HENNEPIN COUNTY
MINNESOTA

Climate Action Plan

DRAFT

Strategies to cut greenhouse gas emissions and adapt to our changing climate in ways that reduce vulnerabilities and ensure a more equitable and resilient Hennepin County

May 2021

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Purpose

The climate in Hennepin County is changing. Hennepin County's climate is getting wetter year-round and winter low temperatures are getting warmer. Climate vulnerability assessments make it clear that the risks posed to Hennepin County residents, infrastructure, and natural resources from climate change warrant an urgent, significant, and coordinated response.

In order to avoid the most severe and devastating impacts from climate change, we need to make significant changes to how our society operates, and we need to do it quickly. Making these changes will have clear benefits to people and natural ecosystems and will help create a more sustainable and equitable society.

Through community engagement efforts, the county learned that residents, community partners, other units of government, and county operations have already been experiencing negative impacts due to climate change. Residents, community partners, and other units of government are advancing their own climate action strategies and are interested in working with the county to address the complexities of climate change. The county has an important role to play in protecting our most vulnerable residents, leading by example in our operations, and fostering partnerships to achieve shared goals.

Today, with our community in the midst of combating COVID-19, facing an uncertain economic outlook, and addressing the public health crisis of structural racism, it is more apparent than ever that building a more resilient community not only helps us adapt to a changing climate but also helps us reduce racial disparities and safeguards our residents, economy, infrastructure, and environment. If we do not act boldly, climate change will progressively worsen the disparities in health, housing, and income that communities of color are already experiencing.

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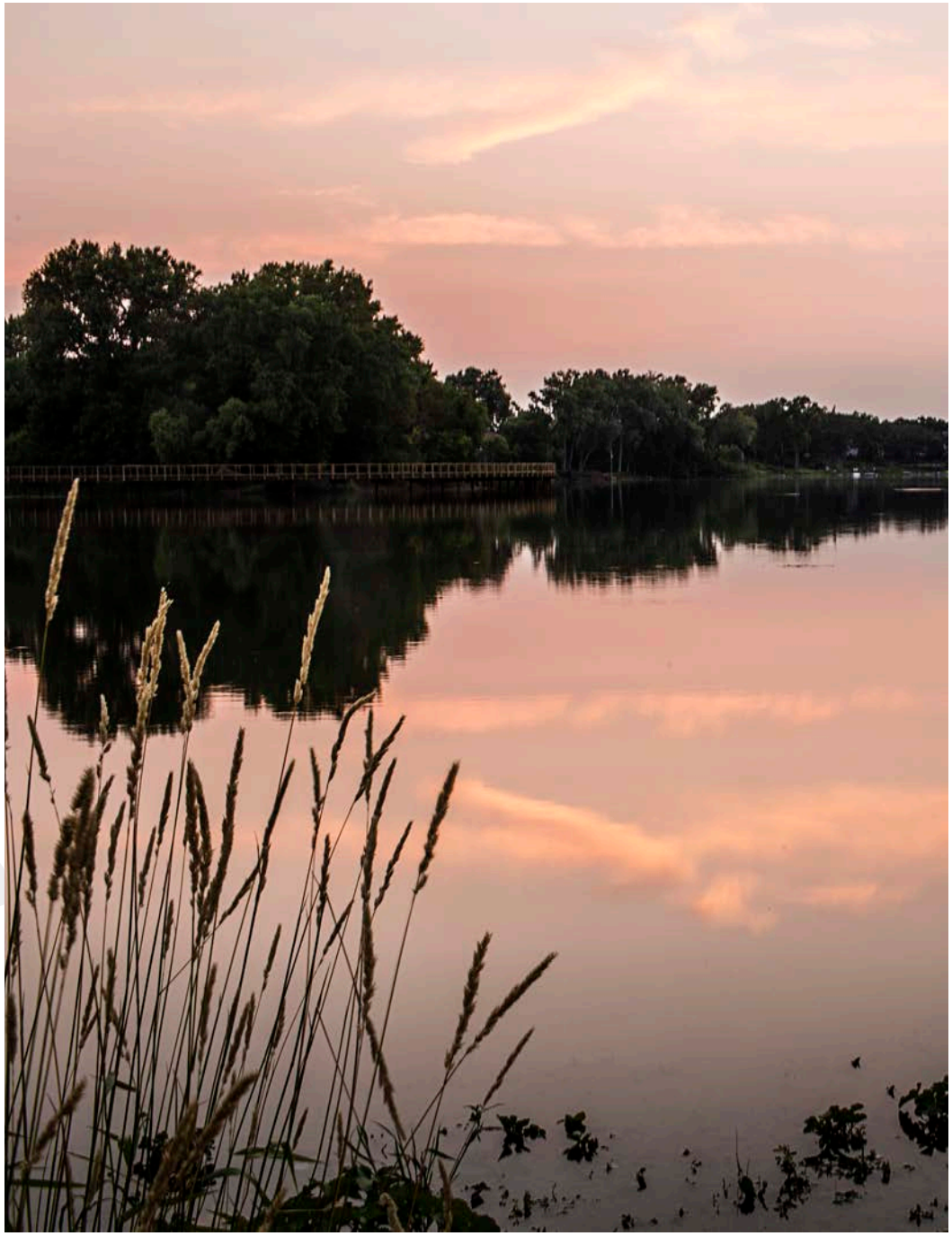
Our vision for a climate-friendly future

Acting boldly on climate change will enable us to create a better future for ourselves and generations to come. Pursuing the strategies laid out in this plan will make ourselves and our communities healthier. The buildings we live and work in will efficiently use the clean energy supplied to them, and we will have numerous sustainable and accessible options for getting where we need to go.

The lakes, rivers, forests, and prairies that make Hennepin County a great place to live will be protected and enhanced so that they provide habitat for a diversity of wildlife, give us a space to connect with nature, and contribute to making our communities more resilient. Transitioning to green, sustainable, and resilient infrastructure will provide economic opportunities that will be made accessible through workforce development and job training programs.

Engaging our communities and developing strong and diverse partnerships will make our strategies more creative, more ambitious, and more achievable. A focus on reducing disparities and protecting residents most susceptible to climate impacts will ensure these benefits are shared by all Hennepin County residents.



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Foundation for an impactful response

Hennepin County's response to climate change is important. We lead in many areas that offer the most effective ways to cut greenhouse gas emissions, such as investing in transit, conserving energy use in our buildings, protecting natural resources, and preventing waste.

The county developed this climate action plan to serve as the foundation for a coordinated approach to planning, policy development, and responses to climate change. This plan both accounts for programs, services, and initiatives that are already underway and identifies new strategies that we need to pursue to effectively respond to and adapt to the changing climate.

The plan establishes how a climate response will be coordinated across lines of business and how reducing the impacts of climate change and creating a climate-friendly future will be integrated into the county's planning and decision-making. This is intended to be an iterative plan that integrates new and bolder goals and strategies as planning for climate change becomes core to how the county achieves its objectives.

This plan is an opportunity for the county to further our purpose-driven culture and innovate how we deliver service. We are well-equipped to meet this opportunity because responding to big challenges brings out the best in county staff – resourcefulness, innovation, and empowerment.

We cannot do it alone. Since climate change is primarily caused by humans burning fossil fuels for energy, we all have a shared responsibility – individuals, businesses, community organizations, institutions, and government – to do more to combat climate change and protect our environment for future generations.

This climate action plan is a framework for how the county will pursue initiatives to cut greenhouse gas emissions and strategies to adapt to the changing climate in ways that reduce vulnerabilities and ensure a more equitable and resilient Hennepin County.

Photo © Star Tribune

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Our climate is changing and will continue to change

Climate change is caused primarily humans burning fossil fuels, such as coal, oil, and natural gas, for energy to power buildings, fuel vehicles, and create goods. Burning fossil fuels for energy releases excess greenhouse gases into the atmosphere, most notably carbon dioxide (CO2), nitrous oxide (N2O), and methane (CH4). The buildup of excess greenhouse gases acts like a blanket that traps heat around the world, disrupting the climate.

According to Minnesota Department of Natural Resources Climatology Office, Minnesota's climate is already changing rapidly and will continue to do so for the foreseeable future.[1] The variability in weather that Minnesota is known for between warm and cool and wet and dry will still be a staple of our climate, with projections showing that in some ways the climate will become more variable.

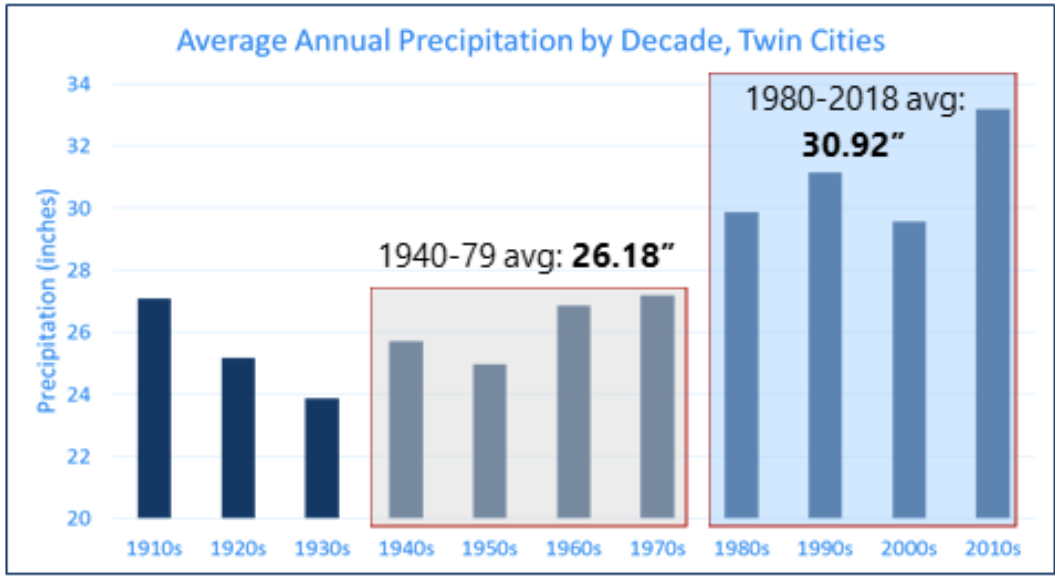

Figure 1: Average annual precipitation by decade in the Twin Cities
Source: Minnesota Department of Natural Resources, 2019

The region has gotten much wetter and warmer, driven by more frequent heavy precipitation and warmer winters (See Figure 1). In fact, the 2010s is the wettest decade on record in Minnesota, and projections indicate these trends will continue. Heavier precipitation events and warmer winters increase the frequency of flooding, landslides, freeze/thaw cycles, ice storms, rain on snow events, and heavy snowstorms. All of these put increased strain on county operations, residents, businesses, and the natural environment.

In addition to heavier precipitation events, the potential for drought will increase in the coming decades. Hot weather, including higher summer temperatures and heat waves, has not worsened yet, but it is expected to by mid-century.

[1] https://www.dnr.state.mn.us/climate/climate_change_info/index.html

Increasing the understanding of the local impacts of climate change

One challenge we face in Hennepin County is that the dramatic images seen in the news of hurricanes, persistent droughts, wildfires, and urban heat waves don't match up with how we are currently experiencing climate change, so it can be harder for our staff, residents, and partner organizations to understand our local impacts. Thus far, impacts in Hennepin County have mostly been limited to small geographic areas, such as an intense rainfall inundating a portion of a city, creeping groundwater flooding affecting a small zone of residents, or landslides happening in specific areas. Additionally, the effects of extreme heat and extreme cold disproportionately impact vulnerable populations, leaving the general public with an underappreciation of these climate change impacts.

There needs to be an increased understanding that a functioning, stable climate serves as the foundation of our lives. Our health and safety, water supplies, food systems, access to healthy air, and where we are able to live all depend on a stable climate. Climate change is the ground shifting under our feet, challenging our capacity to grow food, changing the diseases and pests we have to deal with, disrupting our communities, and threatening our health and safety.

Our health and safety, water supplies, food systems, access to healthy air, and where we are able to live all depend on a stable climate.

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Developing the climate action plan

Planning approach

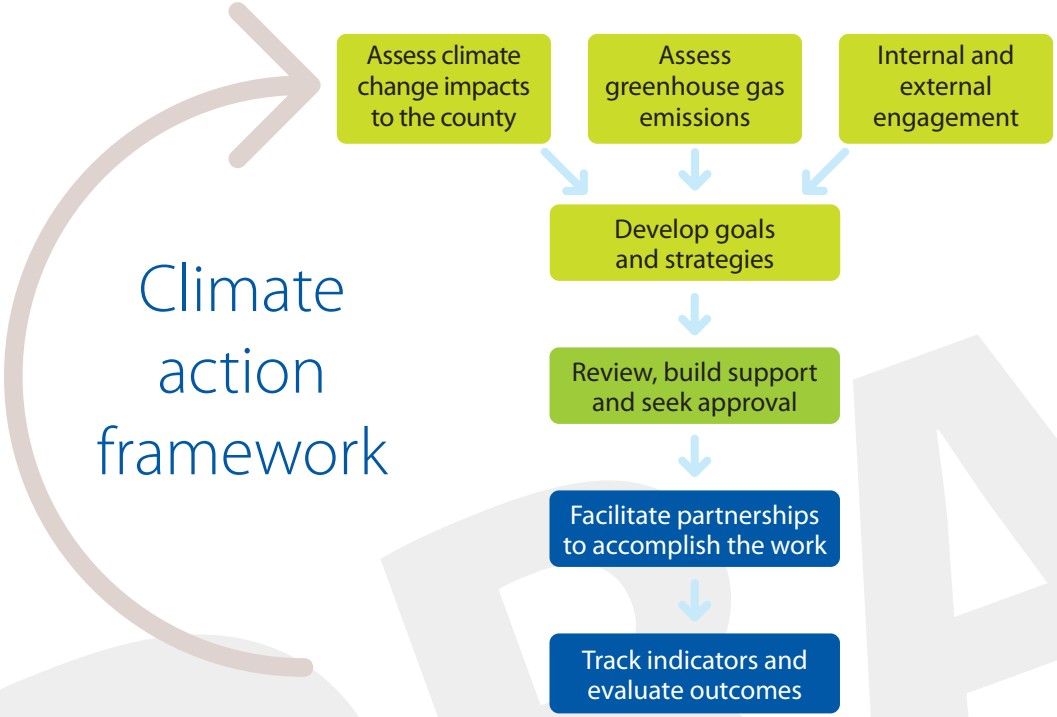

Figure 2: Climate action framework

The development of the climate action plan has followed the process depicted in Figure 2 with the following phases:

- Phase 1: Research and assessment on climate change impacts and greenhouse gas emissions
- Phase 2: Develop goals and strategies
- Phase 3: Review, build support, and seek approval
- 2021 and beyond: Seek and facilitate partnerships to accomplish the work

Internal and external engagement was conducted throughout the plan development. The county will track the metrics identified through the plan to evaluate whether the strategies in the plan achieve their desired outcomes. The arrow reflects the intention to make the plan iterative and adaptable as the county moves into implementation of the plan.

Phase I: Research and assessment

The first phase of the county's climate action plan development involved conducting research and assessing climate change impacts and greenhouse gas emissions. A summary of the key findings are described in the background section for each goal. The full reports are posted online at **hennepin.us/climate-action**.

In this phase, staff engaged Hennepin County's cities, watershed organizations, park districts, and other regional and state units of government to learn about their priorities for climate work and opportunities for collaboration. Staff also reached out to partner community groups that are working on climate change to gather feedback on the community engagement approach.

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Phase II: Develop goals and strategies

Staff from every line of business were engaged in the following five work teams to develop goals and strategies to respond to climate change.

