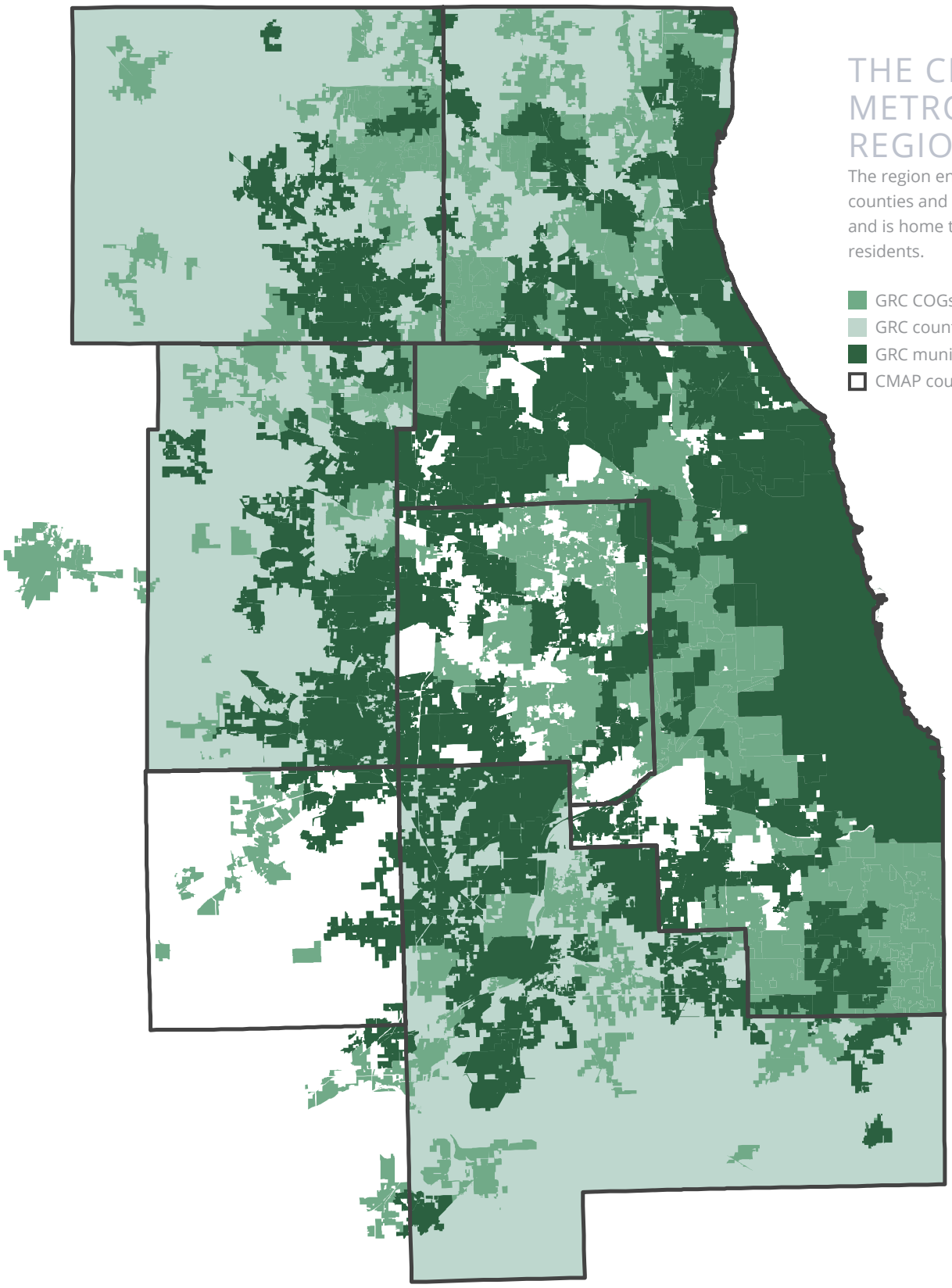


Figure 1. Map of the Chicago region indicating counties and municipalities served by the Chicago Metropolitan Agency for Planning and the Metropolitan Mayors Caucus and the councils of government (COGs) that have adopted the Greenest Region Compact (GRC). Source: CMAP

OUR CHANGING CLIMATE

Our region has witnessed faster warming than the globe as a whole Greenhouse gas (GHG) emissions are known to be the primary driver of this change. Reducing GHG emissions is vital because the trajectory of warming will be much more rapid and extreme with higher rates of GHG emissions. Because carbon dioxide persists in the atmosphere for a long time, temperature will continue to increase throughout the 21st century regardless of global action on climate change. Therefore, people and governments must also adapt to the many ways that a changing climate will impact them. A warmer atmosphere holds more moisture, increasing the frequency and intensity of heavy rain and snow events. The most common climate-related hazards facing our region are heat and flooding.[5]

TEMPERATURE AND HEAT

Heat is the leading cause of weather-related death in the United States.[6] During the years 1985–2016, average temperature in the states that border the Great Lakes rose by 1.4 degrees relative to the early 20th century (1901–1960).[5]

By the end of the century, a higher emissions scenario (RCP 8.5[7]) would force two to three months' worth of additional days each year with temperature exceeding 90 degrees Fahrenheit for people in the Chicago region (Figure 2). This persistent heat would bring higher air conditioning costs, more energy usage, higher water demands, water treatment challenges, and problems for agriculture, forestry, and natural resource management. Extreme temperatures on the hottest days of the year are projected to increase substantially in Cook County (with a mean change of 7 degrees Fahrenheit across many climate models) by mid-century.[8] While temperatures exceeded 100 degrees Fahrenheit perhaps a few times a year in northern Illinois throughout the 20th century (data not shown but are available from the U.S. Climate Resilience Toolkit), some models suggest this threshold could be crossed nearly 30 times per year by 2050 (Figure 3).

Extreme heat poses health threats to vulnerable people with heart or breathing conditions or who do not have access to air conditioning. Structures and dense development in urban areas absorb and hold heat, amplifying impacts in urban heat islands (Figure 5). Urban heat island effects combined with heat waves disproportionately affect people of color and vulnerable populations. The 1995 heat wave was the deadliest weather event in Chicago history. Extreme heat lasting over several days and nights, coupled with inadequate communications, infrastructure, and social and emergency response, led to 739 tragic deaths. Most victims were poor and elderly. This event is indelible in the memories of residents, leading many to be concerned about the potential impacts of future heat waves.

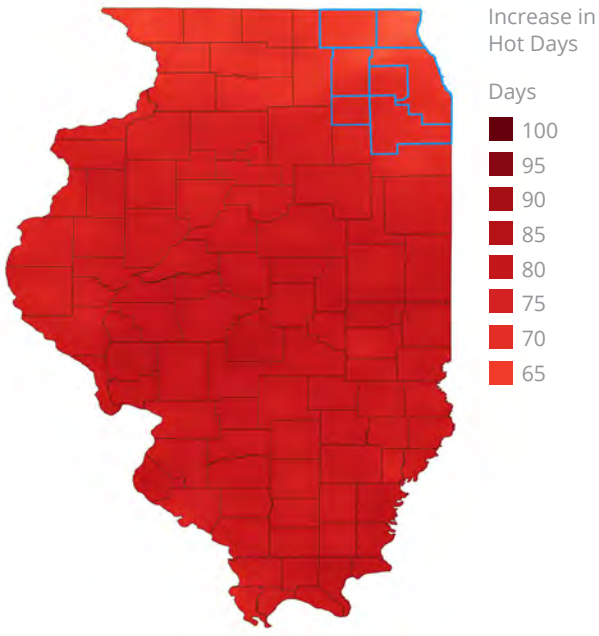


Figure 2. Downscaled climate models (RCP 8.5) suggest the region will experience many more very hot days (over 90°F) by the end of the century unless global emissions are dramatically reduced. Source: Applied Climate Information System (ACIS)

5 Assessment of the Impacts of Climate Change on the Great Lakes. 2020. https://www.climatehubs.usda.gov/sites/default/files/Great-Lakes-Climate-Change-Report.pdf. Accessed February 2021.

6 U.S. Federal Government. 2019. National Weather Service Weather-Related Fatality and Injury Statistics. https://www.weather.gov/hazstat/ Accessed February 2021.

7 Intergovernmental Panel on Climate Change. 2019. Scenario Process for AR5. https://sedac.ciesin.columbia.edu/ddc/ar5_scenario_process/RCPs.html. Accessed February 2021.

8 U.S. Federal Government. 2021. U.S. Climate Resilience Toolkit Climate Explorer. https://crt-climate-explorer.nemac.org/next-steps/?county=Cook%2BCounty&city=Chicago%2C%20IL&fips=17031&lat=41.8781136&lon=-87.62979819999998&station=USW00094846&station-name=CHICAGO%20OHARE%20INTL%20AP&nav=next-steps. Accessed February 2021.

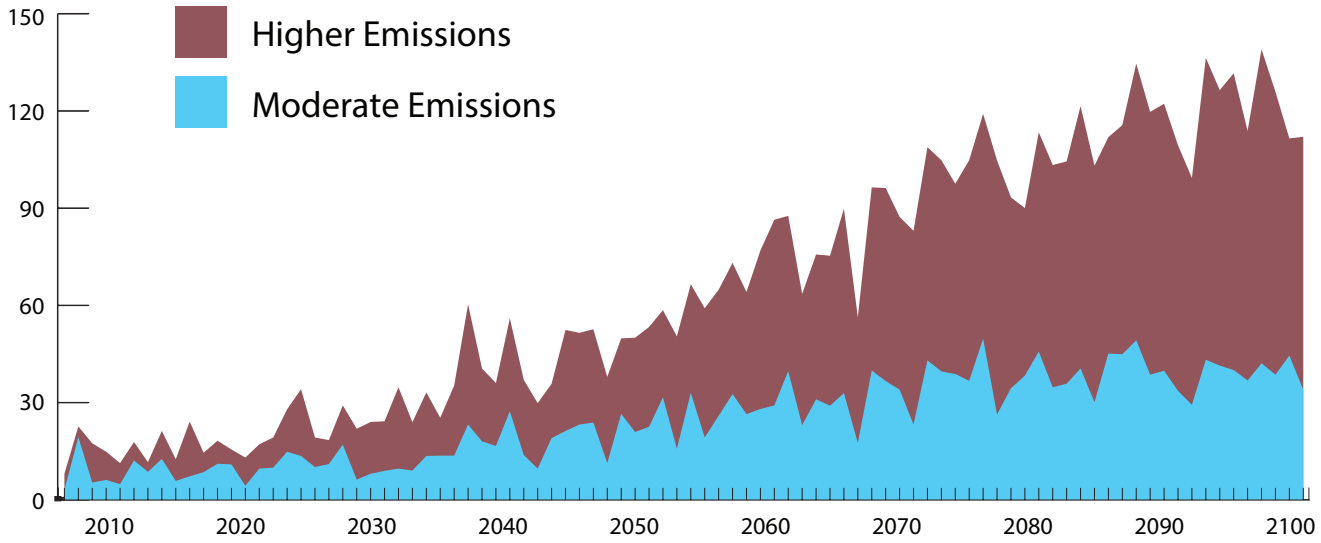


Figure 3. Annual days with maximum temperature greater than or equal to 100°F in northern Illinois. Source: U.S. Climate Resilience Toolkit

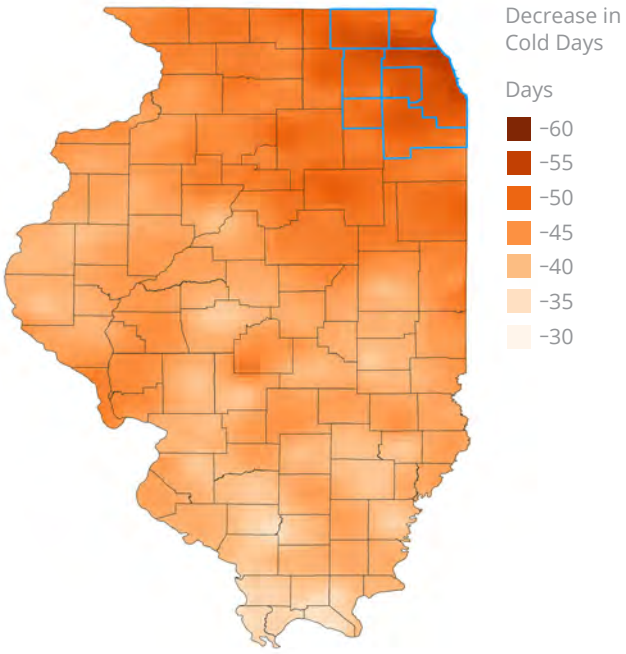


Figure 4. Downscaled climate models (RCP 8.5) suggest the region will have far fewer days with temperatures falling below freezing by the end of the century unless emissions are dramatically reduced. Source: ACIS

The number of freezing days could decrease by 20 to 60 days between 2070 and 2100 under RCP 8.5 (Figure 4). Warmer winter temperatures increase the need for road repairs when repeated freeze-thaw cycles burrow cracks into pavement. A wintry mix of rain and snow falling together causes hazardous driving conditions and the need for de-icing operations, which contributes to groundwater contamination.

While Chicagoland residents might welcome fewer freezing days, this shift in climate represents a radical departure from historical norms that will greatly affect people, agriculture, and other plants and animals that inhabit the region. With fewer freezing days, the growing season would continue to lengthen, while destructive storms, floods, and droughts would become more frequent. Pests and diseases are likely to encounter better conditions for growth, reproduction, and dispersal. Unprecedented temperature, moisture, and energy demands will need to be managed as climate patterns change more and more rapidly throughout the 21st century.

For more details, see Appendix C, Illinois State Climate Summary, for analyses conducted in 2017 for the 4th National Climate Assessment.

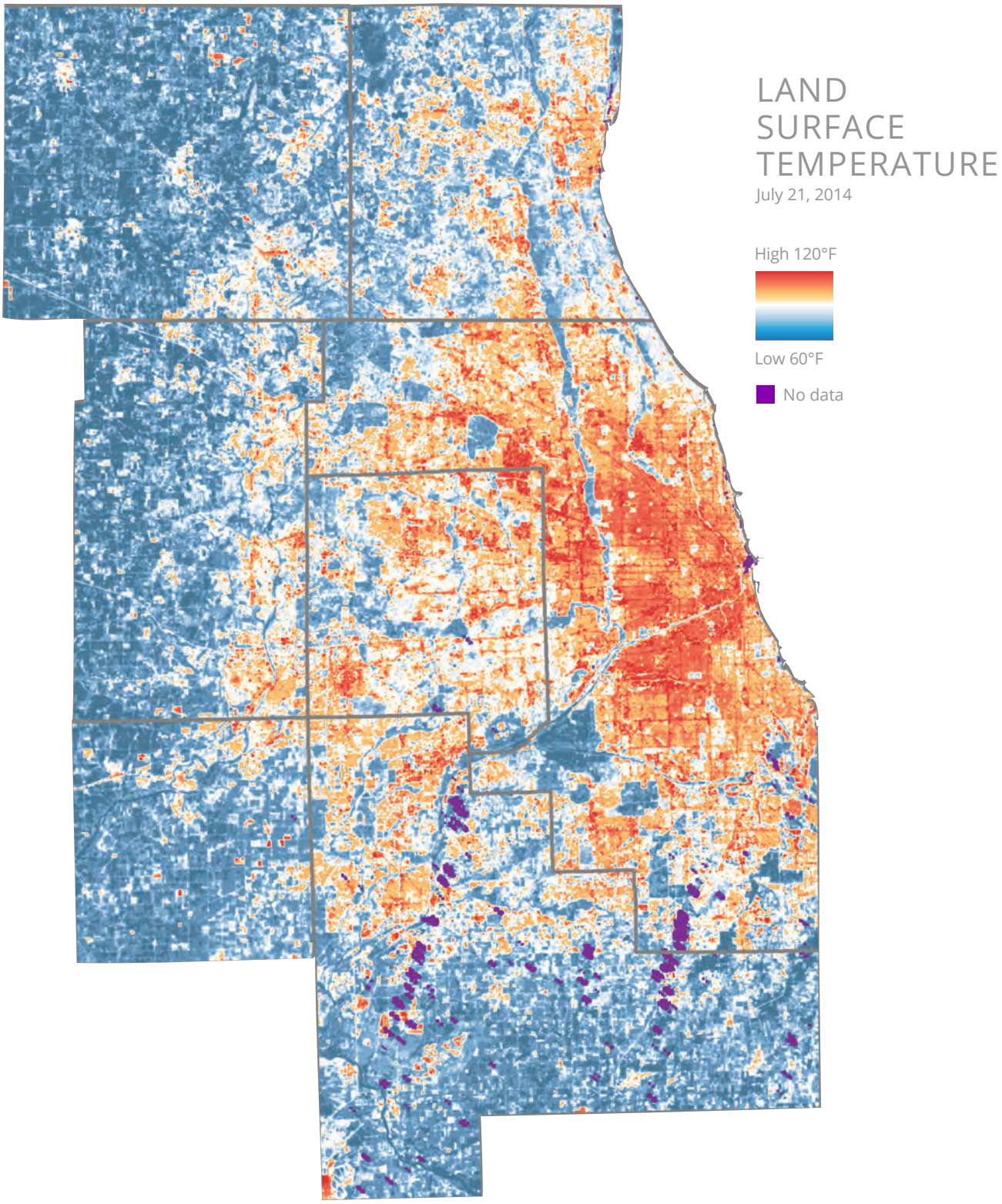


Figure 5. This map of land surface temperature, derived from satellite data acquired July 21, 2014, shows temperature to be greater where paved surfaces dominate the landscape. Source: CMAP

FLOODING

The people and places that make up the Chicago region are already confronting the adverse impacts of climate change. Overall U.S. annual precipitation increased 4% between 1901 and 2015, but the Great Lakes region saw an almost 10% increase over this interval, with more precipitation coming as unusually extreme events. According to the NOAA's Illinois State Climate Summary (Appendix C) and the 2019 *Assessment of the Impacts of Climate Change on the Great Lakes*,[9] Illinois is likely to see more rain (Figure 6) and less snowfall (Figure 7) during the winter months. The region is also likely to see an increased number of very large storms, with longer dry spells between rain events. This change in the timing and intensity of precipitation will likely continue to increase the frequency of both flooding and drought.

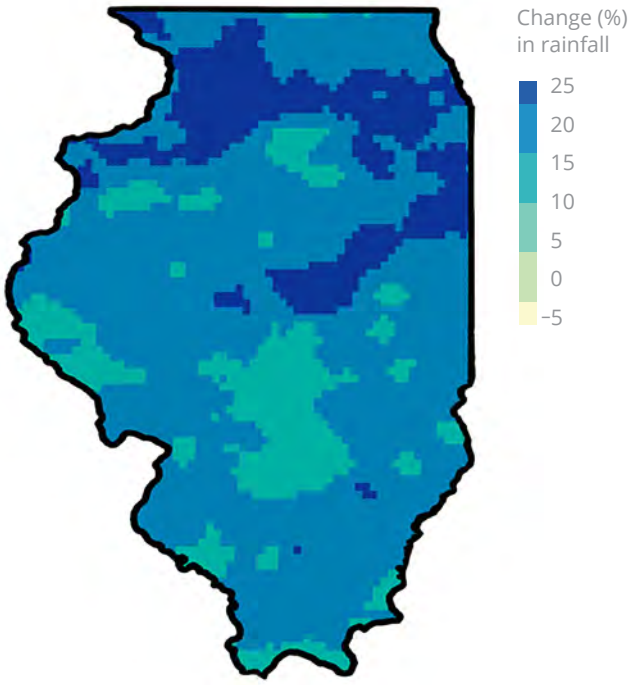


Figure 6. Percent change in the annual maximum 5-day rainfall under RCP 8.5 for 2070–2100 compared to 1976–2005. Source: Great Lakes Climate Change Report[9]

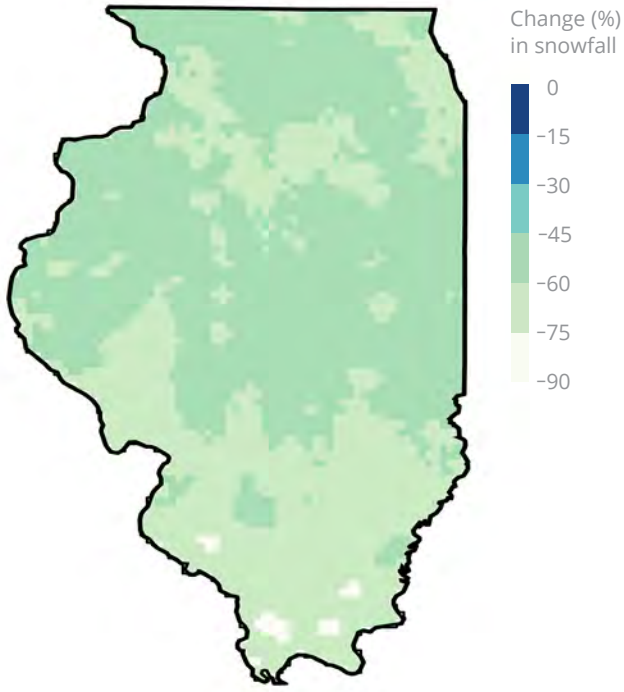


Figure 7. Percent change in annual snowfall under RCP 8.5 for 2070–2100 compared to 1976–2005. Source: Great Lakes Climate Change Report[9]

9 Op. cit. https://www.climatehubs.usda.gov/sites/default/files/Great-Lakes-Climate-Change-Report.pdf. Accessed February 2021.

Between 2007 and 2014, insurance paid out flood-related damages of $1.832 billion in the Chicago metropolitan region (Figure 8). Most of the damage was tied to five storm events, and 90% occurred outside of the mapped 100-year floodplain.[10] People harmed by flood damage are predominantly in Economically Disconnected Areas[11] of our region and are less able to respond and recover (Figure 9).

CMAP analysis of flood risk in the region has shown that communities with lower incomes and a high proportion of minority residents typically have the greatest exposure to flooding. Due to historical disinvestment, these same communities also tend to have lower capacity to prepare for and recover from flood events. During the development of the ON TO 2050 Comprehensive Plan, CMAP defined Economically Disconnected Areas[12] as census tracts with higher-than-average concentrations of low-income and minority or limited English-speaking residents. Economically Disinvested Areas are non-residential census tracts exhibiting signs of long-term economic challenges, including employment loss, limited small business lending, and low commercial real estate values. Economically Disconnected and Disinvested Areas are significantly more likely to have a high degree of flood risk (a score of eight or higher) than the rest of the region.

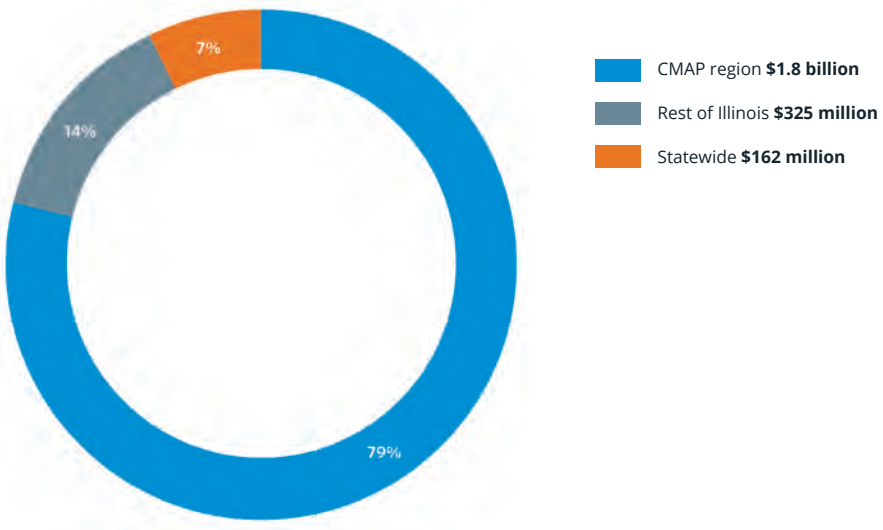


Figure 8. Total public and private flood insurance and disaster relief payouts for flooding, by geography, 2007-14. Note: Statewide includes Public Assistance grants, which are not broken down by geography. Source: CMAP and Illinois Department of Natural Resources (IDNR)

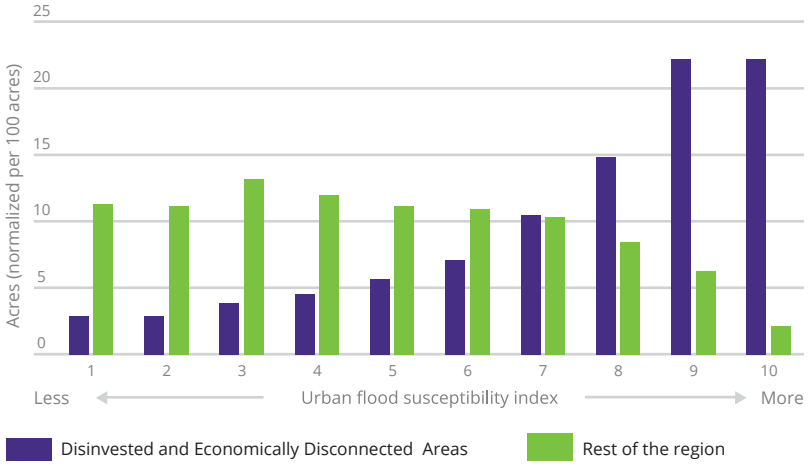


Figure 9. Urban flood susceptibility per 100 acres in Economically Disconnected and Disinvested areas compared with the remainder of the region. Note: Economically Disconnected and Disinvested areas are more likely to be in flood susceptible locations. However, this varies by county and is most significant in Cook, Kane, and Lake. Source: Chicago Metropolitan Agency for Planning, 2018.

10 CMAP. 2017. Stormwater and Flooding, ON TO 2050 Strategy Paper. https://www.cmap.illinois.gov/documents/10180/653821/FY18-0051+STORMWATER+AND+FLOODING_FINAL.pdf. Accessed February 2021.

11 CMAP, ON TO 2050. 2018. https://www.cmap.illinois.gov/2050. Accessed February 2021.

12 Op. cit. https://www.cmap.illinois.gov/2050/maps/eda. Accessed February 2021.

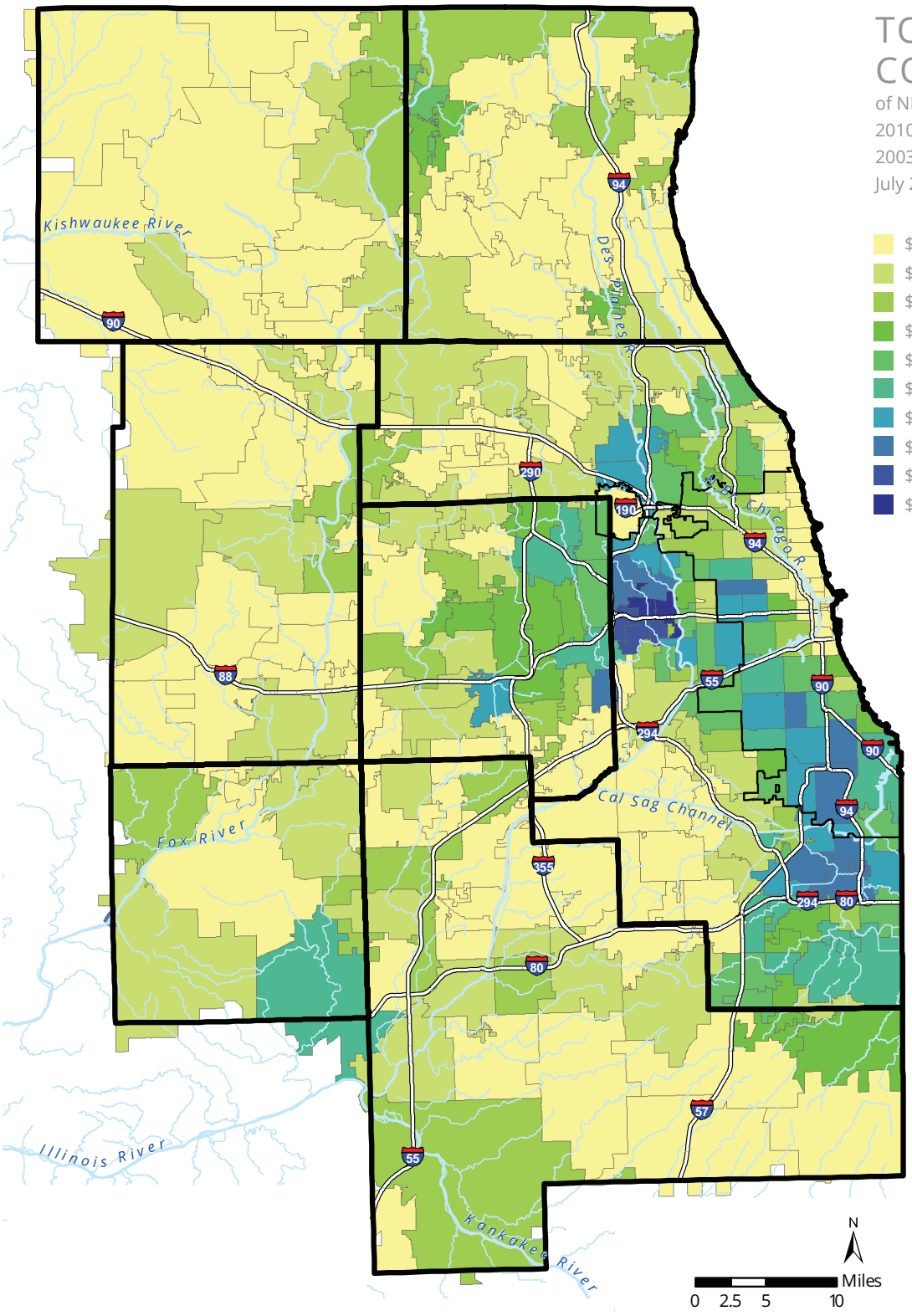


Figure 10. Total flooding damage payments associated with National Flood Insurance Program (NFIP), Individual Disaster Assistance (IA), and Small Business Administration (SBA) programs per 2010 household by ZIP code in the Chicago region from 2003 to 2015. Source: CMAP.

Figure 11. Neighborhood characteristics and access to opportunities are social determinants of health. Copyright 2018, Robert Wood Johnson Foundation. Used with permission.

EQUITY

Figures 12 & 13. Workers installing solar panels. Image credit: Elevate.

Impacts from climate change are profoundly inequitable. Historical policies and systemic racism have created conditions that leave low-income individuals and people of color more vulnerable to climate-related hazards, as evidenced by heat and flooding impacts discussed above. Underlying conditions such as poor stormwater infrastructure, inadequate housing stock, lack of tree cover, exposure to air pollution, and barriers to transit and active transportation are chronic stressors that amplify impacts from climate hazards like flooding and extreme heat.

These underlying conditions also exacerbate health outcomes from stressors like air pollution and poor indoor air quality. In Illinois, low-income communities and people of color are more likely to have,[13] and die from,[14] asthma. These same communities are also more likely to be exposed to air pollution, which exacerbates asthma and is linked with an increased risk of dying from COVID-19. The coronavirus pandemic has illustrated how disasters aggravate existing stressors and further polarize health inequities. Much like the pandemic, climate change is a threat multiplier, meaning it will further intensify existing inequities.

ZIP codes can be predictors of life expectancy given the social determinants of health found therein. These are the conditions of the environment where we are born, live, work, and play, such as access to parks, quality education, and clean air (Figure 11). The Center on Society and Health at the Virginia Commonwealth University looked at life expectancy

13 Illinois Department of Public Health. 2018. Asthma Trends Report Behavioral Risk Factor Surveillance System 2011–2017. http://www.dph.illinois.gov/sites/default/files/publications/122018ohpmbrfsstrendscombined.pdf. Accessed February 2021.

14 Illinois Department of Public Health. 2018. Asthma Trends Report Mortality 2000–2016. http://www.dph.illinois.gov/sites/default/files/publications/122018ohpmmortalitytrendscombine.pdf. Accessed February 2021.

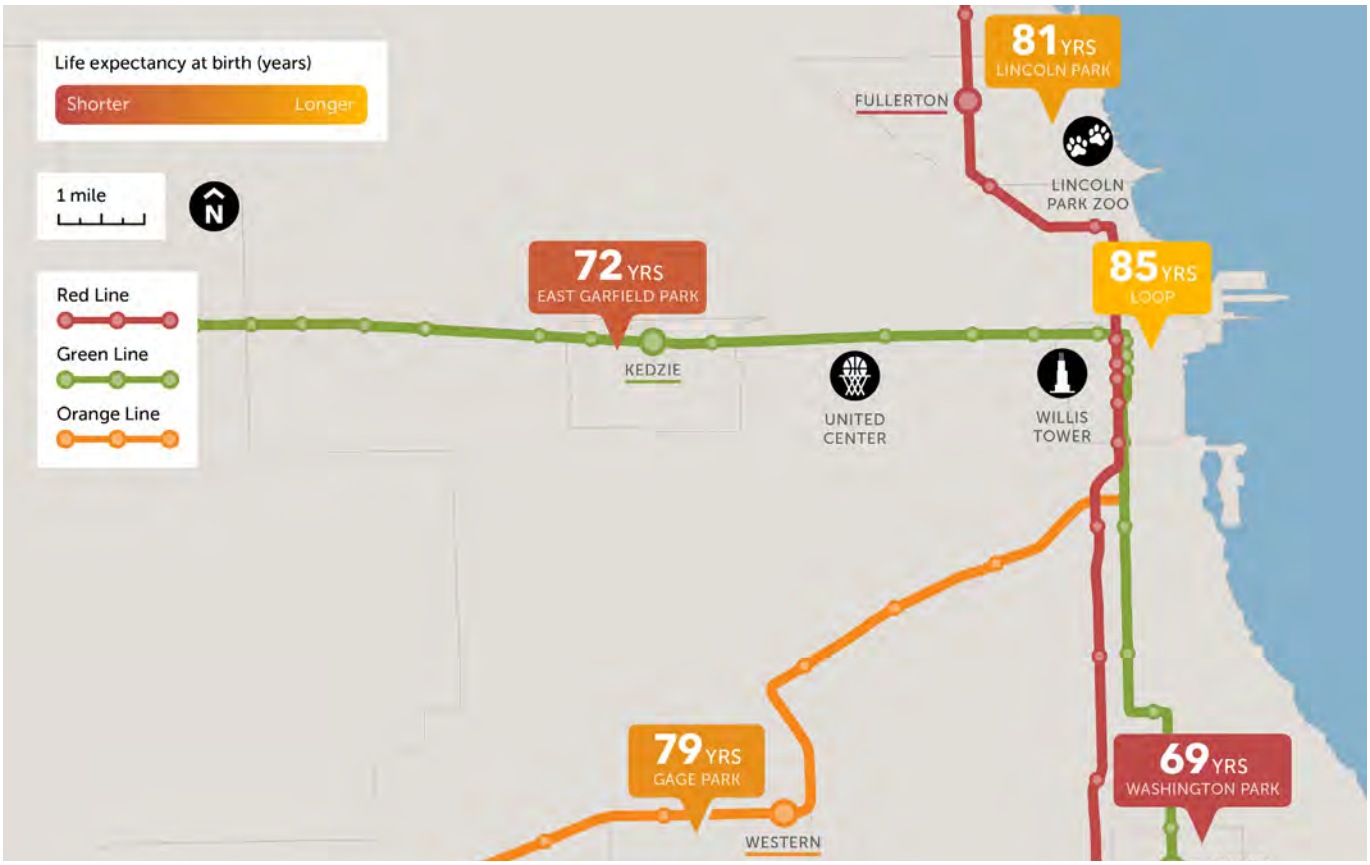


Figure 14. When comparing life expectancy in Chicago neighborhoods, there are large gaps in health when going a short distance. Copyright 2015, Robert Wood Johnson Foundation. Used with permission from the Robert Wood Johnson Foundation. Image credit: Virginia Commonwealth University Center on Society and Health

in relation to public transportation in cities throughout the United States.[15] Life expectancy differs throughout Chicago along the Red, Orange, and Green Lines (Figure 14). For example, the life expectancy for someone living in Washington Park is 69 years, while it is 85 years for someone living in the Loop—a 16-year difference between two neighborhoods that are only eight miles apart in the same city. For a stronger, more equitable future, our region needs to collaborate to ensure that every resident enjoys conditions that support good health and opportunities to thrive.