People: health, behavior, and disparity reduction

Transportation and infrastructure

Buildings and energy

Waste and materials

Water, natural resources, and land use

The teams proposed climate action strategies based on their focus area. The climate team leads then worked with Diversity, Equity, and Inclusion staff to apply a disparities reduction lens to the brainstormed strategies. In total, the teams came up with more than 200 strategies to address climate change.

The strategies were analyzed for similarities among the teams and categorized into themes. Finally, team leads were asked to consider the current landscape, taking into account financial realities, the county's core work functions, and their professional expertise in their focus area to recommend which strategies the county should pursue to build a strong foundation for an impactful response to climate change.

Seven foundational strategies were identified from that analysis. These strategies are staff's recommendation about the best place to start that will serve as a s trong foundation for the county's long-term response to climate change. Those strategies were presented to the county board on September 24, 2020. See foundational strategies on pg. 65.

Appendix A includes an acknowledgement of the 59 staff members representing 20 departments that participated in the teams.

Phase III: Review, build support, and seek approval

The county's approach to engagement began with internal coordination, then expanded to include public entity and community group partners, and then residents and businesses more broadly.

Early in 2020, staff reached out to county subject matter experts and senior leadership in all lines of business asking for their commitment to this work and to consider how the county can best respond to climate change. For the county to succeed in an impactful response to climate change, this work needs to be a priority for all lines of business, not just work for environmental staff. Staff recognized that to achieve the desired outcomes in this plan, the county must commit to a long-term endeavor that requires significant changes to county policies, systems, and practices.

In May 2020, staff reached out to Hennepin County's cities, watershed organizations, park districts, and other regional and state units of government to learn about their priorities for climate work and opportunities for collaboration.

In June 2020, county commissioners reviewed the findings from the research and assessment phase of the work and provided feedback that helped shape the development of the strategies and informed the community engagement efforts.

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In August 2020, staff gathered feedback from public entity partners on proposed strategies that will require external partnership and greater coordination to achieve. Staff then further developed goals and strategies, and those were reviewed by all county lines of business.

In September 2020, a board briefing was held to review the status of the plan development and to seek guidance on the foundational strategies. The board also provided direction on conducting more external community engagement.

In November 2020, staff held a series of feedback sessions with community groups, youth, and the county's Race Equity Advisory Council. A total of 84 people shared feedback on the climate action plan's foundational strategies, impacts the community has experienced from climate change, and their priorities for a climate-friendly future. The county also conducted an online survey for residents that received more than 2,300 responses to learn about impacts the community has experienced from climate change and understand residents' priorities to inform the plan. The survey also asked about actions residents are already taking and what actions they are interested in taking to mitigate climate change, which will be used to shape future outreach on the plan and guide the county's education efforts on climate action. A summary of the key findings from the first phase of public engagement can be found in Appendix B.

Word cloud of responses to the question, "I care about climate change because I am a...____"
Hennepin County Climate Change survey, 2020

In December 2020, staff analyzed the feedback received in the first phase of public engagement and revised the plan.

In January 2021, staff shared a draft of the plan with county commissioners, seeking direction on the public engagement process and when to pursue formal board adoption of the plan.

In February 2021, the draft plan was shared with the public and the second phase of public engagement was held. Feedback was gathered through community meetings, an online comment form, and a survey for public entity partners. Anyone interested in the county's response to climate change was encouraged to attend an online meeting or submit comments. Feedback was received from residents, representatives of community organizations and advocacy groups, and staff from state agencies, cities, and watershed districts. The public engagement process generated more than 1,000 ideas and comments that informed updates to the plan and will guide the county's climate action work going forward. A summary of the key findings from the second phase of public engagement can be found in Appendix B.

In March 2021, staff analyzed the feedback received to identify key themes and calls to action and shared the feedback with county leadership and climate action teams to get responses and identify updates needed to the plan. Staff revised the plan and submitted it to the board for adoption. A public comment opportunity was given in April 2021, and the final plan was submitted for adoption.

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On May 4, 2021, the Hennepin County Board of Commissioners adopted the Climate Action Plan.

2021 and beyond

With this plan, the county's leaders have articulated a framework to realize our vision for a climate-friendly future. As the county moves into implementation, we will demonstrate that climate action is a countywide priority for all departments, and we will align resources with this priority. Work plans outlining timelines, budgets, and responsibilities will be created for the strategies identified in this plan. Employees are already engaged in pursuing the plan's foundational strategies (see page 65) to showcase early successes.

The plan is driven by the county's priority of reducing racial disparities. With this plan, the county centers how climate change work is intersectional with racial equity work. Staff will use the county's Racial Equity Impact Tool to guide how we engage with community, particularly those most impacted by a policy, program, or budget decision, and ensure that we consider how the community may benefit or be burdened by those decisions.

The county looks forward to convening partners to further develop action plans for strategies, pursue collaborations for greater impact, and raise a collective voice for climate policy. The county will also help our residents understand the impacts from climate change, help residents, businesses, and organizations take action, and build support for collective action that is necessary to drive systems change.

For us to achieve our climate goals, climate-driven investments need to be priorities and longer-term solutions to funding must be found. Developing and including a climate analysis framework, which builds on the Race Equity Impact Tool, that can be applied in budgets and planning work will be critical to advancing this work with tight budgets. This plan shifts the climate aspects of projects from "nice to have" to "must have" features. By accounting for a changing climate in the things that we build, we are protecting our investments into the future.

DRAFT

Climate action plan

Prioritize disparity reduction

Cut greenhouse gas emissions

Adapt to climate hazards

Results in a more equitable and resilient Hennepin County

Vision for an impactful plan

This plan includes initiatives to cut greenhouse gas emissions and strategies to adapt to the changing climate in ways that reduce vulnerabilities and ensure a more equitable and resilient Hennepin County. This plan serves as the foundation for a coordinated approach to planning, policy development, and responses to climate change.

The most important values to residents and community partners in creating a climate-friendly future are:

- Ensuring a healthy environment for future generations
- Protecting people most susceptible to climate impacts and reducing racial disparities
- Protecting wildlife and nature
- Responsibly using resources and minimizing wastefulness

Climate action plan

Prioritize disparity reduction

Cut greenhouse gas emissions

Adapt to climate hazards

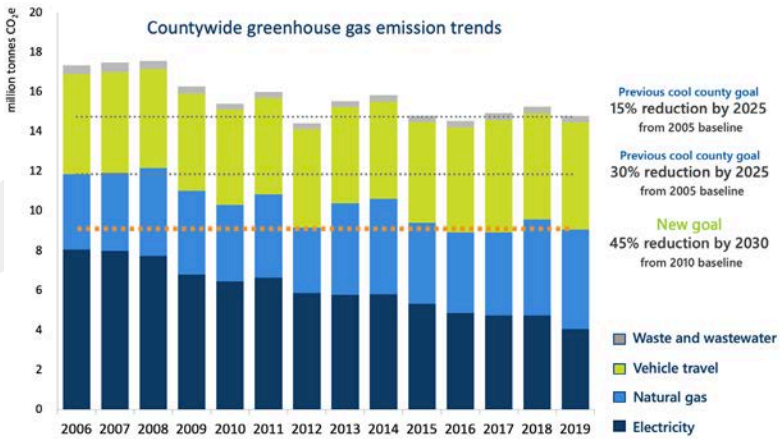
Results in a more equitable and resilient Hennepin County

Cut greenhouse gas emissions

The Hennepin County Board of Commissioners updated county goals to reduce greenhouse gas emissions by 45% from 2010 levels by 2030 and achieve net zero emissions by 2050.

These goals are based on the global consensus from scientists working with the United Nations Intergovernmental Panel on Climate Change (IPCC) and align with the direction being taken at the federal and state level. The scientific consensus establishes that we need to substantially reduce emissions and make rapid and far-reaching changes in all aspects of society to avoid the most severe impacts of climate change.These emission reduction targets apply to both the geographic area of the county and county operations.

Figure 3: Countywide greenhouse gas emission trends



Net zero carbon emissions is achieved by "balancing" a limited amount of carbon released with offsets that remove carbon from the atmosphere. These ambitious goals were recommended as a way to limit warming to 1.5 degrees Celsius, which would reduce challenging impacts on ecosystems, human health, and well-being while making it easier to achieve equitable and sustainable development.

Previously, the county was pursuing emissions reduction goals from a 2005 baseline by: 15% by 2015; 30% by 2025; 80% by 2050 from both the geographic area of the county and from county operations. As depicted in Figure 3, countywide greenhouse gas emissions have dropped by more than 15% from the 2005 baseline. The success in meeting the 2015 greenhouse emission reduction goal was largely due to Xcel Energy's efforts to expand renewable energy sources. Emissions relating to waste and wastewater treatment, transportation, and energy generation from natural gas have changed little over the past 12 years.

Adapt to climate hazards and prepare for the projected impacts

In May 2019, the county board directed staff (Resolution 19-0158R1 S1) to develop a coordinated resiliency and adaptation plan. **Climate adaptation** is about developing and implementing strategies to help human and natural systems cope with and become more resilient to the impacts of climate change.

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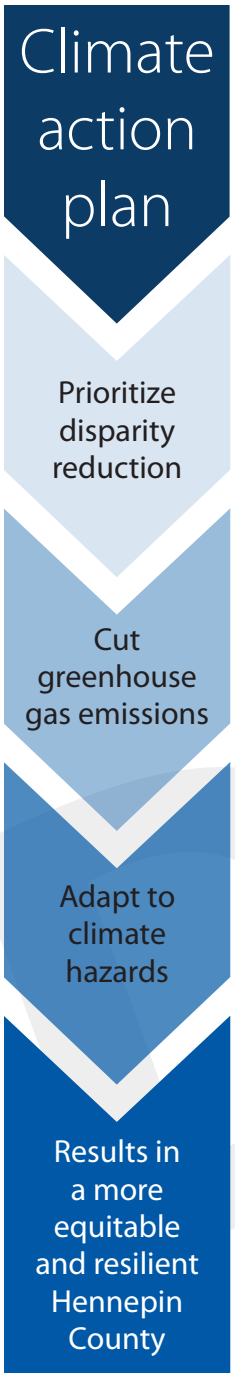

Results in an equitable and resilient Hennepin County

The impacts of climate change will more acutely affect historically marginalized communities. Like other environmental justice issues, data shows that people of color, low-income families, and residents with disabilities contribute least to the problem of climate pollution, but these residents are the most at risk from negative climate impacts. As the county seeks to protect the most susceptible residents, we acknowledge that those who have the least capacity to respond to climate change will be most affected.

Resilience is the capacity of a community, individual, business, or natural environment to prevent, withstand, respond, and recover from acute shocks and stressors.

Because disparity reduction is a priority for the county, we modified a climate resiliency framework used by many organizations to show how climate resiliency aligns with disparity reduction. The county's the disparity reduction domains are shown in the green inner circle (See Figure 4). This helps to identify which areas of climate response and resiliency overlap with the disparity reduction domains. See Appendix C for a chart that aligns each climate plan strategy with its related disparity reduction domains.

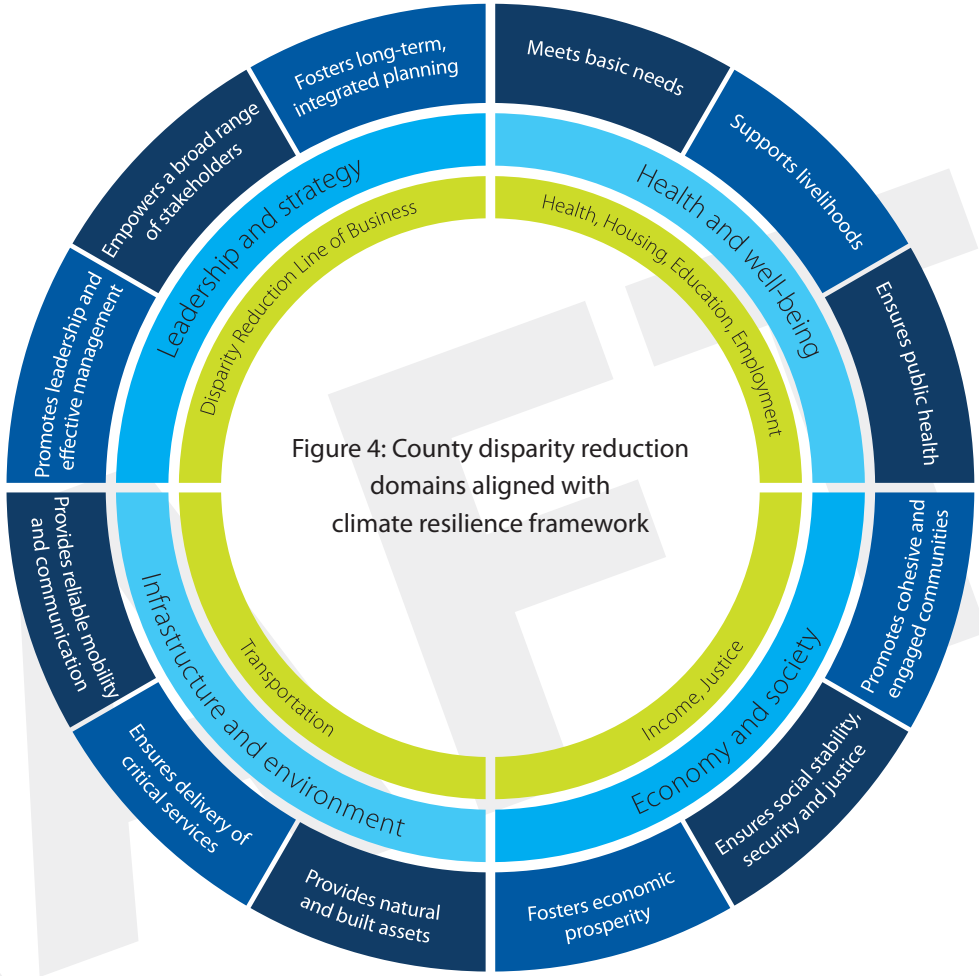

Figure 4: County disparity reduction domains aligned with climate resilience framework

The plan will result in building a more resilient community that can withstand and adapt to abrupt and sometimes unforeseen weather, social, and economic changes. The strategies pursued in this plan need to advance equitable outcomes and not exacerbate racial disparities.

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Goal: Protect and engage people, especially vulnerable communities

The county strives to meet the needs of our residents by enhancing safety, health, and quality of life. As we serve today's residents, the county must also ensure a high quality of life for the generations to come.

The effects of climate change related to air pollution, flooding, and extreme heat will exacerbate health threats, especially for people of color, low-income families and people with physical disabilities. These residents are most susceptible to the negative impacts of climate change due to racist decisions in the past around land use, transportation and other policies. These persistent inequities are still upheld in our systems today. They have created disparities in outcomes and have inequitably increased the risk posed to historically marginalized communities by climate change.

The county must prioritize protecting the health of residents amid these increasing threats. At the same time, the investments the county makes in responding to climate change present the opportunity to reduce disparities in employment and grow the economy. To have a transformative impact, the county needs support and engagement from residents, businesses, and organizations to advance collective action and drive systemic change.

The impacts of the climate crisis are not felt equally, making the response to climate change a justice issue that requires authentically engaging with communities, advancing efforts to dismantle systemic racism, and reducing disparities.

Goal: Protect and engage people, especially vulnerable communities

Health and livability impacts of climate change

Changes in our climate will result in changes to health and livability for our residents. The county anticipates preparing and responding to the following health and livability impacts:

- Rising temperatures and changes in climate patterns are likely to increase air pollution. Air pollutants, such as ozone, particulate matter, and allergens, pose respiratory and cardiovascular threats.
- Increasing frequency and intensity of heavy rainfall events will lead to more flash flooding, which is a safety risk, especially for historically marginalized residents. Flash flooding also threatens property and belongings and limits access for emergency vehicles to respond to calls.
- Sustained high precipitation will saturate soils and disproportionately impact residents living and working in areas prone to groundwater flooding. Buildings in persistently wet soils are more likely to grow mold and bacteria that reduce indoor air quality and pose respiratory threats to people in the buildings.
- Extreme heat, especially in urban areas, will put historically marginalized residents at higher risk of overheating. Increasing temperatures combined with increases in precipitation will lead to increased humidity, compounding risks to residents with underlying health conditions.
- Transmission of West Nile Virus, Lyme disease, and other vector-borne disease is expected to increase as the distribution of ticks, mosquitoes, and other insects change as a result of warmer and wetter conditions.
- Negative mental health outcomes can be caused by the acute trauma of an extreme weather event or the gradual onset of climate change. Mental health issues may include anxiety, stress, depression, and post traumatic stress disorder.

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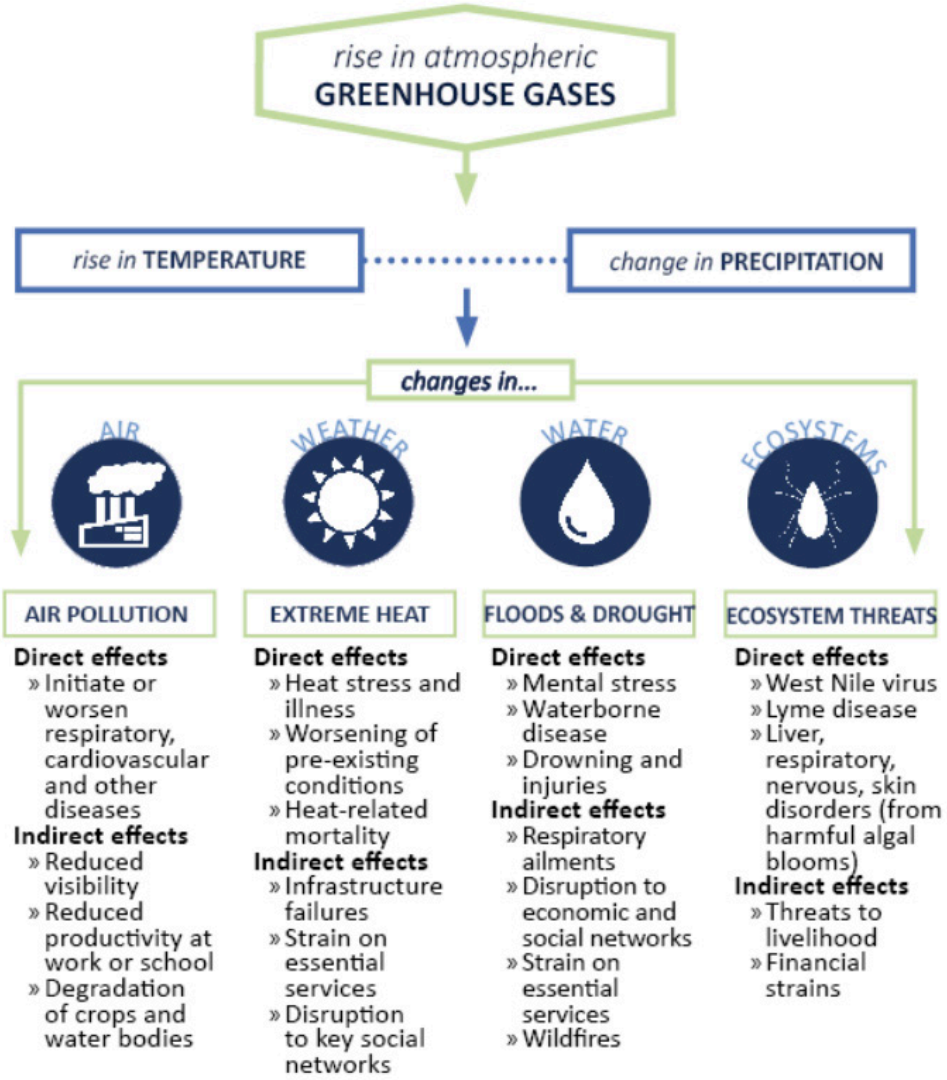
Goal: Protect and engage people, especially vulnerable communities

Figure 5: Health effects of climate change.
Source: Minnesota Department of Health, 2016



Most common effects of climate change that residents have experienced over the last few years

(% of survey respondents who say they have experienced this effect)

- Stress or anxiety due to worrying about climate change and the future (74%)
- Changes in activities due to extreme, severe, or weird weather (55%)
- Increase in pests, such as ticks and mosquitoes (46%)
- Needing to deal with extreme heat or cold, including finding shelter and access to air conditioning (43%)
- Impacts on activities caused by poor air quality (40%)

Goal: Protect and engage people, especially vulnerable communities

Climate resilience

Climate change is likely to bring more abrupt and challenging situations, such as flash floods or severe weather, that worsen existing disparities.

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A climate hazard, such as water in the basement, could be an inconvenience for some, a manageable problem for others, or a catastrophic event for those without the means to respond.

To illustrate this point, as winters have been warming, Hennepin County has seen an increase in winter rains. Rainwater flowing toward snow-covered stormwater intakes cannot infiltrate frozen soils and pools in the lowest spots. When winter rainwater flows into residential and commercial basements, the owner's and/or renter's financial ability to respond determines whether the damage is inconvenient, manageable, or catastrophic. The property of those without the financial means to repair the water damage may end up in tax forfeiture. Hennepin County is finding that many tax-forfeited properties have water damage, which the county repairs prior to reselling the property at market value.

Building a more resilient community – for example, at the individual level by providing financial assistance to help residents prevent or repair water damage and at the community level by increasing stormwater holding capacity in areas that are most prone to flooding – will help disrupt disparities and protect our society, economy, and public health.

Objective: Hennepin County becomes a more resilient community that can withstand and adapt to abrupt and sometimes unforeseen weather, social, and economic changes

Strategy: Strengthen individual and community resilience

- Collect, monitor, and communicate climate risks to public health, society, and the economy.
- Foster relationships with communities to engage, listen, and respond with people-centered solutions.
- Improve education and communication to promote awareness, personal action, and best practices in the areas of:
  - Chronic disease prevention and management.
  - Vector-borne diseases.
  - Physical and mental health, wellbeing, and resiliency.
  - Environmental health, including indoor air quality, wet basements, and mold.
  - Weather and subsequent health effects, including overheating, frost bite, and drowning.
- Plan for population growth due to people relocating from areas facing more severe climate impacts and explore lessons learned from previous climate shocks to prepare for climate refugees.
- Increase coordination with Minnesota Department of Health through their Climate and Health Program efforts.
- Collect data from recreational beach water to monitor disease rates and respond to outbreaks.

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Goal: Protect and engage people, especially vulnerable communities

Protecting vulnerable communities

The impacts of climate change will affect all residents, but the impacts will not be felt equally. Like other environmental justice issues, data show that our communities of color, low-income families, and residents with disabilities contribute least to the problem of climate pollution.[2]
Despite this, these residents are the most at risk from negative climate impacts, especially during flooding events, heat waves, and poor air quality days.[3] As the county seeks to protect residents most vulnerable to climate change impacts, we acknowledge that those who have the least capacity to respond to climate change will be most affected.

The darkest blue areas on the map (Figure 5, pg. 20) are census tracts where people who will most acutely feel disproportionate impacts of climate change live. This map was created by layering 14 social, demographic and economic variables to help assess the influence of social determinants of health on climate vulnerability. This approach is consistent with that used in other, similar analyses, such as Ramsey County Public Health's vulnerability assessment, Met Council's areas of concentrated poverty, MPCA's Environmental Justice datasets, and CDC's Human Vulnerability Index. Of note, this map mirrors both the county's Historically Undercounted Communities map and the COVID-19 Equity Impact Awareness Tool maps recently created by Hennepin County GIS. This makes it clear that the communities most impacted by historic and systemic racism and the COVID-19 pandemic are the communities most susceptible to the impacts of climate change.

[2] Minnesota Pollution Control Agency, Life and Breath: How Air Pollution Affects Public Health in the Twin Cities, July 2015.

[3] Minnesota Department of Health, Minnesota Climate and Health Profile Report 2015.

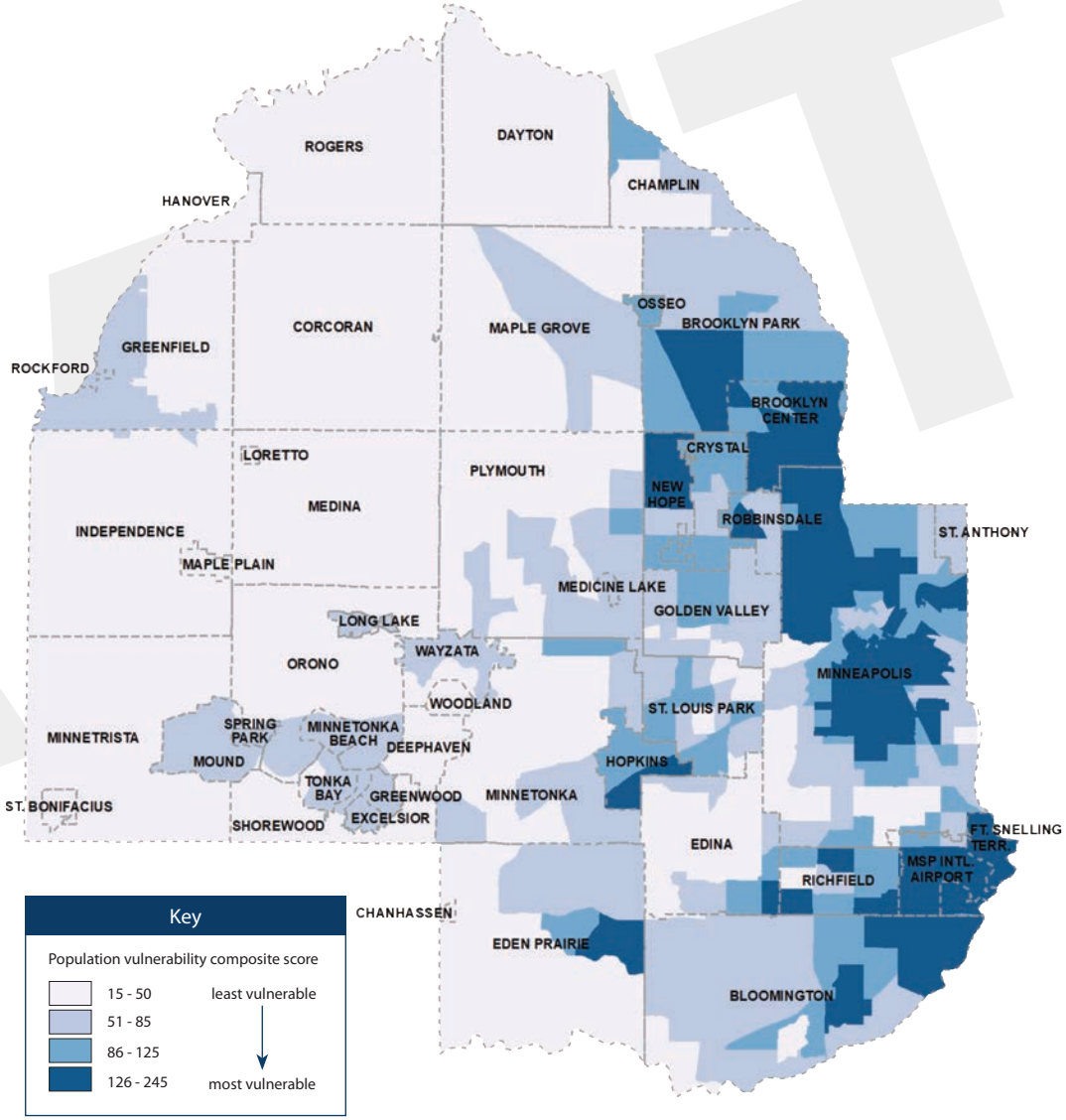
Goal: Protect and engage people, especially vulnerable communities

This map will be used to inform decision-making and help staff determine where to prioritize work to reduce specific vulnerabilities. This dataset can be used as a base layer to which additional program-specific datasets can be overlaid to provide a climate lens on decision-making. This will build on the county's use of a race equity impact tool to create a more robust picture about the impact of a policy, program, or budget decision. Using these tools can help staff and others consider how people of color and other people who are more susceptible to negative climate impacts may benefit or be burdened by those decisions.

Variables included:

- Asthma hospitalization rates
- COPD hospitalization rates
- Households with no vehicle
- Limited English language proficiency
- Median household income
- No high school degree
- People of color
- Population age 5 and under
- Populations below 185% poverty threshold
- Population density
- Population age 65 and older
- Population with any disability
- Renter housing units
- Unemployment rates

Figure 5: Human vulnerability index



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Goal: Protect and engage people, especially vulnerable communities

Objective: The county's response to climate change prioritizes the protection of the most vulnerable residents and advances equitable health outcomes

Strategy: Better understand and plan for the health needs of our diverse communities

- Improve collection of data and monitor the health impacts of climate change, including increased respiratory and cardiovascular disease burdens and particularly the impact on racial disparities.
- Strengthen sustainable access to affordable housing, healthcare, food, and transportation and other social determinates of health for residents.
- Create relationships with the communities in ways that strengthen engagement and build trust.
- Develop and include a climate analysis framework with a health and racial equity lens in budgets and planning work.
- Conduct outreach to vulnerable communities using customized and culturally appropriate approaches to meet diverse communities' needs.

Strategy: Mitigate disproportionate impacts associated with climate change

- Mitigate the heat island effect, especially in areas with people most vulnerable to extreme heat, by supporting increased access to air conditioning, increasing the tree canopy, and converting hardscape where possible to green infrastructure.
- Address flooding in housing, especially where people most vulnerable to flooding impacts live, by promoting and providing financial support for preventative measures such as sump-pumps and landscaping to redirect water away from structures.
- Build awareness of expanding flood zones among at-risk residents and businesses and the potential availability of optional flood insurance. Explore options for possible subsidized flood insurance based on financial need.
- Reduce air pollution associated with transportation, especially in areas with vulnerable populations.
- Reduce the health impacts associated with pollution from the production, packaging, use, and disposal of materials by supporting waste prevention, reuse, recycling, toxicity reduction, and proper management of hazardous waste.

"Climate change is intersectional. Climate change burdens are racial/class discrimination burdens. It is all connected. Make space and time for those most impacted, along with experts. Talk to everyday people from all walks of life."

– Resident comment

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Racism as a public health crisis

The reality is that persistent disparities separate people who are not thriving in Hennepin County from those who are.

Although everyone will be impacted by the climate crisis, it will not be experienced equally. Like other environmental justice issues, those who least contribute to the problem of climate change will be most impacted. In this climate action plan, the county recognizes our obligation to work toward eliminating disparities in our response to climate change.

In June 2020, the Hennepin County Board passed a resolution declaring racism as a public health crisis that affects the entire county. This declaration supports the county's foundational work to develop strategies that mitigate personal bias and prejudice in the community, create systems that build equity, and create a future where all residents are healthy and successful and all communities thrive.

In Hennepin County, inequities in education, employment, health, housing, income, justice, and transportation are starkest between residents of color and their white counterparts. Acknowledging that this is both true and unacceptable is just the beginning. When we start our work from this shared perspective and shift our guiding lens to one that is focused and committed to addressing these disparities, we can see the places, partnerships, programs, and services where we have a responsibility to act. Hennepin County will support local, state, regional, and federal initiatives that advance efforts to dismantle systemic racism, will seek partnerships with local organizations that have a legacy and track record of confronting racism, and will promote community efforts to amplify issues of racism to engage actively and authentically with communities of color wherever they live.