Responding to climate-related impacts starts with an assessment of who and what is vulnerable. This plan—which aims to protect vulnerable people, places, and things—is based upon a qualitative assessment of exposure, vulnerability, and risk for communities throughout the region. We acknowledge that existing mapping and evaluation of socioeconomic vulnerability may not capture the multiplicity, severity, or extent of vulnerability.
Mitigation strategies offer opportunities to address historic inequity by integrating environmental justice principles into clean energy goals. Strategies that reduce building energy demands and provide affordable renewable energy can reduce the energy burden on vulnerable households. Further, strategies that optimize building energy and advance clean energy offer economic opportunities in the growing clean energy industry. In 2019, the Chicago metro region added 1,188 jobs in the solar energy industry, placing it second among metro areas for solar jobs growth[16] (Figure 12 & 13). A survey of diversity and inclusion in the solar industry indicated that 24% of solar firms have a strategy in place to increase representation by people of color.[17]

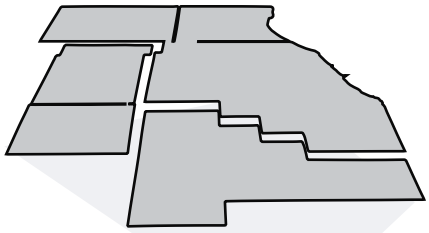
Achieving equity would mean that all people are justly and fairly included in society and that everyone is able to participate, prosper, and achieve their full potential. An equitable approach recognizes that everyone enjoys different advantages and faces different challenges, and that everyone should be treated justly and fairly. This climate action plan strives for that equitable approach.

15 *Virginia Commonwealth University Center on Society and Health. 2014. Mapping Life Expectancy. https://societyhealth.vcu.edu/work/the-projects/mapschicago.html. Accessed February 2021.*
16 *The Solar Foundation. 2020. National Solar Jobs Census. https://www.thesolarfoundation.org/national/. Accessed February 2021.*
17 *The Solar Foundation. 2019. Diversity and Inclusion in the Solar Industry. https://www.thesolarfoundation.org/wp-content/uploads/2019/05/Solar-Diversity-Infographic.pdf. Accessed February 2021.*

COORDINATED EFFORT

INDIVIDUAL

MUNICIPAL



REGIONAL

STATE

FEDERAL

OUR REGIONAL APPROACH

REGIONAL AND METRO-SCALE CLIMATE LEADERS

This climate action plan results from our participation in the pilot Regional and Metro-Scale Climate Leaders project.[18] The European Union (EU) supported Regional and Metro-Scale Climate Leaders through its International Urban Cooperation (IUC) program to accelerate regional climate action in the United States, leverage the experience of European and other global regions collaborating on climate, and test the effectiveness of the regional approach in the U.S. context. We join three other U.S. regions to undertake regional climate planning and commit to the Global Covenant of Mayors for Climate and Energy (GCoM).

The Chicago metropolitan region was selected along with the regions of Kansas City, Missouri, metro Washington, DC, and Denver/Boulder, Colorado, to participate in the Regional and Metro-Scale Climate Leaders project in the summer of 2019. The Twin Cities (Minneapolis-St. Paul) joined the cohort once the project began. The four pilot regions learned from leading international regions including Stuttgart, Brussels, Barcelona, Oceania, and others. The IUC facilitated shared learning opportunities, such as the IUC's City-to-City event in Brussels, and provided technical services.

This project galvanized our region's growing political will for climate action and leveraged our regional knowledge and capacity. The Metropolitan Mayors Caucus Executive Board formally committed to the GCoM in early 2020 on behalf of its 275 municipal members, making it the largest region in the cohort. The Caucus joins just five Illinois cities and 149 other U.S. cities with commitments to GCoM. Globally, more than 10,000 cities and regions in 130 countries have committed to GCoM. The completion of research done to prepare this plan, and the plan itself, satisfy GCoM requirements.

These requirements are:

- A regional-scale greenhouse gas (GHG) emissions inventory;
- An assessment of climate hazards and vulnerabilities;
- An ambitious, measurable, and time-bound target to reduce greenhouse gas emissions;
- Ambitious adaptation vision and goals to increase local resilience to climate change;
- An ambitious and just goal to improve access to sustainable energy; and
- A climate action plan that articulates objectives and recommends strategic actions for both climate mitigation and adaptation.

The Caucus will also regularly report actions and outcomes using GCoM's Common Reporting Framework.

Figure 15. Regional and Metro-Scale Climate Leaders join municipalities and regions from around the world to share information about climate action in Brussels, Belgium, in November 2019. Image credit: IUC

Figure 16. Project team members from CMAP and the Caucus meet with European Commission officials at the National Conference of Regions in Washington, DC, in February 2020. Image credit: IUC

18 Global Covenant of Mayors for Climate & Energy. 2019. GCoM USA 'Regional and Metro-scale Climate Leaders announced.' https://globalcovenant-usa.org/news/gcom-usa-regional-and-metro-scale-climate-leaders-announced/#:~:text=GCoM%20is%20an%20international%20alliance,%2C%20low%20emission%2C%20resilient%20society. Accessed February 2021.

CLIMATE LEADERS

Climate action must occur across a complex and interrelated landscape of government jurisdictions with sometimes overlapping geographies and shared constituents, but the well-being of people must be at the center of climate action. Protecting quality of life and the opportunity for all people to thrive is the reason for this plan.

At the international level, the Intergovernmental Panel on Climate Change[19] (IPCC) of the United Nations provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. Nations express vision and common commitment through the Paris Agreement and take broad actions to meet their own targets, known as Nationally Determined Contributions. The U.N. also created the *Sendai Framework for Disaster Risk Reduction 2015–2030* and the Sustainable Development goals, which are integrated into this plan. United States federal leadership is essential in establishing regulations, making investments, and cementing a culture of individual commitment necessary to stabilize the climate. The federal government has renewed its commitment to the Paris Agreement. The Biden administration is signaling decisive climate leadership, including the proposed American Jobs Plan, which would invest in equitably building resilience and mitigating climate change.

The Chicago metropolitan region has a strong history of collaborative leadership to address regional challenges. At our roots is the visionary *Plan of Chicago*, which considered the vibrancy of the city in the context of a beautiful, safe, thriving region.[20] Communities are connected by shared infrastructure, transportation, and energy systems fundamental to our ability to respond to climate change. A region-wide approach to climate planning reflects the power of participatory planning and collaborative problem solving modeled by CMAP's ON TO 2050. This plan aims to leverage the strengths of municipal government and proposes a coordinated approach to align resources and share expertise to move our region toward a sustainable future. Key players in the planning and implementation of this plan are described below.

The GRC is now adopted by 132 municipalities and four counties, forming the largest regional sustainability collaborative for municipalities in the U.S.

Figure 17. Regional Climate Plan Mitigation Workshop, October 2019. Image credit: Cheryl Scott.

METROPOLITAN MAYORS CAUCUS

The Caucus is a unique council of governments that unites nine sub-regional councils of government and 275 municipal members. It fosters regional collaboration among municipalities and supports its members in taking sustainable actions. Former Mayor Richard M. Daley ushered in a sustainable identity for Chicago during his 20-year tenure and founded the Caucus. Chicago's sustainability leadership inspired complementary action by suburban leaders with the original Greenest Region Compact (GRC) in 2007. In 2016, the Caucus updated the GRC[21] to articulate 49 sustainability goals in 10 categories and provide guidance to achieve these goals with the extensive GRC Framework. The GRC Framework offers hundreds of sustainability strategies in a checklist-type format that allows municipalities to assess their current efforts and develop their own tailored sustainability plan. A hallmark of the GRC is its practical approach that encourages communities of all sizes and strengths to participate and supports their success. The GRC is now formally adopted by 132 municipalities and four counties in the region. This forms the largest regional sustainability collaborative for municipalities in the U.S., representing 6.2 million residents. Many GRC communities participated in the development of this climate action plan.

The Caucus and its powerful collaboration of GRC communities was encouraged to undertake regional climate planning through the Regional and Metro-Scale Climate Leaders program and led the project through to completion. The Caucus will continue to guide municipal climate action as the region's signatory to the Global Covenant of Mayors for Climate and Energy.

19 *Intergovernmental Panel on Climate Change. https://www.ipcc.ch/. Accessed February 2021.*

20 *Chicago Metropolis 2020. 2008. The Plan of Chicago: A Regional Legacy. http://burnhamplan100.lib.uchicago.edu/history_future/plan_of_chicago/ Accessed February 2021.*

21 *Metropolitan Mayors Caucus. 2020. Greenest Region Compact. https://mayorscaucus.org/initiatives/environment/rec/. Accessed February 2021.*

Figure 18. Kevin Burns, Mayor of the City of Geneva and Metropolitan Mayors Caucus Environment Committee Chairman (seated, at right), and Enrique Alfaro Ramírez, former Mayor of Guadalajara, Mexico, sign the Chicago Climate Charter. Image credit: City of Chicago

MUNICIPALITIES

Municipalities in the region have demonstrated the will and ability to take sustainable actions and sustain vibrant cohesive communities that can withstand climate impacts. Research done to prepare the GRC showed that 81% of communities are taking measurable steps toward sustainability.[22] Dozens of communities have sustainability plans, some created with support from CMAP and many more created using the GRC Framework. Yet community-scale climate plans are quite rare in the region. Chicago developed the first *Chicago Climate Action Plan* in 2008 and later released a comprehensive resiliency plan, *Resilient Chicago: A Plan for Inclusive Growth and a Connected City*[23] in 2019. Evanston, Highland Park, Northbrook and Park Forest also have their own climate action plans. A few other communities incorporate mitigation targets or climate risk assessments into other plans and guiding documents. This overarching climate plan for the region realizes economies of scale, providing guidance and benefits to all municipalities in the region. Municipalities that have adopted the GRC have formally expressed support for climate action and are poised to be powerful partners in achieving the objectives of this plan.

COUNTIES

The seven counties of the Chicago metropolitan region have important roles, particularly in climate adaptation. Counties lead in developing hazard mitigation plans, including comprehensive risk assessment, that are adopted by municipalities within their boundaries. Counties and water reclamation districts such as the Metropolitan Water Reclamation District of Greater Chicago (MWRD) prepare stormwater management plans and implement them through county-wide ordinances to manage stormwater and prevent flood damage. Essential health planning and services, like protecting against environmental hazards, are in the purview of county government.

REGIONAL STAKEHOLDERS

Regional stakeholders work in communities across the Chicago region and engage in cross-jurisdictional issues including transportation and mobility, land use, the regional economy, equity, climate, and the environment. CMAP has engaged in climate mitigation, resilience, and adaptation planning through ON TO 2050, the region's comprehensive plan. ON TO 2050

"This helps our municipality have a clear plan of where to go and strategies to take when it comes to climate planning, as we have little technical resources within the City." —Caucus member

22 *Metropolitan Mayors Caucus. 2015. The Greenest Region Compact: Opportunities + Impact. https://mayorscaucus.org/wp-content/uploads/2015/03/GRC-Opportunities-and-Impact-2015-final.pdf. Accessed February 2021.*

23 *City of Chicago. Resilient Chicago. https://resilient.chicago.gov/. Accessed February 2021.*

Figure 19. The 2.7MW Somonauk Road Community Solar project was developed in Somonauk by Nexamp, Inc. The project began producing clean energy to benefit subscribers in the ComEd territory in March of 2021. Image credit: Nexamp, Inc.

is structured around three core principles: resilience, inclusive growth, and prioritized investment. The plan specifically calls for the region to mitigate the impacts of climate change by transitioning to a cleaner transportation system and expanding low and zero-carbon energy generation. The plan also calls for the region to prepare for the unavoidable effects of climate change by strengthening green (nature-based) and gray (traditional, man-made) infrastructure, incorporating resilience into planning and development decisions, and improving operational responses to extreme weather events.

Other regionally focused entities are also critical to accelerating climate solutions. The Regional Transportation Authority, Metra, Pace, Metropolitan Planning Council and the Chicago Area Clean Cities Coalition are working together to reduce the transportation system's climate impact. The Nature Conservancy, Openlands, and Chicago Wilderness are addressing land conservation and resilience issues. Metropolitan Planning Council and Center for Neighborhood Technology address multiple climate issues including water, flooding, equity and transportation. These and other regional entities should work with municipalities to advance local and regional climate action. The private sector, especially corporations and higher education, are making great strides in climate action both with Chicago-based facilities and global operations. These and other regional entities should work with municipalities to advance local and regional climate action.

STATE OF ILLINOIS

Illinois has a number of policies that are supportive of clean energy and will help drive progress toward the objectives of this climate action plan. Illinois' Renewable Portfolio Standard (RPS) requires that 25% of electricity sold by utilities be offset by renewable sources by the year 2025.[24] The Future Energy Jobs Act (FEJA) (P.A. 99-0906) was enacted in 2017 to strengthen and diversify clean energy generation within the state. The law provides equitable access to distributed renewable energy options such as community solar and rooftop solar for all consumers and special funding for low-income solar projects.

The State's Energy Efficiency Portfolio Standard requires electric utilities to invest in energy efficiency programs and sets annual performance standards. This is expected to achieve a 20% reduction in energy consumption over 2017 base levels by the year 2030.[25]

In 2019, Governor J.B. Pritzker joined 24 other governors in committing to the U.S. Climate Alliance, pledging to advance the goals of the Paris Agreement, report progress, and accelerate policies to reduce carbon pollution and promote clean energy. The Governor also released a plan in August 2020, *Putting Consumers & Climate First: Governor Pritzker's Eight Principles for a Clean & Renewable Illinois Economy*, that calls for a state energy goal of 100% renewable energy by 2050.[26] Comprehensive clean energy legislation, which could accelerate state progress toward decarbonization, is now under consideration by the Illinois General Assembly.

24 National Conference of State Legislatures. 2021. State Renewable Portfolio Standards and Goals. https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx#il. Accessed February 2021.

25 Office of Governor J.B. Pritzker. 2020. Putting Consumers & Climate First: Governor Pritzker's Eight Principles for a Clean & Renewable Illinois Economy. https://www2.illinois.gov/IISNews/21974-Putting_Consumers_Climate_First-Governor_Pritzkers_Eight_Principles_for_a_Clean_Renewable_Illinois_Economy.pdf. Accessed February 2021.

26 Ibid.

HOW TO USE THIS PLAN

This Climate Action Plan identifies common objectives for regional stakeholders to consider, though strategies are scaled for municipal action.

The regional GHG inventory and emissions models are likely of great value to municipal leaders embarking on local climate action. This assessment will help local leaders prioritize actions related to building and transportation energy, the two greatest sources of GHG emissions. Individual communities need not undertake their own local GHG inventories to exercise their authority and influence to help the region mitigate climate change.

Proposed mitigation solutions necessarily span a wide range—from actions that are relatively simple and affordable, like making buildings energy efficient, to actions that are complex and formidable, like district energy systems. Municipalities may **lead** by demonstrating low-carbon operations and choices within their own operations. Municipalities may **enact** policies, like streamlining solar codes and processes that accelerate the transition to clean energy, or they may **encourage** others to reduce GHG emissions with investments and behaviors, like creating paths and infrastructure that encourage people to walk or bike instead of drive. Mitigation strategies are framed for municipalities to effect change using these three primary levers, when they can.

The value in the regional climate risk and vulnerability assessment is to focus actions to protect people, places, and things that are increasingly in harm's way given a changing climate. Through diverse stakeholder input, this plan prioritizes climate hazards and impacts threatening communities in the region, primarily heat and flooding. The plan's adaptation objectives leverage municipal strengths and authorities and underscore the importance of equity. It presents strategies that municipalities can take independently and in the near term to begin adapting to climate change. It does not, however, provide a ranked set of priorities for each of the 284 municipalities in the region. In an ideal world, adaptation would ensue from each local government taking the *Steps to Resilience*[27] to understand its own climate-related exposure, vulnerability, and risk. We recognize that resources for such an effort may not be available in all communities. Nonetheless, each government will need to prioritize its own concerns prior to planning and taking adaptation actions that may require substantial resources in their own right.

The mitigation and adaptation strategies proposed in this plan are not exhaustive, but they do reflect priority actions that will effectively support adaptation and mitigation goals in the short term and using ideas that have been tested elsewhere. Strategies dovetail with Greenest Region Compact goals and should inform local sustainability plans. They are anchored in the region's comprehensive plan, ON TO 2050, and build on that plan's recommendations around community, prosperity, environment, governance, and mobility.

The mitigation and adaptation strategies proposed in this plan are not exhaustive, but they do reflect priority actions that will effectively support adaptation and mitigation goals in the short term and using ideas that have been tested elsewhere.

LEAD

Municipalities take actions within their own operations and decisions.

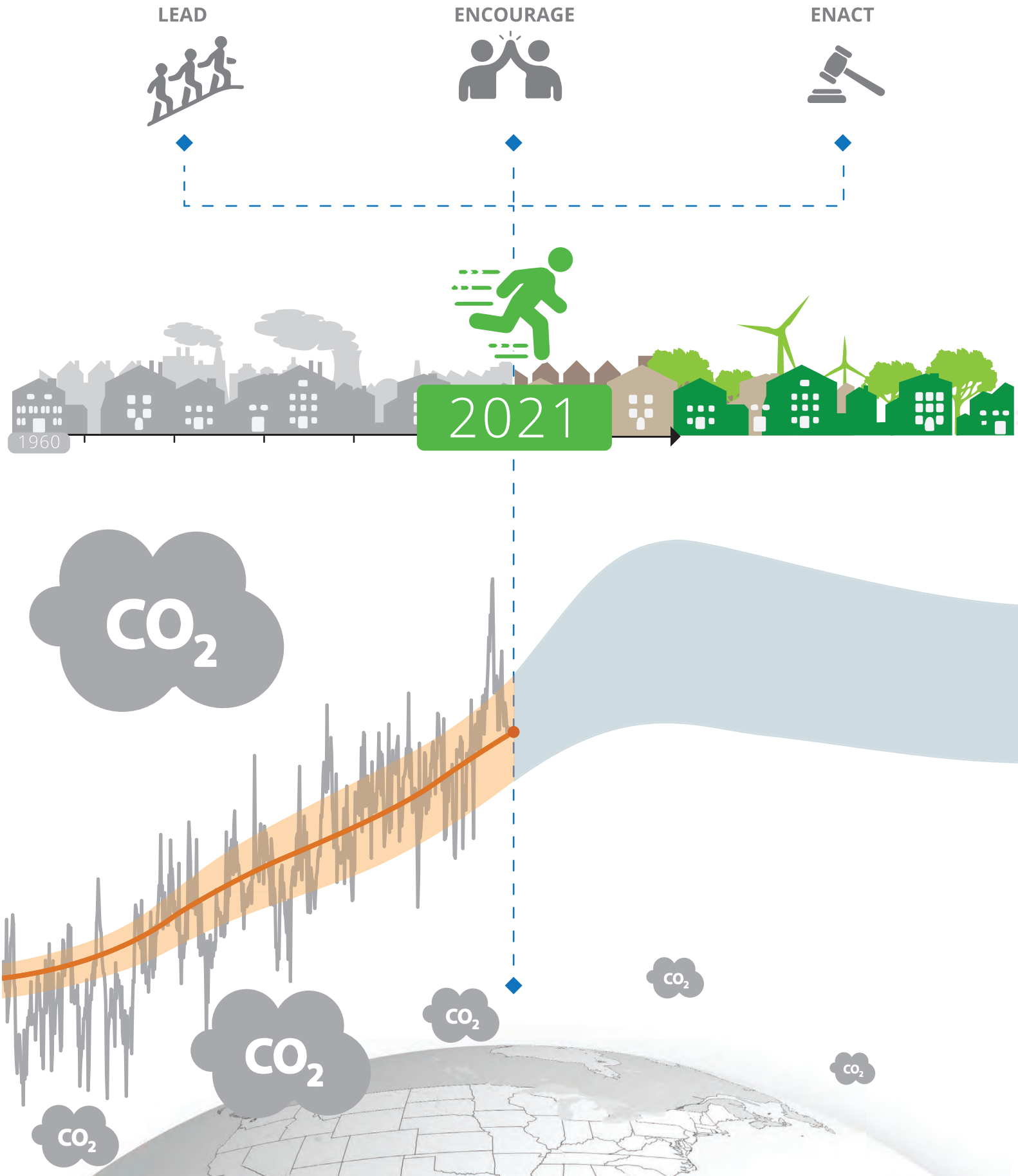
ENCOURAGE

Influence constituents and partners to change behaviors or take action through education, collaboration, direct investment, and incentives.

ENACT

Municipalities enact policies or support other jurisdictions in enacting policies.

27 *Op. cit. https://toolkit.climate.gov/#steps. Accessed February 2021.*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CLIMATE MITIGATION

INTRODUCTION

To address the root causes of climate change—the buildup of greenhouse gases (GHG) in the atmosphere from the burning of fossil fuels—municipalities in the Chicago region must aggressively pursue the goals and objectives laid out below. We must use less energy overall. We must use energy from cleaner sources. We must remove GHGs from the atmosphere. This process of eliminating fossil fuels, commonly called "decarbonization," will involve all dimensions of our society and culture. As we succeed in taking these bold steps to decarbonize, we will set an example for the state of Illinois and the nation as a whole.

In the following pages, we set a course toward reducing the causes of climate change. This mitigation plan rests upon inventories of emissions conducted for the years 2010 and 2015. We adopt goals for future emissions based upon international agreements and the best available science. Plausible emissions pathways based on simple assumptions of population growth combined with emissions intensity reveal that future goals are not going to be reached without striving toward explicit targets within critical sectors of the economy. Because of the pervasive nature of needed changes, we widely consulted constituents and government representatives throughout the planning process to guide reductions in emissions. Political will for decisive climate action at all levels drives this climate mitigation planning process.

GREENHOUSE GAS INVENTORY

Northeastern Illinois' most recent region-wide greenhouse gas emissions inventory was conducted by CMAP during the development of the ON TO 2050 regional plan.[28] The inventory included 2010 and 2015 county-level emissions data for three major GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The inventory included emissions from three sectors: stationary energy (electricity generation and energy used in buildings), transportation, and waste. The stationary energy sector includes emissions occurring as a result of grid-supplied electricity and natural gas used for heat, steam, cooling and other processes in the seven-county region. Emissions for stationary energy were calculated using data on electricity and natural gas fuel consumption supplied by the utilities serving the

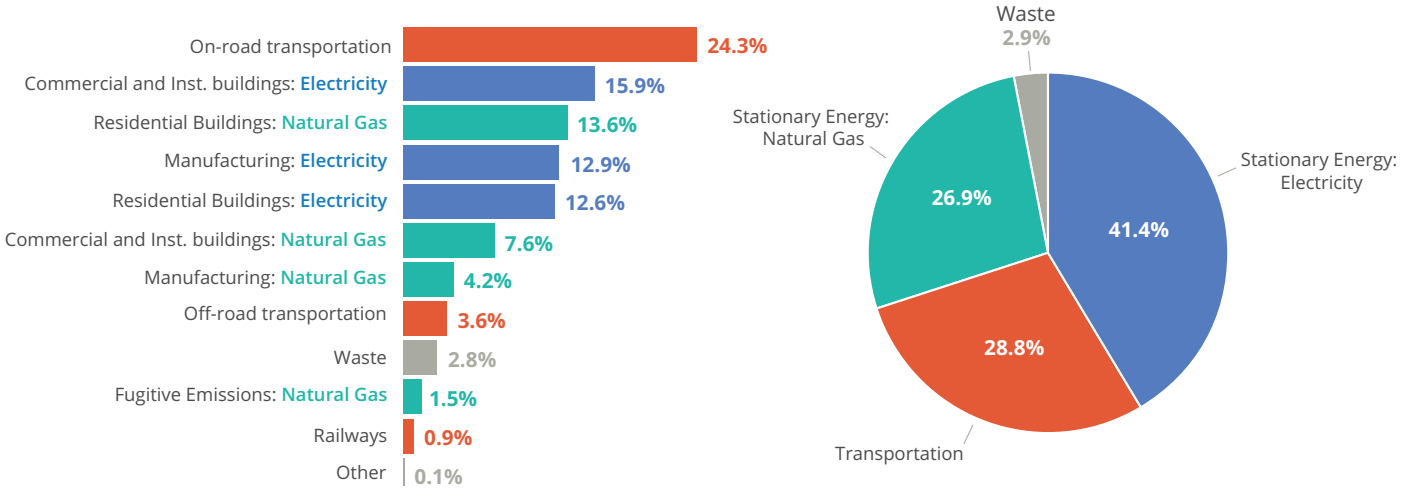


Figure 20. Greenhouse gas emissions in the Chicago region by subsector, 2015. Source: CMAP

28 Chicago Metropolitan Agency for Planning. 2015. Chicago Regional Greenhouse Gas Emissions Inventory: Final Report. https://www.cmap.illinois.gov/documents/10180/885293/2015+Chicago+Regional+Inventory_Final+Report_June+2018.pdf/03087e10-fc65-f276-3342-7059f212b9d2. Accessed February 2021.

region. This is consistent with the Global Protocol for Community-Scale Greenhouse Gas Inventories BASIC protocol, and satisfies the Greenhouse Gas Emissions Inventory reporting requirement in the GCoM Common Reporting Framework.[29] Emissions for the transportation sector were modeled using vehicle miles traveled in the region.

Illinois currently ranks seventh among states for total carbon dioxide emissions.

Emissions from electricity used in our region were calculated using the U.S. EPA's Emissions & Generation Resource Integrated Database (eGRID)[30], which discloses environmental characteristics of the electricity generated in the multi-state electrical transmission region. Methods for analyzing the smaller ComEd region and isolating its locally cleaner electricity were not available at the time the inventory was conducted.[31] Furthermore, the GHG inventory does not include emissions from interregional aviation, industrial processes and product use, or agriculture, forestry, and other land use sectors.[32] All emissions are expressed in million metric tons of carbon dioxide equivalent, or "MMTCO2e."[33]

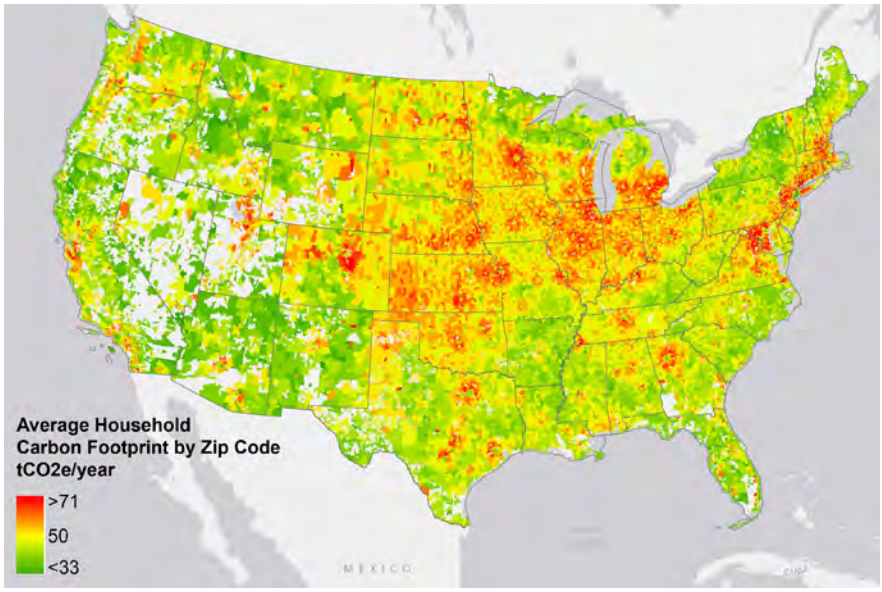


Figure 21. Average Household Carbon Footprint by ZIP code in 2014. Source: Jones and Kammen (2013)[34]

According to this analysis, in 2015 the seven counties of northeastern Illinois produced approximately 119 MMTCO2e of GHG emissions (Figure 20). Over two-thirds of total emissions were derived from stationary energy, within which residential, commercial, and institutional buildings were the largest contributors. Nearly one-third of emissions derived from transportation. Within the transportation sector, on-road transportation, which included private and public cars, buses, and trucks, was overwhelmingly the largest source of emissions.

29 Global Protocol for Community-Scale Greenhouse Gas Inventories BASIC protocol. https://ghgprotocol.org/sites/default/files/standards_supporting/GPC_Executive_Summary_1.pdf. Accessed February 2021.

30 Emissions & Generation Resource Integrated Database (eGRID), U.S. EPA. https://www.epa.gov/egrid. Accessed May 2021.

31 ComEd Environmental Disclosure Statement. 2020. https://www.comed.com/SiteCollectionDocuments/SafetyCommunity/Disclosure/Environmental_Disclosure_12_months_ending_03312020.pdf. Accessed May 2021.

32 Op. cit. https://www.cmap.illinois.gov/documents/10180/885293/2015+Chicago+Regional+Inventory_Final+Report_June+2018.pdf/03087e10-fc65-f276-3342-7059f212b9d2. Accessed February 2021.

33 U.S. Energy Information Administration. 2011. Emissions of Greenhouse Gases in the U.S. https://www.eia.gov/environment/emissions/ghg_report/ghg_overview.php. Accessed February 2021.

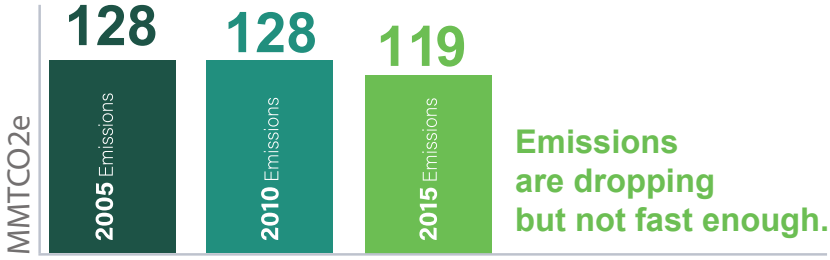
34 Data from Regents of the University of California, University of California, Berkeley. Paper: Christopher M. Jones and Daniel M. Kammen. 2013. Spatial Distribution of U.S. Household Carbon Footprints Reveals Suburbanization Undermines Greenhouse Gas Benefits of Urban Population Density. Environ. Sci. Technol. dx.doi.org/10.1021/es4034364

OBSERVED TRENDS

Within the ComEd service region, which includes the seven-counties surrounding Chicago as well as most of northern Illinois, power generation is currently 85% clean, a fact which is mostly attributable to local nuclear power generation. However, our region's large population, its northern climate, and attendant heating requirements make Illinois a major contributor to the United States' total GHG output. Furthermore, northeastern Illinois is a major manufacturing and transportation hub with a historical dependence on fossil fuels for electricity generation. Illinois currently ranks seventh among states for total carbon dioxide emissions.[35] The relatively high carbon footprint of the region is visible in Figure 21, which depicts total carbon footprint by ZIP code for the U.S. as a whole.

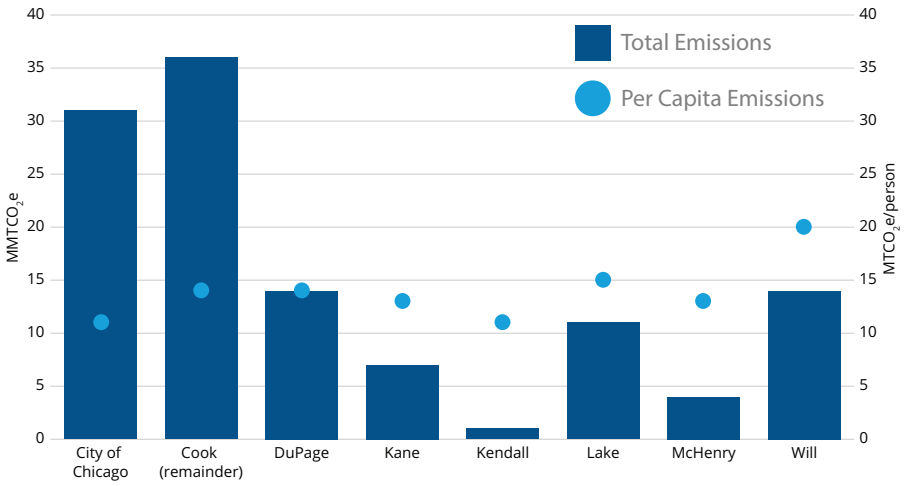
Between 2010 and 2015, the region saw a 7% reduction in total emissions (Figure 22) and an 8.5% reduction in per capita emissions. These reductions were driven by expansion of renewable energy sources (wind and solar) and a transition from coal to less carbon-intensive energy sources, such as natural gas. This period also saw a small reduction in overall electricity use. These decreases offset the 1% emissions increase from the transportation sector.

Figure 22. Total emissions in the Chicago region, 2005, 2010, and 2015. Source: CMAP



In 2015, suburban Cook County generated the most emissions (Figure 23) of any geography in the region (36.1 MMTCO2e), followed by the City of Chicago (31.2 MMTCO2e) and Will County (14.1 MMTCO2e). Kendall County produced the least emissions (1.4 MMTCO2e). On a per capita basis, Kendall County (11.2 MMTCO2e/person) and the City of Chicago (11.4 MMTCO2e/person) were the most efficient. Will County (20.5 MMTCO2e/person) produced the most emissions per capita.

Figure 23. 2015 Chicago Region Emissions and Per Capita Emissions by County. Source: CMAP



35 U.S. Energy Information Administration. Rankings: Total Carbon Dioxide Emissions, 2017 (million metric tons). https://www.eia.gov/state/rankings/?sid=IL#series/226. Accessed February 2021.

... maintaining, or even doubling, the rate of reduction observed between 2010 and 2015 would be insufficient for achieving the climate stabilization target.

SETTING REDUCTION GOAL AND TARGETS

To develop emissions reduction targets and goals, we used two types of models, consulted literature, and engaged stakeholders and experts. We worked with regional stakeholders and scientists from Argonne National Laboratory, the University of Illinois, and NOAA to develop emissions reduction targets that are both realistic and aligned with the Paris Agreement's goal of keeping global warming to less than 2 degrees Celsius. To that end, the Obama Administration committed the United States to a national emissions reduction of 80% below 2005 levels by 2050.

"The Paris Agreement aims to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Consistent with this objective, Parties aim to balance GHG emissions sources and sinks in the second half of this century or, in effect, achieve net-zero global GHG emissions."[36]

The Biden Administration has redoubled that commitment and set a national target of 50% emissions reduction by 2030. The majority of the plans referenced in Appendix A established emissions reduction targets at 80% of 2005 levels by 2050. We have adopted the 80% target for the year 2050. In addition, we have established interim targets for the years 2030 and 2040.