– Excerpt from County's Administration's response to the board resolution declaring racism as a public health crisis

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Inequitable climate impacts that affect health and well-being

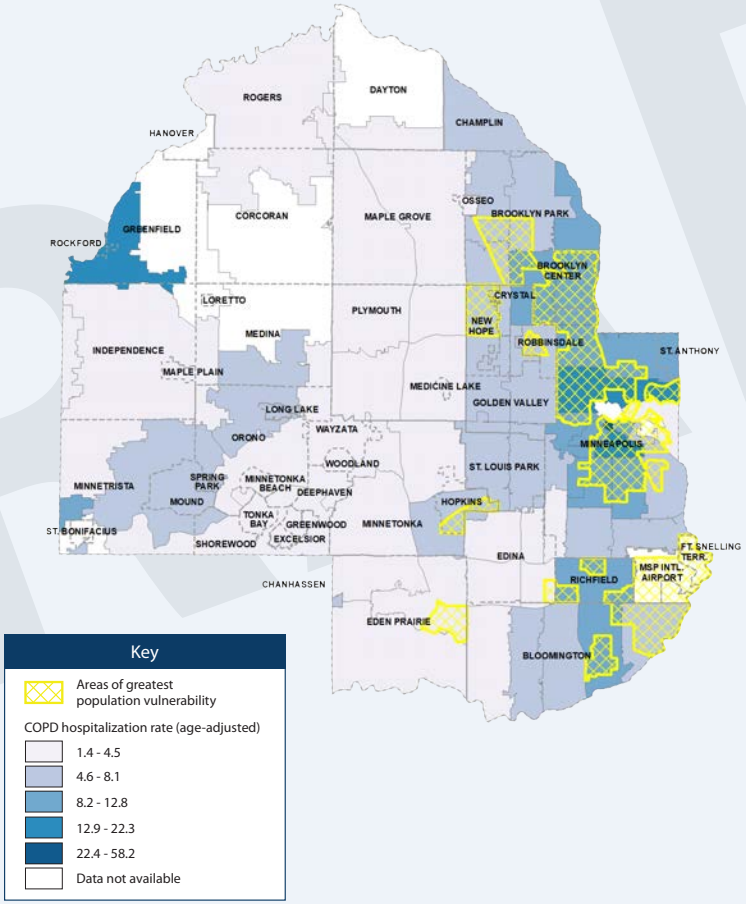
Air quality

Increased heat and precipitation associated with climate change is already causing adverse impacts on air quality that exacerbate many underlying health conditions by increasing stress on the body.

For example, rising humidity levels in combination with more frequent flood events from increased precipitation encourages greater mold and bacterial growth in buildings. In addition, rising temperatures and the lengthening of the growing season will expand the allergy season, disproportionately impacting residents with asthma and/or chronic obstructive pulmonary disease (COPD).

The following map (Figure 7) shows a significant association of COPD hospitalizations with the populations most vulnerable to climate change impacts. Public health experts use COPD hospitalizations rather than asthma hospitalizations because they more closely correlate with poor air quality.

Figure 7: COPD hospitalization rates



Health impacts of air pollution

Understanding the relationship between exposure to pollutants and disease is difficult because people move in and out of neighborhoods - they live, work, and are active in many settings. Some people are exposed to more air pollution than others because of where they live or work, and some people are more affected by it. For example, people with pre-existing heart and lung conditions are at greater risk, and so are the elderly and children. People of color, indigenous people, and people with low incomes face social, economic, and health inequities that often contribute to increased frequency of health conditions that can be affected by air pollution. These inequities mean that communities of color, indigenous communities, and lower-income communities tend to be more vulnerable to the effects of air pollution.[4]

[4] The air we breathe. The state of Minnesota's air quality 2019 https://www.pca.state.mn.us/sites/default/files/lraq-1sy19.pdf

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Goal: Protect and engage people, especially vulnerable communities

Sources of greenhouse gas emissions and air pollution

Two-thirds of Hennepin County's greenhouse gas emissions come from the electricity and natural gas used to power industrial, commercial and residential buildings. Most of the remaining one-third comes from transportation emissions. The rest comes from the smaller, "neighborhood" sources such as backyard fires, auto-body shops, and dry cleaners.

Pollution from these emissions sources is higher in the parts of Hennepin County where our residents who are most vulnerable to climate change live because of the higher density of emissions sources. For example, with the exception of ground-level ozone, transportation-related air pollution is higher in the more urban areas of the county where the road network is densest and traffic is highest. This coincides with where many of the county's most vulnerable residents live.

Climate change impacts on air quality

While Hennepin County's air quality is generally good in terms of meeting federal air quality standards, projected climate trends will result in decreased air quality.

The Minnesota Pollution Control Agency maintains an Air Quality Index that categorizes air quality on a daily basis on a scale ranging from good to very unhealthy. Air quality has improved in recent years due to the increasing transition from coal-fired to natural-gas-fueled power plants, the expansion of solar- and wind-powered energy, more transit choices, and increased vehicle fuel economy standards.

However, unless significant mitigation efforts are undertaken, climate change will cause certain types of air pollution, such as particulates and ground-level ozone, to increase. This will potentially have significant consequences for our vulnerable residents.

One impact of climate change that Minnesota has not yet experienced is increased periods of drought, which is already occurring in other parts of the U.S. Droughts lead to the increased occurrence of wildfires, and smoke from these wildfires, especially those in western states and Canada, can adversely impact air quality in Hennepin County. During the summer of 2018, seven of the nine unhealthy air quality days in the metro area were the result of smoke from distant wildfires. Based on current projections, we can expect the number of unhealthy air quality days caused by distant wildfires to increase. In addition, if projections of periods of localized drought prove correct, nearby wildfires will also impact air quality.

Unhealthy air quality caused by Canadian wildfires. Photo: Minnesota Pollution Control Agency, 2015

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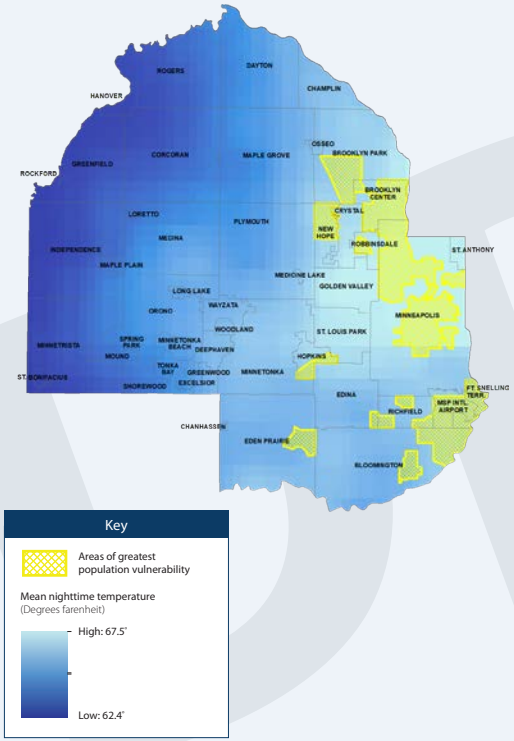
Goal: Protect and engage people, especially vulnerable communities

Extreme heat

Increased temperatures combined with increased humidity will disproportionately affect residents with underlying health conditions, especially those with limited means to adapt.

Figure 6: Heat Island – August Nighttime



Urban heat islands and vulnerable communities

Many urban areas have more concrete and other impermeable surfaces that radiate heat along with less tree canopy and greenspace to mitigate the heat. This creates urban heat islands where the temperature measured can be significantly higher than the official reported temperature. The continued rise of temperatures due to climate change is likely worsening this heat island effect.

Occurrences of daytime extreme heat are projected to increase by 2050. While a couple of degrees may not seem significant, increased temperatures combined with increased humidity will disproportionately affect residents with underlying health conditions, especially those with limited means to adapt.

Areas with those most vulnerable to the effects of extreme temperatures and the urban heat island are show in the map (Figure 6). The map was developed using average August nighttime mean temperatures from August 2011 to August 2014, which was derived from a study by the University of Minnesota[5], overlain with the areas of greatest population vulnerability. Nighttime temperatures are an important factor because our bodies are evolved to cool down at night. The inability for the body to cool off, especially at night, exacerbates physical and mental health stressors.

These data show that the urban heat island effect is stronger at night in the summer and during the day in the winter. Temperatures in the urban Twin Cities core averaged 2 degrees F higher than surrounding areas and spiked to as much as 9 degrees F higher than surrounding areas during a heat wave.

Additionally, a separate analysis by the University of Minnesota[6] showed that the areas most impacted by the urban heat island effect align with areas where people who have historically faced housing discrimination live. More information about this analysis can be found online in the county's climate vulnerability assessment.

Access to cooling centers and other means to cool down

Many cooling centers are not open overnight or are not reasonably available to those in need. In addition, the COVID-19 pandemic has complicated the use of cooling centers, which results in very few cooling centers available in areas where the most vulnerable residents live.

Once again, the capacity to respond to increasing temperatures determines whether heat is an inconvenience, a manageable problem, or a catastrophic event. For many residents, higher temperatures may translate only to higher utility bills resulting from increased use of air conditioning, but some residents may not have air conditioners or the ability to pay to run them and are more likely to have underlying health conditions that make lack of access to air conditioning a bigger problem.

[5] Smoliak, Brian. Dense Network Observations of the Twin Cities Canopy-Layer Urban Heat Island. JOURNAL OF APPLIED METEOROLOGY AND CLIMATOLOGY. Pgs 1899-1917. September, 2015.

[6] University of Minnesota CREATE Lab, Islands in the Sky: Urban Heat Island and Redlining presentation, 2020.

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Engaging the public

Climate change affects all parts of the county and all residents, businesses, and organizations. Transformative climate policies must be driven and supported by the public. To advance an impactful climate change response, we need to engage residents, listen to how climate change is impacting them, and collectively build support for solutions. Defining and articulating our collective vision for a climate-friendly future is critical to motivate collective action.

Objective: Residents, businesses, and organizations pursue individual actions and support collective actions that drive systems change

Strategy: Educate and engage the public in taking collective action

- Engage a broad range of stakeholders in understanding the impacts and developing solutions.
- Define and communicate the county's vision for a climate-friendly future, and work with residents and communities to articulate our collective vision for a climate-friendly future.
- Understand our residents' attitudes, barriers, and motivation toward taking action to address climate change and identify what different priority audiences need to take action.
- Develop effective programs, messages, and outreach efforts to support collective action.

2015 Naturefest event, hosted by Hennepin County, with Earle Brown Elementary at Mississippi Gateway Regional Park in Brooklyn Park.

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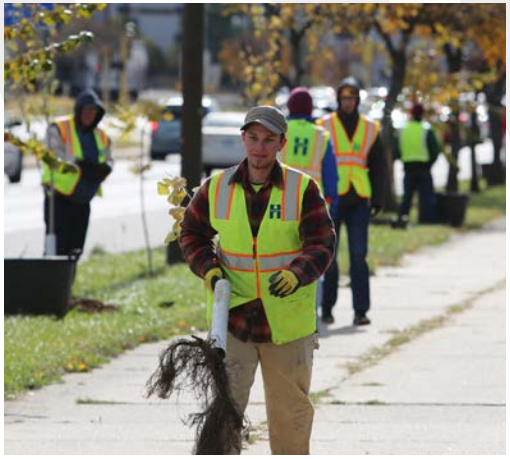
Green jobs

Several Hennepin County departments manage land and property for different purposes. New green infrastructure will help respond to projected changes in precipitation. Installing, establishing, and maintaining this infrastructure creates an opportunity to train a new green workforce and define new contract standards. Hennepin County has developed several training models to achieve other county priorities. The right workforce model will help multiple departments manage projected precipitation and achieve broader county goals to reduce disparities in employment and income.



Objective: County climate investments support broader county goals to reduce disparities in employment and grow the economy

Strategy: Maximize green economic recovery and workforce development opportunities

- Explore a green jobs/pathways program concept for installation, establishment, and maintenance of green infrastructure.
- Engage with youth, especially in areas of greatest vulnerability, to increase awareness of climate change and mitigation strategies, highlight careers in the environmental field, and create a community-based network of environmental stewards.
- Support new job opportunities in energy efficiency, renewable energy, and green infrastructure.

Target metrics

- Include climate considerations in the development of the 2022 budget.
- Determine which data to collect and begin monitoring for the health and environmental impacts of climate change by 2022.
- Develop options for a coordinated green jobs/pathways program by 2022 to support county departments as they install and maintain green infrastructure.

Snapshot from youth listening session

What kinds of green jobs are most interesting to you?

Youth suggested providing green job training in schools. They expressed interest in jobs such as:

- Building solar panels and working in the renewable energy sector
- Planting urban gardens and supporting urban agriculture
- Construction jobs for energy efficiency and extreme weather resiliency
- Conducting outreach to schools
- Environmental consultant to companies
- Transit driver

Community engagement included a listening session held with high-school aged youth involved with community group partners.

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Goal: Enhance public safety

The county's emergency management work includes preparing for, mitigating against, responding to, and recovering from disasters to ensure public safety and health. Hennepin County Emergency Management coordinates the countywide emergency management program, maintains public and private disaster resources in the county, and works to ensure that emergency officials, government, private industry, and volunteer organizations take a unified approach to preparing for and responding to emergencies. Within this framework, Public Health Emergency Preparedness coordinates the portion of preparedness, response and recovery activities aimed at protecting the health of residents and staff.

The risk assessment process measures the vulnerabilities of communities, including loss of life, personal injury, property damage, and economic injury, resulting from hazard events. Hazards are triggered by natural processes, unintentional human causes, or intentional human threats. These triggers may also interact with each other to produce cascading impacts.

Detailed local hazard assessment information provides the framework to develop and prioritize mitigation strategies and plans to help reduce both the risk and vulnerability from future hazard events.

Reducing long-term risk

The most cost-effective disaster measures are mitigation actions that reduce or eliminate long-term risk to people and property from hazards. For every dollar invested in disaster mitigation, six dollars are saved in disaster response and recovery costs.[7]

Some of the climate-related hazards in the Hennepin County Hazard Mitigation Plan include extreme heat and cold, thunderstorms, extreme straight line winds (aka, "derecho"), tornadoes, winter storms, fires, flooding, power outages, infectious disease outbreaks, and geologic hazards, such as landslides or sinkholes. Mitigation efforts undertaken by communities will help to minimize loss of life, personal injury, and damages to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural, and historic resources.

Surveying the damage from an EF-1 tornado in Minnetrista, 2019.

[7] National Institute of Building Sciences, "Natural Hazard Mitigation Saves", 2017

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Impacts of flooding due to heavier rainfall

Risks posed by heavier rainfall events

Hennepin County is experiencing a significant increase in the number of 2-, 3- and even 4-inch rainfall events. More frequent, heavy rainfall events means more flooding. Increased flooding events can put vulnerable residents at risk, endanger lives, destroy property and belongings, disrupt vital services, and hinder the ability of emergency response vehicles to respond to calls.

Varying ability to respond and recover

The ability of property owners and residents to respond and recover from flood impacts varies greatly. For some residents and businesses, flooding may be an inconvenience or a manageable problem. For others, such as a small business or a low-income family, flooding is potentially catastrophic. Beyond property damage, flooding also can lead to mold-related health impacts, waterborne diseases, and stress.