The CMAP team developed three future emissions scenarios.[37] predicated upon the completion of the 2015 GHG inventory (Figure 24). Scenario 1 was based upon population growth through 2050 combined with per capita emissions from 2015; this is a business-as-usual scenario. Scenario 2 assumed that per capita emissions will decrease at the same rate of decrease observed from 2010 to 2015 (approximately 8.5% over five years). Scenario 3 was predicated on a doubling of that rate of decrease in per capita emissions (approximately 17% over five years).

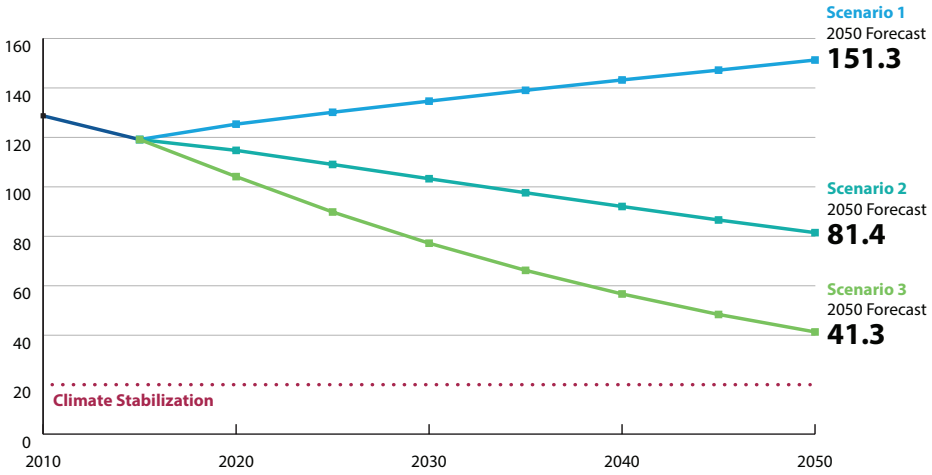


Figure 24. Emissions forecasts for the Chicago region. Source: CMAP [38]

36 White House. United States Mid-Century Strategy for Deep Decarbonization. November 2016. https://unfccc.int/files/focus/long-term_strategies/application/pdf/mid_century_strategy_report-final_red.pdf accessed June 14, 2021

37 Op. cit. https://www.cmap.illinois.gov/documents/10180/885293/2015+Chicago+Regional+Inventory_Final+Report_June+2018.pdf/03087e10-fc65-f276-3342-7059f212b9d2. Accessed February 2021.

38 The World Bank, 2016. The CURB Tool: Climate Action for Urban Sustainability. https://www.worldbank.org/en/topic/urbandevelopment/brief/the-curb-tool-climate-action-for-urban-sustainability. Accessed February 2021.

These simple assumptions and calculations clearly establish that maintaining, or even doubling, the rate of reduction observed between 2010 and 2015 will be insufficient for achieving the climate stabilization target. To reduce emissions 80% by 2050, per capita emissions must decrease by approximately 23% every five years. Such a reduction would be approximately 2.7 times the rate of decrease observed between 2010 and 2015. Without ambitious targets and effective strategies as described in this climate action plan, our region will not achieve its climate stabilization targets.

The Paris Accord also urges action toward "net zero" emissions, or carbon neutrality. Carbon neutral means that overall GHG emissions attributed to an organization or region are minimized and excess emissions are offset by supporting additional mitigation or sequestration actions elsewhere. In advance of COP26, the next UN Climate Change conference, the global push to reach net zero and keep global temperature rise to 1.5 is intensifying.[39] Many individuals and organizations participating in the development of this plan expressed a sense of urgency to strive for "net zero." **This plan sets an aspirational goal of achieving net zero in addition to the data-driven target of 80% reduction from 2005 levels by 2050.**

When emissions reduction from all objectives are combined, total forecasted 2050 emissions exceed the 80% reduction target but fall short of the net zero emissions goal.

Goal

Net zero greenhouse gas emissions

Targets

- Reduce GHG emissions **50%** from 2005 levels by **2030**
- Reduce GHG emissions **65%** from 2005 levels by **2040**
- Reduce GHG emissions **80%** from 2005 levels by **2050**

SETTING OBJECTIVES AND STRATEGIES

Reaching the 80% reduction target by 2050 will require political action and massive changes in all economic sectors. We explored these possibilities through stakeholder input and consultation with international mitigation plans.

Three stakeholder workshops framed around the GRC were held to identify climate mitigation strategies that are achievable by local governments (see Appendix B). The GRC categories of Energy, Land, Mobility, Municipal Operations, Waste, and Water were analyzed and considered. The workshops underscored the importance of local leadership to *enable* local climate action and reduce emissions, though these results cannot be measured in the CURB tool. Within the stationary energy sector, the objective to Decarbonize Energy Sources was analyzed to critically examine the large impact of grid decarbonization, while building-level interventions such as efficiency upgrades and heating electrification were captured within the Optimize Building Energy objective. Building energy, not including manufacturing, accounts for about 69% of GHG emissions in the region, so GRC objectives and strategies related to building energy were a significant focus during the mitigation workshops.

39 International Energy Agency, IEA (2021), Net Zero by 2050, IEA, Paris. https://www.iea.org/reports/net-zero-by-2050. Accessed June 2021.

Participants prioritized actions that will be both impactful and achievable, such as streamlining solar codes and policies to encourage private sector solar investment. On the other hand, changing the structure of municipal franchise agreements to remove barriers to municipal investment in solar for public facilities was considered quite challenging for local governments to undertake on their own. Regional collaboration is recommended to undertake this strategy.

Next, the CMAP team employed the Climate Action for Urban Sustainability (CURB) Tool (developed by the World Bank) to explore how discrete emissions reduction strategies could be combined to reach specific targets.[40] The CURB tool allows users to establish mitigation goals for each of the three main sectors in the GHG Inventory—stationary energy, transportation, and waste—and define actions to achieve those goals. Within CURB, the team employed the PJM eGRID emissions factor to reflect electricity generation serving the Chicago region and to account for northern Illinois' cleaner nuclear electricity generation. The geographical boundaries of PJM exclude some coal-burning facilities within the RFC West eGRID subregion (which is what was used for the 2015 inventory).[41] Because a different emissions factor was used, the starting point for modeling with CURB has a lower emissions starting point than the 2015 GHG inventory. The outputs of all discussions and analyses are reflected on pages 28 to 35, where emissions reduction targets are established and linked to strategies and actions within economic sectors throughout the region.

Stakeholders identified urban forest stewardship as an important local and regional objective. However, the benefits of forests and thriving landscapes to remove carbon from the atmosphere through sequestration could not be modeled using the CURB tool. Carbon sequestration benefits from the urban forest were estimated using data from the U.S. Forest Service[42] and the Chicago Region Trees Initiative's goal of adding 22 million trees by 2050.[43] Fostering thriving natural systems to remove and store carbon furthers the magnitude of climate mitigation actions and produces abundant co-benefits for communities. Sequestration occurs in thriving ecosystems and healthy soils that support them. However, data to support modeling soil and herbaceous plant biomass in the region were not incorporated into this analysis.

Using aggressive but realistic assumptions for the adoption and implementation of mitigation strategies, the CURB analysis showed that an overall emissions reduction of 80%, relative to 2005 levels, is currently possible (Figure 25, heavy line). Without any intervention, emissions would increase along with forecasted regional population increase (dashed line, Figure 25). Mitigation actions were evaluated within the tool for 2030, 2040, and 2050 for the objectives listed in the legend.

The CURB analysis revealed great opportunities for rapid GHG reduction. If decarbonization of energy sources and electrification of the transportation sector occur rapidly, it would be feasible to reach an interim target of 50% GHG reduction by 2030. The CURB tool helped identify strategies, such as building electrification and

40 Op. cit. https://www.worldbank.org/en/topic/urbandevelopment/brief/the-curb-tool-climate-action-for-urban-sustainability. Accessed February 2021.

41 Emissions & Generation Resource Integrated Database (eGRID), U.S. EPA. https://www.epa.gov/egrid/data-explorer. Accessed April 2021.

42 Nowak, David J., Robert E. Hoehn III, Allison R. Bodine, Daniel E. Crane, John F. Dwyer, Veta Bonnewell, and Gary Watson, 2012. Urban Trees and Forests of the Chicago Region, Resource Bulletin NRS-84. USDA Forest Service, Northern Research Station. https://www.fs.fed.us/nrs/pubs/rb/rb_nrs84.pdf. Accessed February 2021.

43 Chicago Region Trees Initiative. Master Plan 2050. http://chicagorti.org/sites/chicagorti/files/Supplemental%20Attachment%20A.%2018CRTI_Master%20Plan_FULL.pdf. Accessed February 2021.

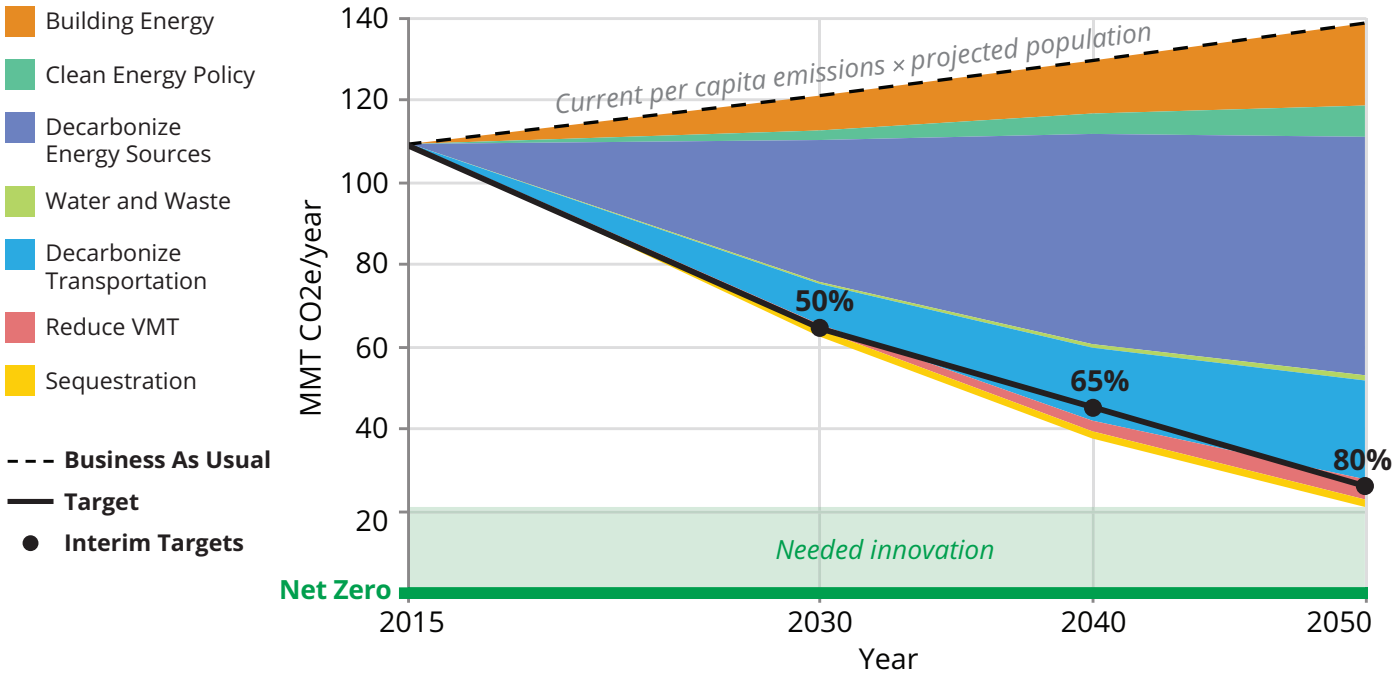


Figure 25. Modeled emission reductions by mitigation objective. Source: CURB

the establishment of district energy systems, which are essential to meeting the GHG reduction target but which are not directly influenced by municipalities.

This is the decisive decade when policymakers and local leaders must step up to meet the climate mitigation target of 80% reduction by 2050. When emissions reductions from all objectives were combined, total forecasted 2050 emissions exceeded the 80% reduction target of 25.7 MMTCO2e but fell far short of the net zero emissions goal. Municipalities are an important part of the solution, but cooperation and commitment from utilities, industry, property owners, builders, and many others will be essential for bridging the gap between realistic targets and the aspirational goal of net zero emissions. To be sure, substantial technology, market, and behavior changes are needed to achieve the mitigation targets in this plan. To reach net zero by 2050, innovation and investment in solutions yet to be identified and modeled are urgently needed.

Both the scenario process and the CURB model show that aggressive mitigation action across all sectors will not eliminate GHG emissions in our region by 2050 without sustained, focused attention aimed at transforming the energy basis of our economy. **Innovation in all facets of society will be essential to reach a goal of net zero emissions, or carbon neutrality.**

The following pages summarize the eight climate mitigation objectives and key strategies needed to achieve this **regional climate mitigation target: Reduce GHG emissions 80 percent from 2005 levels by 2050.**

CLIMATE MITIGATION GOAL

Net zero greenhouse gas emissions

INTERIM TARGETS

2030 Reduce GHG emissions 50% from 2005 levels

2040 Reduce GHG emissions 65% from 2005 levels

2050 Reduce GHG emissions at least 80% from 2005 levels

MITIGATION OBJECTIVES

1. Demonstrate Leadership to Reduce Emissions.
2. Decarbonize Energy Sources.
3. Optimize Building Energy.
4. Implement Clean Energy Policies.
5. Decarbonize Transportation.
6. Reduce Vehicle Miles Traveled.
7. Manage Water and Waste Sustainably.
8. Sustain Ecosystems to Sequester Carbon.

Appendix D contains a complete overview of all eight mitigation objectives and 42 mitigation strategies.

MITIGATION OBJECTIVES AND STRATEGIES

DEMONSTRATE LEADERSHIP TO REDUCE EMISSIONS

Direct emission reductions are not possible without local leadership, public engagement and the supportive actions of local government. This objective supports all other mitigation objectives in reaching the overall GHG reduction target. Municipalities must lead in sustainability planning by engaging residents and articulating a shared vision and plan. Municipal operations can be smart and sustainable by conserving energy and resources.

LEAD

- Build and support a resilient local economy that supports climate objectives.
- Integrate smart technology into operations to effectively manage resource consumption (also *Encourage* others to do so).
- Demonstrate sustainability in municipal operations, purchasing and through public events.

ENACT

- Adopt the Greenest Region Compact and a GRC-based sustainability plan aligned with regional climate objectives.
- Establish local sustainability targets that support the regional climate objectives.

EQUITY CONSIDERATIONS

- Engage diverse civic leaders in target-setting and implementation.
- Tailor plans to benefit vulnerable communities.

OUTCOMES & CO-BENEFITS

- Leading by example inspires followers and cooperation across sectors.
- Alignment of local energy, water conservation, and waste reduction targets.
- Effective local plans guide action.
- Collaborative and accelerated GHG reduction.
- Local green jobs and sustainable businesses.
- Informed and engaged constituents.
- 'Smart' operations perform better.

GRC2 Greenest Region Compact

COLLABORATING FOR SUSTAINABLE COMMUNITIES

Four counties and 132 municipalities support consensus sustainability goals within the Greenest Region Compact (GRC) to guide action and citizen engagement. With this plan, the GRC will now address the climate crisis.

DECARBONIZE **ENERGY SOURCES**

Switching from fossil-fuel to cleaner sources to generate energy presents the greatest opportunity to meet our GHG reduction target. While 80% of energy generated regionally is already clean, this continued transition must include large utility-scale solar, wind, and nuclear power generation systems, and infrastructure to transmit, store and supply electricity to the grid when needed. The transition must be affordable for all consumers and support reliability. Smaller distributed energy resources, like rooftop solar, provide clean energy close to where they are used. District energy systems connect multiple buildings to highly efficient sources of heating and cooling energy.

LEAD

- Procure clean energy for municipal operations
- Build renewable energy and energy storage capacity to meet the clean energy needs of the region

ENCOURAGE

- Engage the community and policymakers to support existing clean energy and choose renewable clean energy through procurement, aggregation, financing, community solar, and other collaborative programs
- Partner with utilities to complete the decarbonization of the local grid and collaborate to decarbonize the multi-state regional grid
- Explore renewable district energy solutions

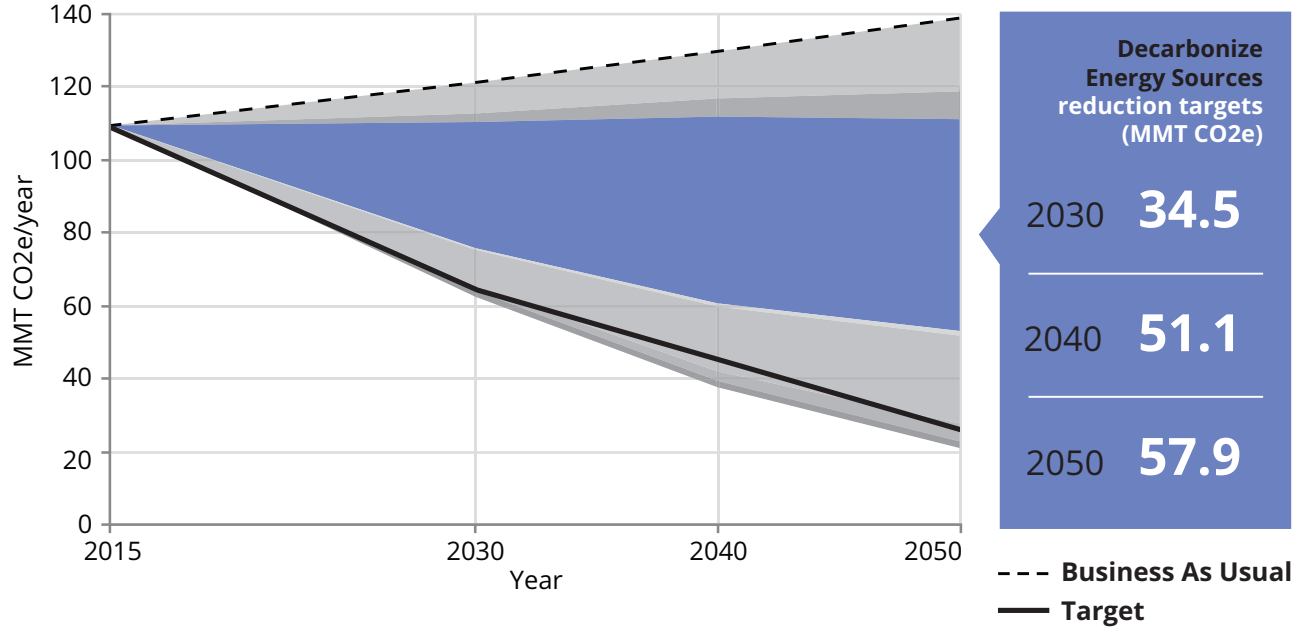
See also: Implement Clean Energy Policies

EQUITY CONSIDERATIONS

- Replace fossil fuel-fired power to improve air quality
- Demonstrate long-term utility cost savings
- Make clean energy options available to low-income households through incentives and collaborative procurement

OUTCOMES & CO-BENEFITS

- Thriving renewable energy industry
- Modern, efficient electric grid
- Resilient energy systems
- Informed clean energy consumers
- Reduce long-term costs



OPTIMIZE BUILDING **ENERGY**

Energy used for heating and cooling buildings is currently the largest source of regional GHG emissions. Operational and behavioral changes and more efficient equipment can reduce energy use. Growing numbers of policy and finance mechanisms support increased energy efficiency investments. Options to power buildings with zero-carbon energy sources, generate and store renewable energy are technically accessible to building owners. Electrifying heating, cooling, cooking and other operations allows emissions from the building sector to fall as the energy grid decarbonizes.

LEAD

- Retrofit municipal buildings, facilities, and streetlights for maximum efficiency.

ENCOURAGE

- Support electric space and water heating through demonstration, education, and incentives.
- Engage residential and commercial property owners to optimize building efficiency. Leverage programs such as demand response, energy efficiency incentives, and PACE financing.

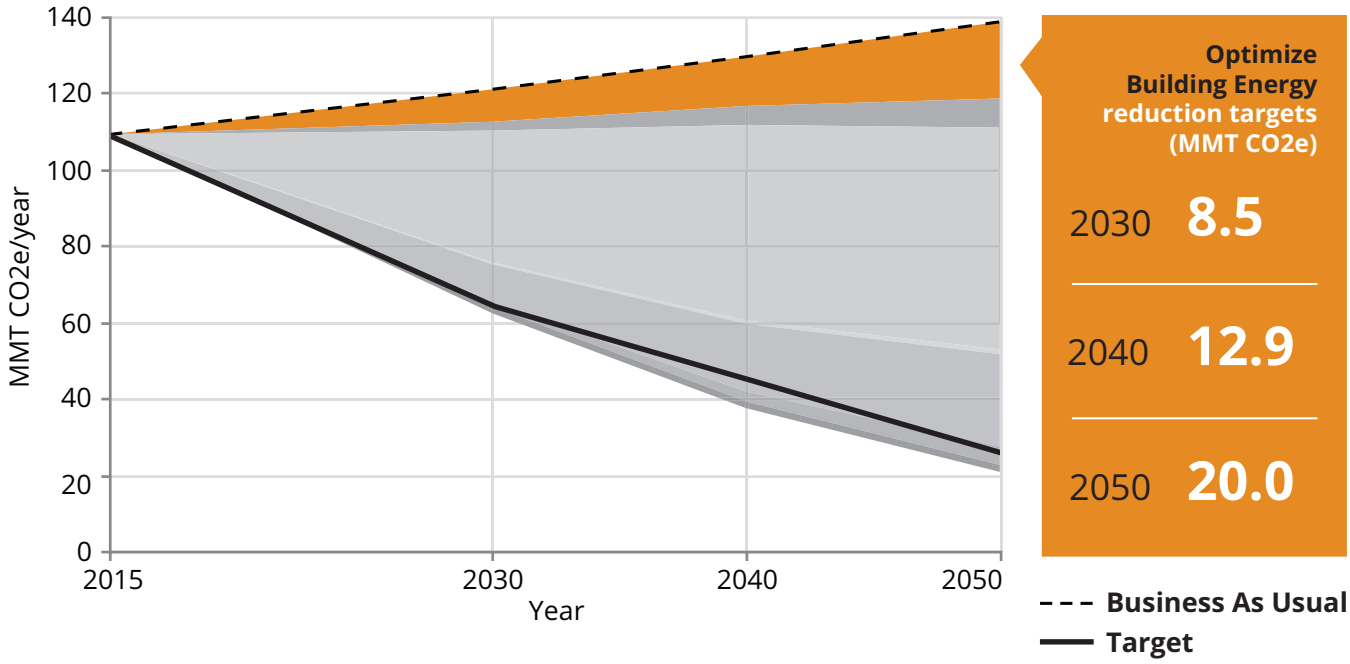
See also: Implement Clean Energy Policies

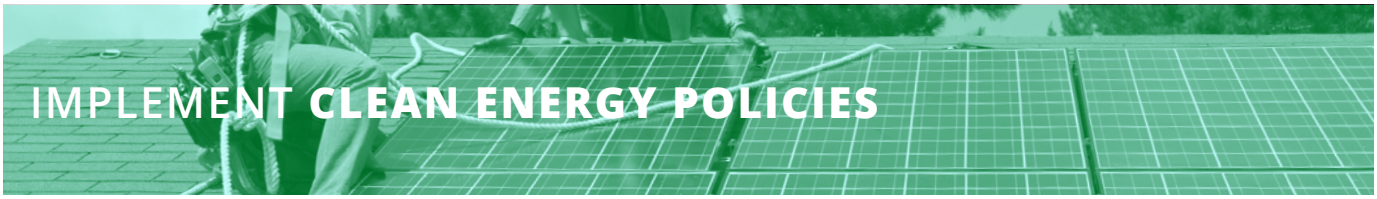
EQUITY CONSIDERATIONS

- Invest in multi-family housing
- Reduce household energy burden
- Make homes safer, and more comfortable

OUTCOMES & CO-BENEFITS

- Reduce energy costs
- Improve building performance
- Improve heating and cooling
- Improve indoor air quality
- Create clean energy jobs





IMPLEMENT **CLEAN ENERGY POLICIES**

Policies that promote building efficiency and support renewable energy can reduce GHG emissions over the long term. Local governments can set and support clean energy policies, though policies that are aligned with local, state and federal levels are most impactful. When possible, buildings should be net zero, generating at least as much renewable energy as the building efficiently consumes.

ENACT

- Support robust building energy conservation codes, benchmarking, and building performance standards to optimize energy efficiency for retrofit projects
- Require high performance, all-electric, and net zero new building construction
- Modernize municipal franchise agreements to leverage investment in clean energy and reduce costs to residents
- Adapt zoning codes and streamline development processes to accelerate investment in solar and other renewable energy systems

ENCOURAGE

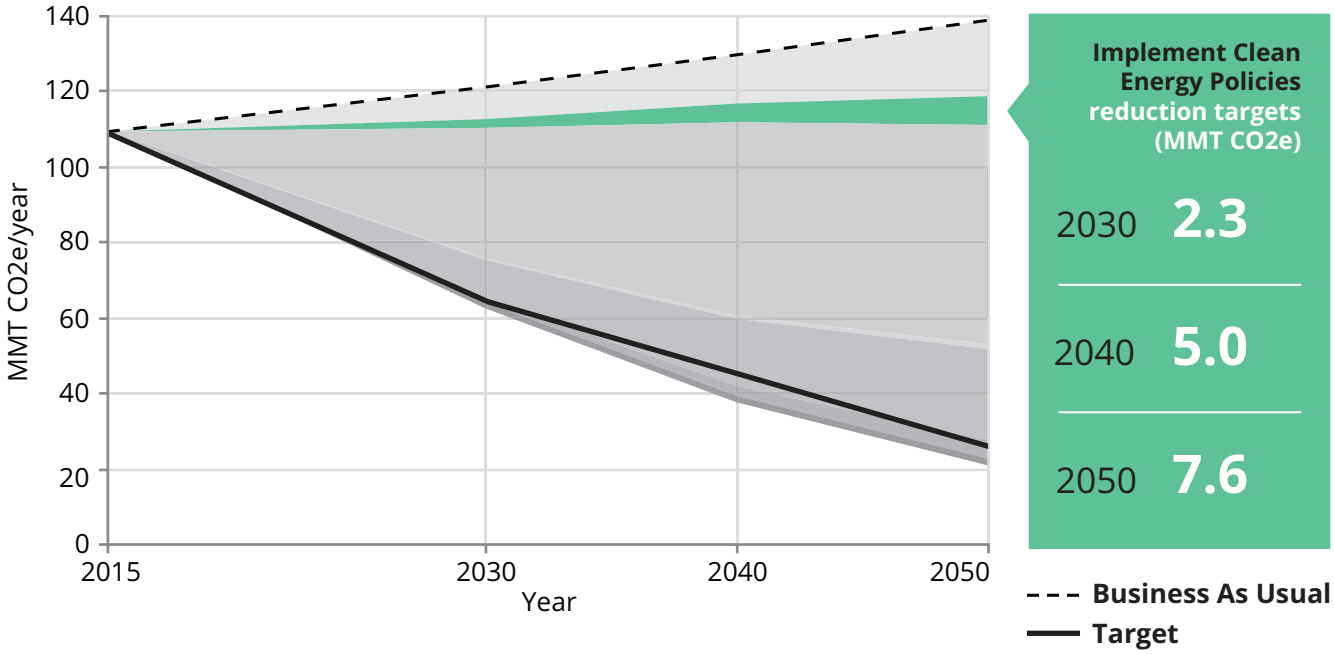
- Support state and federal policies to advance clean energy

EQUITY CONSIDERATIONS

- Ensure benefits are shared equitably
- Reduce long term energy burden
- Eliminate utility franchise cost to residents
- Make rooftop solar more accessible by reducing soft costs
- Support retrofits and code compliance for low-income property owners

OUTCOMES & CO-BENEFITS

- Reduce energy and water costs
- Improve long-term building performance
- Leverage private investment in buildings
- Demonstrate technology and design to achieve net-zero
- Create operational resilience
- Create clean energy jobs



DECARBONIZE **TRANSPORTATION**

Vehicles used for transportation and freight are a major source of emissions in the region. Switching to electric vehicles (EVs) and improving fuel efficiency reduces these emissions significantly. Converting high-mileage transit and fleet vehicles to cleaner EVs can drive market demand for EVs and accelerate broad adoption in other vehicle markets. New networks of accessible EV charging infrastructure must support this expansion.

LEAD

- Create accessible and reliable networks of electric vehicle chargers
- Transition fleets to low- and zero-emission vehicles

ENCOURAGE

- Support strong national fuel efficiency standards
- Encourage other public and private fleet operators to switch to low- and zero-emission vehicles
- Encourage residents to transition to electric vehicles through policies and infrastructure investment

ENACT

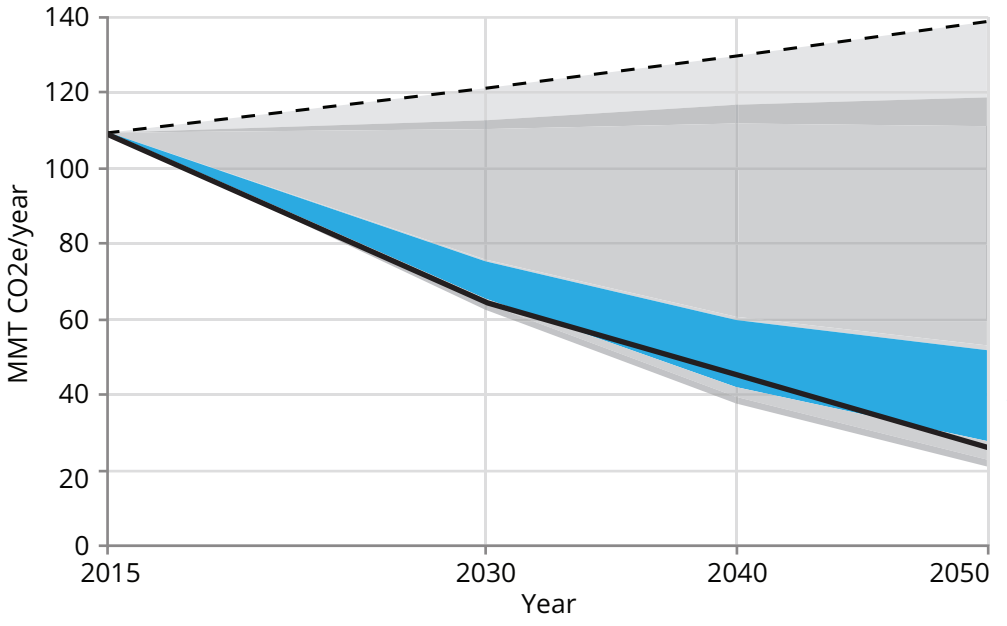
- Enact and enforce anti-idling policies
- Adapt development processes to accelerate investment in EV charging infrastructure

EQUITY CONSIDERATIONS

- Support access to clean transportation for all
- Invest in EV charging for multi-family dwellings
- Reduce health impacts from tailpipe emissions
- Reduce long-term fuel costs

OUTCOMES & CO-BENEFITS

- Reduce tailpipe emissions and pollution
- Clean, quiet transit and service vehicles
- Reduce fuel cost over the long-term
- Reduce soft costs of installing EV charging
- Accelerate private investment in EVs and EV charging infrastructure
- Build safe and effective EV charging networks
- Create clean energy jobs



Decarbonize Transportation reduction targets (MMT CO2e)

2030	**9.8**
2040	**17.7**
2050	**24.0**

Business As Usual

Target

REDUCE VEHICLE MILES TRAVELED

Whenever possible, walking, biking and public transit should replace trips made using single occupancy vehicles (SOVs). To encourage sustainable transportation choices, safe, accessible infrastructure like bike lanes, sidewalks, and multi-use paths are needed. Development anchored by access to transit, and collaboration to support robust transit service will reduce dependence on SOVs for the long-term.

LEAD

- Build and maintain safe, resilient, and accessible active transportation infrastructure (also *Encourage* others to do so)

ENCOURAGE

- Collaborate to enhance regional transit and expand capacity
- Encourage walking, biking and transit use through education, incentives, and collaboration

ENACT

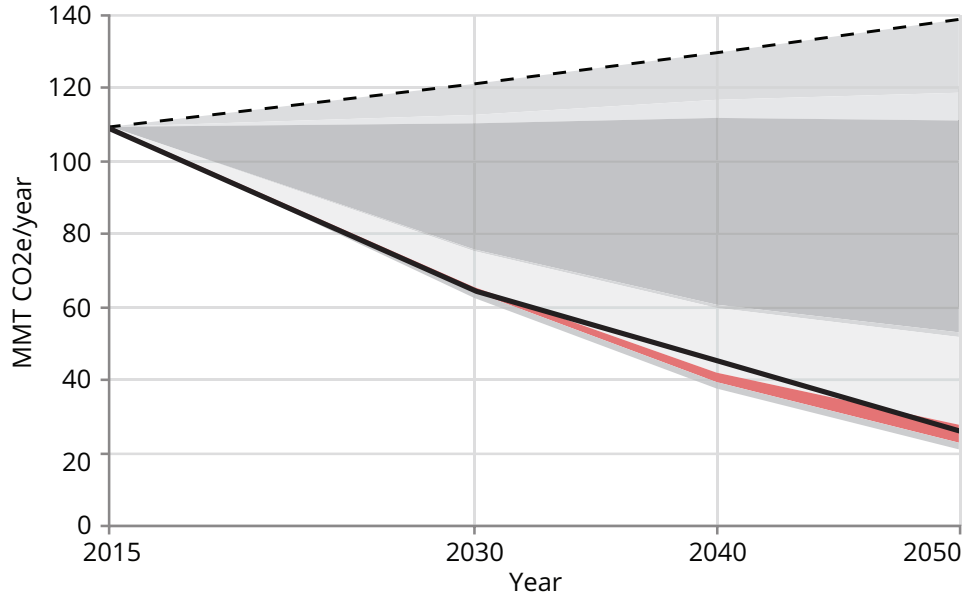
- Prioritize transit-oriented and transit-supportive development and curtail sprawl
- Plan and design roadways and corridors to benefit all road users and promote active transportation
- Strategically manage parking policies to promote active and public transportation
- Promote multi-family housing development near transit stations and along transit routes

EQUITY CONSIDERATIONS

- Focus on safe and accessible transportation for vulnerable communities
- Reduce burden of owning and maintaining personal vehicles
- Better health outcomes
- Greater mobility to improve access to opportunity

OUTCOMES & CO-BENEFITS

- Development of more compact, accessible neighborhoods
- More walking and biking strengthens community cohesion
- Improve health and wellness
- Reduce infrastructure needed to support SOVs
- Reduce traffic congestion
- Improve air quality



Reduce Vehicle Miles Traveled reduction targets (MMT CO2e)

2030	1.3
2040	2.6
2050	4.9

Business As Usual

Target

MANAGE **WATER AND WASTE SUSTAINABLY**

Managing waste sustainably requires actions ranging from smart consumer choices to waste systems and markets. A circular economy keeps material in use to reduce GHG emissions over the life-cycle of materials and products. Robust community recycling and composting, and strong markets for using these commodities is needed. Methane and other potent GHG emissions from landfills and wastewater systems can be captured and utilized.