The increased need for flood insurance and protection

Until recently, those getting flood insurance were mostly property owners and residents in floodplains designated by the Federal Emergency Management Agency (FEMA). This led many people to believe that unless they were mandated to carry flood insurance, they were not at risk. But recently with the increasing frequency and intensity of heavy rainfall, nearly one-quarter of flood damage and one-third of flood recovery costs occur outside of the FEMA-designated floodplains, making it clear that wherever it can rain, it can also flood. This has led to an effort to increase flood insurance awareness and coverage in more areas.

Hum's Liquors at the corner of 22nd & Lyndale flooded on July 16, 2019. Photo by Jason Grote

Goal: Enhance public safety

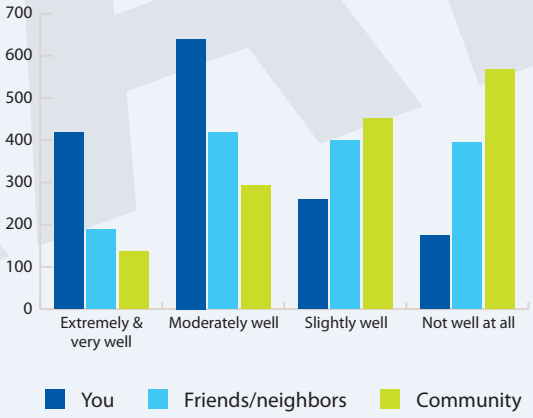
Objective: Hennepin County assesses, prepares for, and mitigates risks from hazard events

Strategy: Improve preparation for and response to extreme weather events, flooding, and other climate disasters

- Increase the density of the county's network of automated weather and environmental monitoring stations (also known as the Hennepin West Mesonet) for improved warning and response decisions and increased ability to precisely target weather-related notifications.
- Identify areas at risk for all types of flooding, including flowing surface water (fluvial), standing surface water (pluvial) and subsurface water (groundwater) and coordinate with public entity partners to create strategies for reducing risk, especially for vulnerable populations.
- Inform development by increasing risk awareness of areas of surface and groundwater flooding, landslides, and sinkholes. Work with cities to include these risks as part of their review of new development proposals.
- Work with residents and businesses to build awareness of flood risks outside of FEMA-designated flood zones.
- Review emergency management preparedness plans to identify and address significant vulnerabilities in ensuring access to food, drinking water, energy supply and other living essentials during emergencies, particularly those anticipated to be exacerbated by climate change.
- Help create an more resilient energy infrastructure by establishing a mix of renewable energy and energy storage that together can withstand significant environment extremes to reduce the potential for blackouts, power outages, price spikes and public health risks.
- Regularly review continuity of operations plans to ensure delivery of core services and recovery after a disaster.
- Increase and maintain the supplies and equipment in the Hennepin Disaster Cache and elsewhere for emergency response to flooding and other increasing climate-related disasters.
- Improve natural disaster plans to include sustainable waste management practices to deal with the debris resulting from climate disasters.

Snapshot from resident survey

Preparedness to respond to climate change



Most respondents think they are prepared to deal with and adapt to climate change. Two-thirds of respondents describe themselves as being extremely, very, or moderately well prepared. Only 10% noted they were not well prepared, and another 10% responded they didn't know. The perspective shifted when asked to assess how well prepared their friends and neighbors are, with only about 40% of respondents describing their friends and neighbors as being extremely, very, or moderately well prepared. Nearly 30% think their friends and neighbors are not well prepared. Perception of preparedness is even lower when respondents consider their community. Nearly 40% think their community is not well prepared to respond to climate change impacts.

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Goal: Enhance public safety

Objective: Residents, businesses, and organizations understand and are prepared to respond to the impacts of climate change

Strategy: Reduce risks to vulnerable people from extreme heat or cold

- Clearly communicate climate risks and vulnerabilities and raise awareness about programs and services available to decrease risks and address vulnerabilities.
- Coordinate operations of readily accessible and culturally appropriate cooling and heating options and communicate the availability of these centers to vulnerable people.
- Advocate for expanding utility disconnect protections to include air conditioning and modifying building codes to require efficient air conditioning.

Target metrics

- Increase the county's network of automated weather and environmental monitoring stations (Hennepin West Mesonet) in areas most vulnerable to heat and flooding by 2022.
- Develop a mapping tool to comprehensively identify the sites most at risk for flooding of all types (fluvial, pluvial, and groundwater) to guide effective mitigation and response actions by 2022.
- Identify the structures and properties most at risk for flood damage in Hennepin County and develop partnerships that will help reduce or eliminate flood damages and disruption by 2025.

Goal: Increase the resilience of the built environment and protect natural resources

Climate adaptation is about developing and implementing strategies to help human and natural systems cope with and become more resilient to the impacts of climate change. The county needs to plan for and respond to increased pressure on natural resources and the built environment, including building sites, roads, and other infrastructure, from impacts such as increased rainfall, extreme weather, and freeze/thaw cycles. There are also many opportunities to use green and natural infrastructure to manage stormwater, improve water quality, decrease the urban heat island, and sequester carbon. Protecting and enhancing our natural areas will provide habitat for native plants and wildlife, increase wellbeing, and make our communities more resilient.

Buildings and transportation infrastructure

Stormwater design standards

Hennepin County uses the national standard, Atlas-14 precipitation estimates,[8] to build resilient infrastructure. The dataset analyzes the historical frequency of heavy rainfall events through 2011. Transportation infrastructure is currently designed to handle a broad range of impacts based on historic climate records and familiar seasonal variations. Preparing for climate change and extreme weather events using projections of increased precipitation and heavier rainfall events is critical to protecting the integrity of the transportation system and the sound investment of taxpayer dollars.

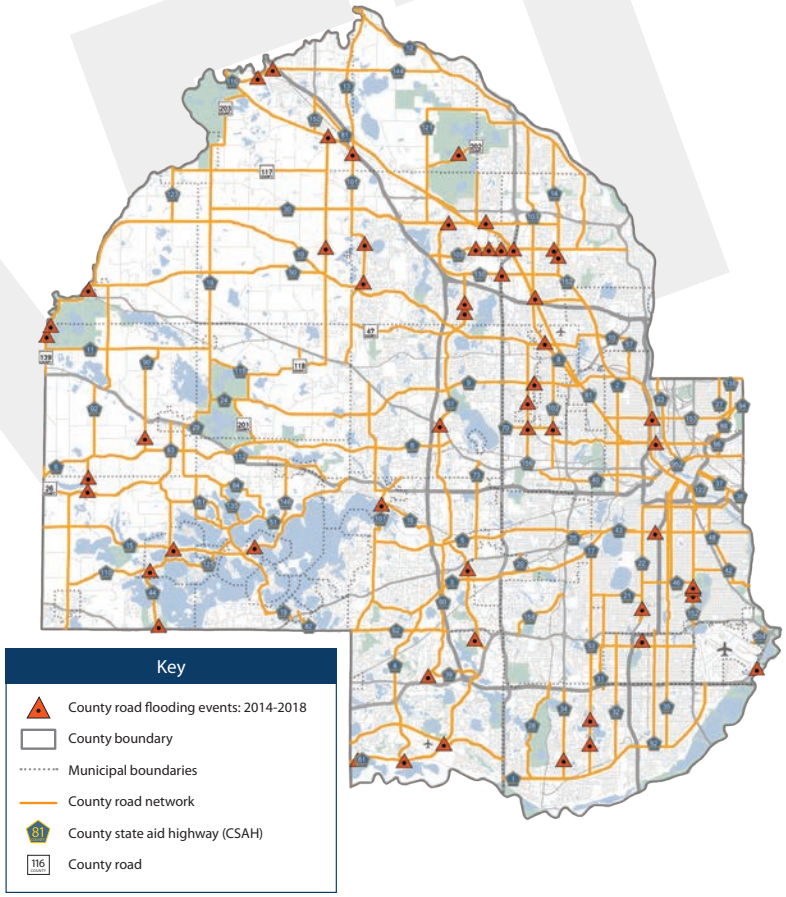
While most county roads are kept passable with a stormwater pipe, these pipes were designed to old precipitation projections and may not adequately keep roads passable given mid-century precipitation projections. This map (Figure 8) depicts the locations where county roads were temporarily impassable due to flooding from 2014 to 2018.

The county is working to identify ways to estimate changes to projected rainfall, relative to current Atlas-14 estimates, to better understand how planning needs must change to ensure county transportation infrastructure is prepared to handle mid-century conditions.

Freeze/thaw cycles

Minnesota is experiencing warmer winters and an increase in freeze/thaw events, which negatively impact pavement systems. Generally speaking, more freeze/thaw cycles will accelerate infrastructure deterioration, especially for older pavements that are distressed and have cracks in the surface and places where water will impact buildings, facades, sidewalks, and plazas.

Figure 8: County roads locations temporarily impassable due to flooding (2014-2018)



[8] National Oceanic and Atmospheric Administration, Precipitation-Frequency Atlas of the U.S. Volume 8 https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf

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Goal: Increase the resilience of the built environment and protect natural resources

Objective: Climate risks and impacts to county buildings and infrastructure are assessed and mitigated

Strategy: Reassess policies, design standards, and maintenance practices for county buildings and infrastructure projects

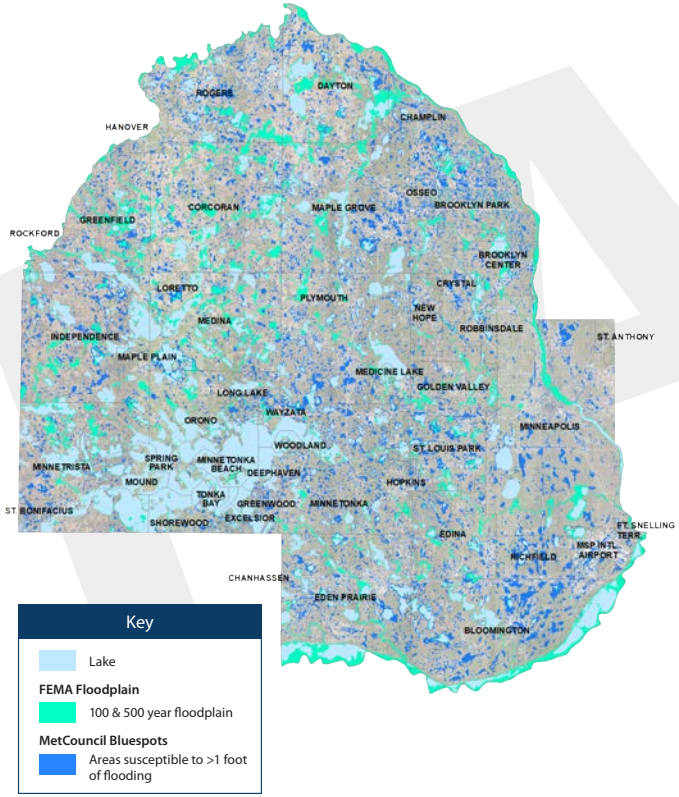
- Update stormwater design standards that will serve as a standard across Hennepin County lines of business to account for increased rainfall intensities.
- Modify pavement and sidewalk design standards to accommodate projected changes to freeze/thaw cycles.
- Change snow and ice removal practices to account for increased precipitation intensity and increased icing due to increased freeze/thaw cycles, reduce total salt use on county property, and accommodate more multi-modal transportation options on county roads.
- Alter site development performance standards and design guidelines for rights-of-way and other county properties to reduce impervious surfaces and prioritize green infrastructure, such as trees, boulevard landscaping, tree trenches, and detention tactics. Adjust county policy to address long-term maintenance needs of green infrastructure assets.
- Design capital projects to projected mid-century rain events and incorporate landslide hazard reduction approaches, where applicable.
- Incentivize projects that are designed to control projected mid-century rainfall events in the cost participation policy for contribution to regional flood reduction projects.

Increased stormwater and localized flooding

Surface water impacts are determined by how much and how quickly precipitation falls and by the ability of soils to infiltrate water or the capability of stormwater conveyance systems to drain it away.

This map (Figure 9) depicts the location of 100-year and 500-year floodplains as mapped by FEMA. A 100-year flood is more accurately defined as a flood that has a 1% probability of occurring in any one year. Due to increasing precipitation, the 500-year floodplain is rapidly becoming the new 100-year floodplain. While many FEMA maps take into account storm sewer capacity and soil types, the mapping doesn't present a full picture because it doesn't consider localized flooding. The Minnesota Department of Natural Resources is working to update these maps locally.

Figure 9: Areas susceptible to flooding



The locations on the map in dark blue are identified by the Met Council as susceptible to localized flash flooding from high-intensity rainfall based on topography. In other words, these are low spots. This analysis was conducted, in part, to examine risks from localized flooding that FEMA mapping doesn't consider. This Met Council "Blue Spot" data does not consider the varying capacity of these locations to drain, either by the existence of stormwater drains or soil infiltration. However, most stormwater conveyance systems were designed based on outdated precipitation models.

Increased precipitation also increases groundwater recharge, which in many cases results in a rise in local water tables. This can create groundwater flooding, which is already occurring in several locations in Hennepin County. The increased flooding poses risks to numerous properties, many of which may not have flood insurance because they are located outside of the mapped 100-year floodplain. While the acute risks posed by surface flooding from heavy rains are potentially covered, the longer-term impacts of increased precipitation such as rising water table levels and the expansion of wetlands and shorelines can jeopardize local infrastructure, private wells and sewage treatment systems, cause flooded basements, and create water-quality impacts.

Goal: Increase the resilience of the built environment and protect natural resources

Objective: Risks and impacts from increased precipitation, flooding, and landslides are reduced

Strategy: Reassess policies and practices to manage increased stormwater volumes

- Design capital projects to manage flows from mid-century forecasted rainfalls.
- Incorporate Green Streets stormwater management strategies into the county's Complete Streets policy.
- Protect and restore streams, wetlands, floodplains, and uplands.
- Reduce impervious surfaces, use green infrastructure, reuse stormwater for irrigation, and design landscapes that don't require irrigation.
- Reduce barriers to regional stormwater management by investing in partnerships, empowering staff to work beyond property line boundaries, and creating a policy for financial contributions to such projects.
- Preserve open space and agricultural lands and promote stormwater best management practices to landowners.

Strategy: Manage the increased risk of landslides due to increased rainfall

- Conduct further analysis to determine areas of risk, rank them in terms of severity, and develop solutions.

Localized urban street flooding, 2013

Strategy: Coordinate regional stormwater resiliency efforts with public entity partners

- Align land use, zoning, ordinances, and permitting activities with the realities of climate vulnerabilities and risks.
- Dedicate land at time of plat for climate change mitigation and stormwater facilities.
- Consider managed retreat in areas most vulnerable to flash flooding, such as finding opportunities with Hennepin County's tax-forfeited land portfolio, city economic development authorities, and local watersheds.
- Build stormwater facilities within county rights-of-way as part of capital improvement projects in opportunistic ways that share costs while achieving county, city, and watershed management goals.
- Protect drinking water by assessing vulnerability of wellhead protection areas and private wells to increased precipitation and flooding.
- Develop a groundwater plan that considers the impacts of climate change, including extreme weather events and wet/dry cycles, on groundwater resources, surface-level groundwater hazards, and drinking water availability.

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Green infrastructure and resilience in the built environment

The county offers incentives for sustainable building practices and green infrastructure that can be leveraged to increase resiliency in the built environment. Green infrastructure refers to ecological systems, both natural and engineered, that act as living infrastructure. Examples include rain gardens, bio-swales, trees, and green roofs. These systems restore some of the natural processes required to manage water and create healthier urban environments. Building and maintaining green infrastructure to manage stormwater in flood-prone areas, especially on county-owned property, can protect surrounding properties, create green spaces, and make the community more resilient to climate change.