LEAD

- Increase composting and biological treatment of waste
- Utilize compost and biosolids in landscaping
- Reduce energy used to process and deliver safe drinking water
- Reduce energy needed to manage wastewater
- Shift both drinking and wastewater operations to clean energy sources
- Conserve water and operate efficient water utilities to reduce energy demands
- Capture and convert wastewater biogas to energy (also *Encourage* others to do so)

ENCOURAGE

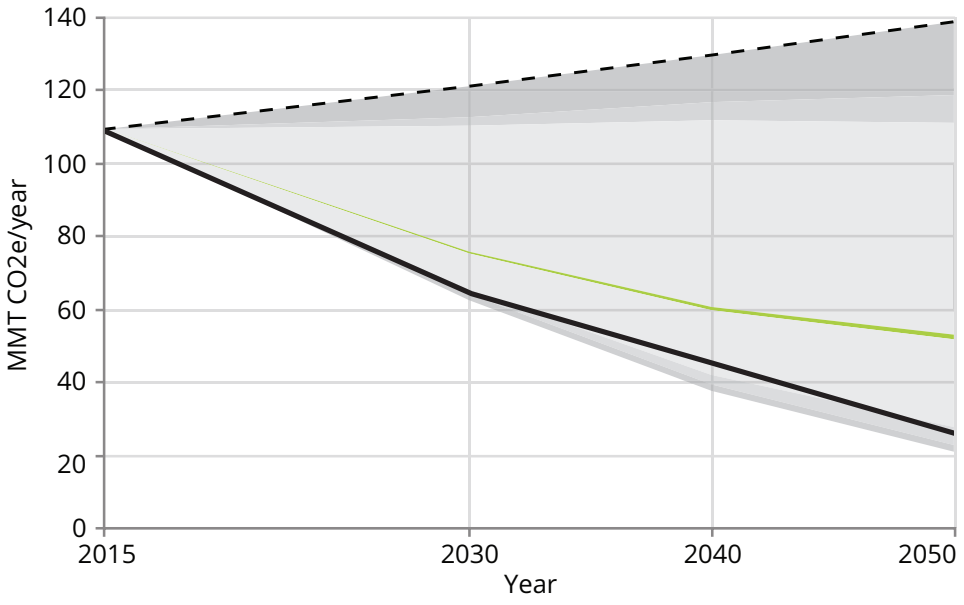
- Capture landfill emissions and eliminate pipeline methane
- Support circular economies
- Increase the volume of waste that is recycled and composted
- Encourage water conservation

EQUITY CONSIDERATIONS

- Reduce exposure to litter and illegal dumping
- Smart purchasing reduces waste
- Replace lead service lines for safe drinking water delivery
- Site landfills and waste operations to avoid harm to low-income and communities of color

OUTCOMES & CO-BENEFITS

- Reduce methane gas emissions
- Reduce embedded energy and emissions from production, transport, and disposal of materials
- Reduce persistent waste like plastic
- Grow recycling and organic waste industries
- Capture value from waste stream and operations



Manage Waste and Water Sustainably reduction targets (MMT CO2e)

2030 **0.5**

2040 **0.9**

2050 **1.3**

Business As Usual

Target

SUSTAIN **ECOSYSTEMS TO SEQUESTER CARBON**

Growing and sustaining urban forests and natural ecosystems is a nature-based solution that will help meet the region's climate mitigation target. All other mitigation objectives aim to rapidly reduce GHG emissions, while thriving trees, robust landscapes, and the soils that support them, capture CO_2. All communities can plant and protect trees and both public and private property owners can contribute by growing and sustaining healthy urban ecosystems at any scale.

LEAD

- Manage public and private landscapes to optimize ecosystem services and support biodiversity
- Plant trees and sustain the urban forest (also *Encourage* others to do so)

ENCOURAGE

- Encourage citizen tree stewardship
- Encourage property owners to install and maintain sustainable and native landscapes

ENACT

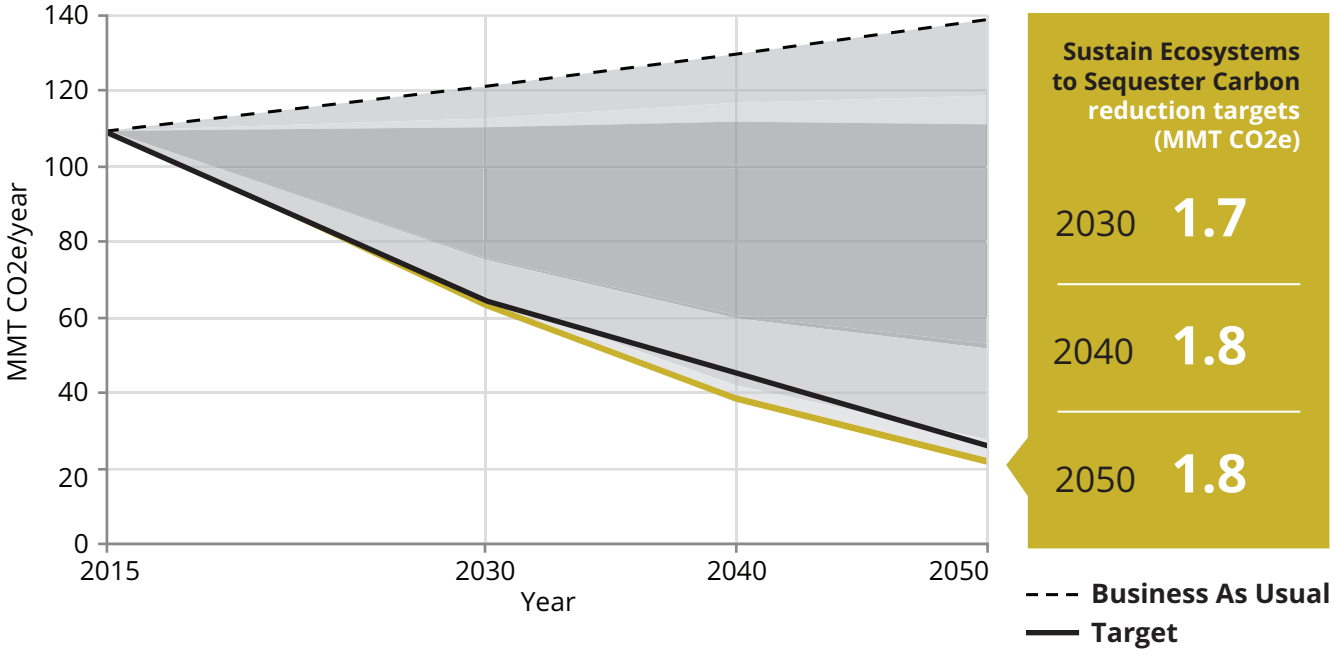
- Preserve soil through low-impact development and restore soil integrity

EQUITY CONSIDERATIONS

- Maintain accessible open space to invite safe and healthful activity
- Sustain tree canopy for cooling benefits in vulnerable communities
- Mitigate and restore nature on contaminated sites in environmental justice communities

OUTCOMES & CO-BENEFITS

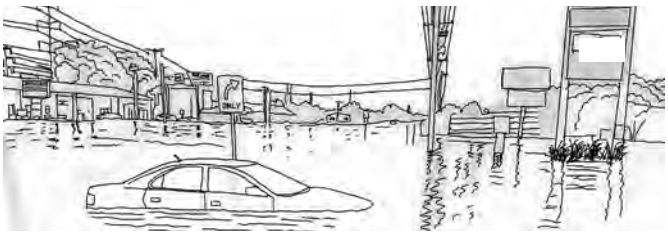
- Improve air quality
- Sustainably manages stormwater
- Cooling shade mitigates heat islands
- Low impact construction preserves soil and water quality
- Shade reduces cooling energy demands
- Quality open space encourages active transportation and lifestyles
- Enhances livability and community character
- Supports pollinator and wildlife habitat

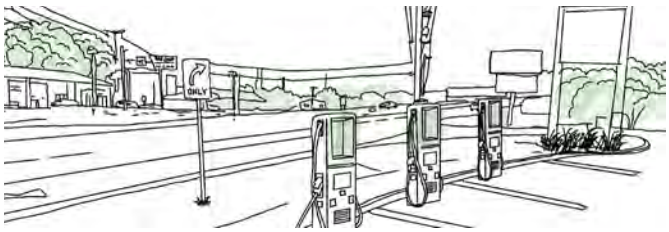


BUILDING RESILIENCE

2021

FLOODING

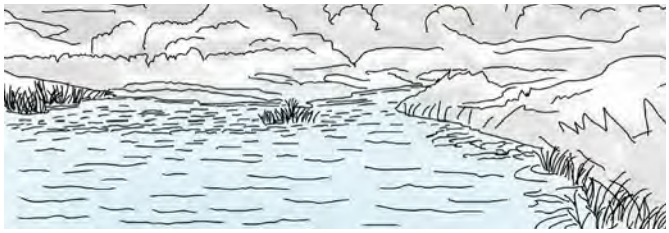




HEAT & HEALTH

AIR QUALITY

DROUGHT & WATER SUPPLY



CLIMATE ADAPTATION AND RESILIENCE

INTRODUCTION

This portion of the plan addresses the climate-related hazards we face as a region and recommends actions that will help communities adapt to changing climate conditions. Adaptation must occur in tandem with mitigation to protect the well-being of residents and the assets we value. To plan for resiliency, we first must understand exposure, vulnerability, and risk to climate-related hazards. The assessment and scoping presented below were done with stakeholder participation in a series of webinars and complemented by further research on climate vulnerability and risk. Priority climate-related impacts are listed as pairs of hazards linked to people, assets, and resources that regional leaders value. Corresponding objectives and strategies, scaled for municipal action, address these impacts.

This plan refers to adaptation actions that aim to reduce present and future harm as "building resilience" to climate-related hazards. The concept of resilience can be distilled to a simple principle, illustrated below (Figure 26). In the left figure, a community value or service operates at steady state until an acute hazard occurs, which is represented by the red lightning bolt. Focusing still on the left figure, the acute hazard pushes the level of service below an acceptable standard and causes permanent harm. Alternatively (now focusing on the right-hand picture), actions can be taken prior to an event to improve overall conditions. From this higher baseline, depicted by the green line prior to the acute hazard, the same event will not cause irreversible damage. Building resilience means improving conditions so that future disruptions can be accommodated.

The Steps to Resilience[44] helps communities and decision makers to understand exposure, vulnerability, and risk to climate-related hazards and so they may prioritize actions to build resilience. Armed with a firm understanding of these concepts and how they relate to one's own community, it is feasible to raise the baseline of services, quality of life, and community functions in order to withstand and recover from climate-related hazards.

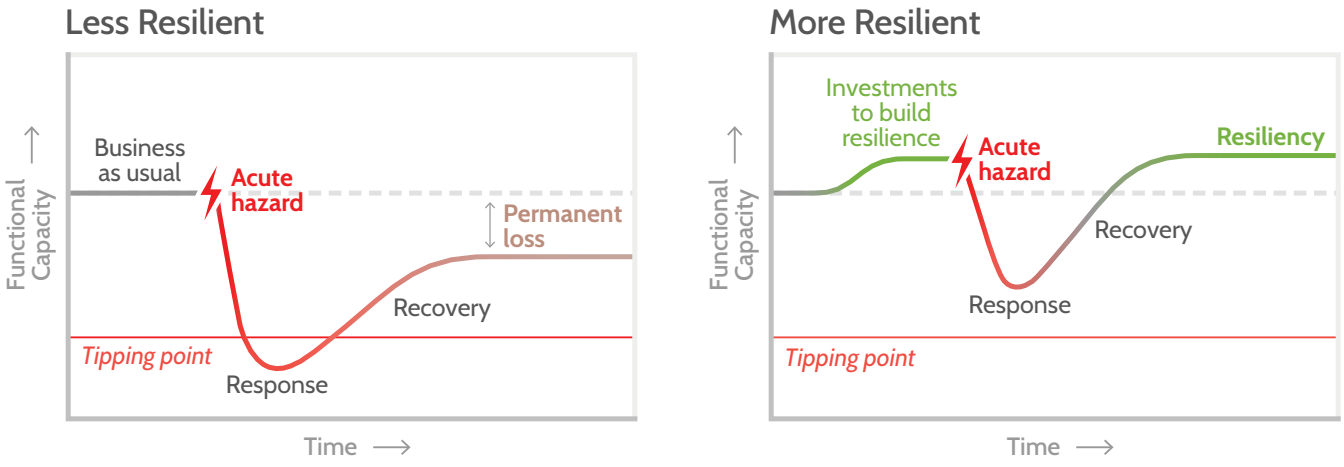


Figure 26. A pictorial definition of resilience, "improving conditions so that future disruptions can be accommodated." Source: U.S. Climate Resilience Toolkit

44 Gardiner, Edward P., David D. Herring, and James F. Fox. "The U.S. Climate Resilience Toolkit: evidence of progress." Climatic Change 153, 477–490 (2019). https://doi.org/10.1007/s10584-018-2216-0. See also https://toolkit.climate.gov/#steps. Accessed February 2021.

STEP 1: EXPLORING HAZARDS

Beginning at Step 1 of the *Steps to Resilience* (*Explore Hazards*) we conducted a webinar on May 22, 2020, to gather input about the climate-related hazards or impacts of greatest concern.

Municipal leaders throughout the Chicago region indicated widespread concern with flooding and heat. Severe and frequent flooding impacts neighborhoods, road networks, bridges, culverts, and aging infrastructure designed to convey stormwater and to treat drinking water. Though relatively infrequent, extreme heat events present grave concerns to an aging population as well as those who lack air conditioning, well-insulated homes, tree-lined neighborhoods, and other protections against heat waves. Participants also cited vulnerability and equity concerns as motivation for addressing climate resilience.

Stakeholders expressed moderate concern about drought and mild concern about severe thunderstorms and severe winter weather. Some participants also expressed concerns about food supply, shoreline erosion, and increased prevalence and virulence of disease. Additional concerns from individuals included cascading impacts (from multiple hazards), infrastructure, pollution, and unspecified general concerns.

Climate-related hazards influence specific localities in unique ways. A neighborhood with very little urban tree canopy is likely to experience greater impacts from a warmer climate than one with a very dense urban tree canopy. Those two landscapes also have very different capacities to absorb heavy rainfall (Figure 27). Because municipalities and neighborhoods experience impacts in different ways, each one should evaluate and address those impacts independently.

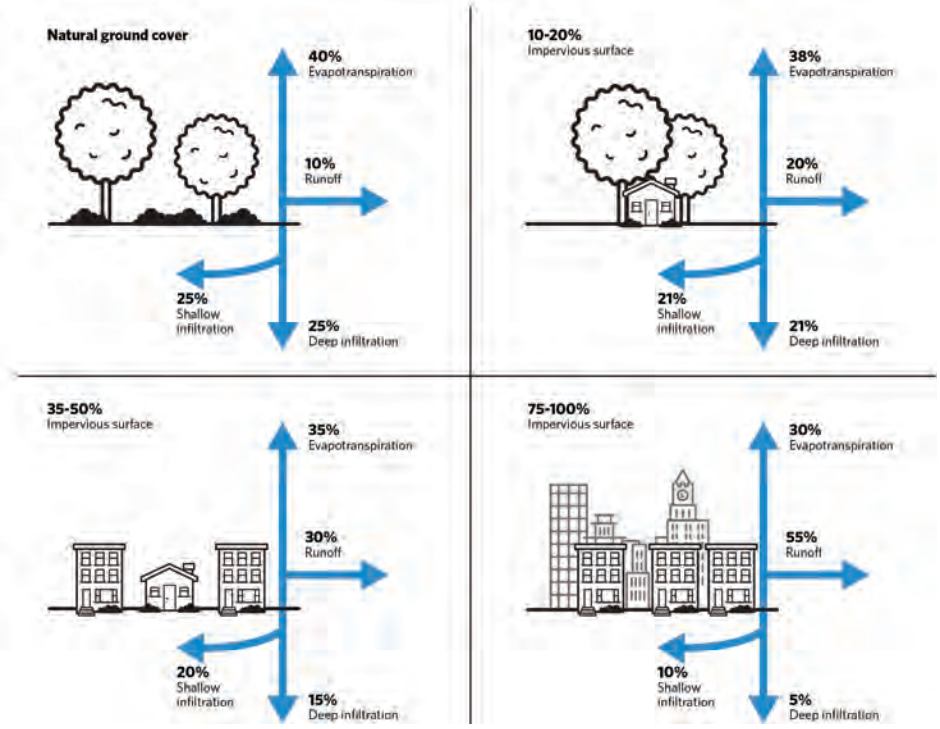


Figure 27. The landscape settings of municipalities influence their sensitivity to flooding. In a rural setting, rainfall can infiltrate into soil. In an urban setting, rain runs across impervious pavement, thereby increasing the intensity and probability of flooding. Source: CMAP, Data Source: U.S. EPA

2 ASSESS VULNERABILITY & RISKS

STEP 2: ASSESS VULNERABILITY AND RISKS

Because municipalities experience climate-related hazards and impacts in unique ways, it is important to understand and plan at a local level while keeping in mind the trends and hazards that concern the region as a whole. Table 1 presents a set of climate concerns compiled from literature reviews.[45] To complement climate science assessments, we conducted a live survey (on May 22, 2020) of stakeholder **perceptions** about the probability and potential impacts from climate-related hazards. All participants had been briefed on relevant climate science assessments prior to these surveys. In Figure 28, each dot represents an aggregate of 28 individual opinions about both the potential impacts and the probability of that impact occurring. The results confirm the ranking in Table 1. Perception of risk is an important motivation for taking action. In Figures 28–33, each individual's response is shown using a small dot. Viewed in this way, divergence of opinion about risk becomes evident by members from communities throughout the region.

Flooding is the most widely recognized major climate-related hazard (Figure 29), as evidenced by its high ranking by all webinar attendees in both probability and potential impacts.

Most participants agreed that extreme heat can occur with sufficient frequency and with enough severity that it should be treated as a high-risk hazard (Figure 30). Some people, perhaps in communities that have adequate adaptive capacity and lower sensitivity, put heat in the "moderate" risk category, indicated by the center box in the grid.

Drought (Figure 31), severe thunderstorms (Figure 32), and severe winter weather (Figure 33), all have a wide diversity of opinion concerning either probability or potential impact. In some locations, participants are seeking actions to prepare for severe thunderstorms and winter weather.

Drought deserves greater attention by local decision makers.

The vulnerability and risk-scoping exercises presented here reveal a diversity of opinion but also a critical mass of political will to move forward with building resilience in the face of extreme heat, flooding, and, to a lesser extent, drought, severe thunderstorms, and severe winter weather. While audience perception diverged on drought, literature reviews (see Table 1) indicate drought is an important climate-related hazard in the region and deserves further attention by local decision makers.

Table 1. Vulnerability and Risk scoping based on literature review (Appendix G). Climate-related hazards are ranked on a scale (1–5) indicating probability and potential consequence. The two are multiplied to assign a risk score. Source: Buro Happold

Climate-Related Hazard	Probability	Consequence	Risk
Extreme Heat	3	3	9
Drought	2	3	6
Severe Thunderstorms	2	2	4
Flooding	3	3	9
Severe Winter Weather	2	2	4

45 Buro Happold (Appendix G).

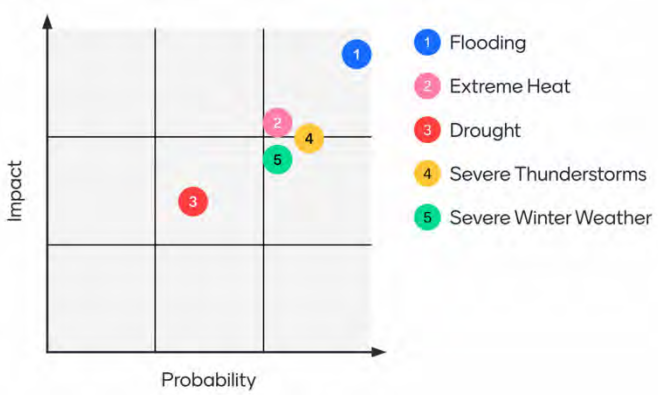


Figure 28. Aggregated votes of 28 individuals who assessed the probability and potential impacts from five sets of climate-related hazards. Source: MMC constituent engagement

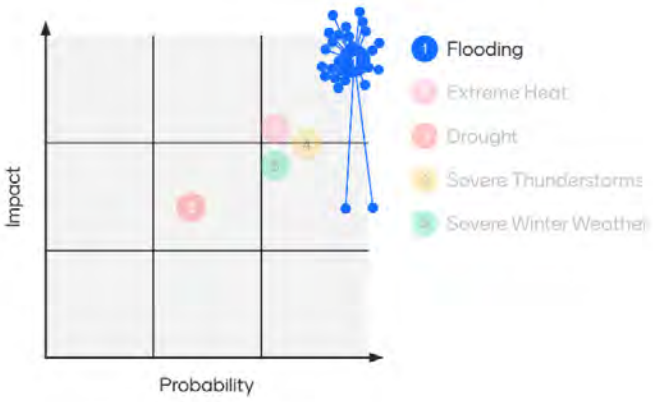


Figure 29. Twenty-six respondents considered flooding both highly probable and highly impactful. Two suggested impacts would be moderate, not severe. Source: MMC constituent engagement

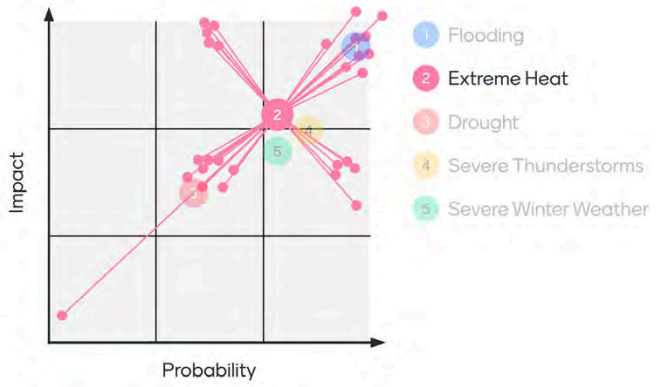


Figure 30. Extreme heat represents a moderate to severe risk and/or impact to all but one participant. Source: MMC constituent engagement

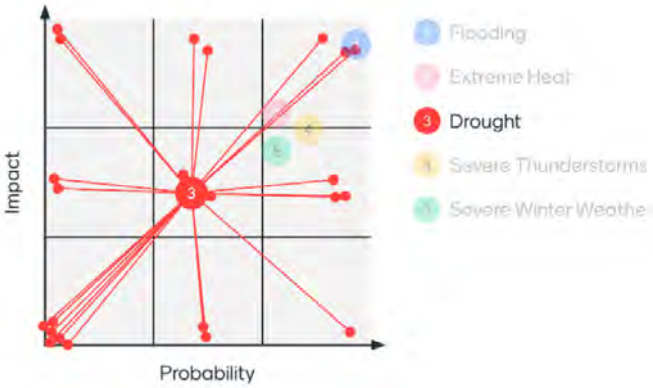


Figure 31. Only a minority of participants consider drought a major concern. Source: MMC constituent engagement

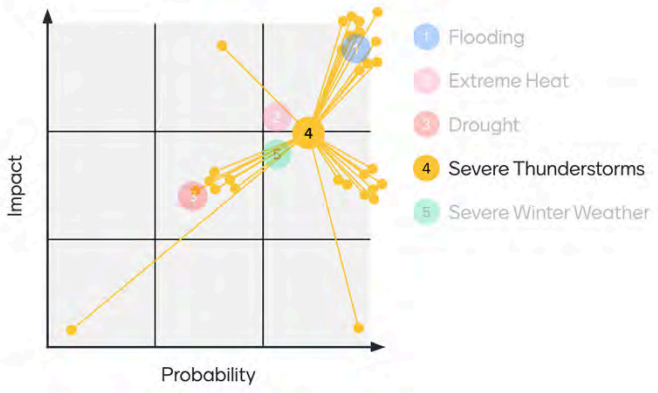


Figure 32. Many are concerned about high likelihood and impacts of Severe Thunderstorms. Source: MMC constituent engagement

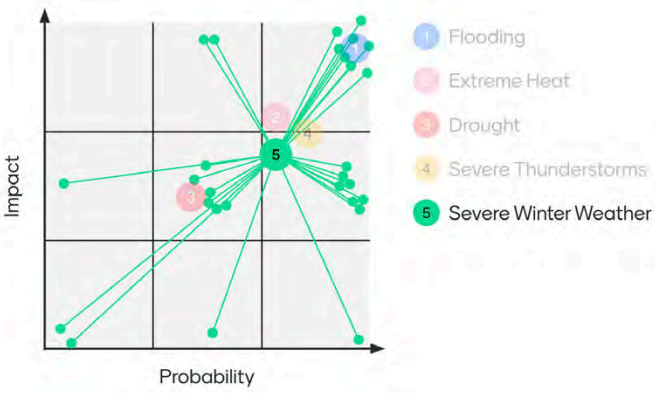
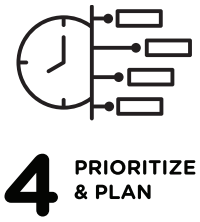


Figure 33. Severe Winter Weather also concerned a large number of participants. Source: MMC constituent engagement

STEP 3. INVESTIGATE OPTIONS

More frequent and severe climate-related hazards and resultant potential impacts require communities to then "Investigate Options"—the third in the *Steps to Resilience*.[46] Near-term options for building resilience may be found in the GRC Framework[47]—particularly the Climate, Land, Sustainable Communities, and Water categories—which now serves as a source of locally achievable adaptation strategies. To strengthen the GRC, we analyzed 30 local sustainability plans, 18 municipal climate action plans and guides from around the U.S.A., and three regional climate action plans from Europe (see Appendix A) to identify tested strategies for adapting to climate change in our region. Each strategy is appropriate for municipal action either to ***Lead***, ***Encourage*** others to take action, or ***Enact*** policies. Communities that have adopted the GRC have already expressed support for the goal *"Develop resiliency to climate change impacts."*



STEP 4. PRIORITIZE & PLAN

To provide more context about the practical application of the strategies in Appendix E, we have demonstrated how those strategies can be used to address six potential sets of impacts pertinent to pairs of hazards and assets, or "impact pairs." The "impact pair" analyses on the following pages can support municipal action now. Additional impacts, such as those from severe thunderstorms, severe winter weather, or drought, could be addressed through additional analyses for each community. Also, consult the **Overarching Actions to Build Community Resilience** (p. 45) for actions to educate, build capacity, and plan for all types of climate hazards while also reducing greenhouse gas emissions.

*Because climate impacts are experienced locally, each local government should develop its own priorities and plans utilizing the **Steps to Resilience** framework.*

A live survey during a webinar held May 22, 2020, gauged interest in how to focus adaptation actions. Free-form responses from participants (see Appendix B) fell into four categories: education; cooperation; prioritization & planning; and moving quickly to take adaptation actions. It is widely recognized that equity and inclusion are essential for successful adaptation efforts.

This plan is a first step in the ongoing, iterative process of increasing resilience to climate-related hazards. All potential impacts, including ones that have not yet been identified through this plan, are important for constituents throughout the region. Since this report does not provide details about the prevalence, severity, or options for addressing all of possible climate-related impacts, local governments and multi-jurisdiction stakeholders are encouraged to conduct their own asset inventories and examine exposure to a wide range of hazards. Since impacts are experienced locally, each local government should develop its own priorities and plans utilizing the *Steps to Resilience*[48] framework.

STEP 5. TAKE ACTION
ADAPTATION GOALS & OBJECTIVES

Using community input from May 22, 2020, as a guide, we grouped all strategies from the literature review based on similar focus and intent, yielding five broad objectives to support ongoing efforts of municipal leaders to adapt to climate-related hazards. The following five climate adaptation objectives support the regional climate adaptation goal: **persistent, equitable climate adaptation**.

46 Op. cit. https://toolkit.climate.gov/#steps. Accessed February 2021.
47 Op. cit. https://mayorscaucus.org/initiatives/environment/rec/. Accessed February 2021.
48 Op. cit. https://doi.org/10.1007/s10584-018-2216-0. Accessed February 2021.

CLIMATE ADAPTATION GOAL

Persistent, equitable climate adaptation

INTERIM TARGETS

2030 Climate-resilient governance

Local governments incorporate the *Steps to Resilience* into local permitting and regulation. Across jurisdictions, establish baselines for resilience; quantify vulnerability and risk to expected climate changes.

2040 Resilience across jurisdictions

Secure funding for adaptation projects that span municipal boundaries. Achieve measurable improvement in adaptive capacity for health, infrastructure, and services.

2050 Cohesive, resilient communities

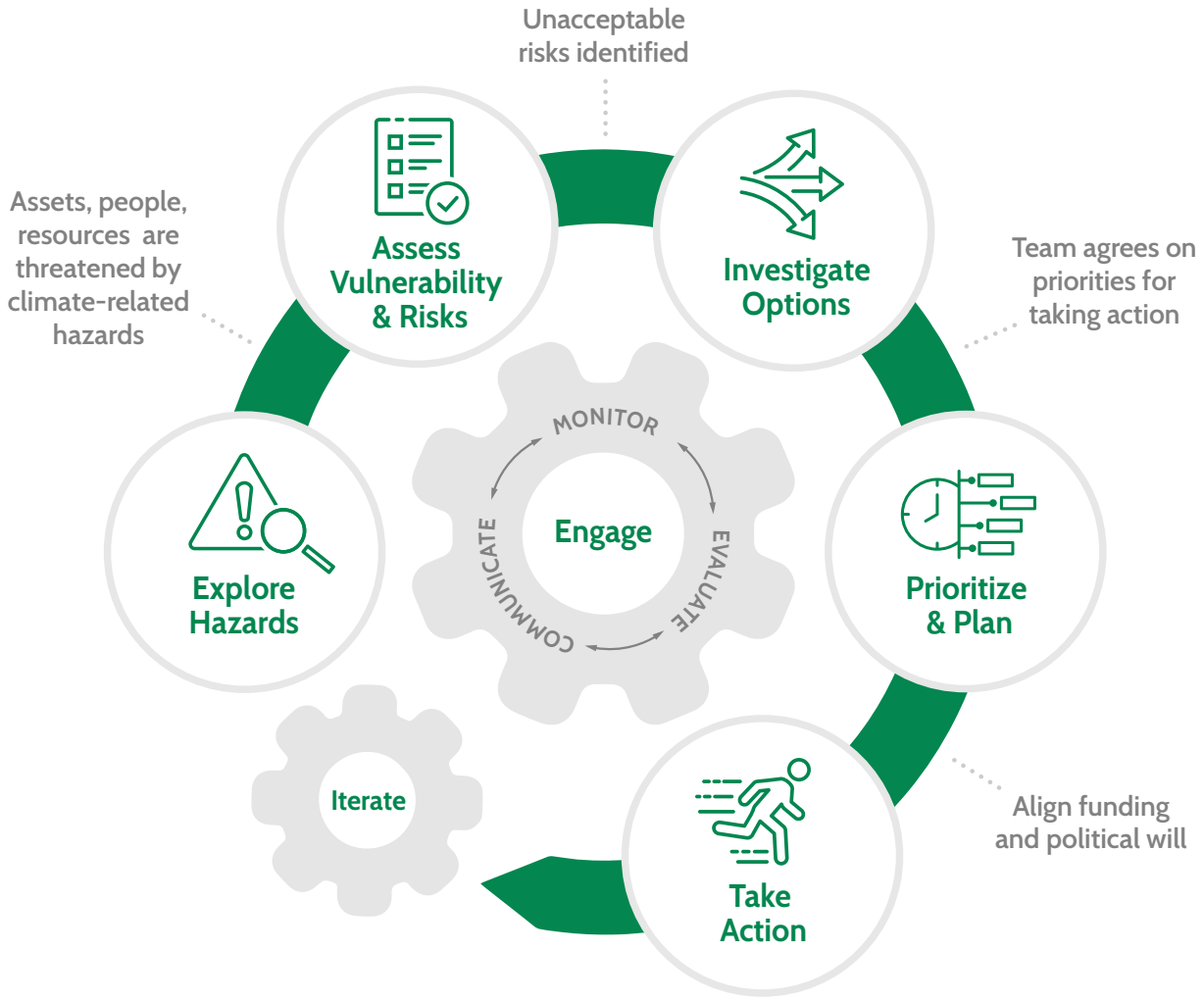
All new infrastructure exceeds baseline levels of vulnerability and risk. Throughout the region, end-of-century climate projections shall be incorporated into operations, management, and capital planning.

ADAPTATION OBJECTIVES

1. Engage and educate the community about climate resilience and adaptation.
2. Incorporate equity and inclusion into climate adaptation efforts.
3. Collaborate and build capacity for a more resilient community.
4. Enact plans and policies focused on adaptation and resilience.
5. Adapt operations and investments for future climate conditions.

Appendix E presents all 50 strategies embedded within these five objectives.

STEPS TO RESILIENCE



Populations, infrastructure, and resources will never be completely "resilient", and there will always be some chance of an acute hazard. Therefore, communities, regional planners, and state government should commit to persistent adaptation, revisiting the *Steps to Resilience* continually, over time.

ADAPTATION OBJECTIVES AND STRATEGIES

OVERARCHING ACTIONS TO BUILD RESILIENCE

ENGAGE AND EDUCATE THE COMMUNITY:

- Inform the community about changing weather hazards and risks.
- Encourage families to prepare an emergency response plan.
- Foster community spirit to recover, adapt and "bounce forward" from disaster.
- Employ an effective early warning and response system.

INCORPORATE EQUITY AND INCLUSION:

- Collaborate to ensure residents most vulnerable to heat, air pollution and flooding are connected to emergency relief services.
- Include vulnerable populations in planning and prioritize investments to protect them.
- Assure community education messages are accessible in all languages and formats.

COLLABORATE AND BUILD CAPACITY:

- Coordinate resiliency efforts with federal, state, and regional agencies.
- Access and share timely weather data.
- Manage public and private landscapes to optimize ecosystem services and support biodiversity
- Strengthen emergency and adaptive response skills among staff, civic leaders, and allied organizations.

ADAPT OPERATIONS AND INVESTMENTS:

- Integrate climate resiliency into decision-making about capital expenditures.

ENACT PLANS AND POLICIES:

- Assess climate vulnerability and risks to local infrastructure.
- Adopt and integrate county hazard mitigation plan into local plans and policies.
- Integrate climate impacts and vulnerability into relevant plans and regulations.
- Proactively update codes to reflect evolving climate conditions.
- Incentivize or require resilient building design.
- Reduce sprawl by promoting infill development.
- Prioritize transit-oriented development and transit-supportive land uses.
- Participate in the Community Rating System and National Flood Insurance Program.
- Guide future development plans to conserve and restore open space, soil, trees, and native landscapes to preserve ecosystem services.

FLOODING AND HOMES

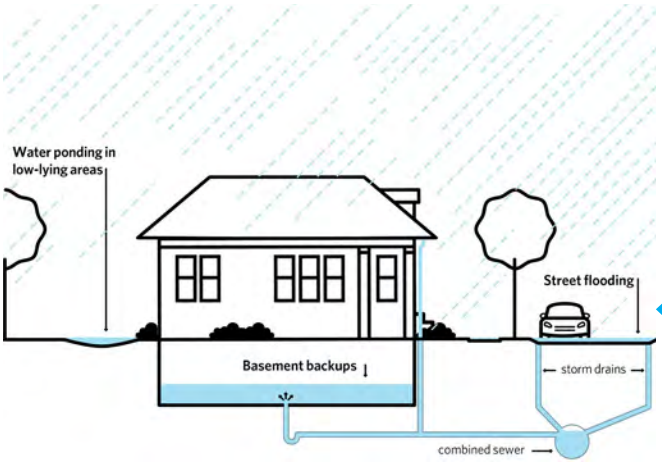
In the Chicago region, heavy rainfall events are increasingly frequent and severe, causing more flooding. Flooding is the climate-related hazard most residents and leaders want to address.

> *Some neighborhoods experience flooding after less than two inches of rain—small storms that, over time, result in significant harm to property and quality of life.*
>
> *ON TO 2050*

It will take all of us to build resilience to this growing hazard, from individuals to neighborhoods and local governments. Efforts should be focused to help vulnerable communities "bounce forward" from flooding events. Homeowners and renters must be aware of their flood risk so they can take steps to build personal resilience.

MITIGATION CO-BENEFITS:

Managing stormwater using green infrastructure saves energy.



Source: CMAP

ACTIONS TO BUILD RESILIENCE

ENGAGE AND EDUCATE THE COMMUNITY:

Inform the community about weather hazards, flood risk, and encourage preparation at home. Promote green infrastructure practices. Promote IDPH standards for post-flood clean up. Incentivize overhead basement sewer conversion. Foster community spirit to bounce forward from disaster.

INCORPORATE EQUITY AND INCLUSION:

Include vulnerable residents in planning and prioritize investments to protect them. Collaborate to ensure residents most vulnerable to flooding are connected to relief services.

COLLABORATE AND BUILD CAPACITY:

Coordinate resiliency efforts with federal, state, and regional planning agencies. Access and share timely weather data. Strengthen emergency and adaptive response skills among staff, civic leaders and allied organizations.

ENACT PLANS AND POLICIES:

Participate in the Community Rating System and National Flood Insurance Programs. Guide future development to reduce sprawl, conserve land and protect ecosystem services. Incentivize or require resilient building design. Optimize tree planting and protect existing trees for maximum stormwater benefits. Acquire and remove flood-prone homes.

Many of our sewers are connected to our storm drains, so when the streets flood, our homes and basements can too. A couple of things that we can do to help—disconnect our downspouts from the stormwater system, and install overhead basement plumbing.

FLOODING AND TRANSPORTATION

Flooding limits emergency access to neighborhoods. Roads provide vitally important access for safety, essential goods, and emergency services, and many neighborhoods and businesses can become isolated during flood events.

Of course, roads are also essential for people to move from where they live to where they work and meet with others. Flooding can be both acute due to heavy precipitation or chronic due to failing infrastructure. Both issues need to be addressed to create a truly resilient community.

MITIGATION CO-BENEFITS:

Resilient transit systems reduce vehicle miles traveled.

Image credit, above: CMAP, Image credit, right: Lake County Stormwater Management Commission

ACTIONS TO BUILD RESILIENCE

INCORPORATE EQUITY AND INCLUSION:

Assure transit along routes serving vulnerable populations is accessible and operable during a flood. Include vulnerable residents in planning and prioritize investments to protect them.

COLLABORATE AND BUILD CAPACITY:

Coordinate resiliency efforts with federal, state, county, and regional planning agencies. Collaborate on emergency transportation and logistics plans to move vital resources. Monitor and share real-time roadway conditions.

ENACT PLANS AND POLICIES:

Conduct climate vulnerability assessment and risks to local transportation infrastructure. Adopt and integrate county hazard mitigation plan into local plans and policies. Promote connected and walkable neighborhoods. Prioritize transit-oriented development.

ADAPT OPERATIONS AND INVESTMENTS:

Assess and adapt vulnerable transportation infrastructure to be responsive to changing climate conditions. Integrate stormwater management into transportation projects. Respond to weather events to ensure mobility.

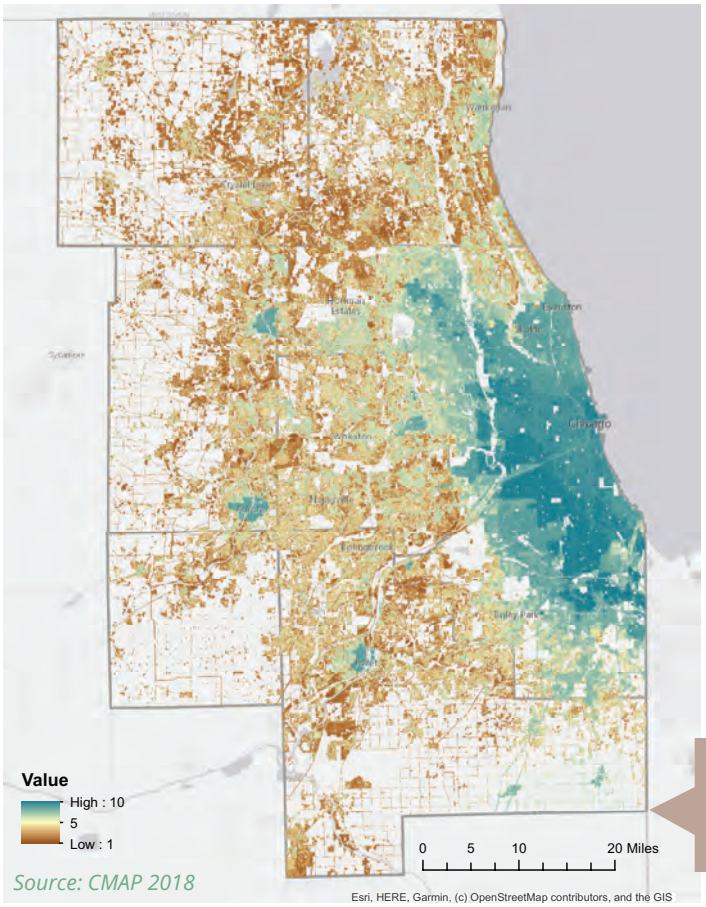
STORMWATER AND INFRASTRUCTURE

Floods are the most common and most costly disasters in Illinois. Heavy rainfall events are increasing in frequency and severity, pushing existing bridges and culverts beyond capacity and causing more flooding across the region. Cities and towns struggle to maintain that infrastructure, let alone replace it. Many structures are in floodplains and urban flood risk areas.

Stormwater management must be part of regional planning. Green infrastructure includes preserved habitat, open space, and wetlands, each of which buffers these problems and improves quality of life. Gray infrastructure includes basins, sewers, and other engineering solutions, such as those included in the Tunnel and Reservoir Plan (TARP).

Image credit: CMAP

URBAN FLOOD SUSCEPTIBILITY INDEX 2017



Source: CMAP 2018

The Urban Flood Susceptibility Index highlights areas with attributes associated with an elevated risk of urban flooding.

ACTIONS TO BUILD RESILIENCE

ENGAGE AND EDUCATE THE COMMUNITY:

Foster community spirit to recover, adapt and "bounce forward" from disaster. Encourage residents and businesses to disconnect downspouts from sewers and adopt water efficient behaviors.

INCORPORATE EQUITY AND INCLUSION:

Include vulnerable populations in planning and prioritize investments to protect them.

COLLABORATE AND BUILD CAPACITY:

Coordinate with federal, state, and regional agencies to manage stormwater.

ENACT PLANS AND POLICIES:

Integrate climate impacts and vulnerability into relevant plans and regulations. Adopt and integrate county hazard mitigation plan into local plans and policies. Participate in the Community Rating System and National Flood Insurance Programs. Guide development to conserve land and ecosystem services. Allow developments flexibility to meet stormwater requirements.

ADAPT OPERATIONS AND INVESTMENTS

Assess and adapt stormwater systems to respond to future rainfall projections. Establish green infrastructure and include maintenance in capital improvement plans.

HEAT AND HEALTH

Average temperatures in the Chicago region are increasing, not only during the day but also at night. This trend is projected to increase, with heat waves becoming more prevalent. This is adding stress to people, regional power supply, water resources, and ecosystems.

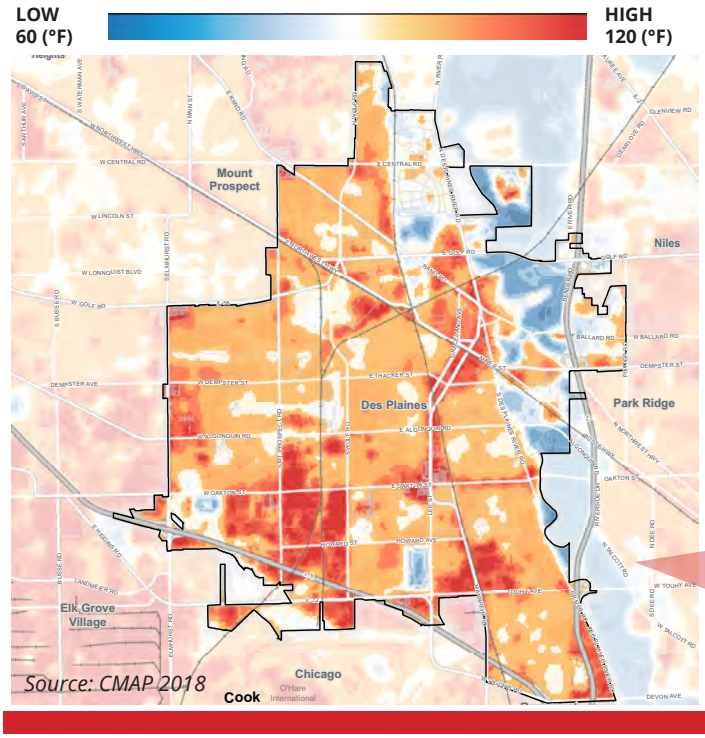
Residents need to cool their homes for longer each day, further burdening household budgets. This may be particularly difficult for socially vulnerable populations, including people on fixed incomes and families living below the poverty line.

Communities may need to provide more places and ways for these vulnerable populations to stay well—urban shade, splash pads, parks in neighborhoods, or community cooling centers. Home owners may build adaptive capacity by replacing dark roof materials with light-colored shingles or green roofs.

MITIGATION CO-BENEFITS:

Cooler neighborhoods and homes save energy, especially during very hot weather when energy demands are high.

City of Des Plaines Land Surface Temperature (LST)



Source: CMAP 2018

Areas with more concrete absorb and hold heat, increasing the impact for heat waves on vulnerable populations.

ACTIONS TO BUILD RESILIENCE

ENGAGE AND EDUCATE THE COMMUNITY:

Inform the community about changing heat hazards and risks; encourage preparation. Foster social cohesion. Engage residents with services that support health and wellness.

INCORPORATE EQUITY AND INCLUSION:

Collaborate to ensure vulnerable residents are connected to relief services. Include vulnerable residents in planning, and prioritize investments to protect them. Provide effective, accessible, and desired cooling interventions to vulnerable communities. Assure vital messages are accessible in all languages and formats.

COLLABORATE AND BUILD CAPACITY:

Strengthen emergency and adaptive response skills among staff, civic leaders, and allied organizations. Identify and mitigate urban heat islands. Facilitate compliance with federal air quality standards by businesses.

ENACT PLANS AND POLICIES:

Promote connected, complete and walkable neighborhoods. Optimize tree planting. Protect existing trees for maximum shading. Reduce sprawl by promoting infill development. Incentivize or require resilient building design. Proactively update building codes to reflect evolving conditions.

AIR QUALITY, FLOODING AND PUBLIC HEALTH

Epidemiologists evaluate many factors that either diminish or improve public health. Climate-related hazards can multiply with one another as well as non-climate factors to exacerbate health impacts. For example, poor air quality compounds the effects of flooding on mold, respiratory health, allergies, waterborne disease, and other consequences. Flood damage to homes can impact mental health due to stress from the loss itself, the resulting displacement, or ongoing problems managing recovery from a flood.

The underlying causes of climate change from greenhouse gas emissions bring a number of additional stressors to air quality, which, in turn, diminish quality of life and life expectancy, particularly for residents of urban and suburban areas.

MITIGATION CO-BENEFITS:

Preventing mold often involves securing the building envelope, insulation, and healthy outdoor air exchange. Reducing air pollution and lowering GHG emissions go hand-in hand.

Image credit: Neighborhood Housing Services

Image credit: @macnifying_glass on Instagram
A dust cloud covered Little Village in April 2020, after a smokestack at the Crawford Coal Plant was demolished.

ACTIONS TO BUILD RESILIENCE

ENGAGE & EDUCATE:

Inform the community about air pollution action days. Educate residents about maintaining healthy indoor air quality and about services that support health and wellness. Promote the Illinois Department of Public Health standards for post-flood clean up.

INCORPORATE EQUITY AND INCLUSION:

Assess local air quality and take action to protect vulnerable populations from pollution. Collaborate to ensure vulnerable residents are connected to and utilizing human services.

COLLABORATE AND BUILD CAPACITY:

Facilitate compliance with federal air quality standards by businesses.
Collaborate with public health and emergency management agencies to strengthen adaptive response skills among staff, civic leaders, and allied organizations. Manage public and private landscapes to provide accessible recreation and optimize ecosystem services.

ENACT PLANS AND POLICIES:

Integrate climate impacts and vulnerability into relevant plans and regulations.

DROUGHT AND WATER SUPPLY

Sustaining water supply is critical to both climate adaptation and mitigation. Some communities in the region are facing water supply limitations within the next decade. Surface and groundwater supplies are vulnerable to drought. Regional water supply planning is essential to help communities adapt and sustain water resources.

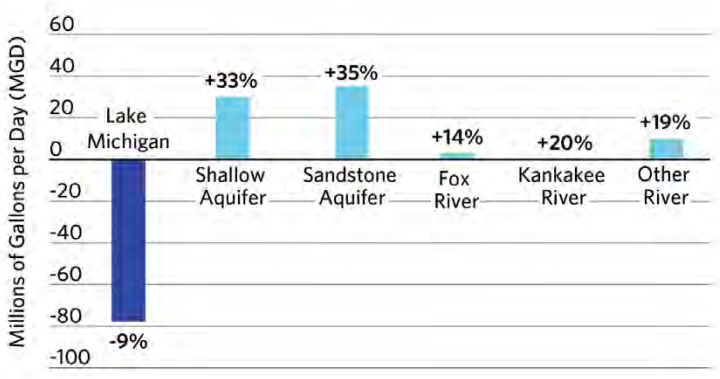
Water conservation policies like outdoor watering regulations, sustainable landscaping and conservation practices by water customers are important solutions. Affordable access to safe drinking water for all protects public health and eases household utility burden.

Low water levels and higher temperature yield drought. Both can reduce water quality, driving up energy demands and costs for water supply.

MITIGATION CO-BENEFITS:

Modernizing water delivery systems for efficiency and resilience reduces energy demands.

PROJECTED CHANGES IN WATER DEMAND BY WATER SOURCE 2011 - 2050



Source: CMAP

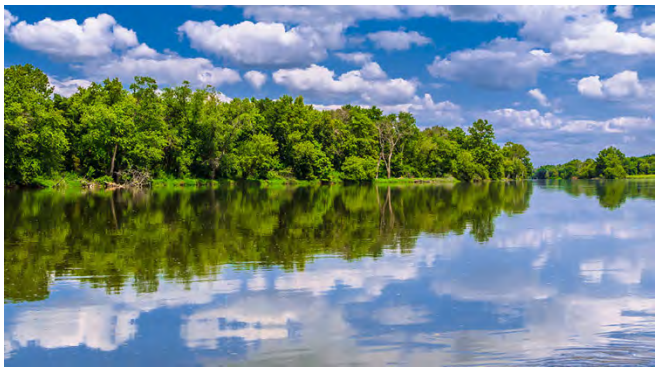


Image credit: CMAP

ACTIONS TO BUILD RESILIENCE

ENGAGE & EDUCATE:
Encourage residents and businesses to conserve water and adopt green infrastructure practices.

INCORPORATE EQUITY AND INCLUSION:
Assure affordable access to safe drinking water for all. Include vulnerable populations in planning and prioritize investments to protect them. Replace lead service lines for safe drinking water delivery.

COLLABORATE AND BUILD CAPACITY:
Coordinate resiliency efforts with federal, state, and regional planning agencies to sustainably manage water supply. Monitor and protect water quality in private wells

ENACT PLANS AND POLICIES:
Adopt a water conservation plan. Enact and enforce outdoor watering regulations responsive to drought conditions. Protect surface and groundwater from contamination.

ADAPT OPERATIONS AND INVESTMENTS
Create resilient water utilities through efficiency, conservation, demand management, technology, and flexible operations. Assess and adapt vulnerable infrastructure to be responsive to changing climate.

CROSS-CUTTING OBJECTIVES AND CO-BENEFITS

Objectives and strategies in this plan are sorted into either Mitigation or Adaptation. This section addresses objectives that cut across both categories of climate action.

OVERARCHING OBJECTIVES

The objective, *Demonstrate Leadership to Reduce Emissions* (page 28), recognizes the value of planning, community engagement, robust local economies, and sustainable municipal operations even though these are not associated with a specific emissions reduction target. Clearly, those tasks are also essential for adaptation and building resilience. Constituent engagement, planning and measuring progress, and investing in sustainability are all essential for both mitigation and adaptation.

The objective *Sustain Ecosystems to Sequester Carbon* (page 35) not only reduces GHGs in the atmosphere but improves quality of life. This plan encourages nature-based solutions wherever feasible. Trees, prairie grasses, and other plants absorb carbon dioxide through their leaves and store it in wood, roots, and the soil. This process contributes to longer term carbon sequestration. It is difficult to measure the amount of carbon sequestered by a specific green infrastructure project, but the cumulative impact is real. Often, these strategies can be justified for another purpose, such as flood control, heat island reduction, or quality of life. The carbon mitigation impacts are a positive side effect.

CO-BENEFITS

Most climate mitigation objectives related to clean energy also contribute lasting economic, social, environmental, and human health benefits. Strategies that simultaneously improve quality of life and reduce GHG emissions are said to provide "co-benefits." These co-benefits add value to climate action and are often more familiar and apparent to constituents than the resulting GHG emissions reduction. For example, retrofitting homes to improve energy efficiency reduces building energy demands and therefore GHG emissions. However, more efficient homes can be more comfortable, maintain cleaner indoor air quality, and reduce the burden of household energy bills. In another example, providing more accessible active transportation creates more connected communities and promotes healthy lifestyles, improving public health outcomes. Integrating multiple drivers of change, such as social vulnerability, climate change, utility consumption data, etc., can help identify targeted urban design solutions and investments. These design choices reduce GHG emissions.

Adaptation actions primarily result in lasting economic, social, environmental, and human health benefits that create community resilience. Green infrastructure, an adaptation strategy to manage flooding and heat, makes neighborhoods more beautiful and helps to sequester carbon. Reducing the need to treat stormwater also saves energy needed for wastewater processing, thereby reducing emissions.[49]

The co-benefits of all mitigation and adaptation actions in this plan are summarized in Table 2:

49 *Commonwealth Edison Company, 2021. Green Stormwater Infrastructure. https://www.comedemergingtech.com/project/green-stormwater-infrastructure. Accessed February 2021.*

Table 2. All Mitigation and Adaptation Objectives and Corresponding Adaptation and Mitigation Benefits

Mitigation Objective	*Outcome/Co-benefits*	*Adaptation Benefit*
Demonstrate Leadership to Reduce Emissions	Engaged constituents, public support, green jobs, efficiencies and cost-savings	More resilient communities
Decarbonize Energy Sources	Cleaner air and water, renewable energy, potential improvements to energy security	More resilient electric grid
Optimize Building Energy	Improved building performance, lower energy costs/energy burden, cleaner air	More resilient buildings
Implement Clean Energy Policies	Clean energy jobs, leveraged investment	Economic development
Decarbonize Transportation	Cleaner air, lower long-term fuel costs, reduced noise pollution, beneficial electrification	Less reliance on vulnerable fuel supply chain
Reduce Vehicle Miles Traveled	Less congestion, less reliance on single-occupancy vehicles, more connected communities, more social cohesion, more walking and biking and better health outcomes, lower transportation costs, reduced injuries/fatalities from road accidents	More resilient transportation systems
Manage Water and Waste Sustainably	Cleaner air and water, less waste	More resilient water and wastewater systems
Sustain Ecosystems to Sequester Carbon	Enhanced ecosystems, preserved biodiversity, improved quality of life and mental health, active and healthy lifestyles	Reduced flooding, cooler communities

Adaptation Objective	*Outcome/Co-benefits*	*Mitigation Benefit*
Engage and educate the community about climate resilience and adaptation	Prepared and engaged constituents, community cohesion, better health outcomes, private property and well-being preserved	Awareness of hazards and impacts builds support for climate mitigation actions
Incorporate equity and inclusion into climate adaptation efforts	Prepared and engaged constituents, community cohesion, improved health equity, private property preserved	
Collaborate and build capacity for more resilient community	Shared and leveraged resources, greater efficiency and outputs, greater adaptive capacity. Property, water supply, and other assets preserved	
Enact plans and policies focused on adaptation and resilience	Prepared assets and operations, greater adaptive capacity. Improved nature, quality of life	Reduced energy demands for water utilities. Healthy ecosystems help sequester carbon
Adapt operations and investments for future climate conditions	Prepared assets and operations, nature, quality of life, property, water supply and other assets preserved	Reduced energy demands for operations

1 EXPLORE HAZARDS

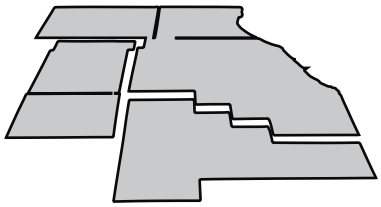
2 VULNERABILITY & RISK

3 OPTIONS

4 PRIORITIZE & PLAN

5 TAKE ACTION

STEPS TO RESILIENCE



- MUNICIPAL

  Citizens and municipal leaders bear the brunt of climate-related hazards. They have the greatest motivation to lower their own vulnerability and risk, to improve their preparedness, and to enhance emergency response.

- REGIONAL

  Regional governmental entities, such as the Caucus, can focus political support on local efforts to lead, encourage action, and enact relevant policies.

- STATE

  State governments can support local resilience-building activities and coordinate with federal authorities to align resources and expertise with regional and local needs.

- FEDERAL

  Federal programs, such as FEMA's BRIC, can be directed toward resilience projects at a local level.

STATE SUPPORT OF **LOCAL CLIMATE RESILIENCE**

1 PROVIDE BASIC SERVICES

2 STATE FINANCE AND INVESTMENT

3 SUPPORT LOCAL PROJECTS

4 ENABLE LOCAL FUNDING

5 PRIVATE INVESTMENT

6 EXPAND FEDERAL FUNDING

IMPLEMENTATION

Figure 34. Greenest Region Compact communities celebrate earning SolSmart designation collaboratively. May, 2018. Image credit: Argonne National Laboratory

COHESIVE, RESILIENT COMMUNITIES

While municipalities can't tackle climate change on their own, the strategies contained in this plan are specifically tailored for action at the municipal scale. Implementing the plan will require support and engagement at a breadth and pace beyond the authority or capacity of any single organization, yet municipalities can move forward deliberately and quickly using the guidance compiled herein.

This plan empowers municipalities to sharpen their focus on climate action. Many municipalities in the region have already embraced the goals of the Greenest Region Compact (GRC). Climate mitigation and adaptation are now aligned with the GRC so that municipalities may act quickly and decisively on both mitigation of greenhouse gases and adaptation to the impacts that stem from a changing climate.

Using regional emission targets as a guide, municipalities need not conduct their own greenhouse gas inventories, but can immediately step ahead to climate action. The climate planning process revealed strategies that are both familiar to municipal leaders and also impactful in reaching the mitigation goal of net zero emissions by 2050. One GRC goal, *Advance renewable energy*, appears within this plan with a new heading, *Implement Clean Energy Policies*, in order to reflect our focus on mitigating GHG emissions.

Another strategy, *Adapt zoning codes and streamline development processes to accelerate investment in solar and other renewable energy systems*, is something GRC communities have successfully done. The Caucus partnered with The Solar Foundation to lead 35 municipalities and counties to earn the national SolSmart designation[50] for streamlining solar codes and processes in their own jurisdictions. This collaborative approach led to more community SolSmart designations than any other state and dovetailed with increased investment in solar energy resulting from the Future Energy Jobs Act (Public Act 09-0906). This also led to measurable gains in solar development, such as in the Village of Schaumburg, which reports growth in rooftop solar development of 5,900% since earning SolSmart.[51] At the appropriate scale, continued action to grow solar energy capacity could reduce 2.4 MMTCO2e emissions per year by 2030.

50 Metropolitan Mayors Caucus. 2020. SolSmart. https://mayorscaucus.org/solsmart/. Accessed February 2021.

51 SolSmart. 2021. Chicago Metro Area. https://solsmart.org/chicago-metro-area-mini-case-study/. Accessed February 2021.

Figure 35. Geneva residents transition turf grass to a biologically rich landscape. Image credit: Jay Womack

Municipalities are also uniquely positioned to take action toward the objective *Implement Clean Energy Policies* by supporting robust building efficiency standards. Local action adds momentum to current efforts underway to update the International Energy Conservation Code (IECC), which sets efficiency and performance standards for new buildings. New provisions to be adopted in 2021 are expected to realize an 8%– 14% boost in building energy efficiency over the current version,[52] yielding long-term energy savings over the life of the building.

In the transportation sector, emissions are closely linked to consumer preferences and development patterns. Personal vehicles, which are the largest overall contributor to transportation emissions in the Chicago region, typically have a life cycle of greater than 15 years, so changes may occur slowly. Municipalities can accelerate adoption of electric vehicles (EV) by updating zoning codes, parking policies, and permitting procedures to support EV charging infrastructure and transitioning their own fleets to electric, when possible.[53] Land use planning and decisions that favor transit and active transportation are also influential and squarely within the authority of municipalities.

More detailed information to support municipalities in implementing strategies are provided in the summary spreadsheets: Mitigation Strategies Appendix D and Adaptation Strategies Appendix E. Strategies are again characterized by actions to **Lead**, **Encourage**, and **Enact** to guide municipalities to prioritize their actions based on their community needs and opportunities.

PLANNING AND PERSISTENT ADAPTATION

For adaptation to proceed in a comprehensive way in the Chicago region, decisions must be coordinated across levels of government. County managers, city managers, mayors, and council members require data as well as a vision about how to build resilience to variable and changing climate conditions. The ON TO 2050 plan underscores these concepts.

> *CMAP is already working to integrate climate change information, such as vulnerability assessments, and recommendations into local planning processes. Other units of government in the region have created standalone plans related to climate change or incorporated these elements into other planning documents. Coordination across units of government responsible for different planning efforts is particularly important. For example, counties typically conduct land use, watershed, stormwater, and hazard mitigation planning, all of which affect climate resilience at the municipal level. And because climate change can disproportionately affect residents within EDAs (Economically Disconnected Areas), as well as the elderly, people with chronic diseases, and those without health insurance, it is critical to meaningfully engage these populations in resilience planning.*
>
> *ON TO 2050*[54]

Flooding, for instance, broadly requires a good understanding of weather, climate, and hydrology. Accurate maps showing the ways that precipitation moves over the landscape are needed in order to provide spatially explicit insight into the exposure of vulnerable populations, housing, critical facilities, roadways, and other resources. Data and insights about flooding typically require the expertise of engineers capable of detailed analyses, and their services may not be accessible or affordable to small communities. Likewise, to address the health impacts that accompany urban heat island effects, more detailed information about housing conditions and micro-scale variations in the distribution of extreme heat are needed. Once data about exposure to flooding and heat are available, further analyses may be needed in order to evaluate vulnerability and risk to those hazards at municipal and parcel scales.

Regional analyses can help justify investments by both municipalities and regional authorities such as transit agencies, water utilities, county health departments, emergency

52 Ruppenthal, Alex. "How a suburban Chicago mayor helped inspire the biggest jump in building energy code improvements in a decade." Energy News Network, 2020. https://energynews.us/2020/06/03/national/how-a-suburban-chicago-mayor-helped-inspire-the-biggest-jump-in-building-energy-code-improvements-in-a-decade/.

53 Metropolitan Mayors Caucus, 2020. Becoming EV Ready. https://mayorscaucus.org/initiatives/environment/becoming-ev-ready/. Accessed February 2021.

54 CMAP. ON TO 2050, Climate Resilience. https://www.cmap.illinois.gov/2050/environment/climate-resilience. Accessed February 2021.

management agencies, and electric and gas utilities.
A multi-jurisdictional approach is needed for addressing hazards that manifest over large areas. For example, stormwater management should involve a watershed-wide perspective, which may incorporate multiple communities. Rather than develop multiple models for every municipality, it is more efficient to develop a watershed-wide model and provide results to each municipality as well as any entity charged with managing water within the relevant area. Further, management strategies may require a broader approach than a single municipality can accomplish on its own. Quantified risk assessments can support local resilience plans by providing site-specific information about transportation, economic development, stormwater management, water treatment, and land use planning.

Impacts of climate-related hazards are experienced locally and must be addressed at that level. This plan identifies priority pairs of climate-related hazards and assets (e.g., Flooding and Homes) and recommends effective strategies for local action. Each local government should build upon this regional plan to develop their own priorities and actions utilizing the *Steps to Resilience*[55] framework.

It is important that local governments allocate funds to their own highest risks from climate-related hazards. Adaptation professionals suggest that state governments support and fund regional analyses and quantified risk assessments so that local governments can target adaptation activities in a responsible way.[56] In future steps, mayors and regional planners can collaborate to bridge both local and regional scales of analysis and decision making and work together to iteratively take the *Steps to Resilience*[57] in all localities throughout the region.

MONITORING AND PROGRESS

The Metropolitan Mayors Caucus has committed to the reporting requirement of the Global Covenant of Mayors for Climate and Energy. We will annually report actions and outcomes resulting from this plan utilizing the Common Reporting Framework hosted by the Carbon Disclosure Project (CDP). The CDP maintains the world's largest, most comprehensive dataset on environmental action and it is used by all GCoM cities and regions, as well as 9,600 companies.

CMAP is planning the next regional GHG inventory based on data from the year 2019. That inventory process may reveal new ways of calculating emissions for the region and may require a re-assessment of historical progress. Any such innovation should be both expected and considered essential to understanding emissions trends across all sectors. Future inventories will comply with GCoM requirements. Moving forward, CMAP will continue to provide regional inventory updates and will explore opportunities for providing new and more detailed data.

Figure 36. The Village of Diamond constructed a bike path to give children a safe route to school. Image credit: Village of Diamond

Municipalities need to measure local progress toward the goals in this plan and for the region as a whole. In the future, the Greenest Region Compact (GRC) Framework tool will be enhanced to track outcomes and measure progress. It will also incorporate the *Steps to Resilience* to further guide and track progress as municipalities conduct their own local risk assessments and develop focused resilience plans. Now and in the future, GRC communities can use the GRC Framework as a guide to design their own tracking and reporting process.

NEXT STEPS

All communities in the GRC are now poised to coordinate regional action, measure and report progress at municipal levels, and support local climate hazard assessment and adaptation planning. Each community must link their work to that of others throughout the Chicago metropolitan region. As we engage stakeholders and coordinate with the private sector, we may all "scale up" our regional work to meaningful levels to address global climate change. Simultaneously, the Caucus will help municipalities "scale down" this regional plan so they may take strategic climate action. Then municipalities' actions will strengthen their own communities while advancing progress toward the regional goals of this plan.

55 Op. cit. https://toolkit.climate.gov/#steps. Accessed February 2021.

56 Plastrik, Peter, Joyce Coffee, Scott Bernstein, and John Cleveland. 2020. How State Governments Can Help Communities Invest in Climate Resilience. Innovation Network for Communities, Climate Resilience Consulting, and The Summit Foundation. http://lifeaftercarbon.net/wp-content/uploads/2020/09/State-Resilience-Framework-September-2020.pdf. Accessed February 2021.

57 Op. cit. https://toolkit.climate.gov/#steps. Accessed February 2021.

CONCLUSION

This regional climate plan, and the process on which it is built, has revealed a need for urgent, coordinated action to both mitigate and adapt to climate change. Encouragement and assistance from NOAA's Climate Program Office and International Urban Cooperation has also spotlighted our region as a leader in collaborative climate planning. Our culture of cohesion and the collective expertise of stakeholders position us well to meet this challenge.

The climate mitigation objectives and strategies in this plan are tailored to address the greatest sources of greenhouse gas emissions and the most promising opportunities to meet the goal of **net zero emissions by 2050**. This plan also suggests strategies to address a set of high-priority climate impacts and offers targeted objectives and strategies to commit to **persistent, equitable adaptation**. The next steps for municipalities require an iterative approach to using the *Steps to Resilience*.

Municipal governments are uniquely positioned to engage constituents to bring about meaningful actions in both climate mitigation and adaptation. They have tools and expertise that can bolster community resilience. For example, capital planning can guide investments in infrastructure that can adapt to changing weather patterns. Municipal leaders can also cultivate cohesive and prepared communities that can endure and bounce forward from disasters.

Join us in working toward the goals and objectives of the Climate Action Plan for the Chicago Region. We recognize that hard work and a challenging shift to a new direction lies ahead on our journey. Regardless, we must begin movement toward a better future and begin now.