Through the Transit Oriented Development (TOD) financial assistance program, the county has provided $40 million in assistance to create walkable, mixed-use, human-centered communities established around high-quality transit service. These TOD projects are compact and typically include reduced or shared parking, increased density that emphasizes public spaces, and enhanced pedestrian and bicycle amenities. Some of the projects incorporate sustainable design and stormwater management features. The county's Environmental Response Fund, which provides grants for the assessment and cleanup of contaminated sites, helps to remove barriers to green infrastructure and has scoring criteria that encourages developers to incorporate sustainable development. In addition, the county's Natural Resources Grants have funded 80 projects that include neighborhood rain garden programs, water reuse projects, habitat restoration, and regional stormwater facilities.

The county's forestry program was created in 2015 as the county took on an expanded role in natural resources conservation. The forestry program focuses on protecting the county's tree canopy to increase the benefits that trees provide. Trees improve air quality by absorbing fine particulate matter and other pollutants and protect water by slowing down and infiltrating stormwater runoff. They also provide shade, reduce the urban heat island effect, lower stress, and increase property values. The county's forestry program includes growing healthy trees, partnering in large-scale planting events, managing threats to the tree canopy, raising awareness about tree pests and disease, educating the public on the benefits of trees, providing forestry workforce development opportunities, and supporting partners through the Healthy Tree Canopy Grants program.

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Goal: Increase the resilience of the built environment and protect natural resources

Objective: The county employs green and natural infrastructure, including trees, plants, and soil, to increase resiliency of the built environment, especially in areas at higher risks for localized flooding and extreme heat

Strategy: Reassess policies and practices to ensure capacity to design, implement, and maintain green infrastructure

- Expand the use of sustainable landscapes to increase the resilience of county properties by managing stormwater onsite, reducing the impact of the urban heat island, and sequestering carbon by incorporating Minnesota's sustainable building guidelines (B3) site and water guidelines for building projects.
- Minimize hardscape in project designs and convert existing hardscape, where practical, into pervious pavement or green infrastructure.
- Assure long-term financial support to maintain green infrastructure and create green jobs.
- Include green infrastructure in site development performance standards for county projects.
- Reduce the volume of and pollutant load in stormwater runoff through increased implementation of stormwater best management practices on current county building sites and rights-of-way.

Target Field Station includes a variety of features, including these cisterns and bio swale that capture and filter approximately three million gallons of rainwater and snow annually.

Strategy: Use county investments to increase resilience in the built environment

- Advocate for and incentivize the incorporation of green infrastructure into building renovation and site development plans on private property through transit-oriented development, Environmental Response Fund, Natural Resources Grants, and other incentive programs.
- Assess all excess and tax-forfeited property for higher public uses, such as water infiltration basins or tree plantings, before considering for sale.

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Goal: Increase the resilience of the built environment and protect natural resources

Strategy: Plant, diversify, and maintain trees throughout Hennepin County and increase the resiliency of the county's community forest

- Achieve a goal of no net loss of trees on Hennepin County property by planting more trees, replacing trees, addressing barriers associated with maintenance, and protecting mature trees.
- Create and implement tree planting plans to expand the urban forest canopy using the tree planting prioritization map to determine greatest needs and focus on increasing tree species diversity to include bird-friendly native species as well as species that are now hardy in Hennepin County.
- Partner with cities and other organizations on tree plantings and provide grants to cities and organizations for tree inventories, tree plantings and maintenance, and forestry education
- Educate the public about tree benefits and threats, engage volunteers and youth through tree plantings and tree care education, and support the planting of trees on private property.

Maple-basswood forest restoration on a conservation easement in Independence.

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Goal: Increase the resilience of the built environment and protect natural resources

Natural areas and agricultural lands

Hennepin County has an abundance of natural areas and diverse landscapes that provide critical habitat for wildlife, protect water quality, offer recreational opportunities, and serve as the foundation for the region's environmental well-being, economic prosperity, and collective quality of life. Climate change will further disrupt our ecosystems, which are already impacted by invasive species, population growth, and development. Healthy ecosystems play a vital role not only in the health of plants and animals, but of people, too.

As the Soil and Water Conservation District for Hennepin County, the county is responsible for providing technical and financial assistance to landowners to help manage natural resources, protect soil, preserve habitats, and improve water quality. The county also enforces wetland regulations, establishes conservation easements, protects natural areas, maintains natural resources data, and provides technical assistance to local governments.

Native wildlife and plants are extremely sensitive to climate change impacts. Warming lakes, rivers, streams, and wetlands and an increase in algae blooms impact fish habitat and recreation. Our tree canopy already faces many threats from pests, such as the invasive emerald ash borer, and climate change will only worsen those pressures by enabling more pests to survive. A warming climate is also changing the types of plants and trees that can thrive in our area, with northern species struggling while new species adapted to warmer climates start to take their place.

Woodpecker activity on an ash tree infected with emerald ash borer

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Goal: Increase the resilience of the built environment and protect natural resources

Increasing groundwater levels pose threats to water quality as our climate trends wetter. Groundwater is not far from the surface in most of Hennepin County. Although a comprehensive evaluation of groundwater flow through shallow soils in Hennepin County has not been conducted, increased precipitation over the last decade has already affected groundwater levels across the county. As groundwater levels rise, there is a risk that contaminants in shallow soils may be mobilized in ways that are not yet fully understood. Rising groundwater levels may pose a risk to local water quality when it intersects with septic systems, petroleum tanks, areas of historic contamination, plumes, and vapors, which are all regulated by federal, state, county, and municipal offices. Protecting local water quality in partnership across jurisdictions is crucial to increased climate resilience.

The trend toward a wetter climate has already added uncertainty and increased the challenge of producing food in a rapidly developing county. Working with residents to preserve open space and improve agricultural practices represent some of the best opportunities to sequester carbon, manage increased precipitation, connect habitats, and improve access to nutritious, locally produced food. However, the added business risks that climate change poses to farmers will make it increasingly challenging to realize those benefits, and the incentives to develop open space will only increase. Without efforts focused on preserving agricultural land, the vibrant local and regional economy that agricultural activity supports will shift westward out of Hennepin County.

Changes in temperature and precipitation patterns will also disrupt the delicate balance of ecosystems and the species that depend on each other. Shifts in food availability, migration timing, and breeding seasons will impact survivability for many species. For example, a bird species may start to arrive earlier in the spring because the temperatures are already warm enough, but they may not have enough food to sustain themselves because the plants they rely on start growing in response to the amount of sunlight available, which is not changing.

Preserving the agricultural character of western Hennepin County's open space and working to improve land management practices is one of the best ways to support local food production, protect wildlife corridors, restore habitat, and work to improve regional water quality.

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Goal: Increase the resilience of the built environment and protect natural resources

Objective: Natural areas and open spaces are functional and diverse

Strategy: Plan for and mitigate anticipated ecosystem and open space impacts

- Monitor for both aquatic and terrestrial invasive species by using early detection methods, such as community scientists, and implementing invasive species control programs that include rapid response protocols and employ integrated pest management on public and private property.
- Protect, restore, and connect natural areas, including streams, wetlands, floodplains, prairies, savannas, and forests, with a focus on supporting biodiversity and providing habitat for species that alter their range in response to climate change.
- Continue efforts to preserve natural areas through conservation easements.
- Create pathways for residents and partners to preserve natural areas and other open spaces and adjust land management practices to provide ecosystem services crucial to climate adaptation, including
  - Wetland restorations that can help manage stormwater and mitigate flooding.
  - Erosion-control best management practices that can protect water quality even as precipitation increases.
  - Growing practices that support the local food system.
  - Habitat protection and restoration in areas that are crucial for wildlife movement.

Wetland and tallgrass prairie restoration on a conservation easement in Independence

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Goal: Increase the resilience of the built environment and protect natural resources

- Develop an Integrated Water Management Plan that considers findings from the groundwater plan, including vulnerabilities and/or areas of concern, with already established surface watershed management plans and land use management practices to develop a framework that protects vital aquatic ecosystems and source waters.
- Create and preserve affordable agricultural space for every scale of local food production – from conventional commodity agriculture to urban farming – and work with partners to encourage the development of farm-to-table efforts, focusing especially on increasing access to these programs in low-income communities.
- Promote best management practices on agricultural land with a focus on practices that create healthier soils with increased carbon storage and water holding capacity of soils while maintaining or improving long-term crop yields.
- Conduct education and outreach that helps current and future agricultural producers and their partners understand both the need for and financial benefit of building climate change resiliency into their farming operations and the agricultural economy.
- Work with other public agencies to address threats from climate change impacts to water quality more broadly to clearly understand the risks related to increased precipitation and changing surface-level groundwater flows and ensure that responses in one location do not exacerbate water quality degradation downstream.

Target metrics

- Develop stormwater design standards for mid-century precipitation projections and develop policies and practices for green infrastructure to manage precipitation projections by 2023.
- Evaluate all existing building sites to maximize water retention considering projected mid-century rain event volumes by 2050.
- For new buildings, exceed runoff rates using projected mid-century rain event volumes instead of current Atlas 14 volumes, where feasible.
- Plant 1 million trees by 2030 through partnerships with cities, Three Rivers Park District, and other community partners.
- Acquire 6,000 additional acres of conservation easements by 2040.
- Develop a groundwater plan by 2025 and an integrated water management plan by 2026.

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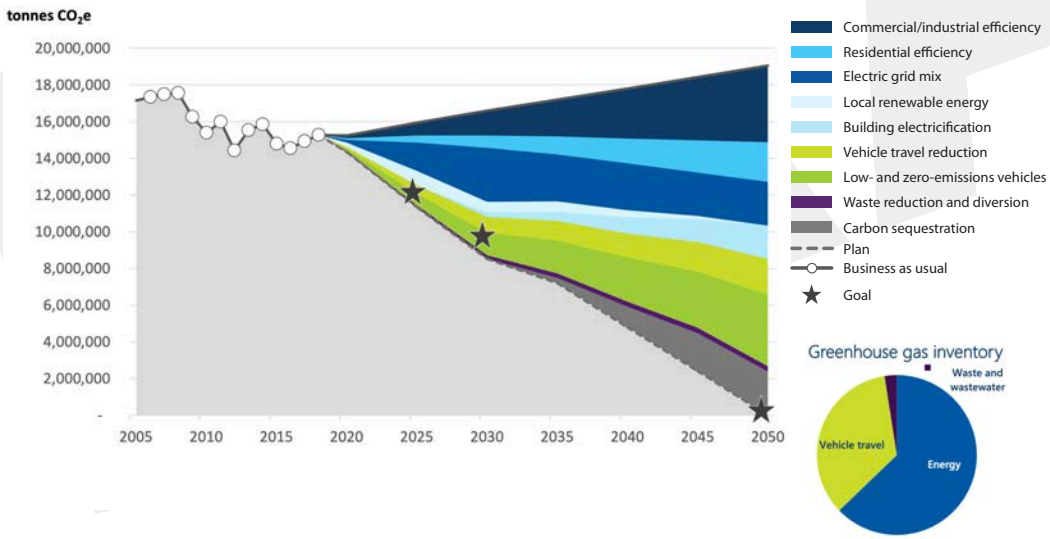
Goal: Reduce emissions in ways that align with core county functions and priorities

There is a path forward to meeting the county's greenhouse gas reduction goals. That was the finding from a scenario planning exercise staff conducted that generated the graphic below (Figure 10) using greenhouse gas emissions inventory data within the county's geographic boundaries. See Appendix D for the assumptions made for each strategy in this planning exercise.

Starting after 2020, the solid line across the top is a forecast of business-as-usual based on anticipated population and job growth out to 2050. The dotted line trending down to 2050 shows a scenario of how the county climate action plan can meet its net zero greenhouse gas reduction goal. The stars at 2025 and 2030 show the interim emission reduction goals established by the county board.

Figure 10: Greenhouse gas emission reduction scenario planning



Components to meeting our greenhouse gas reduction goal

The colored wedges show what high-impact strategies will need to be pursued to reach these goals.

- The top five wedges in blue show the impact of strategies that address the energy slice of our greenhouse gas emissions – from increasing efficiency in commercial and residential energy use to transitioning to a carbon-free energy mix.
- The two wedges in green show the impacts from reducing vehicle travel and using clean cars.
- The purple wedge shows the impacts of reducing waste and avoiding disposal of waste in landfills or waste-to-energy facilities. It is worth noting that disposal is responsible for a small percentage of the carbon footprint of most products. The biggest opportunity to reduce greenhouse gas emissions lies in the phases of production, distribution, and use, which are not accounted for in regional greenhouse gas inventories.
- The gray wedge shows the impacts achieved from carbon sequestration through tree planting, preservation and restoration of natural areas, soil health improvement initiatives including the use of compost and biochar in landscaping projects, and emerging carbon sequestration technologies for the built environment.

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Goal: Reduce emissions in ways that align with core county functions and priorities

This analysis shows we can meet our greenhouse gas emission reduction goals, but only if we work in sync with our partners. On the energy side, the county has a role to play in leading by example and supporting the adoption of these efforts by local governments for broader impact. Because the county operates a transportation network and supports transit and transit-oriented development, we have an important role to play in reducing vehicle related emissions. Also, because of the county's statutory responsibilities to manage a solid waste system, we can be impactful in reducing greenhouse gas emissions associated with material use and waste.

When the county's Public Works Facility was commissioned in 1997, it was the first building in Minnesota to use the sustainable building design standards.

Buildings and energy use

As a large organization, a major consumer of energy, and an energy generator, Hennepin County can have a significant impact through efforts to reduce energy use and improve energy efficiency in buildings. The county is well situated to lead by example in reducing energy use and associated emissions, as well as influencing energy planning, policies and regulations to lessen the impact on the environment, improve communities, and protect public health.

The greenhouse gas emissions associated with buildings are accounted for in two ways. The initial emissions from the construction and materials used are called embodied emissions. The remaining emissions are from the energy used to operate the building.

The county has a history of leading collaborative efforts to improve energy efficiency and sustainability of buildings. Recognizing the importance of energy efficiency in building design and operation, the county initiated a collaborative effort that resulted in the creation of the Minnesota Sustainable Design Guide in 1996. This guide was a precursor to the current Minnesota Sustainable Building Guidelines (B3 guidelines) that are now widely used by state and local agencies to meet sustainability goals for new building design and building renovations.

Other ways to avoid greenhouse gas emissions with buildings is by reusing buildings and building materials rather than building new and by using of a life cycle analysis when designing new buildings. Some of the materials widely used in construction have the highest climate impacts, including cement, aluminum, steel, and plastics. Unlike operational carbon emissions, which can be reduced over time with building energy efficiency renovations and the use of renewable energy, embodied carbon emissions are locked in place as soon as a building is constructed. As new buildings become more energy efficient, the construction and material sourcing of the building will be a much larger component of the overall building carbon footprint.

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Goal: Reduce emissions in ways that align with core county functions and priorities

A significant portion of meeting our greenhouse gas emission goals will require energy conservation and using energy more efficiently in existing buildings. The county has reduced energy use in county buildings by 21% since 2013. To continue to achieve reductions in energy use, the county is investing in more comprehensive retrofits of our buildings, energy efficient technology, and continuous commissioning. These investments will allow us to increase energy efficiency and improve the space for employees and residents while preserving the county's assets. The county is also looking to maximize the use of our existing building space to best serve the community.

Electrifying buildings is another key pathway to meeting ambitious greenhouse gas emission reduction goals. By transitioning to electricity for heating, cooling, and hot water needs instead of burning natural gas or fuel oil, the county can greatly reduce our buildings' emissions. This is a new endeavor for the county that will require further study to evaluate strategies and establish priorities for electrifying county buildings.

Capital project in 2017 to replace electric chillers at the Hennepin County Energy Center with more efficient models, saving $175,000 per year in electricity costs.

The county seeks to use carbon-free electricity sources, such as solar and wind, for county operations and to make carbon-free electricity more widely available for residents and businesses. In county operations, we generate less than 1% of our energy use from on-site solar and get another 4% from subscriptions to community solar gardens. The county can support Xcel Energy's commitment to providing carbon-free electricity by 2050 by purchasing electricity through renewable rates tariffs. We can also work with the other local electricity providers to create opportunities to purchase and increase renewable energy in their portfolio.

The cities of Minneapolis and St. Louis Park have goals of 100% of renewable electricity by 2030. These cities comprised 33% of the county's residential electricity use and 38% of commercial electricity use in 2018. In 2019, about 6% of Xcel's residential customers and less than 1% of business customers in Hennepin County participated in renewable energy purchasing programs, such as Xcel's Windsource or Renewable*Connect. Nationally, the highest participation rate in residential green power purchase programs is Portland, Oregon, currently at 19%.

Hennepin County residents, businesses and institutions are generating 21 megawatts (MW) of on-site solar, or 2.4% of the of total community electricity use. The State of Minnesota has set a goal of 10% of total community electricity use met by on-site solar by 2030.

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Goal: Reduce emissions in ways that align with core county functions and priorities

Hennepin County leads the Efficient Buildings Collaborative, which supports the adoption and implementation of local benchmarking ordinances by Minnesota cities. Energy benchmarking is the process of monitoring and reporting the energy use of a building. It allows comparison of a building's energy use to similar buildings or the building's past performance. Minneapolis, Edina, and St. Louis Park are cities within the county that currently have commercial building benchmarking ordinances in effect, and Bloomington is working toward an ordinance. A national study found benchmarked buildings achieve a 2.4% annual average reduction in energy use.[9]

This plan makes it clear that the county is pursuing more ambitious greenhouse gas reduction goals that will prioritize carbon-free energy sources, such as solar and wind. In review of the draft climate plan, community members sought clarity about the role that waste-to-energy plays in the county's climate response and waste management plans. Neither the county nor other local governments or utilities see the Hennepin Energy Recovery Center (HERC) or waste-to-energy as the solution to meeting renewable energy goals. Biomass accounts for only 3% of Minnesota's energy portfolio, and waste-to-energy facilities are at capacity. HERC and other waste-to-energy plants in Minnesota are in place to manage trash in an environmentally preferable way to landfills, and they are not major sources of energy production. More information on HERC's role in meeting greenhouse gas emissions goals can be found in the waste and material use section (page 57).

Replacing the lighting at the Hennepin County Government Center with an energy-efficient option

[9] U.S. Environmental Protection Agency, 2012, Benchmarking and Energy Savings

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Goal: Reduce emissions in ways that align with core county functions and priorities

Objective: Greenhouse gas emissions associated with buildings and energy use are reduced to meet the county's emission goals

Strategy: Reduce climate impacts of buildings through innovative and efficient design, including the use of climate-friendly material choices

- Establish green building guidelines for county and regional adoption that include:
  - Using the B3 guidelines to measure and track the impacts of design features on all county capital improvement projects.
  - Using life cycle analysis for selecting climate-friendly building materials and furnishings for all county facilities. The analysis will:
    - Prioritize renovation over building new.
    - Promote the design of all county buildings for adaptability and reuse.
    - Implement a sustainable purchasing policy, especially for the use of concrete and steel.
  - Implementing procedures that require the salvage and recycling of construction and demolition waste at all county-funded building projects.
  - Continuing to work with the state and Hennepin County cities to develop and adopt policies that prioritize building reuse and construction and demolition waste reuse and diversion.
  - Working with cities to establish guidelines around building materials that prioritize materials with lower climate impact
  - Working with cities to establish minimum energy performance targets for new construction and major renovations on both public and private properties.
- Reassess current development grants and explore new financial incentives to increase market transformation of climate-friendly buildings and renewable energy.

Strategy: Transition to renewable energy sources and reduce energy use overall in county operations

- Prioritize conservation, efficiency, and renewable energy in policies and programs.
- Invest in renewable energy through utility sources, community solar gardens, and on-site solar.
- Develop strategies to convert Hennepin County buildings from natural gas to electric fuel sources.
- Maximize centralized energy sources that incorporate renewable technologies.

Solar panels on the roof of Hennepin County Public Works Facility in Medina.

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Goal: Reduce emissions in ways that align with core county functions and priorities

Strategy: Support Hennepin County communities in establishing initiatives to reduce greenhouse gas emissions associated with energy use

- Determine the approach and level to which the county encourages residential and commercial energy efficiency and renewable energy, focusing on:
  - Training contractors and building operators on new energy technology and efficient building construction and operation.
  - Supporting affordable adoption of renewable energy and conservation for energy consumers, including small businesses and low-income households.
  - Establishing and funding programs to promote equitable clean energy and efficient housing.
- Become more engaged in:
  - Developing benchmarks and strategies for the state Conservation Improvement Program (CIP), which is a program funded by ratepayers and administered by utilities that helps households and businesses use electricity and natural gas more efficiently.
  - Advancing a statewide Advanced Energy Standard (stretch code) for a building code that would require net zero buildings by 2036, along with other regional efforts.
  - Advancing energy efficiency and energy resilience investments where energy-cost burdens are greatest.
- Encourage energy benchmarking of buildings and expand the Hennepin County Efficient Buildings Collaborative.
- Explore a uniform, county-level green building policy that cities could adopt, or advocate for B3/LEED standards and protocols above and beyond when state funding comes in for facilities and infrastructure.
- Engage with municipalities to develop strategies that encourage switching to a less carbon-intense fuel source for commercial and residential buildings, such as electrification.

Energy benchmarking is the process of monitoring and reporting the energy use of a building. Some cities require large buildings to record their energy use each year. This allows for comparison of buildings' energy use to similar buildings or the buildings' past performance and helps pinpoint properties with efficiency issues. The county's Health Services Building is the top ranked public owned building in Minneapolis.

Target metrics

- Use carbon-free electricity used for county operations by 2035, and the geographic area of Hennepin County transitions to carbon-free electricity by 2050.
- 10% of total community electricity use is met by on-site solar by 2030.
- Reduce operational energy by 3% annually through 2030.
- Implement procedures that require the salvage and recycling of construction and demolition waste at all county-funded building projects by 2022.
- Use life cycle analysis for selecting climate-friendly building materials and furnishings for all county facilities by 2023.
- Develop a framework for a public sector, regional energy efficiency partnership by 2022.

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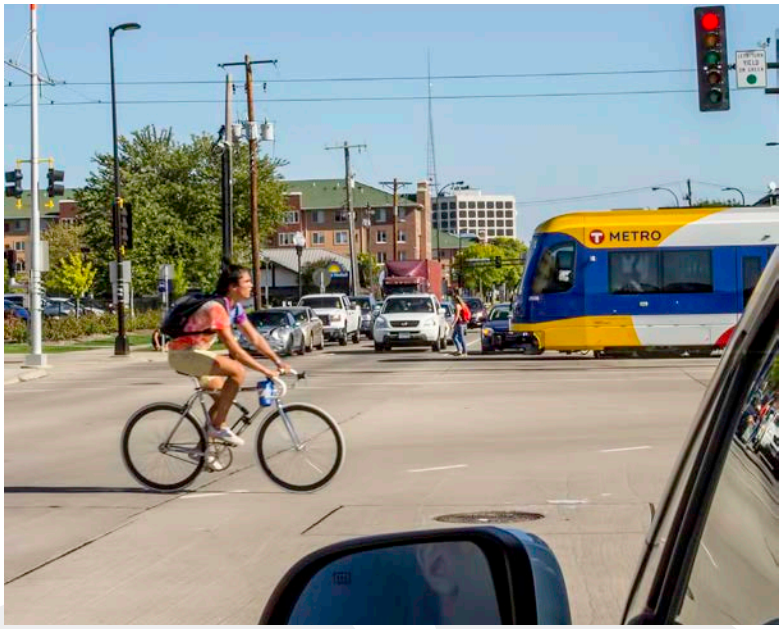
Goal: Reduce emissions in ways that align with core county functions and priorities

Transportation



Hennepin County plans, funds, builds, and manages a transportation network of roadways, bikeways, and sidewalks. Long-term partnerships with the State of Minnesota, other metropolitan counties, cities, and park districts have produced an increasingly dense network of transit and transportation options that include light rail transit, bus rapid transit, commuter rail, bikeways, and pedestrian walkways.

Managing the land and infrastructure in this transportation network creates opportunities to reduce greenhouse gas emissions from vehicles, sequester carbon, manage increased precipitation, and reduce the impact of the urban heat island effect.

In 2019, vehicle travel produced 35% of all greenhouse gas emissions within the county. Emissions in the vehicle sector are influenced by three main factors:

1. Land use and community planning: Where people are located and where they go affects how often trips are made and how long those trips take.
2. Mode of transportation: Whether people are driving, walking, biking, or taking transit.
3. Fuel choice and fuel efficiency: Which could include gasoline, diesel, biofuels, electricity, or human effort.

Transportation emissions have declined slightly in the past decade despite an increase in the number of miles driven due to increased transit options, higher fuel economy standards, and intelligent traffic systems that reduces congestion.

Hennepin County adopted its Complete Streets policy in 2009. Complete Streets are designed, built, and maintained to be safe and convenient for people of all ages and abilities — whether they are walking, biking, taking transit, or driving. As the first Minnesota county to adopt a Complete Streets policy, Hennepin County recognizes the importance of addressing the needs of transit riders, bicyclists, and pedestrians along with the needs of motorists.

With maintaining current efforts, Minnesota's transportation planners have determined that we will not be able to achieve our state greenhouse gas emission reduction goals without reducing vehicle miles traveled (VMT).[10] Vehicle miles traveled is a measure used in transportation planning that is calculated by adding up all the miles driven by all the cars and trucks on all the roadways in a region. Reducing VMTs means reducing the amount of time and money that people spend driving, which reduces air pollution and promotes safe and healthy communities.

[10] Minnesota Department of Transportation **http://www.dot.state.mn.us/sustainability/docs/advisory%20council/stac-recommendations-response-2020.pdf**

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Goal: Reduce emissions in ways that align with core county functions and priorities

In response to the COVID-19 pandemic, many office workers have been sent to work at home for more than a year, including two-thirds of county employees. This has led many businesses, organizations, and individuals to reconsider the need to work in an office full time.

While it is too soon to tell the lasting effects of the pandemic, the greenhouse gas emissions scenario planning analysis (Figure 10 on page 44) assumes an 8% emissions reduction due to a sustained increase in remote work. In addition, work being less tied to a centralized office space could reduce the necessity or appeal of living near the urban core, causing shifts in land use and community planning.

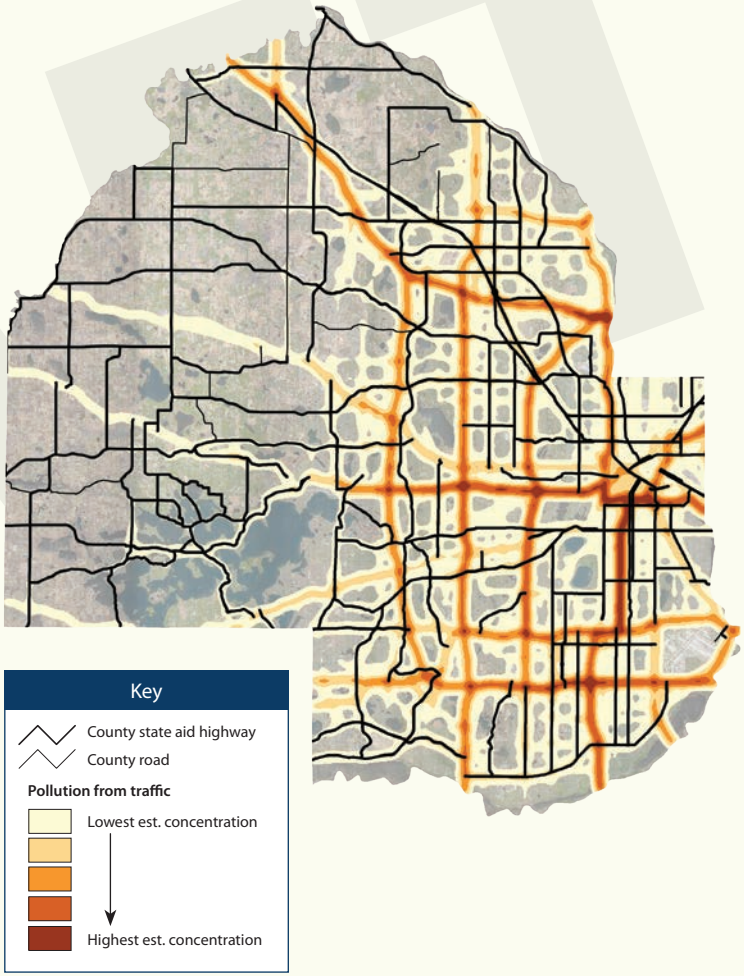
As our transportation system is evolving, reducing air pollutants from fossil fuel combustion will not only help meet our greenhouse gas emission reduction goals, but also reduces disparities in traffic-related health impacts.

Inequitable climate impacts: Air pollution from transportation

Vehicles are a large source of air pollution. The map (Figure 11) depicts a projection of air pollution from traffic based on average daily trip data.[11] As would be anticipated, transportation-related air pollution is higher in the more urban areas of the county where the road network is densest and traffic is highest. According to the Minnesota Pollution Control Agency, communities of color bear a disproportionate burden of traffic-related health impacts[12] due to living in proximity to the highest traffic levels.

According to the Minnesota Department of Transportation, reducing VMT will have immediate, lasting benefits to communities of color who breathe worse air and are at a higher risk of traffic crashes. Lowering VMT will help reduce both particulate matter and other pollutant emissions and reduce the risk of traffic crashes, resulting in improved, equitable outcomes.[11]

Figure 11: Projection of air pollution from traffic based in average daily trips.



[11] Minnesota Department of Health, Healthy Communities Count! Indicators of Community Health along the Central Corridor Light Rail Transit

[12] Minnesota Pollution Control Agency, Life and breath: How air pollution affects health across Minnesota (2019)

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Goal: Reduce emissions in ways that align with core county functions and priorities

Objective: Greenhouse gas emissions associated with transportation are reduced to meet the county emission goals

Strategy: Reduce vehicle miles traveled in Hennepin County and throughout the region

- Advance the Minnesota Department of Transportation's (MnDOT) goal of 20% reduction in VMT by 2050 by developing a more ambitious goal for Hennepin County that reflects our role in the state as a more densely populated county, and also reflects rural, suburban, and urban contexts within Hennepin County.
  - Develop a plan by June 2022 with a recommendations on a more ambitious goal and evaluate how to achieve this goal.
- Engage with MnDOT and other transportation partners as the MnDOT develops the Statewide Multimodal Transportation Plan in 2021 to align greenhouse gas emission reduction strategies by:
  - Evaluating the preliminary goal in a public engagement process, establish a baseline year from which reductions would be measured, and consider interim goals.
  - Developing a method for estimating program and project VMT outcomes by assessing both induced (e.g. adding lanes) and reduced (e.g. increasing walking access) vehicle travel demand.
  - Participating in a new intergovernmental climate change council (once established) to coordinate efforts with partner agencies, cities, and counties.
- Advocate for the buildout of planned transit routes and the development of new routes.
- Expand transit-oriented development and bicycle and pedestrian facilities.
- Explore strategies to reduce employee vehicle use for county business purposes
- Advocate for strategies to reduce travel demand, such employer support for employee transit expenses and promoting flexible work schedules.
- Prioritize roadway preservation and modernization, including expanded safety and multi-modal upgrades, to minimize system expansion.
- Manage the road system to minimize pollution by leveraging additional technologies.
- Support increased and more efficient transit on county roadways in coordination with transportation partners.
- Update the county's Complete Streets policy to develop a modal hierarchy framework that prioritizes transit, pedestrians, and bicyclists in urban and suburban contexts.