Image credit: Andy Marfia


Metropolitan
Mayors
Caucus


GRC2
Greenest
Region
Compact
COLLABORATING FOR SUSTAINABLE COMMUNITIES


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE


U.S. Climate
Resilience Toolkit


Co-funded by
the European Union


GLOBAL COVENANT
of MAYORS for
CLIMATE & ENERGY
UNITED STATES


Chicago Metropolitan
Agency for Planning

APPENDIX

APPENDIX A:
SUSTAINABILITY AND CLIMATE ACTION PLANS REFERENCED

SUSTAINABILITY PLANS

Area	*Name*	*Publication Year*
Village of Algonquin	Environmental Action Plan	2010
City of Aurora	Sustainability Plan	2008
City of Batavia	Environmental Identity	2013
Village of Buffalo Grove	Environmental Plan	2014
City of Chicago	Resilient Chicago	2019
City of Chicago	Sustainable Chicago	2012
Village of Deer Park	Deer Park Sustainability Report	2020
City of Des Plaines	Sustain Des Plaines	2011
Village of Elburn	Comprehensive Plan, Sustainability Chapter	2013
City of Elgin	Sustainability Action Plan	2013
City of Elmhurst	Comprehensive Plan, Sustainability Chapter Climate	2009
City of Evanston	Action Plan	2008
City of Highland Park	Sustainability Strategic Plan	2010
Village of Hoffman Estates	Sustainability Plan	2013
Village of Homer Glen	Green Vision	2004
Village of La Grange Park	Sustainability Plan	2012
Lake County	Strategy for Sustainable Lake County	2009
Village of Lombard	Local Climate Action Plan	2012
Village of Millbrook	Comprehensive Plan	2009
Village of Monee, Peotone, University Park	Green Communities Vision	2009
City of Naperville	Environmental Sustainability Plan	2010
Village of Niles	Environmental Action Plan	2013
City of Normal	Community-Wide Sustainability Plan	2010
Village of Oak Park/River Forest	Sustainability Plan	2012
Village of Orland Park	Comprehensive Plan, Sustainability Chapter	2013
Village of Park Forest	Growing Green: Park Forest Sustainability Plan	2012

Area	Name	Publication Year
Village of Robbins	Green Communities Vision	2004
Village of Schaumburg	Comprehensive Green Action Plan	2008
Village of Sleepy Hollow	Green Communities Vision	2004
Village of Winnetka	Environmental & Forestry Commission, Strategic Plan	2010
City of Woodstock	Environmental Plan	2010

CLIMATE ACTION PLANS

Authoring Organization	Area	Name	Publication Year
City of Asheville, NC	City of Asheville, NC	Building a Climate Resilient Asheville	2019
Área de Metropolitana de Barcelona	Barcelona Region, Spain	Pla d'Adaptació al Canvi Climàtic de l'Àrea Metropolitana de Barcelona	2018
Brussels Capital Region	Brussels Region, Belgium	Brussels Capital Region's Energy and Climate Plan 2030	2019
City of Chicago	City of Chicago	Chicago Climate Action Plan	2008
CMAP	Chicago Metropolitan Region	Climate Adaptation Guidebook for Municipalities in the Chicago Region	2013
City of Columbus	City of Columbus	Columbus Climate Adaptation Plan	2018
Cook County	Cook County	Cook County Climate Change and Public Health Action Plan	2012
City and County of Denver	City and County of Denver	Climate Adaptation Plan	2014
City of Evanston	City of Evanston	Climate Action and Resilience Plan	2018
Global Covenant of Mayors for Climate and Energy	Global	Common Reporting Framework	2018
City of Highland Park	City of Highland Park	Climate Hazard Assessment	2019
City of Indianapolis	City of Indianapolis	Thrive Indianapolis	2019
Climate Action KC	Kansas City region	Climate Action Playbook	2019
Metropolitan Mayors Caucus	Chicago Metropolitan Region	Greenest Region Compact	2016
City of New Orleans, LA	City of New Orleans, LA	Climate Action for a Resilient New Orleans	2017
Village of Northbrook	Village of Northbrook	Northbrook Climate Action Plan	2021
City of Oakland, CA	City of Oakland, CA	Equitable Climate Action Plan	2020
Village of Park Forest	Village of Park Forest	Park Forest Climate Action and Resilience Plan	2019
City of Santa Monica, CA	City of Santa Monica, CA	Climate Action & Adaptation Plan	2019
City of Seattle	City of Seattle	Seattle Climate Action Plan	2013
City of St. Louis	City of St. Louis	Climate Action & Adaptation Plan	2017
Verband Region Stuttgart	Stuttgart region, Germany	Climate Planning Strategy	2019
U.N. Office for Disaster Risk Reduction	Global	Disaster Resilience Scorecard for Cities	2018
U.N. Office for Disaster Risk Reduction	Global	Sendai Framework for Disaster Risk Reduction 2015-2030	2015
Metropolitan Washington Council of Governments	Washington, DC Metropolitan Region	Metropolitan Washington 2030 Climate and Energy Action Plan	2020

APPENDIX B:
STAKEHOLDER ENGAGEMENT

ALL ORGANIZATIONS PARTICIPATING

Organization	
Advanced Renewables LLC	CMAP Economic Development Committee
American Public Works Association	CMAP Environment & Natural Resources Committee
Animalia Project	CMAP Metropolitan Planning Organization Planning Committee
Applied Ecological Services	CMAP Transportation Committee
Argonne National Lab, Decision and Infrastructure Sciences Division	Chicago Region Trees Initiative
Argonne National Lab, Environmental Science Division	Chicago Wilderness, Climate Committee
Village of Arlington Heights	Climate Literacy & Energy Awareness Network
City of Aurora	CME Group
City of Aurora Sustainability Commission	Collective Resource Compost
City of Batavia Environmental Commission	College of Lake County
Baxter & Woodman	ComEd
City of Blue Island	Cook County Dept. of Environment & Sustainability
Blue Stem	City of Darien
Village of Bolingbrook	Village of Deer Park
Village of Broadview	Deigan & Associates
Village of Brookfield	City of DeKalb Environmental Commission
Buro Happold Engineering	DePaul University Dept. of Public Policy
City of Chicago	DuPage County Dept. of Stormwater Management
Chicago Area Clean Cities Coalition	Ecology and Environment, Inc.
Chicago Dept. of Transportation	Elevate
Chicago Metropolitan Agency for Planning (CMAP)	Environmental Law and Policy Center
CMAP Citizens' Advisory Committee	City of Evanston
CMAP Counties Committee	The Field Museum

Organization	
First Congregational Church of Western Springs	Illinois Sustainable Technology Center
Foresight Design Initiative	Illinois-Indiana Sea Grant
Forest Preserve District of Cook County	International Urban Cooperation
Forest Preserve District of Will County	Jacobs Engineering Group
City of Fort Lauderdale, FL	Kane County Development Dept.
Friends of the Chicago River	Kane County Farm Bureau
Gade Environmental Group	Kane County, Division of Environmental and Water Resources
City of Geneva	Kishwaukee Water Reclamation District
Village of Glen Ellyn	Village of La Grange Environmental Quality Commission
Village of Glenview	Lake County Administrator's Office
Global Covenant Mayors for Climate and Energy	Lake County Forest Preserves
Global Philanthropy Partnership	City of Lake Forest
Go Green Winnetka	Village of Lombard
Great Lakes Commission	Loyola University Chicago School of Environmental Sustainability
Green Diamond, LLC	McHenry County Dept. of Transportation
Greenest Region Corps	Merritt Connect Inc.
Greenleaf Communities	Metra
Green Ways 2Go	Metro West Council of Government
Village of Hanover Park	Metropolitan Mayors Caucus
Harvey Area Chamber of Commerce	Metropolitan Planning Council
Village of Hawthorn Woods	Metropolitan Water Reclamation District of Greater Chicago
Village of Hazel Crest	Midwestern Regional Climate Center
City of Highland Park	Village of Montgomery
Village of Hoffman Estates	Moraine Valley Community College
Village of Homer Glen, Environment Committee	Village of Morton Grove
Illinois Dept. of Natural Resources (IDNR)	Village of Mount Prospect
IDNR, Coastal Management Program	City of Naperville
Illinois Dept. of Transportation	Naperville Area Chamber of Commerce
Illinois Division of U.S. DOT Federal Highway Administration	City of Naperville Environment and Sustainability Task Force
Illinois Environmental Protection Agency, Office of Energy	National Environmental Modeling and Analysis Center - Fern Leaf Collaborative
Illinois Green Alliance	National Oceanic & Atmospheric Administration
Illinois State Water Survey	Natural Resources Defense Council

Organization	
The Nature Conservancy	Village of South Barrington
Nicor Gas	South Metropolitan Higher Education Consortium
Village of Niles	Southwest Conference of Mayors
Village of Northbrook	City of St. Charles
Northern Illinois Energy Summits and Expos	St. Charles Natural Resources Commission
Northern Illinois University Dept. of Economics	Village of Summit
Village of Northfield	Sustain Edgewater
Northwest Municipal Conference	Sustain Libertyville Commission
Northwestern University Center for Engineering Sustainability and Research	Sustainable Development Strategies Group
Northwestern University Dept. of Chemical and Biological Engineering	The Technology Alliance, Inc.
Village of Oak Brook	TRC Solutions
Village of Oak Park	United Nations, Disaster Risk Reduction, ARISE
Office of Alderman Michele Smith- 43rd Ward, City of Chicago	University of Illinois at Chicago (UIC)
Openlands	UIC College of Urban Planning
Village of Oswego	UIC Energy Initiative
Pace Suburban Bus	UIC Office of Sustainability
Village of Palos Park	UIC School of Public Health
Village of Park Forest	University of Illinois at Urbana-Champaign (UIUC)
City of Park Ridge Sustainability Task Force	UIUC College of Law
The Power Bureau	UIUC Dept. of Atmospheric Sciences
Prairie Research Institute	UIUC Dept. of Geography & Geographic Information Science
Quercus Consulting	University of Virginia McIntire School of Commerce
Region 1 Planning Council, Rockford	U.S. Environmental Protection Agency
The Resiliency Institute	City of Waukegan
Village of Richton Park	Village of Western Springs
Village of River Forest Sustainability Commission	Village of Westmont Environmental Improvement Committee
Village of Round Lake Beach	Will County Dept. of Land Use
SCARCE	Will County Board
Village of Schaumburg	Will County Emergency Management Agency
Seven Generations Ahead	Will County Governmental League
Shared Use Mobility Center	Village of Winnetka
Shedd Aquarium	Winnetka Environmental and Forestry Commission
Solid Waste Agency of Lake County	

ALL EVENTS

Date	*Stakeholder Engagement Events*	*Location*
10/8/2019	Regional Climate Planning Kickoff & Mitigation Workshop	MMC/CMAP, Chicago
11/5/2019	CMAP Counties Committee	CMAP, Chicago
11/7/2020	Northern Illinois University Center for Government Studies, 50th Anniversary Conference	DeKalb
11/21/2019	International Urban Cooperation/Global Covenant of Mayors City to City Event	Brussels, Belgium
12/9/2019	MMC Environment Committee- Regional Climate Action Planning Meeting at the Global Congress for Climate Change and Sustainability Professionals	The Westin Chicago Northwest, Itasca
1/9/2020	CMAP Environment & Natural Resources Committee	CMAP, Chicago
1/21/2020	MMC Environment Committee- Regional Climate Action Planning Workshop	Village of Montgomery, Village Hall
1/27/2020	CMAP Economic Development Committee	CMAP, Chicago
2/7/2020	Growing Sustainable Communities Together conference	Prairie State College, Chicago Heights
2/10/2020	National Conference of Regions	Washington, DC
3/10/2020	CMAP Citizens' Advisory Committee	CMAP, Chicago
3/12/2020	CMAP MPO Planning Committee	CMAP, Chicago
5/22/2020	CMAP Transportation Committee	Remote
5/22/2020	Webinar 1- A Chicago Regional Climate Plan- Overview & Status	Webinar
5/29/2020	Webinar 2- Climate Impacts & Hazards	Webinar
6/5/2020	Webinar 3- Climate Risk and Vulnerability at the Nexus of Equity, Health, Public Works, & Planning	Webinar
6/12/2020	Webinar 4- Regional Climate Adaptation Planning & Prioritization Virtual Workshop	Webinar
9/23/2020	GreenTown conference	Webinar
10/22/2020	MMC Environment Committee- Regional Climate Plan Preview	Remote
12/3/2020	4th City-to-City International Urban Cooperation Event	Remote

APPENDIX C:
ILLINOIS CLIMATE SUMMARY

Frankson, R., K. Kunkel, S. Champion, B. Stewart, D. Easterling, B. Hall, and J. R. Angel, 2017: Illinois State Climate Summary. NOAA Technical Report NESDIS 149-IL, 4 pp.

ILLINOIS

Key Messages

Average annual temperature has increased by about 1°F since the beginning of the 20th century. There has been seasonal variation in this warming, with average spring temperature increasing by about 2°F and average summer temperature increasing very little. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century.

Precipitation in spring and summer has generally been above average over the past two decades, affecting agriculture in both positive (adequate soil moisture) and negative (delays in spring planting) ways. Precipitation in winter and spring is projected to increase, which poses a continuing risk of spring planting delays.

Severe flooding and drought have occurred periodically in recent years. Future increases in extreme precipitation events and in evaporation rates may increase the intensity of both floods and droughts.

Illinois's location in the interior of the North American continent exposes it to a climate with large ranges in temperature with warm, humid summers and cold winters. The lack of mountains to the north or south allows very cold air masses from the Arctic in the winter and warm, humid air masses from the Gulf of Mexico in the summer to move into the state, further increasing the range of conditions that affect Illinois. Temperature varies widely across the state, with a range of about 10°F from north to south. In northeastern Illinois, Lake Michigan moderates the temperature, causing cooler summers and warmer winters. Topography and urban areas also have local impacts on climate.

Since the beginning of the 20th century, temperatures in Illinois have risen approximately 1°F (Figure 1). Temperatures in the 2000s have been higher than any other historical period, with the exception of the early 1930s "Dust Bowl" era. Warming has been concentrated in winter and spring while summers have not warmed substantially in the state, a feature characteristic of much of the Midwest (Figure 2). The lack of summer warming is reflected in a below average occurrence of very hot days (days with maximum temperature above 95°F) since the mid 1950s (Figure 3a) and no overall trend in very warm nights (minimum temperature above 75°F) since the beginning of the 20th century (Figure 3b). The winter warming trend is reflected in a below average number of very cold nights (minimum temperature below 0°F) over the past 25 years (Figure 3c).

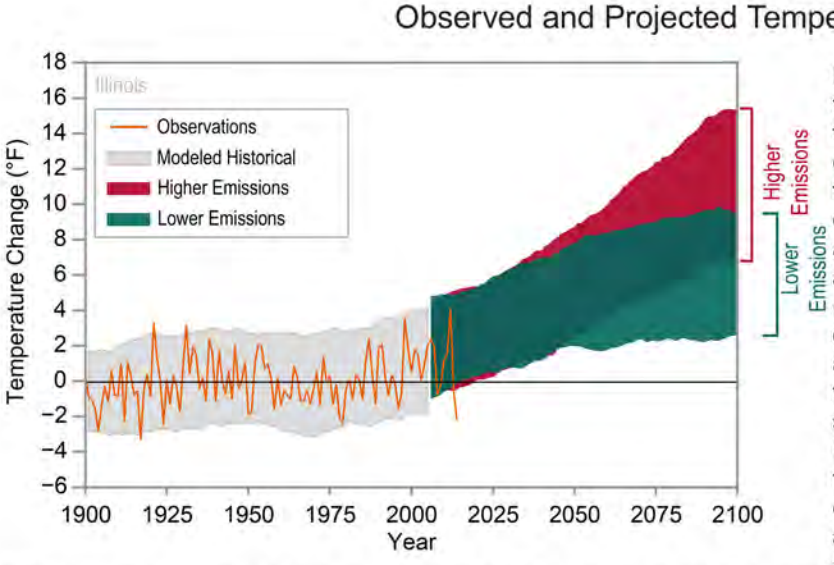


Figure 1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Illinois. Observed data are for 1900–2014. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions)[1]. Temperatures in Illinois (orange line) have risen about 1°F since the beginning of the 20th century. Shading indicate the range of annual temperatures from the set of models. Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Historically unprecedented warming is projected during the 21st century. Less warming is expected under a lower emissions future (the coldest years being about as warm as the hottest year in the historical record; green shading) and more warming under a higher emissions future (the hottest years being about 10°F warmer than the hottest year in the historical record; red shading). Source: CICS-NC and NOAA NCEI.

[1]Technical details on models and projections are provided in an appendix, available online at: https://statesummaries.ncics.org/il

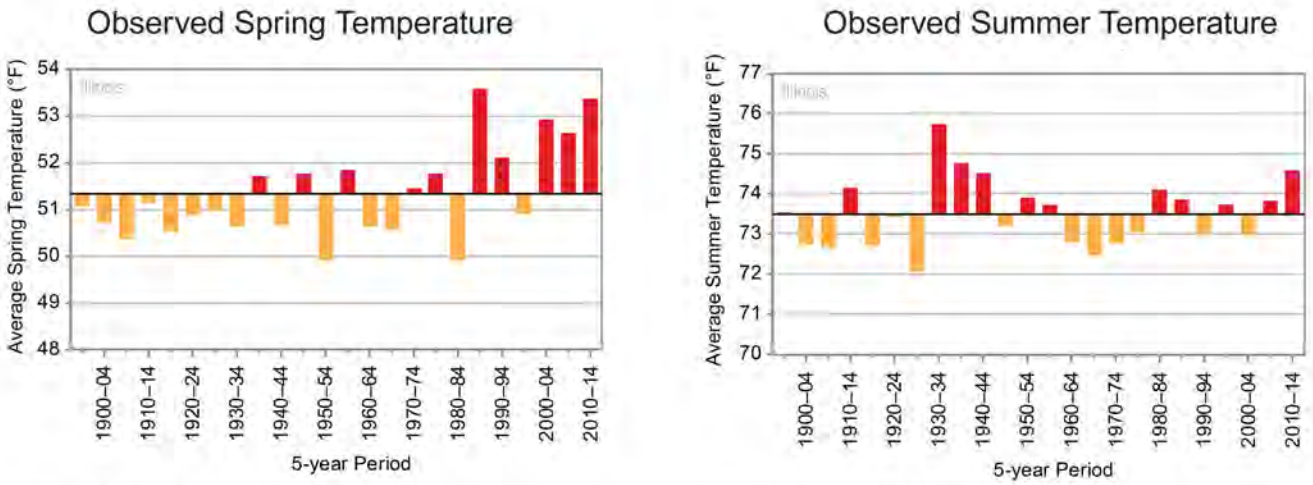


Figure 2: The observed spring and summer temperatures across Illinois for 1895–2014, averaged over 5-year periods; these values are from NCEI's version 2 climate division dataset. The dark horizontal line represents the long-term average. Over the past three decades, Illinois has experienced the highest springtime temperatures in the historical record. Summer temperatures during the most recent 5-year period (2010–2014) have reached the highest level since the extreme heat of the 1930s Dust Bowl era. The dark horizontal line on each graph is the long-term average (1895–2014) of 51.3°F (spring) and 73.5°F (summer). Source: CICS-NC and NOAA NCEI.

Statewide annual precipitation has ranged from a low of 25.52 inches in 1901 to a high of 51.18 inches in 1993. The driest multi-year periods occurred in the majority of years in the first half of the 1900s, and the wettest periods have been observed since the 1990s and into the 2000s. (Figure 3d). The driest 5-year period was 1952-1956 and the wettest was 2007-2011. **However, annual precipitation varies widely across the state, ranging from more than 48 inches in the south to less than 32 inches in the north.** For snowfall, the pattern is reversed, with the northeastern part of the state averaging 40 inches of snowfall annually, compared to only 10 inches in the southernmost section. In the Chicago Metropolitan area, the proximity to Lake Michigan occasionally results in heavy winter precipitation from lake-effect snows.

Agriculture is an important component of the state's economy, and the agricultural sector is particularly vulnerable to extreme precipitation conditions. On average, Illinois has experienced above average precipitation in spring and summer over the past two decades (Figure 4). While precipitation during these critical growth months is important for adequate soil moisture, it is also vital for proper planting and root development. Poor root development in important state crops, such as corn and soybeans, can lead to reduced plant absorption of nutrients and water from the soil, increased soil erosion, and loss of nutrients from the fields into the rivers and streams. Both flooding and droughts have resulted in billions of dollars in losses in recent years. In 2012, a large drought across the Midwest had severe impacts on Illinois. Rainfall totals for May, June, and July were several inches below average and ranked as the third driest period (after 1936 and 1988) in 120 years of record. By early August, much of the state was in extreme drought. The drought caused major damage to crops, particularly in the southern third of the state.

Illinois has experienced a dramatic increase in the number of extreme precipitation events (more than 2 inches of precipitation), which can cause severe flooding in the state (Figure 5). In the summer of 1993, persistent heavy rainfall over the upper Midwest caused severe flooding along the Mississippi River. The 1993 flood was one of the greatest natural disasters in U.S. history, causing billions of dollars in damage to homes, businesses, agriculture, and infrastructure. Recently, from April 16 to 19, 2013, heavy rainfall from a slow-moving storm system caused severe flooding across parts of northern and central Illinois, with some areas receiving up to 10 inches of rain. This event, along with the wettest January–June on record in the state, caused planting to be delayed and resulted in diminished revenue for many farmers. In addition, Illinois has struggled with urban flooding caused by heavy rains falling on impervious surfaces (e.g., roads, sidewalks, and driveways) with inadequate infrastructure. A recent report found that more than 90% of urban flooding damage claims from 2007 to 2014 were outside the mapped floodplain.

Illinois experiences storms during all seasons. From February 1 to 3, 2011, Illinois was hit by one of the most powerful winter storms in history. The greatest snow accumulation associated with the storm was in Antioch where 27 inches of snow was measured; this area averages only one snowfall greater than 6 inches annually. Chicago O'Hare International Airport recorded wind gusts of more than 60 mph and 20.2 inches of snow, the third largest snowfall accumulation reported for the city in 120 years of record. More than 9.8 million Illinois residents were in areas with 12 or more inches of snow. Severe thunderstorms occur frequently during late spring and early summer. These storms can occasionally cause tornadoes, which sometimes result in major damage and loss of life.

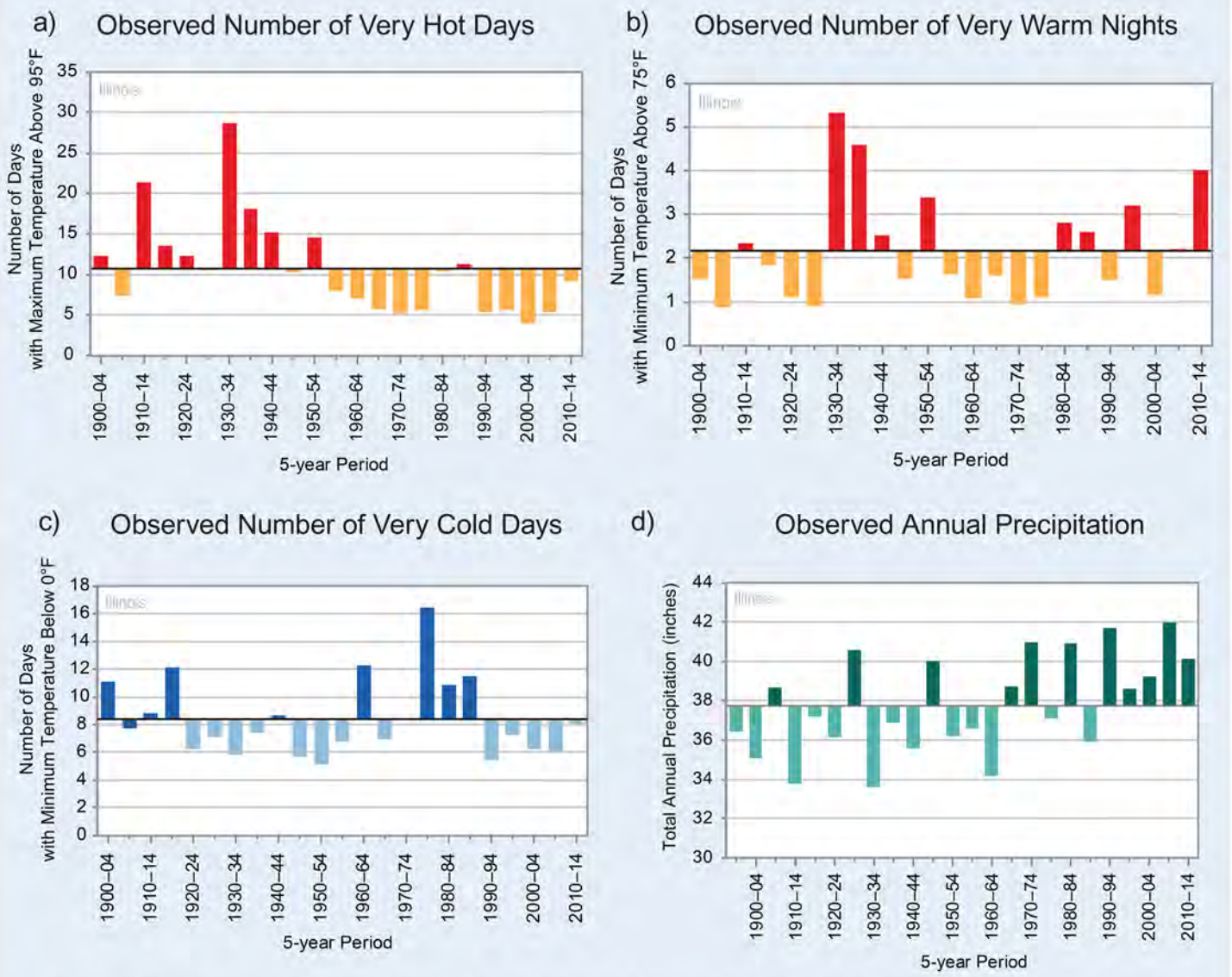


Figure 3: The observed (a) number of very hot days (maximum temperature above 95°F), (b) number of very warm nights (minimum temperature above 75°F), (c) number of very cold nights (minimum temperature below 0°F), and (d) total annual precipitation, averaged over 5-year periods; the dark horizontal lines represent the long-term average. The values in Figures 3 a,b, and c are averages from 36 long-term reporting stations. The values in Figure 3d are from NCEI's version 2 climate division dataset. Since 1990, Illinois has experienced a below average number of very hot days and no trend in very warm nights. However, the state has experienced a below average number of very cold nights since 1990, indicative of winter warming. Annual precipitation varies widely, but has been above average since 1990. Source: CICS-NC and NOAA NCEI.

Water levels in the Great Lakes have fluctuated over a range of three to six feet since the late 19th century (Figure 6). Higher lake levels were generally noted in the latter part of the 19th century and early 20th century, the 1940s and 1950s, and the 1980s. Lower lake levels were observed in the 1920s and 1930s and again in the 1960s. For Lake Michigan-Huron, the first decade of the 21st century has also seen lower levels. Overall, Lake Michigan-Huron has shown a statistically significant downward trend over the past 150 years. The trend is largely due to the high levels early in the period and the extremely low levels in the past 10 years.

Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century (Figure 1). Even under a pathway of lower greenhouse gas emissions, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. However, there is a large range of temperature increases under both pathways, and under the lower pathway, a few projections are only slightly warmer than historical records (Figure 1).

From July 12 to 16, 1995, Chicago experienced a severe heat wave— the worst weather-related disaster in the city's history. Over a five-day period, more than 700 people died in Chicago. In addition to daytime highs of greater than 90°F (including two days greater than 100°F), nighttime temperatures only dropped into the 80s. Furthermore, the heat index, which considers both temperature and humidity, reached values of 105ºF or more for 42 hours during the event. Values of 105ºF are considered

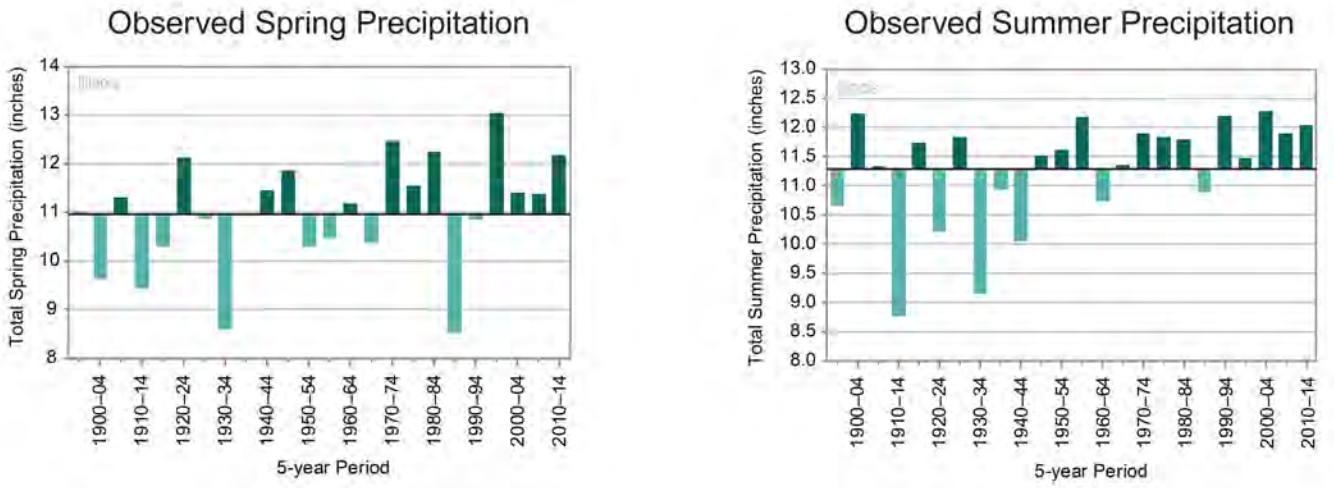


Figure 4: The observed spring and summer precipitation across Illinois for 1895–2014, averaged over 5-year periods; these values are from NCEI's version 2 climate division dataset. Seasonal precipitation varies widely. Since 1995, Illinois has experienced above average precipitation during both the spring and summer months. The dark horizontal line on each graph is the long-term average (1895–2014) of 10.97 inches (spring) and 11.28 inches (summer). Source: CICS-NC and NOAA NCEI.

dangerous by the National Weather Service. An analysis of hourly data in Chicago from the 1930s onward (Figure 7) shows that conditions were the most severe on record in terms of the number of hours above critical thresholds of the heat index. Future heat waves are likely to be more intense if temperature increases continue, coupled with periods of high humidity. This will pose risks to human health, particularly in the Chicago and St. Louis metro areas. Cold wave intensity is projected to decrease.

Precipitation is projected to increase in Illinois, with increases most likely during the winter and spring (Figure 8). Extreme precipitation is also projected to increase, potentially increasing the frequency and intensity of floods. Springtime flooding in particular could pose a threat to Illinois's important agricultural economy by delaying planting and resulting in loss of yield.

The intensity of future droughts is projected to increase. Even if precipitation increases in the future, increases in temperature will increase evaporation rates and the rate of loss of soil moisture. Thus, future summer droughts, a natural part of the Illinois climate, are likely to be more intense.

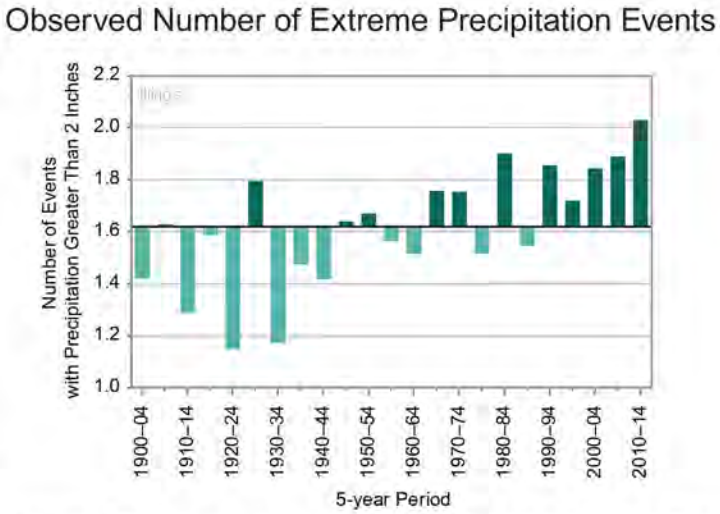


Figure 5: The observed number of days with extreme precipitation events (annual number of days with precipitation greater than 2 inches) for 1900–2014, averaged over 5-year periods; these values are averages from 43 available long-term reporting stations. A typical station experiences 1–2 such events each year. The number of extreme precipitation events has been above average since the 1990s. During the most recent 5-year period (2010–2014), Illinois experienced a record high number of events when stations averaged more than 2 events annually. The dark horizontal line is the long-term average (1900–2014) of 1.62 days per year. Source: CICS-NC and NOAA NCEI.

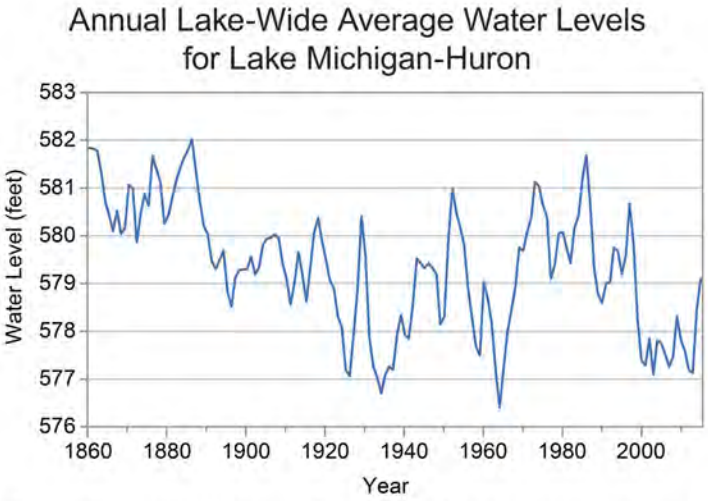


Figure 6: Long-term annual time series of the average water levels for Lake Michigan-Huron. Water levels in the Great Lakes have fluctuated widely over the years. Lake Michigan-Huron has shown a statistically significant downward trend over the past 150 years. The trend is largely due to the high levels early in the period and extremely low levels during the 21st century. Source: NOAA NOS and Canadian Hydrographic Service.

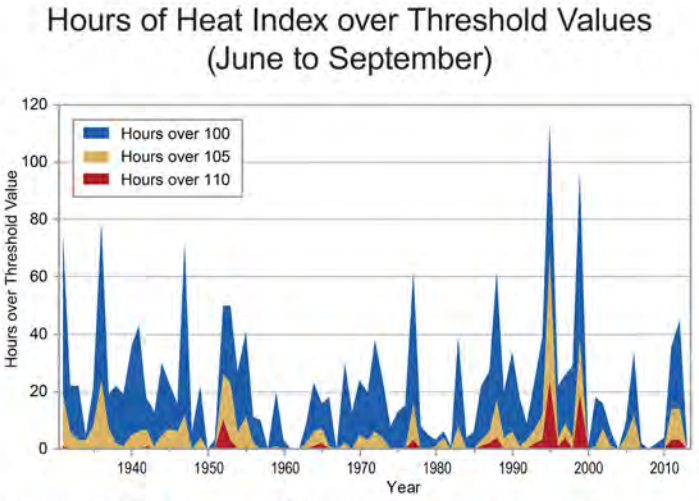


Figure 7: The number of hours with heat index values over selected thresholds of 100°F, 105°F and 110°F for Chicago Midway International Airport from 1931 to 2012. The number of hours above the three thresholds reached their highest values on record during the 1995 heat wave (22, 42, and 69 hours, respectively). Source: NOAA MRCC.

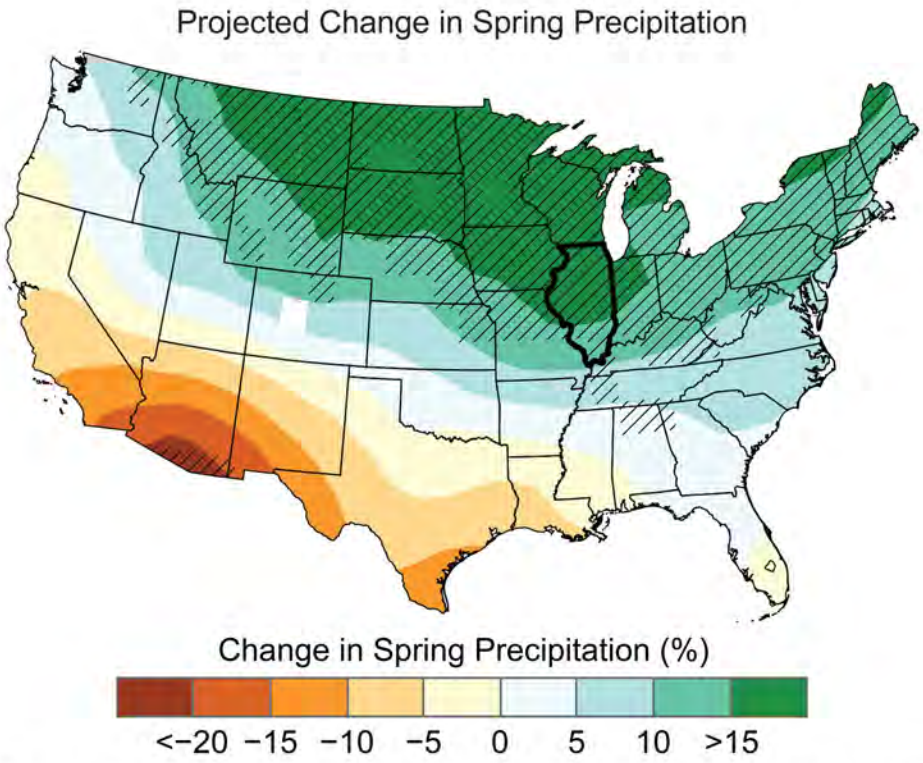
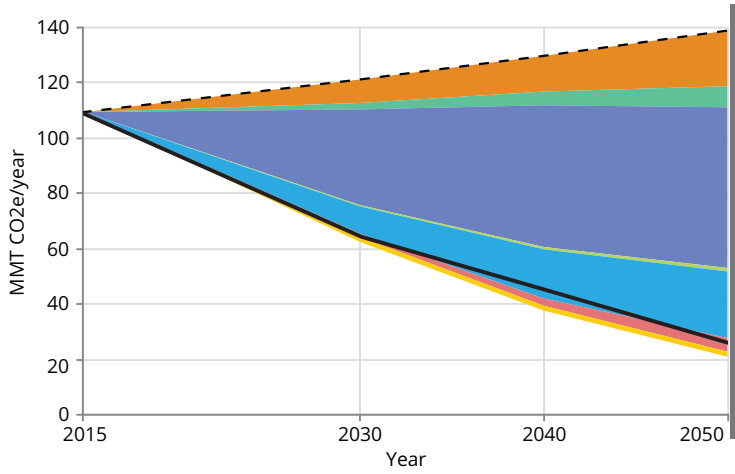


Figure 8: Projected change in spring precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Spring precipitation in Illinois is projected to increase in the range of 10–20% by 2050. These increases are part of a large area of projected increases across the northern United States. Source: CICS-NC, NOAA NCEI, and NEMAC.

APPENDIX D:
SUMMARY OF MITIGATION STRATEGIES

1. DEMONSTRATE LEADERSHIP TO REDUCE EMISSIONS

	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Establish local sustainability targets that support regional climate objectives.	ENACT	Proven	Enabling	¢	Med	Constituents, nonprofits	Engage diverse civic leaders in target-setting and implementation.	Local energy, water conservation, and waste reduction targets aligned; collaborative and accelerated GHG reduction
b	Build and support a resilient local economy that supports climate objectives.	LEAD	Proven		$$	High	Economic development organizations, businesses, academia	Provide access to green jobs; preserve local retail and services in disadvantaged communities.	Local green jobs and sustainable businesses; local production and consumption; reduced transportation costs
c	Integrate smart technology into operations to effectively manage resource consumption.	LEAD ENCOURAGE	Evolving		$$$	High	Gas and electric utilities, tech industry, EMAs, transit agencies	Prioritize smart technology investments in vulnerable communities.	Improved operational performance through 'smart' technology
d	Adopt the Greenest Region Compact and a GRC-based sustainability plan aligned with the regional climate objectives.	ENACT	Proven		$	Med	MMC, StR, nonprofits	Tailor plans to the needs of vulnerable communities	Local plans guide effective action
e	Demonstrate sustainability in municipal operations, purchasing, and through public events.	LEAD	Proven		$	High	Constituents, COGs, vendors	Prioritize small and minority-owned vendors.	Leading by example inspires followers and cooperation across sectors; informed and engaged constituents



MUNICIPAL ROLES IN CLIMATE ACTION

LEAD:
municipalities take actions within their own operations and decisions

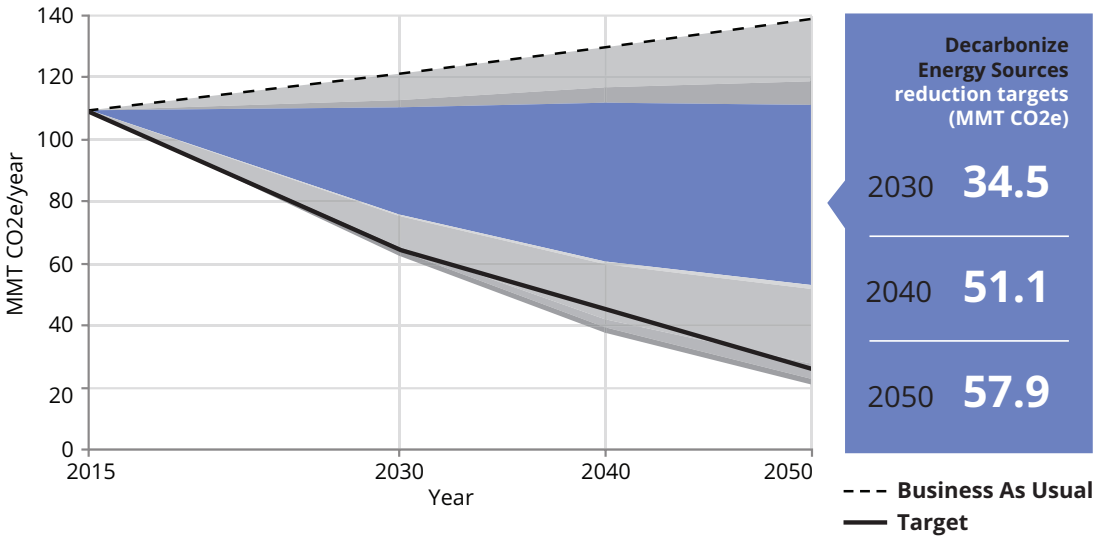
ENCOURAGE:
influence constituents and partners to change behaviors or take action through education collaboration, direct investment and incentives

ENACT:
municipalities enact policies or support other jurisdictions in enacting policies

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

2. DECARBONIZE **ENERGY SOURCES**

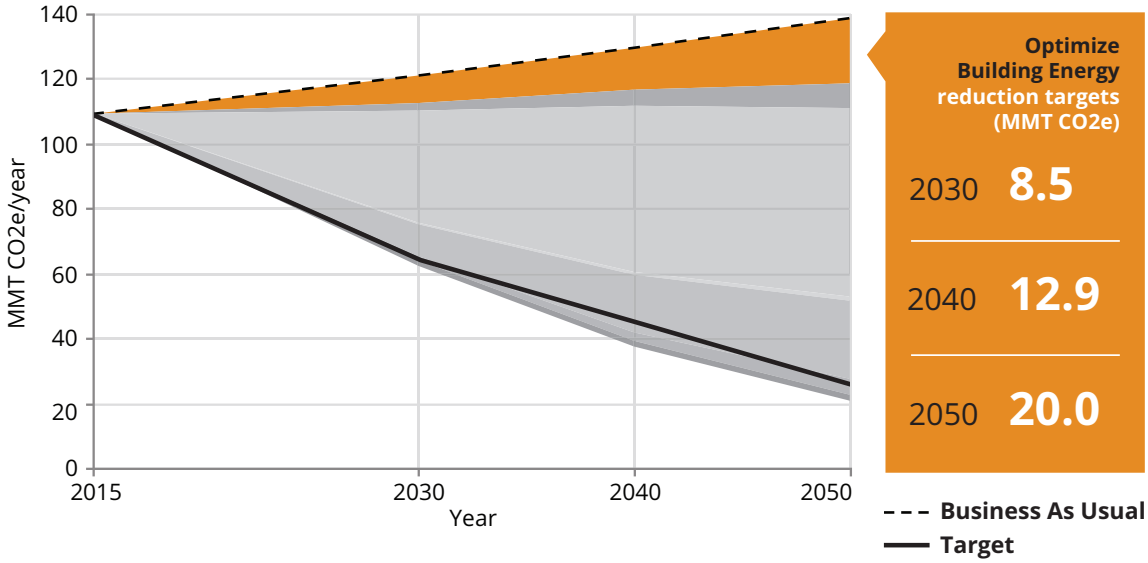
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Procure clean energy for municipal operations. Build renewable energy and energy storage capacity.	LEAD	Evolving	High	$$$	High	Clean energy industry, property owners, investors	Prioritize access to clean energy jobs in disadvantaged communities.	Modernized, efficient electric grid; resilient distributed generation; thriving renewable energy industry; reduced long-term utility costs; create clean energy jobs
b	Engage the community to choose clean energy through procurement, aggregation, financing, community solar, and other collaborative programs	ENCOURAGE	Evolving	Enabling	$	Low	Clean energy industry, nonprofits, electric utility, regulators	Provide access to affordable, clean energy.	Expanded market demand for clean energy; informed energy consumers
c	Partner with utilities to complete decarbonization of the local grid, collaborate to decarbonize the multi-state regional grid	ENCOURAGE	Aspirational	High	$$$	High	Electric utility, investors, regulators, clean energy industry	Replace coal-fired and gas-fired power to improve air quality. Support clean energy jobs training for displaced fossil fuel workers.	Elimination of fossil-fuel generated electricity; utility-scale solar, wind, and nuclear power generation
d	Explore renewable district energy solutions	ENCOURAGE	Aspirational	High	$$$	High	Clean energy industry, utilities, developers, property owners	Reduce long-term energy burden.	Increased resilience and efficiency, reduced long-term costs



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

3. OPTIMIZE BUILDING **ENERGY**

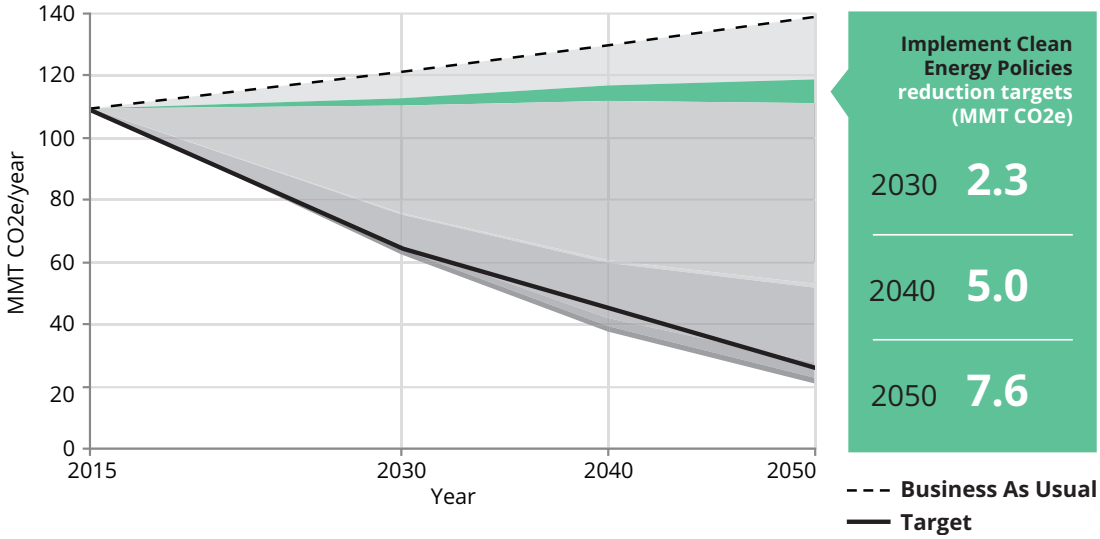
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Retrofit municipal buildings, facilities, and streetlights for maximum efficiency.	LEAD	Proven	Low	$$	Low	Electric and gas utilities, clean energy industry	Prioritize access to clean energy jobs in disadvantaged communities.	Reduced energy costs; improved building performance; resilient facilities
b	Support electric space and water heating through demonstration and education.	ENCOURAGE	Aspirational	High	$$$	Med	Electric and gas utilities, building owners	Invest in areas vulnerable to poor indoor air quality.	Improved indoor air quality; increases impact of grid decarbonization
c	Engage residential and commercial property owners to optimize building efficiency. Leverage programs such as demand response, energy efficiency, and PACE financing.	ENCOURAGE	Proven	High	$	Low	Homeowners, CAAs, building owners, electric and gas utilities, clean energy industry, IECA, nonprofits	Invest in multi-family housing; reduce household energy burden. Provide energy savings information in all languages and formats.	Reduced energy costs; reduced peak demand; improved building performance; leveraged private investment; resilient buildings; safe and comfortable homes



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

4. IMPLEMENT CLEAN ENERGY POLICIES

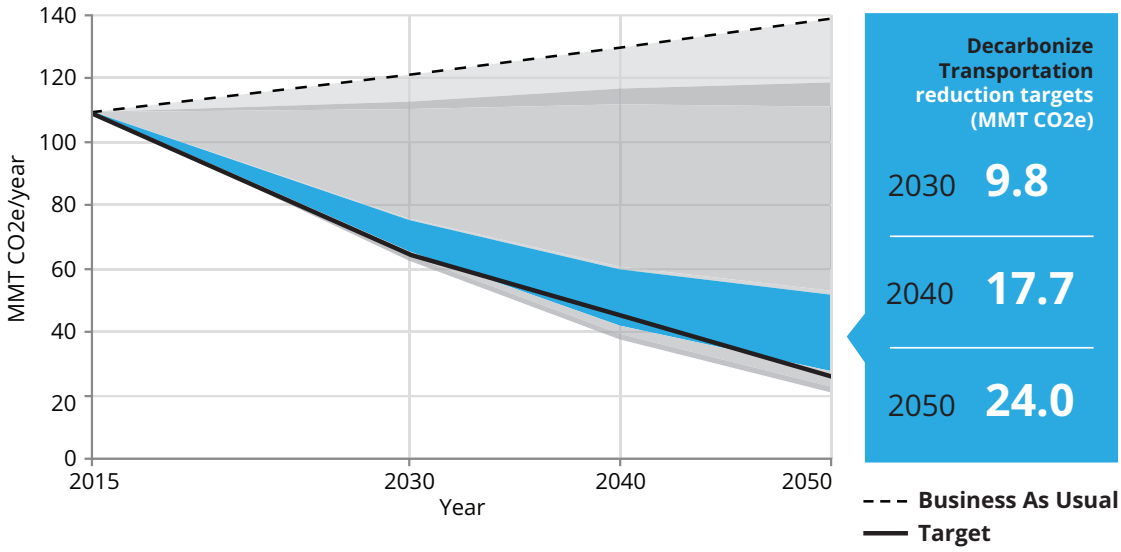
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Support robust building energy conservation codes, benchmarking, and building performance standards to optimize energy efficiency for retrofit projects.	ENACT	Evolving	Enabling	$	Med	ICC, IGA	Reduce long-term energy burden. Support retrofits and code compliance for low-income property owners.	Reduced energy and water costs; improved long-term building performance; operational resilience; leveraged private investment; demonstration of technology and design to achieve net-zero
b	Require high performance, all-electric, and net zero new building construction.	ENACT	Evolving	High	$$$	High	Developers, building owners, clean energy industry, gas and electric utilities		
c	Modernize municipal franchise agreements to leverage investment in clean energy and reduce costs to residents.	ENACT	Contingent	Enabling	$$$	Med High	Gas and electric utilities	Eliminate franchise cost to residents.	Investment in public facilities enabled
d	Adapt zoning codes and streamline development processes to accelerate investment in solar and other renewable energy systems.	ENACT	Proven	Enabling	$	Med	Clean energy industry, MMC	Make rooftop solar more accessible by reducing soft costs.	Accelerated investment in solar; more affordable, safe and effective renewable energy systems; grid dependency lessened
e	Support state policies to advance clean energy	ENCOURAGE	Evolving	Enabling	¢	Low	ICC, IGA	Assure clean energy investments benefit vulnerable communities	Thriving clean energy industry



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

5. DECARBONIZE TRANSPORTATION

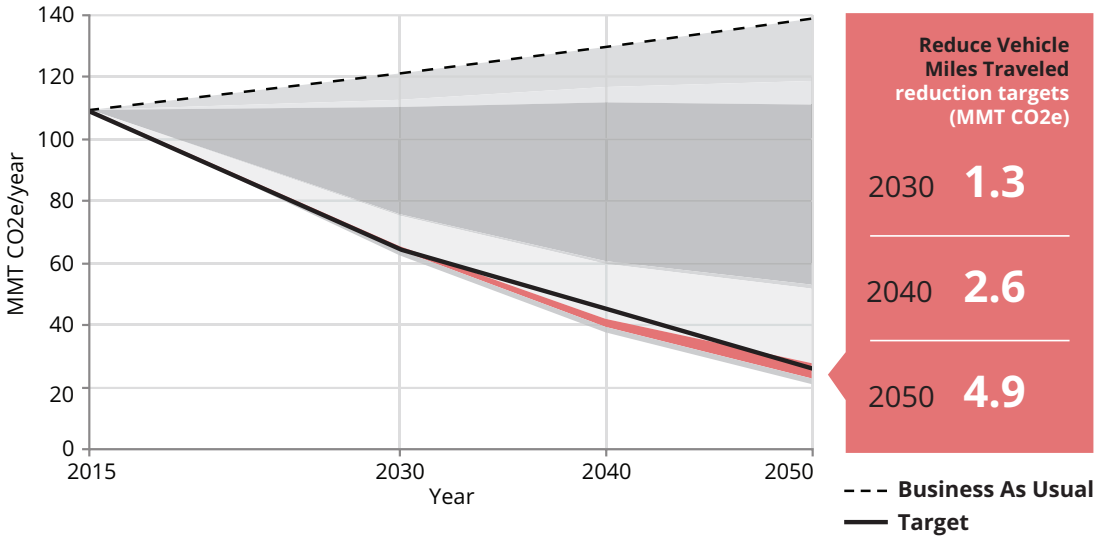
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Create accessible and reliable networks of electric vehicle (EV) chargers.	LEAD	Evolving	Enabling	$$	High	IEPA, IDOT, CMAP, electric utility, EV industry, employers, property owners, businesses	Provide access to clean transportation for all, focus on EV infrastructure for workplace and multi-family dwellings; protect vulnerable residents from tailpipe emissions.	Electric vehicles displace internal combustion vehicles
b	Transition fleets to low- and zero-emission vehicles and encourage others to do so. Encourage the switch to electric passenger vehicles.	LEAD ENCOURAGE	Evolving	High	$$$	Med High	IEPA, CTA, Pace, Metra, school districts, public and private fleet operators, nonprofits		Clean, quiet transit and service vehicles; reduced long-term fuel costs; reduced tailpipe emissions
c	Support strong national fuel efficiency standards.	ENCOURAGE	Proven	High	¢	Low	Federal government		Reduced health impacts of tailpipe emissions
d	Enact and enforce anti-idling policies.	ENACT	Proven	Low	$	Low	School districts, transit agencies, institutions and venues		
e	Adapt development processes to accelerate investment in EV charging infrastructure.	ENACT	Evolving	Enabling	$	Med	IDOT, electric utility, EV industry, MMC		Accelerated investment in EV charging infrastructure; reduced soft costs; safe and effective EV charging systems



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

6. REDUCE VEHICLE MILES TRAVELED

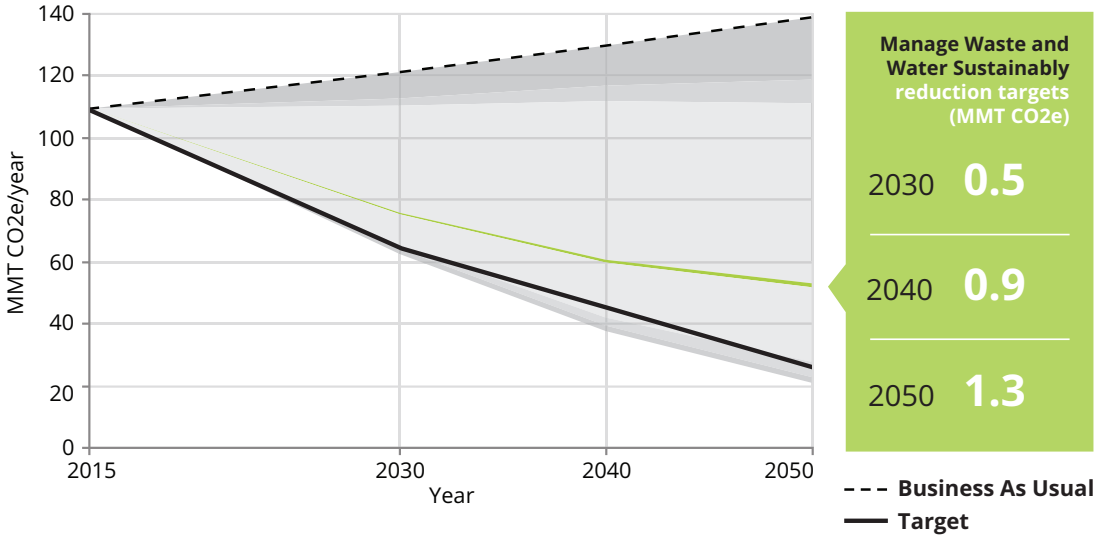
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Prioritize transit-oriented development and transit-supportive development.	 ENACT	Evolving	High	$$	High	RTA, CMAP, developers, property owners, economic development organizations	Focus on safe and accessible transportation for vulnerable communities.	Development of more compact, accessible neighborhoods; community cohesion strengthened; burden of owning and maintaining personal vehicle lessened
b	Promote multi-family housing development near transit stations and along transit routes.	 ENACT	Proven		$	Med			
c	Collaborate to enhance regional transit and expand capacity.	 ENCOURAGE	Proven	Combined High	$$$	High	CTA, RTA, Pace, Metra		Reduced traffic congestion; improved air quality; improved access to economic opportunity through greater mobility
d	Plan and design roadways and corridors to benefit all road users and promote active transportation.	 ENACT	Proven		$$	High	IDOT, RTA, counties	Provide safe and accessible transportation for all.	Safe active transportation; connected communities; reduced tailpipe emissions; improved health and wellness; reduced infrastructure demands for personal vehicles
e	Build and maintain safe, resilient, and accessible active transportation infrastructure.	 LEAD ENCOURAGE	Proven		$$	High	IDOT, counties, forest preserve districts, park districts, nonprofits, COGs	Target disadvantaged communities for investment and education.	
f	Encourage walking, biking and transit use through education, incentives, and collaboration.	 ENCOURAGE	Proven		$	Low	School districts, nonprofits, employers, local businesses, institutions, CTA, RTA, Metra, Pace		
g	Strategically manage parking policies to promote active and public transportation.	 ENACT	Evolving		$	Med	Local businesses, economic development organizations, CTA, RTA, Metra, Pace	Provide safe and accessible transportation for all.	Reduced use of personal vehicles, increased active transportation



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

7. MANAGE WATER AND WASTE SUSTAINABLY

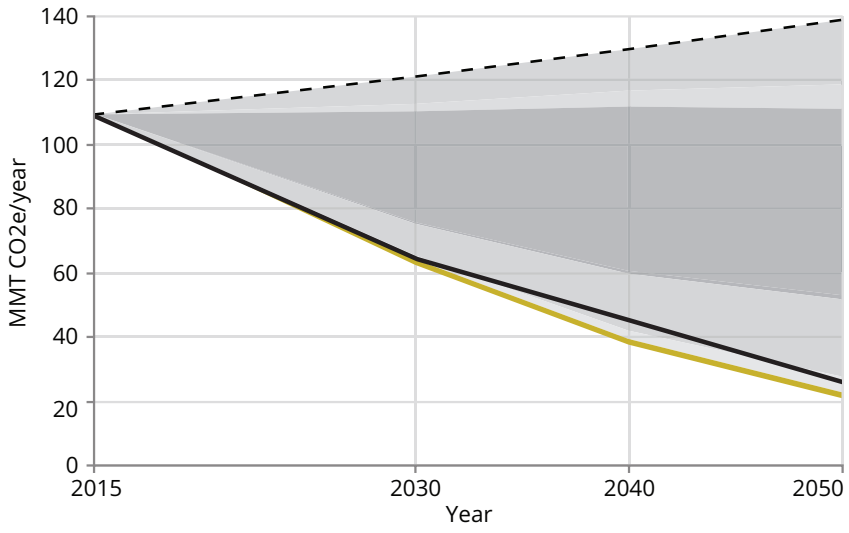
	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Capture landfill emissions and eliminate pipeline methane emissions.	ENCOURAGE	Proven	Medium	$$	Med High	Landfill operators, clean energy industry	Reduce exposure of vulnerable residents. Site landfills and waste operations to avoid harm to low-income and communities of color.	Reduced methane gas emissions
b	Capture and convert wastewater biogas to energy.	LEAD ENCOURAGE	Proven	Medium	$$$	High	MWRD, POTW		Displacement of fossil fuels
c	Increase composting and biological treatment of waste. Utilize compost and biosolids in landscapes.	LEAD ENCOURAGE	Proven	Low	$$$	High	SWAs, waste industry		Expanded recycling and organic waste industries; value from waste captured
d	Support circular economies.	ENCOURAGE	Evolving	Combined High	$$	High	Economic development organizations, businesses, waste industry	Reduce exposure to litter and illegal dumping. Site landfills and waste operations to avoid harm to low-income and communities of color.	Reduced embedded energy from production, transport, and disposal of materials; reduced persistent waste like plastic; value from waste stream and operations captured; household budgets stretched through smart purchasing
e	Increase the volume of waste that is recycled and composted.	ENCOURAGE	Contingent		$$$	Med	Constituents, employers, local businesses, institutions, waste industry		
f	Reduce energy needed to deliver safe drinking water and shift operations to clean energy sources.	LEAD	Proven	Low	$$	High	Water supply industry	Eliminate lead pipes. Provide access to safe, clean, and affordable water to all.	Modern, resilient, and efficient water utilities
g	Reduce energy needed to manage wastewater and shift operation to clean energy sources.	LEAD	Proven	Low	$$	High	Utilities, POTW	Provide access to safe, clean and affordable water utilities to all.	
h	Encourage water conservation.	ENCOURAGE	Proven	Low	$	Low	Nonprofits, water utilities	Reduce water burden.	Conserve water supply



SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

8. SUSTAIN ECOSYSTEMS TO SEQUESTER CARBON

	Strategy	Municipal Role	Solution Status	GHG Reduction Potential	Cost	Effort Required	Lead Partners & Resources	Achieve Equity	Outcomes (Co-benefits)
a	Grow and manage public landscapes to optimize ecosystem services and support biodiversity.	LEAD ENCOURAGE	Proven	Sequestration	$$	High	IDNR, forest preserve & park districts, property owners, businesses, institutions, nonprofits, MWRD	Maintain accessible open space to invite safe and healthful activity.	Stormwater managed sustainably; pollinator and wildlife habitat supported; quality open space encourages active transportation and lifestyles
b	Encourage property owners to install and maintain sustainable and native landscapes.	ENCOURAGE	Proven		$	Med	Constituents, property owners, park districts, IDOT	Sustain tree canopy and gardens for desired cooling benefits in vulnerable communities.	
c	Plant trees and sustain the urban forest.	LEAD ENCOURAGE	Proven		$	Med			
d	Encourage citizen tree stewardship.	ENCOURAGE	Proven		¢	Med	Nonprofits, public gardens, MWRD, POTW, compost industry		Improved air quality; cooling shade mitigates heat islands; reduced cooling energy demands; enhanced livability
e	Preserve soil through low-impact development and restore soil integrity.	ENACT ENCOURAGE	Aspirational		$$$	High	Developers, counties, MWRD, POTW, compost industry	Remediate contaminated soils and restore nature to sites in vulnerable communities.	Clean water; healthy ecosystems



Sustain Ecosystems to Sequester Carbon reduction targets (MMT CO2e)

2030 **1.7**

2040 **1.8**

2050 **1.8**

--- **Business As Usual**

— **Target**

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

APPENDIX E:
SUMMARY OF ADAPTATION STRATEGIES

OVERARCHING ACTIONS TO BUILD RESILIENCE

ENGAGE AND EDUCATE THE COMMUNITY:

- Inform the community about changing weather hazards and risks.
- Encourage families to prepare an emergency response plan.
- Foster community spirit to recover, adapt and "bounce forward" from disaster.
- Employ an effective early warning and response system.

INCORPORATE EQUITY AND INCLUSION:

- Collaborate to ensure residents most vulnerable to heat, air pollution and flooding are connected to emergency relief services.
- Include vulnerable populations in planning and prioritize investments to protect them.
- Assure community education messages are accessible in all languages and formats.

COLLABORATE AND BUILD CAPACITY:

- Coordinate resiliency efforts with federal, state, and regional agencies.
- Access and share timely weather data.
- Manage public and private landscapes to optimize ecosystem services and support biodiversity
- Strengthen emergency and adaptive response skills among staff, civic leaders, and allied organizations.

ADAPT OPERATIONS AND INVESTMENTS:

- Integrate climate resiliency into decision-making about capital expenditures.

ENACT PLANS AND POLICIES:

- Assess climate vulnerability and risks to local infrastructure.
- Adopt and integrate county hazard mitigation plan into local plans and policies.
- Integrate climate impacts and vulnerability into relevant plans and regulations.
- Proactively update codes to reflect evolving climate conditions.
- Incentivize or require resilient building design.
- Reduce sprawl by promoting infill development.
- Prioritize transit-oriented development and transit-supportive land uses.
- Participate in the Community Rating System and National Flood Insurance Program.
- Guide future development plans to conserve and restore open space, soil, trees, and native landscapes to preserve ecosystem services.

ALL MITIGATION AND ADAPTATION OBJECTIVES AND CORRESPONDING ADAPTION AND MITIGATION BENEFITS

Mitigation Objective	*Outcome/Co-benefits*	*Adaptation Benefit*
Demonstrate Leadership to Reduce Emissions	Engaged constituents, public support, green jobs, efficiencies and cost-savings	More resilient communities
Decarbonize Energy Sources	Cleaner air and water, renewable energy, potential improvements to energy security	More resilient electric grid
Optimize Building Energy	Improved building performance, lower energy costs/energy burden, cleaner air	More resilient buildings
Implement Clean Energy Policies	Clean energy jobs, leveraged investment	Economic development
Decarbonize Transportation	Cleaner air, lower long-term fuel costs, reduced noise pollution, beneficial electrification	Less reliance on vulnerable fuel supply chain
Reduce Vehicle Miles Traveled	Less congestion, less reliance on single-occupancy vehicles, more connected communities, more social cohesion, more walking and biking and better health outcomes, lower transportation costs, reduced injuries/fatalities from road accidents	More resilient transportation systems
Manage Water and Waste Sustainably	Cleaner air and water, less waste	More resilient water and wastewater systems
Sustain Ecosystems to Sequester Carbon	Enhanced ecosystems, preserved biodiversity, improved quality of life and mental health, active and healthy lifestyles	Reduced flooding, cooler communities

Adaptation Objective	*Outcome/Co-benefits*	*Mitigation Benefit*
Engage and educate the community about climate resilience and adaptation	Prepared and engaged constituents, community cohesion, better health outcomes, private property and well-being preserved	Awareness of hazards and impacts builds support for climate mitigation actions
Incorporate equity and inclusion into climate adaptation efforts	Prepared and engaged constituents, community cohesion, improved health equity, private property preserved	
Collaborate and build capacity for more resilient community	Shared and leveraged resources, greater efficiency and outputs, greater adaptive capacity. Property, water supply, and other assets preserved	
Enact plans and policies focused on adaptation and resilience	Prepared assets and operations, greater adaptive capacity. Improved nature, quality of life	Reduced energy demands for water utilities. Healthy ecosystems help sequester carbon
Adapt operations and investments for future climate conditions	Prepared assets and operations, nature, quality of life, property, water supply and other assets preserved	Reduced energy demands for operations

1. ENGAGE AND EDUCATE THE COMMUNITY ABOUT CLIMATE RESILIENCE AND ADAPTATION

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

	Strategy	Overarching resilience	Heat & Health	Flooding & Homes	Stormwater & Infrastructure	Flooding & Transport	Drought & Water	Air Pollution & Health	Municipal Role	Solution Status	Cost	Effort Required	Lead Partners & Resources	Outcomes (Co-benefits)
a	Inform the community about changing weather hazards and risks. Encourage preparation.	x	x	x				x	ENCOURAGE	Proven	¢	Low	NOAA, GLISA, IEMA, State Climatologist, StR, BRACE, DRSC, APWA, stormwater agencies	Prepared and engaged constituents; community cohesion; positive health outcomes; private assets preserved; safe and healthy constituents
b	Engage the community about services that support health and wellness.		x					x	ENCOURAGE	Proven	$	Med	Public health agencies, hospitals, BRACE	
c	Encourage families to prepare an emergency response plan.	x	x	x					ENCOURAGE	Proven	¢	Med	IEMA, Ready.gov	
d	Foster community spirit to recover, adapt and "bounce forward" from disaster.	x	x	x	x	x			ENCOURAGE	Proven	¢	Med-High	Constituents, CBO, FBO	
e	Educate the community about air pollution action days and maintaining healthy indoor air quality.							x	LEAD	Proven	¢	Low	IEPA, IDPH, U.S. EPA	
f	Engage residents and businesses in conserving water.						x		ENCOURAGE	Proven	$	Low	AWWA, JAWA, U.S. EPA Water Sense, CMAP, IISG	Reduced water costs, water supply conserved
g	Promote green infrastructure practices.			x			x		ENCOURAGE	Proven	$	Med-High	U.S. EPA Water Quality scorecard, IISG, CNT, stormwater agencies, nonprofits	Reduced energy use for processing stormwater, assets preserved, safe and healthy constituents
h	Encourage residents and businesses to disconnect downspouts from sewers.				x				ENCOURAGE	Proven	$	Med	Stormwater agencies, POTW	
i	Promote IDPH standards for post-flood clean up.			x				x	ENCOURAGE	Proven	¢	Low	IDPH	
j	Support and incentivize overhead sewer conversion in basements.			x					LEAD	Proven	$$	Med-High	MWRD, POTW	

2. INCORPORATE EQUITY AND INCLUSION INTO CLIMATE ADAPTATION EFFORTS

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

	Strategy	Overarching resilience	Heat & Health	Flooding & Homes	Stormwater & Infrastructure	Flooding & Transport	Drought & Water	Air Pollution & Health	Municipal Role	Solution Status	Cost	Effort Required	Lead Partners & Resources	Outcomes (Co-benefits)
a	Collaborate to ensure residents most vulnerable to heat, air pollution and flooding are connected to relief services.	x	x	x		x	x	x	LEAD ENCOURAGE	Proven	$	Med	CAA, BRACE, public health organizations, CBO, FBO, IEMA	Health & well-being of most vulnerable residents protected; equitable access to health, services, and opportunity; equitable investment; positive health outcomes
b	Include vulnerable populations in planning and prioritize investments to protect them.	x	x	x	x	x	x	x	LEAD	Proven	$	Med	CMAP, CBO, public health organizations, BRACE	
c	Ensure that high quality essential human services programs are available and utilized.		x				x	x	ENCOURAGE	Proven	$$	Med	CBO, FBO, public health organizations	
d	Assess local air quality and take action to protect vulnerable populations from pollution.							x	ENCOURAGE	Contingent	$	Med	IEPA, public health agencies, BRACE, RHA	
e	Provide effective and accessible cooling interventions to vulnerable residents.		x						LEAD ENCOURAGE	Evolving	$$	Med	Park districts, public health agencies, cultural venues, transit services	
f	Assure community education messages are accessible in all languages and formats.	x	x	x	x	x	x	x	LEAD	Proven	$	Low	Nonprofits, ADA coordinators	
g	Assure affordable access to safe drinking water for all.						x		LEAD	Proven	$$$	High	AWWA, JAWA, U.S. EPA, ISWS, CMAP, MPC	Water burden lessened, safe and healthy constituents
h	Assure transit routes serving vulnerable populations are accessible and operable during weather events.					x			ENCOURAGE	Evolving	$$	High	RTA, CTA, Metra, Pace, BRACE, public health agencies	Mobility; access to economic opportunity

3. COLLABORATE AND BUILD CAPACITY FOR MORE RESILIENT COMMUNITY

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

	Strategy	Overarching resilience	Heat & Health	Flooding & Homes	Stormwater & Infrastructure	Flooding & Transport	Drought & Water	Air Pollution & Health	Municipal Role	Solution Status	Cost	Effort Required	Lead Partners & Resources	Outcomes (Co-benefits)
a	Coordinate resiliency efforts with federal, state and regional agencies.	x		x	x	x	x		LEAD ENCOURAGE	Contingent	$$	High	FEMA, IEMA, EMA, MABAS, NIMS, IDNR, IDOT, CMAP, counties, public health agencies, park and forest preserve districts, utilities, StR, DRSC	Shared and leveraged resources, optimized efficiency and outputs; greater adaptive capacity; assets preserved
b	Strengthen emergency and adaptive response skills among staff, civic leaders, and allied organizations.	x	x	x				x	LEAD	Proven	$	Med	FEMA, IEMA, NIMS, IAFSM, APWA, AWWA, MABAS, public health agencies	
c	Develop an emergency transportation and logistics plan to move vital resources.					x			LEAD ENCOURAGE	Evolving	$$	High	IEMA, IDOT, counties, EMA, APWA, public health agencies	Vital services and economy protected
d	Monitor and share real-time roadway conditions.					x			LEAD ENCOURAGE	Evolving	$	Low	IDOT, counties, townships, APWA	Timely and targeted response to climate hazards
e	Access and share timely weather data.	x		x					LEAD	Proven	¢	Low	NOAA, NWS, State Climatologist	
f	Facilitate compliance with federal air quality standards by businesses.		x					x	ENCOURAGE	Contingent	$	Med-High	IEPA, U.S. EPA	Constituents protected from extreme heat
g	Identify and mitigate urban heat islands.		x						ENCOURAGE	Evolving	$$$	High	U.S. EPA, USFS, GLISA, IEPA, State Climatologist utilities, park & forest preserve districts, public health agencies	
h	Manage public and private landscapes to optimize ecosystem services and support biodiversity.	x						x	LEAD ENCOURAGE	Proven	$$$	High	USFS, IDNR, park & forest preserve districts, SWCD, CW, watershed organizations, nonprofits	Natural systems optimized for resiliency and public well-being; air and water quality protected; threats from stormwater and heat islands managed
i	Collaborate to sustainably manage regional water supply.						x		LEAD ENCOURAGE	Evolving	$$$	High	ISWS, IDNR, CMAP, MPC	Water supply protected and conserved
j	Monitor and protect water quality in private wells.						x		ENCOURAGE	Evolving	$$	Med	BACOG, ISWS	
k	Collaborate to sustainably manage stormwater.				x				LEAD ENCOURAGE	Evolving	$$$	High	U.S. EPA, FEMA, IEMA, IAFSM, stormwater agencies, SWCS, IDNR, counties, townships, park & forest preserve districts, IDOT & transportation agencies	Resources shared and leveraged; greater adaptive capacity; flood impacts reduced; assets preserved

4. ENACT PLANS AND POLICIES FOCUSED ON ADAPTATION AND RESILIENCE

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

	Strategy	Overarching resilience	Heat & Health	Flooding & Homes	Stormwater & Infrastructure	Flooding & Transport	Drought & Water	Air Pollution & Health	Municipal Role	Solution Status	Cost	Effort Required	Lead Partners & Resources	Outcomes (Co-benefits)
a	Adopt and integrate county hazard mitigation plan into local plans and policies.	x			x	x			ENACT	Proven	$$	Med-High	FEMA, BRIC, IEMA, ISI, counties, APA, CMAP	Assets and operations prepared; greater adaptive capacity; investments protected; safe and healthy constituents
b	Integrate climate impacts and vulnerability into relevant plans and regulations.	x			x			x	ENACT	Evolving	$$	High	APA, APWA, stormwater agencies, CMAP	
c	Proactively update codes and standards to reflect evolving climate conditions.	x	x					x	ENACT	Evolving	$$	Med	CMAP, ICC, IDNR, ISI, GLISA, stormwater agencies	
d	Incentivize or require resilient building design.	x	x	x					ENACT ENCOURAGE	Evolving	$$	Med	APA, ISI	
e	Guide future development to conserve land and ecosystem services.	x	x	x	x				ENACT ENCOURAGE	Proven	$$$	High	CMAP, APA	Landscapes preserved and optimized for ecosystem services; more pervious surfaces; more sustainable transportation systems; energy and resources conserved; positive health outcomes; greater adaptive capacity; planning for prioritized investment; assets protected; safe and healthy constituents
f	Promote connected, complete, and walkable neighborhoods.		x			x			ENACT ENCOURAGE	Evolving	$$$	Med-High	CMAP, APA	
g	Prioritize transit-oriented development and transit-supportive development.	x				x			ENACT ENCOURAGE	Evolving	$$$	High	CMAP, APA, RTA	
h	Participate in the Community Rating System and National Flood Insurance Program.	x		x	x				ENACT LEAD	Proven	$$	Med-High	FEMA, IEMA, IDNR, CRS, NFIP, IAFSM	
i	Protect surface and groundwater from contamination.						x		ENACT ENCOURAGE	Proven	$$$	High	IEPA, IDNR, ISWS, counties, watershed organizations	Water supply protected and conserved; safe and healthy constituents
j	Allow developments flexibility to meet stormwater requirements.				x				ENACT ENCOURAGE	Proven	$$	Med-High	APA, counties, stormwater agencies	Landscapes conserved for ecosystem services; energy and resources conserved
k	Adopt a water conservation plan.						x		ENACT	Evolving	$$	High	CMAP, AWWA, U.S. EPA WaterSense, IISG	Water supply protected and conserved; energy for water distribution conserved; costs reduced
l	Enact and enforce outdoor watering regulations responsive to drought conditions.						x		ENACT	Proven	$	Med	CMAP, NWPA, MPC, IISG	
m	Optimize tree planting and protect existing trees for maximum shading and stormwater benefits.		x	x					LEAD ENACT ENCOURAGE	Proven	$$	High	USFS, IDNR, utilities, public gardens, watershed organizations, stormwater agencies, SWCD, park & forest preserve districts	Heat and flooding hazard lessened; cooling energy demand lessened; air and water quality improved

5. ADAPT OPERATIONS AND INVESTMENTS FOR FUTURE CLIMATE CONDITIONS

SUSTAINABLE DEVELOPMENT GOALS ADDRESSED

	Strategy	Overarching resilience	Heat & Health	Flooding & Homes	Stormwater & Infrastructure	Flooding & Transport	Drought & Water	Air Pollution & Health	Municipal Role	Solution Status	Cost	Effort Required	Lead Partners & Resources	Outcomes (Co-benefits)
a	Integrate stormwater management into transportation projects.				x	x			LEAD ENCOURAGE	Evolving	$$$	Med-High	IDOT, counties, townships, GLISA, RTA, CTA, Metra, Pace	Assets and operations prepared; greater adaptive capacity; assets protected; services and economy protected; mobility maintained
b	Assess and adapt vulnerable infrastructure to be responsive to changing climate conditions.	x			x	x	x		LEAD ENCOURAGE	Evolving	$$$	Med-High	StR, IDOT, counties, townships, ISI, APWA	
c	Acquire and remove floodprone homes			x					LEAD ENCOURAGE	Proven	$$$	High	Counties, FEMA, IEMA, IDNR	
d	Respond to weather events to ensure mobility					x			LEAD ENCOURAGE	Proven	$$	High	IDOT, counties, townships, RTA, CTA, Metra, Pace	
e	Manage public and private landscapes to provide accessible recreation and optimize ecosystem services.	x	x					x	LEAD	Proven	$$$	High	Park & forest preserve districts, SWCD, watershed organizations, IAFSM	Greater adaptive capacity, community cohesion, natural systems optimized for resiliency and public well-being; air and water quality improved; threats from stormwater and heat islands managed
f	Establish green infrastructure and include maintenance in capital improvement plans.				x				LEAD	Proven	$$$	High	MWRD, stormwater agencies, IEPA, IISG	Water quality protected; assets protected; flood impacts reduced
g	Assess and adapt stormwater systems to respond to future rainfall projections.				x				LEAD	Evolving	$$$	High	ISWS, IEPA, state climatologist, IAFSM, stormwater agencies, POTW, APWA	
h	Create resilient water utilities through efficiency, conservation, demand management, technology, and flexible operations.						x		LEAD	Proven	$$$	High	AWWA, JAWA, U.S. EPA, CMAP, MPC	Water supply protected and conserved; energy conserved

APPENDIX F:

KEY PARTNERS TO MUNICIPALITIES, RESOURCES TO SUPPORT IMPLEMENTATION

Key Partners to Municipalities and Resources	*Abbreviation*
Academia	
American Public Works Association	APWA
American Water Works Association	AWWA
Barrington Area Council of Governments	BACOG
Building owners	
Building Resilient Infrastructure and Communities, Federal Emergency Management Agency	BRIC, FEMA
Businesses	
Center for Neighborhood Technology	CNT
Chicago Metropolitan Agency for Planning	CMAP
Chicago Transit Authority	CTA
Chicago Wilderness	
Clean energy industry	
ComEd	
Community Action Agencies	CAAs
Community-based organizations	CBOs
Community Rating System	CRS
Constituents	
Councils of governments	COGs
Counties	
Cultural venues	
Developers	
Disaster Resilience Scorecard for Cities	DRSC
Economic development organizations	
Electric vehicle industry	

Key Partners to Municipalities and Resources	*Abbreviation*
Emergency Management Agencies (federal, state, county)	
Employers	
Faith-based organizations	FBO
Federal Emergency Management Agency	FEMA
Federal government	
Forest preserve districts	
Freight industry	
Great Lakes Integrated Sciences and Assessments	GLISA
Homeowner associations	HOA
Homeowners	
Hospitals	
Illinois Association of Floodplain & Stormwater Managers	IAFSM
Illinois Energy Conservation Authority	IECA
Illinois Department of Natural Resources	IDNR
Illinois Department of Transportation	IDOT
Illinois Emergency Management Agency	IEMA
Illinois Environmental Protection Agency	IEPA
Illinois General Assembly	IGA
Illinois State Water Survey	ISWS
Illinois-Indiana Sea Grant	IISG
Institute for Sustainable Infrastructure	ISI
Institutions	
International Code Council	ICC
Investors	

Key Partners to Municipalities and Resources	Abbreviation
Joint Action Water Agency	JAWA
Land trusts	
Landfill operators	
Local businesses	
Metra	
Metropolitan Mayors Caucus	MMC
Metropolitan Planning Council	MPC
Metropolitan Water Reclamation District	MWRD
Municipal Americans with Disabilities Act Coordinators	ADA
Mutual Aid Box Alarm System	MABAS
National Incident Management	
National Oceanic and Atmospheric Administration	NOAA
National Oceanic and Atmospheric Administration, Steps to Resilience	NOAA
National Weather Service	NWS
Nonprofits	
Northwest Water Planning Alliance	NWPA
Other jurisdictions	
Pace Suburban Bus	Pace
Park districts	
Property owners	
Public and private fleet operators	
Public gardens	
Public health agencies (state, county)	
Publicly owned treatment works	POTW

Key Partners to Municipalities and Resources	Abbreviation
Ready.gov	
Regional Transportation Authority	RTA
Regulators	
Respiratory Health Association	RHA
School districts	
Soil and water conservation districts	SWCD
Solid waste agencies	SWA
State Climatologist	
Stormwater agencies	
Technology industry	
Townships	
Transportation agencies (county, township)	
Universities	
University of Illinois, BRACE	BRACE
U.S. Environmental Protection Agency	U.S. EPA
U.S. Environmental Protection Agency Water Quality Scorecard	U.S. EPA
U.S. Environmental Protection Agency Water Sense	U.S. EPA
U.S. Forest Service	USFS
Utilities (gas and electric)	
Vendors	
Waste haulers	
Waste industry	
Water supply industry	
Watershed organizations	

APPENDIX G:
CLIMATE RISK AND VULNERABILITY ASSESSMENT

HAZARDS

Climate Hazard	*Probability*	*Consequence*	*Risk*
Extreme Heat	3	3	**9**
Drought	2	3	**6**
Severe Thunderstorms	2	2	**4**
Flooding	3	3	**9**
Severe Winter Weather	2	2	**4**

ADAPTIVE CAPACITY

Factor	*Degree of Challenge*
Access to Basic Services	Moderate
Public Health	Moderate
Housing	Moderate
Inequality	High
Economic Health	Moderate
Government Capacity	High
Resource Availability	High

FLOODING

Determining Risk Level

PROBABILITY OF HAZARD

Determine the current probability (likelihood of occurrence) of the hazard based on the options provided (do not know, low, moderate, high).

Probability
3

GCoM Options		
3	High	Extremely likely that the hazard occurs (e.g., greater than 1 in 20 chance of occurrence)
2	Moderate	Likely that the hazard occurs (e.g., between 1 in 20 and 1 in 200 chance of occurrence)
1	Low	Unlikely that the hazard occurs (e.g., between 1 in 200 and 1 in 2,000 chance of occurrence)
0	Do not know	Region has not experienced or observed climate hazards in the past or has no ways of accurately reporting this information based on evidence of data

CONSEQUENCE OF HAZARD

Determine the current consequence (outcome/impact/gravity) of the hazard based on the options provided (do not know, low, moderate, high).

Consequence
3

GCoM Options		
3	High	The hazard represents a high (or the highest) level of potential concern for your jurisdiction. When it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life.
2	Moderate	The hazard represents a moderate level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are moderately significant to day-to-day life.
1	Low	The hazard represents a lower (the lowest) level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life.
0	Do not know	City has not experienced or observed climate hazards in the past of has no ways of accurately reporting this information based on evidence or data.

RISK LEVEL

A hazard risk level is determined for current and future scenarios. Risk is determined based on the probability and consequence of a particular hazard. [Risk = Probability x Consequence]

Risk
9

Qualifying Impacts

PAST IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

Flooding has led to major road, rail, and utility outages, sewer overflows, mold, damaged property, disruptions to freight traffic, and financial losses for local businesses [1]

Flooding in urban areas has resulted in $1.975 billion of documented damages in the CMAP region from 2007-2014 alone (85.2% of pay-outs in the entire state) [1]

INTENSITY

How strong the hazard is

Change in Intensity
Increase | *Decrease* | *No change* | *Not known*
Increase

FREQUENCY

How often the hazard occurs in the region

Change in Frequency
Increase | *Decrease* | *No change* | *Not known*
Increase

TIMESCALE

How often the hazard occurs in the region

Change in Frequency
Immediately | *Short Term (by 2025)* | *Medium Term (by 2050)* | *Long Term (after 2050)* | *Not known*
Short Term

FUTURE IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

In areas along rivers and streams, floodplains would flood more frequently. Drainage systems in built-out parts of the region would often be overwhelmed, causing more basement backups and ponding in yards and parks, while impairing access on roads. By mid-century, federal and state governments, residents, businesses, and municipalities will likely be paying significantly more to address property damage and accidents caused by flooding and rain. Private insurers may also choose to exclude flood prone areas, particularly where stormwater infrastructure has not been upgraded, from coverage, leading to greater dependence on federal programs. [4]

Select the sectors, assets, or services that are currently most impacted by the hazard and those that will be most impacted in the future. A general assessment of the magnitude of impact for each sector, asset, or service must be included.

Sectors, Assets, and Services	***Magnitude of Future Impact*** *Low* | *Moderate* | *High* | *Unknown*	***Description***
Transport	**High**	Heavier rains are expected to increase scouring and deterioration of bridges [1] Flooding and severe weather will likely impair surface transportation -- including cars, buses, trucks, and trains -- more frequently by causing congestion, road closures, and accidents, leading to time lost and increased costs due to repeated rerouting [4]
Water Supply and Sanitation	**Moderate**	More severe storms and flooding are likely to increase non-point source pollution [1] **Increased stormwater runoff may decrease the percent of the Lake Michigan allocation available for drinking water supplies.**
Residential	**Moderate**	**More frequent and more severe flooding may reduce property values in many areas, which in turn may reduce property tax revenues that support services in those areas.**
Commercial	**Moderate**	Flooding and transportation or electricity outages can affect local business operations and employee commutes [1]
Environment, Biodiversity, and Forestry	**Moderate**	Ravine and slope degradation [5]
Public Health	**Moderate**	Flooded areas that remain stagnant may harbor insect growth and could result in vector-borne disease outbreaks and persistent moisture inside buildings due to flooding and seepage can lead to mold growth which decreases indoor air quality and compromises respiratory health [5] **Flooding-related disruptions to the transportation system may prevent some residents (especially those who are elderly, disabled, or have limited transportation options) from accessing health care providers.**

VULNERABLE GROUPS

[OPTIONAL] Determine the population groups in the region that are most vulnerable to the climate hazards and impacts. Vulnerable groups can be matched with each impacted sector or presented as a whole for each hazard.

Vulnerable Groups		
Women and Girls	**Marginalized Groups**	Unemployed Persons
Children and Youth	**Persons with Disabilities**	**Persons in Sub-Standard Housing**
Elderly	**Persons with Chronic Diseases**	Other
Indigenous Populations	**Low-Income Households**	

EXTREME HEAT

Determining Risk Level

PROBABILITY OF HAZARD

Determine the current probability (likelihood of occurrence) of the hazard based on the options provided (do not know, low, moderate, high).

Probability
3

GCoM Options		
3	High	Extremely likely that the hazard occurs (e.g., greater than 1 in 20 chance of occurrence)
2	Moderate	Likely that the hazard occurs (e.g., between 1 in 20 and 1 in 200 chance of occurrence)
1	Low	Unlikely that the hazard occurs (e.g., between 1 in 200 and 1 in 2,000 chance of occurrence)
0	Do not know	Region has not experienced or observed climate hazards in the past or has no ways of accurately reporting this information based on evidence of data

CONSEQUENCE OF HAZARD

Determine the current consequence (outcome/impact/gravity) of the hazard based on the options provided (do not know, low, moderate, high).

Consequence
3

GCoM Options		
3	High	The hazard represents a high (or the highest) level of potential concern for your jurisdiction. When it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life.
2	Moderate	The hazard represents a moderate level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are moderately significant to day-to-day life.
1	Low	The hazard represents a lower (the lowest) level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life.
0	Do not know	City has not experienced or observed climate hazards in the past of has no ways of accurately reporting this information based on evidence or data.

RISK LEVEL

A hazard risk level is determined for current and future scenarios. Risk is determined based on the probability and consequence of a particular hazard. [Risk = Probability x Consequence]

Risk
9

Qualifying Impacts

PAST IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

Heat waves have caused illnesses, hospitalizations, and deaths in vulnerable communities [1]

The Chicago region experienced a historic heat wave in 1995 that led to 700 heat-related deaths, followed by another heat wave in 1999 with more than 100 deaths. The 1995 heat wave resulted in major reforms to Chicago's emergency response programs: The city formed a Commission on Extreme Weather Conditions, developed a comprehensive Extreme Weather Operations Plan, and established better coordination among emergency responders call centers, and traffic management. [1]

INTENSITY

How strong the hazard is

Change in Intensity
Increase | *Decrease* | *No change* | *Not known*
Increase

FREQUENCY

How often the hazard occurs in the region

Change in Frequency
Increase | *Decrease* | *No change* | *Not known*
Increase

TIMESCALE

How often the hazard occurs in the region

Change in Frequency
Immediately | *Short Term (by 2025)* | *Medium Term (by 2050)* | *Long Term (after 2050)* | *Not known*
Short Term

FUTURE IMPACTS

Select the sectors, assets, or services that are currently most impacted by the hazard and those that will be most impacted in the future. A general assessment of the magnitude of impact for each sector, asset, or service must be included.

Sectors, Assets, and Services	***Magnitude of Future Impact*** *Low* | *Moderate* | *High* | *Unknown*	***Description***
Public Health	**High**	Air pollution, especially ozone, would get worse because of higher temperatures, aggravating chronic health conditions [4] Heat waves have caused illnesses, hospitalizations, and deaths in vulnerable communities [1] Additional heat-related deaths [1]
Society / Community and Culture	**Moderate**	Extreme heat may discourage outdoor activity during the summer months, weakening communal ties in residential areas
Environment, Biodiversity, and Forestry	**High**	Increased temperatures are expected to exacerbate the presence of invasive species and diseases that have affected the region's forestry [1] Overnight low temperatures over 80F have the potential to have even more harmful effects on humans, livestock, and vegetation [3] Tree deterioration and fire risk [5]
Transport	**Moderate**	During the summer months, extreme heat could cause more pavement and railways to buckle, disrupting traffic and endangering commuters. [4]
Energy	**Moderate**	More extreme heat would also increase demand for energy, leading to more blackouts and brownouts as demand surpasses capacity [4]
Emergency Services	**Moderate**	Strain on emergency services [5]
Food and Agriculture	**Moderate**	Higher average temperatures throughout the wider Midwest region may lead to declines in the productivity of commercial crops and contribute to invasive species growth and pollinator declines that impact overall agricultural productivity. Projected higher temperatures by the end of the century are likely to cause negative impacts to livestock and breeding operations. This may lead to reduced milk and egg production. [6]

VULNERABLE GROUPS

[OPTIONAL] Determine the population groups in the region that are most vulnerable to the climate hazards and impacts. Vulnerable groups can be matched with each impacted sector or presented as a whole for each hazard.

Vulnerable Groups		*Description*
Women and Girls	**Persons with Chronic Diseases**	Elderly population; people of color; limited English proficiency; family income below poverty level; no health insurance coverage; people without air conditioning; people with chronic diseases [1] People living in lands with high- and medium-intensity developments (defined as having greater than 50% impervious surfaces) are 5-6°F hotter than the regional average [1]
Children and Youth	**Low-Income Households**	
Elderly	Unemployed Persons	
Indigenous Populations	**Persons in Sub-Standard Housing**	
Marginalized Groups	**Other**	
Persons with Disabilities		

Heat Vulnerability				
Socioeconomic Characteristic	**Regional Population**		**Top 10 Percent Hottest Census Tracts Based on Land Surface Temperature**	
	Count	***Percent***	***Count***	***Percent***
Total Population	8,459,768	100%	511,171	100%
Elderly Population (over 65 years)	1,013,640	12.0%	45,368	9.2%
People of Color	4,030,135	47.6%	381,249	73.7%
Limited English Proficiency	1,029,670	12.2%	144,993	27.2%
Family Income below Poverty Level	1,160,842	13.7%	101,134	19.7%
No Health Insurance Coverage	1,146,328	13.6%	125,787	23.0%

Source: 2010–14 American Community Survey, 2010 U.S. Census, and CMAP analysis derived from Landsat 8.

DROUGHT

Determining Risk Level

PROBABILITY OF HAZARD

Determine the current probability (likelihood of occurrence) of the hazard based on the options provided (do not know, low, moderate, high).

Probability
2

GCoM Options		
3	High	Extremely likely that the hazard occurs (e.g., greater than 1 in 20 chance of occurrence)
2	Moderate	Likely that the hazard occurs (e.g., between 1 in 20 and 1 in 200 chance of occurrence)
1	Low	Unlikely that the hazard occurs (e.g., between 1 in 200 and 1 in 2,000 chance of occurrence)
0	Do not know	Region has not experienced or observed climate hazards in the past or has no ways of accurately reporting this information based on evidence of data

CONSEQUENCE OF HAZARD

Determine the current consequence (outcome/impact/gravity) of the hazard based on the options provided (do not know, low, moderate, high).

Consequence
3

GCoM Options		
3	High	The hazard represents a high (or the highest) level of potential concern for your jurisdiction. When it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life.
2	Moderate	The hazard represents a moderate level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are moderately significant to day-to-day life.
1	Low	The hazard represents a lower (the lowest) level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life.
0	Do not know	City has not experienced or observed climate hazards in the past of has no ways of accurately reporting this information based on evidence or data.

RISK LEVEL

A hazard risk level is determined for current and future scenarios. Risk is determined based on the probability and consequence of a particular hazard. [Risk = Probability x Consequence]

Risk
6

Qualifying Impacts

PAST IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

Drought has had significant adverse effects on the region's agricultural sector and natural areas [1]

INTENSITY

How strong the hazard is

Change in Intensity
Increase | *Decrease* | *No change* | *Not known*
Increase

FREQUENCY

How often the hazard occurs in the region

Change in Frequency
Increase | *Decrease* | *No change* | *Not known*
Increase

TIMESCALE

How often the hazard occurs in the region

Change in Frequency
Immediately | *Short Term (by 2025)* | *Medium Term (by 2050)* | *Long Term (after 2050)* | *Not known*
Medium Term

FUTURE IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

The aquifer that provides water for many parts of northwest Will County and the eastern portion of Kane County could be completely depleted in 2050 -- and aquifers that supply water to areas in Kane County, southeast Kendall County, and northern Kendall County could be at least partially desaturated.20 With limited access to Lake Michigan for drinking water, 21 communities who are dependent upon already stressed groundwater supplies could face growing water supply issues during periods of drought. Municipalities may need to switch water sources and build new wells and treatment plants, which could increase the costs of water. Furthermore, because groundwater feeds into multiple water bodies, withdrawals from shallow aquifers would also negatively impact the ecosystems of streams, lakes, wetlands, and Lake Michigan. [4]

Select the sectors, assets, or services that are currently most impacted by the hazard and those that will be most impacted in the future. A general assessment of the magnitude of impact for each sector, asset, or service must be included.

Sectors, Assets, and Services	*Magnitude of Future Impact* *Low* | *Moderate* | *High* | *Unknown*	*Description*
Water Supply and Sanitation	**Moderate**	Water demand from all sectors is expected to increase by up to 12% under a high-emissions scenario [1] **Drought conditions may reduce shallow aquifer recharge, placing considerable strain on residential and commercial water supplies.** **Reduced river flow, paired with high temperatures, may increase the rate of algae growth in rivers used for water supply and recreation.**
Food and Agriculture	**Moderate**	Irrigation for agriculture is projected to see the largest relative increase in water demand compared to any other water use [1]
Environment, Biodiversity, and Forestry	**Moderate**	An increase in projected summertime droughts will lead to ecosystem stress and habitat loss [1]

VULNERABLE GROUPS

[OPTIONAL] Determine the population groups in the region that are most vulnerable to the climate hazards and impacts. Vulnerable groups can be matched with each impacted sector or presented as a whole for each hazard.

Vulnerable Groups			*Description*
Women and Girls	Marginalized Groups	Unemployed Persons	Communities who are dependent upon already stressed groundwater supplies [4]
Children and Youth	Persons with Disabilities	Persons in Sub-Standard Housing	
Elderly	Persons with Chronic Diseases	Other	
Indigenous Populations	Low-Income Households		

SEVERE THUNDERSTORMS

Determining Risk Level

PROBABILITY OF HAZARD

Determine the current probability (likelihood of occurrence) of the hazard based on the options provided (do not know, low, moderate, high).

Probability
2

GCoM Options		
3	High	Extremely likely that the hazard occurs (e.g., greater than 1 in 20 chance of occurrence)
2	Moderate	Likely that the hazard occurs (e.g., between 1 in 20 and 1 in 200 chance of occurrence)
1	Low	Unlikely that the hazard occurs (e.g., between 1 in 200 and 1 in 2,000 chance of occurrence)
0	Do not know	Region has not experienced or observed climate hazards in the past or has no ways of accurately reporting this information based on evidence of data

CONSEQUENCE OF HAZARD

Determine the current consequence (outcome/impact/gravity) of the hazard based on the options provided (do not know, low, moderate, high).

Consequence
2

GCoM Options		
3	High	The hazard represents a high (or the highest) level of potential concern for your jurisdiction. When it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life.
2	Moderate	The hazard represents a moderate level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are moderately significant to day-to-day life.
1	Low	The hazard represents a lower (the lowest) level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life.
0	Do not know	City has not experienced or observed climate hazards in the past of has no ways of accurately reporting this information based on evidence or data.

RISK LEVEL

A hazard risk level is determined for current and future scenarios. Risk is determined based on the probability and consequence of a particular hazard. [Risk = Probability x Consequence]

Risk
4

Qualifying Impacts

INTENSITY

How strong the hazard is

Change in Intensity
Increase | *Decrease* | *No change* | *Not known*
Increase

FREQUENCY

How often the hazard occurs in the region

Change in Frequency
Increase | *Decrease* | *No change* | *Not known*
Increase

TIMESCALE

How often the hazard occurs in the region

Change in Frequency
Immediately | *Short Term (by 2025)* | *Medium Term (by 2050)* | *Long Term (after 2050)* | *Not known*
Not known

FUTURE IMPACTS

Select the sectors, assets, or services that are currently most impacted by the hazard and those that will be most impacted in the future. A general assessment of the magnitude of impact for each sector, asset, or service must be included.

Sectors, Assets, and Services	*Magnitude of Future Impact* *Low* | *Moderate* | *High* | *Unknown*	*Description*
Public Health	**Low**	More frequent and intense storms would also increase the risk of accidents, particularly on roads. [4] **Though rare, personal injuries due to extreme wind, tornadoes, and lightning strikes do occur in the Chicago region.**
Energy	**Moderate**	Severe thunderstorms, ice storms, and strong winds could damage overhead power lines, and cause power outages that disrupt business productivity and threaten public safety. [4]

VULNERABLE GROUPS

[OPTIONAL] Determine the population groups in the region that are most vulnerable to the climate hazards and impacts. Vulnerable groups can be matched with each impacted sector or presented as a whole for each hazard.

Vulnerable Groups		
Women and Girls	Marginalized Groups	Unemployed Persons
Children and Youth	Persons with Disabilities	**Persons in Sub-Standard Housing**
Elderly	Persons with Chronic Diseases	Other
Indigenous Populations	**Low-Income Households**	

SEVERE WINTER WEATHER

Determining Risk Level

PROBABILITY OF HAZARD

Determine the current probability (likelihood of occurrence) of the hazard based on the options provided (do not know, low, moderate, high).

Probability
2

GCoM Options		
3	High	Extremely likely that the hazard occurs (e.g., greater than 1 in 20 chance of occurrence)
2	Moderate	Likely that the hazard occurs (e.g., between 1 in 20 and 1 in 200 chance of occurrence)
1	Low	Unlikely that the hazard occurs (e.g., between 1 in 200 and 1 in 2,000 chance of occurrence)
0	Do not know	Region has not experienced or observed climate hazards in the past or has no ways of accurately reporting this information based on evidence of data

CONSEQUENCE OF HAZARD

Determine the current consequence (outcome/impact/gravity) of the hazard based on the options provided (do not know, low, moderate, high).

Consequence
2

GCoM Options		
3	High	The hazard represents a high (or the highest) level of potential concern for your jurisdiction. When it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life.
2	Moderate	The hazard represents a moderate level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are moderately significant to day-to-day life.
1	Low	The hazard represents a lower (the lowest) level of potential concern for your jurisdiction. When it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life.
0	Do not know	City has not experienced or observed climate hazards in the past of has no ways of accurately reporting this information based on evidence or data.

RISK LEVEL

A hazard risk level is determined for current and future scenarios. Risk is determined based on the probability and consequence of a particular hazard. [Risk = Probability x Consequence]

Risk
4

Qualifying Impacts

PAST IMPACTS

Include a description of the impacts experienced in the past including loss of human lives, economic and non-economic losses, environmental and other impacts.

Blizzards, extreme low temperatures, freezing rain, freeze-thaw.

INTENSITY

How strong the hazard is

Change in Intensity
Increase | *Decrease* | *No change* | *Not known*
Increase

FREQUENCY

How often the hazard occurs in the region

Change in Frequency
Increase | *Decrease* | *No change* | *Not known*
Mixed

TIMESCALE

How often the hazard occurs in the region

Change in Frequency
Immediately | *Short Term (by 2025)* | *Medium Term (by 2050)* | *Long Term (after 2050)* | *Not known*
Mixed

FUTURE IMPACTS

Select the sectors, assets, or services that are currently most impacted by the hazard and those that will be most impacted in the future. A general assessment of the magnitude of impact for each sector, asset, or service must be included.

Sectors, Assets, and Services	*Magnitude of Future Impact* *Low* | *Moderate* | *High* | *Unknown*	*Description*
Transport	**Moderate**	These winter temperature patterns may lead to more freeze-thaw events, which lead to wear and tear on the built environment [1] **More frequent incidents of freezing rain may reduce road safety and increase maintenance costs (salt, sand, etc.)**
Energy	**Low**	More frequent freeze-thaw cycles would increase the risk of water pipes bursting [4] Severe thunderstorms, ice storms, and strong winds could damage overhead power lines, and cause power outages that disrupt business productivity and threaten public safety. [4] **Extreme low temperature events (polar vortex events) may place**
Water Supply and Sanitation	**Moderate**	Water supply service interruptions due to increased cold and the extreme freeze/thaw cycle is leading to increased applications of salt during the winter to combat more frequent ice buildup on roadways. The snow melt runoff, contaminated with this higher level of salt, will eventually reach the lake where it may have negative impacts on the ecosystem [5]
Public Health	**Moderate**	More frequent and intense storms would also increase the risk of accidents, particularly on roads. [4]
Environment, Biodiversity, and Forestry	**Moderate**	**Increased salt use during freezing rain events may impact regional ecosystems. Freezing rain may also damage forest ecosystems.**

VULNERABLE GROUPS

[OPTIONAL] Determine the population groups in the region that are most vulnerable to the climate hazards and impacts. Vulnerable groups can be matched with each impacted sector or presented as a whole for each hazard.

Vulnerable Groups		
Women and Girls	Marginalized Groups	Unemployed Persons
Children and Youth	Persons with Disabilities	Persons in Sub-Standard Housing
Elderly	Persons with Chronic Diseases	Other
Indigenous Populations	Low-Income Households	

ADAPTIVE CAPACITY

Determining Adaptive Capacity of the Region

ADAPTIVE CAPACITY

Determine the degree in which the region is able to adapt to climate change. Select factors that will affect the region's adaptive capacity and influence climate resilience efforts by hindering the climate change adaptation actions within the regional jurisdiction.

Factor *Select from dropdown*	***Effect on Adaptive Capacity***	***Degree of Challenge*** *High | Moderate | Low | No Change/Do Not Know*
Access to Basic Services	Transportation and power disruptions [1]	**Moderate**
Public Health	Heat waves have led to heat-related illnesses and mortality. Elderly residents, people with chronic diseases, and people without access to air conditioning are particularly susceptible to heat waves [1]	**Moderate**
Housing	Widespread and chronic flooding has damaged homes (sometimes irreparably), causing evacuations and significant costs [1]	**Moderate**
Inequality	With fewer financial resources, lower income residents would be less able to afford housing in areas that are less exposed to the urban heat island effect [4]	**High**
Economic Health	Slow rate of growth, declining sales and manufacturing production [1]	**Moderate**
Government Capacity	Some issues are for the private sector or other levels of government to address. In some cases, the range of solutions available to municipalities is shaped by policies at other levels of government [2]	**High**
Resource Availability	**The aquifer that provides water for many parts of northwest Will County and the eastern portion of Kane County could be completely depleted in 2050 [4]. More frequent droughts and drought-like conditions may decrease shallow aquifer recharge and reduce water levels in revers used for water supply.**	**High**

SOURCES

1 CMAP Climate Resilience Strategy
2 CMAP Climate Adaptation Toolkit
3 CMAP Climate Adaptation Toolkit (Appendix A: Primary Impacts of Climate Change in the Chicago Region)
4 CMAP Changed Climate Memo
5 City of Highland Park Climate Hazard Assessment
6 Guidebook, Using Climate Information in Local Planning