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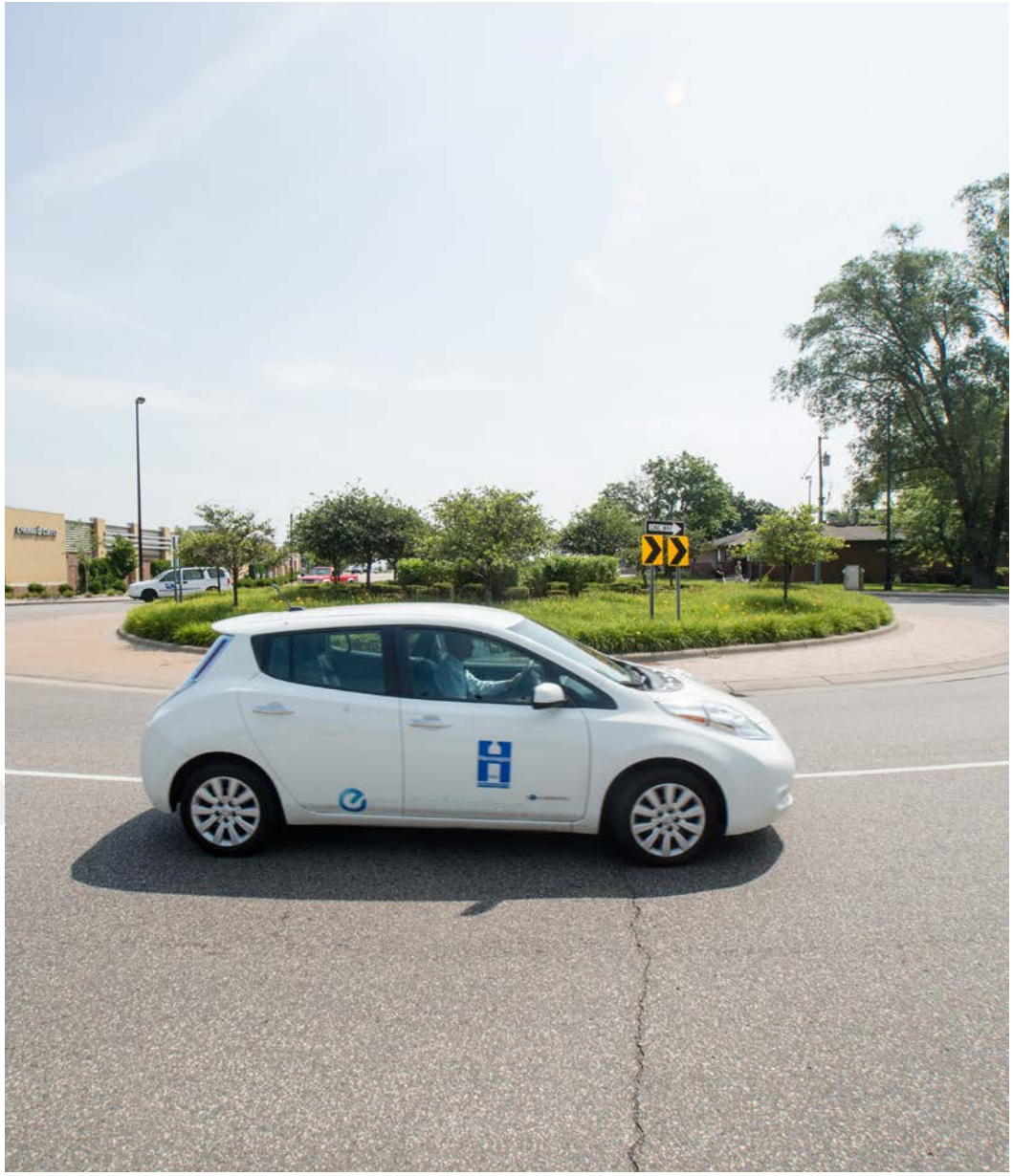
Goal: Reduce emissions in ways that align with core county functions and priorities

Strategy: Promote electric vehicle infrastructure regionally

- Engage with regional and statewide efforts to advance electric vehicles.
- Work with the private sector and municipal partners to increase charging capacity.
- Develop electric vehicle and infrastructure guidelines at county buildings.
- Complete an assessment of existing county fleet vehicles and infrastructure for electrification opportunities, right-size county fleet through new standards, and develop an electrification implementation plan to guide the procurement of electric vehicles and charging station locations.
- Educate residents about proper vehicle maintenance and electric vehicle options and support incentives for low-income residents, such as a scrappage incentive for vehicles in areas of higher air pollution or low-interest loans to income-qualified households, to increase participation.



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Goal: Reduce emissions in ways that align with core county functions and priorities

Strategy: Use transportation investments to support broader county goals including reducing disparities, improving health, enhancing livability, and growing the economy

- Link transit, bicycle, pedestrian, and road projects to housing, jobs, and recreational opportunities.
- Prioritize vehicle emission reduction strategies in areas with the residents experiencing high health burdens.
- Provide convenient, affordable access to destinations, especially for residents experiencing high transportation and housing cost burdens.
- Create healthy and livable communities by including pedestrian, bicycle, and transit facilities as well as green boulevards in roadway projects.
- Strengthen the connection between land-use planning and transportation to promote orderly growth and transit-oriented development that reduces the need to drive.

"The biggest opportunities for county impact are transportation and housing, and particularly their intersection. County roads are responsible for a huge amount of transportation emissions. Reallocate capacity from cars to alternatives, such as public transit and biking. Housing sprawl in the exurbs is also responsible for a huge amount of transportation and energy emissions. Promote availability of higher-density housing options closer to the core metro area."

– Resident comment

Construction at RiZe at Opus Park Apartments along the Southwest LRT line in Minnetonka.

Target metrics

- Plan to meet a more ambitious vehicle miles traveled reduction goal by June 2022.
- Achieve net zero emissions in the county's fleet by 2050, with interim goals of:
  - Decreasing greenhouse gas emissions 30% by 2030.
  - Converting a minimum of 20% of the county's light-duty fleet vehicles to electric and 50% to hybrid by 2030.

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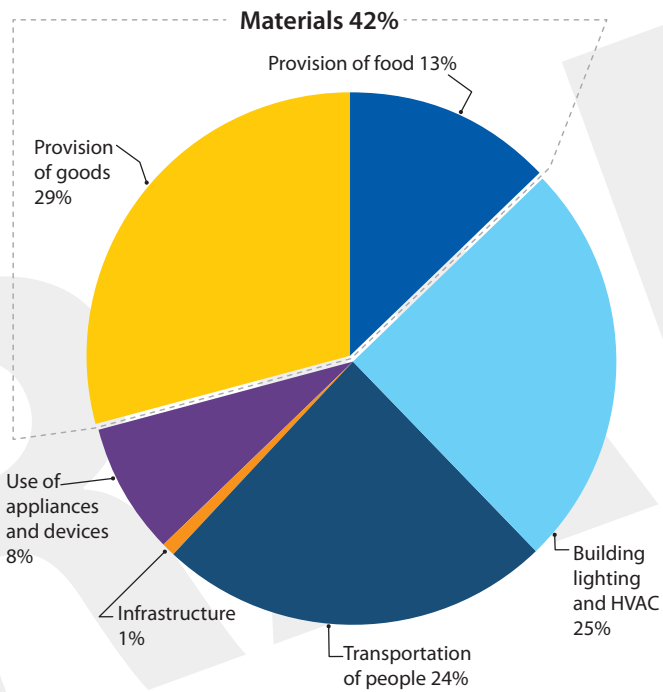
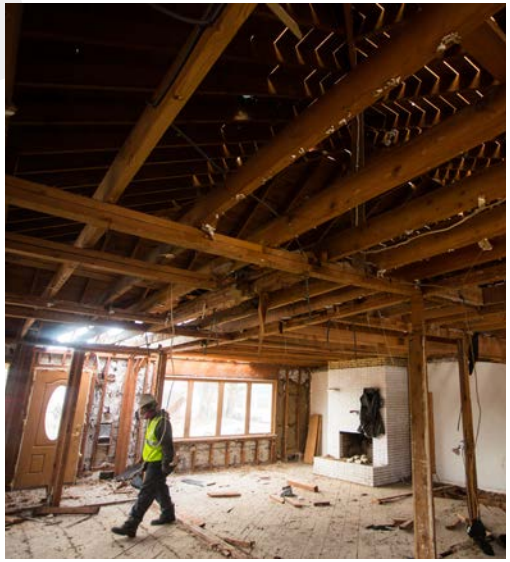
Waste and material use

A traditional greenhouse gas inventory shows the emissions broken down by energy, transportation, and waste, but disposal is responsible for only a small percentage of the carbon footprint of most products. If you regroup the emissions to show how they are tied to the production of materials and goods, you see that what we buy has a big impact on the climate (Figure 12). Creating new products requires energy – to harvest raw material, process it, manufacture it, transport it, and sometimes, to use it. Producing and transporting goods is associated with 45% of global greenhouse gas emissions. This underscores the importance of sustainable purchasing. Public entities have significant purchasing power, which provides an opportunity to make a positive impact on climate change through procurement decisions. There are also opportunities with salvaging construction and demolition waste, reducing food waste, and shifting consumer behavior.

Figure 12: Systems-based greenhouse gas sources
Source U.S. EPA 2009



Materials widely used in construction, including cement, aluminum, steel, and plastics, have some of the highest climate impacts. Many building materials have the potential to be salvaged and reused or recycled. In fact, about 85% of the materials in a typical demolition project could be salvaged for reuse and kept out of landfills. But currently, only about 30% of building materials are reused or recycled.



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Goal: Reduce emissions in ways that align with core county functions and priorities

Climate action experts identify reducing food waste as one of the single most effective solutions to climate change, and the county has a lead role in waste management. Food has both upstream and downstream impacts, from the energy used to grow, transport, process, and refrigerate it to the methane generated when food waste is landfilled. Although methane made up only 10% of the total greenhouse gas emissions nationwide in 2018[13] it is 28 times more potent than carbon dioxide in terms of trapping solar radiation and exacerbating climate change. An estimated 17% of all methane emissions come from landfills. From waste sorts, we know that 20% of our trash is food. Preventing food waste and composting or digesting food scraps is the biggest opportunity for our residents and businesses to reduce waste.

Organic waste is hauled to a commercial composting facility

In 2018, Hennepin County revised its recycling ordinance to make organics recycling more widely available and accessible to residents. By January 1, 2022, large cities (those with more than 10,000 residents) must make organics service available to all households with curbside recycling, which includes single-family homes and dwellings up to 4 units. Smaller cities (those with fewer than 10,000 residents) must provide an organics recycling drop-off if curbside organics service is not made available to residents. In multifamily buildings not served by city programs, properties can request organics hauling service from some haulers for a fee. The county provides financial assistance to cover some of the start-up costs through the county's business recycling grants. The county also provides free educational materials and on-site assistance to property owners and managers. Additionally, as of January 1, 2020, businesses that generate large quantities of food waste must implement food waste recycling in back-of-house operations.

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Goal: Reduce emissions in ways that align with core county functions and priorities

Engaging and educating residents, businesses, institutions, and cities will be critical to both adapting to what lies ahead and taking action to reduce climate impacts. For materials and waste, this means engagement and education around the climate impacts of consumption and reducing the environmental impacts of waste.

The county has several popular programs that shift consumer behavior by generating excitement about waste prevention, encouraging action on waste reduction and reuse, and partnering with organizations in the community to motivate behavior change. These efforts include training Master Recycler/Composter volunteers, offering educational challenges for residents to reduce waste, go plastic-free and prevent food waste, and hosting fix-it clinics to encourage repair. The county also supports reuse retailers and encourages residents to shop used first through the Choose to Reuse program.

Repair Lair, Choose to Reuse retail participant

In review of the draft climate plan, community members sought clarity about the role that waste-to-energy plays in the county's climate response and waste management plans. The county sees the Hennepin Energy Recovery Center (HERC) as just one part of the county's integrated solid waste management master plan, which outlines the county's strategy to pursue a zero-waste future. HERC is not a featured strategy in the climate action plan because the county chose to highlight higher priority climate solutions. Climate experts at Project Drawdown recognize waste-to-energy's potential as a transitional solution because it reduces methane emissions by keeping waste out of landfills.[13] HERC also recovers scrap metal – more than twice the amount collected in city curbside programs. Recycling steel requires 60% less energy than producing steel from iron ore. Waste delivered to HERC is processed close to where it is produced, minimizing the transportation of waste and associated truck emissions. Finally, HERC creates baseload electricity and steam that might otherwise be sourced from coal or gas-fired power plants.

The county views HERC as an asset in fighting climate change, but expects waste-to-energy to decline in importance as waste prevention, reuse, recycling and composting become more widely adopted. There is still a lot of trash created by residents and business, and we need to manage it responsibly. HERC makes environmental sense until we have successfully diverted most organic materials which include food waste, paper and wood, from the trash. Until then, HERC operates with stringent safety standards and meets all air permit requirements.

Learn more about the county efforts to reach the goal of 75% recycling and zero waste to landfills in the county's board-adopted Solid Waste Management Master Plan at **hennepin.us/solidwasteplanning**

[13] Project Drawdown **https://drawdown.org/solutions/waste-to-energy**

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Goal: Reduce emissions in ways that align with core county functions and priorities

Objective: Greenhouse gas emissions associated with waste and material use are reduced to meet county goals

Strategy: Prevent food waste and divert organic material from the trash

- Support food rescue efforts to divert more food to people in need.
- Help businesses and organizations that produce a lot of food waste implement best practices for preventing food waste.
- Use research gathered by surveying residents and conducting focus groups into the the barriers and benefits to reducing wasted food at home to develop a consumer campaign on food waste prevention.
- Continue to support and fund residential and commercial organics recycling programs and implement business food waste recycling requirements and city residential organics recycling requirements.
- Develop organics recycling infrastructure by advancing anaerobic digestion and making improvements to the Brooklyn Park Transfer Station.
- Close the loop by increasing the use of compost in county projects and encouraging public and private partners to do the same.
- Expand organics collection and improve recycling at county facilities.

Strategy: Reuse and recycle construction and demolition waste

- Require the salvage and recycling of construction and demolition waste at all county-funded building projects.
- Educate county contractors on building material reuse and recycling.
- Increase implementation of in-place pavement rehabilitation in road projects.
- Sustainably manage waste after disasters.

"We need to ask more of people. The assumption that we can all continue to live as we always have, consuming and disposing wantonly, driving everywhere, is a fallacy, and we need initiatives that make it easy for people to change their habits. Or expectations that require change. And the county must lead the way. Every county building should have organics recycling, 100% green energy, and other easy changes. If the county isn't showing up and making changes, no one else will."

– Resident comment

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Goal: Reduce emissions in ways that align with core county functions and priorities

Strategy: Understand the climate impacts of our consumer choices and mitigate the largest impacts

- Conduct a consumption-based emissions inventory and use the results to create a more comprehensive approach to climate change mitigation.
- Educate residents on the climate impacts of consumer choices and expand efforts that educate residents and businesses on the importance of practicing more thoughtful consumption by preventing waste, recycling more, participating in organics recycling or backyard composting and reducing meat consumption.
- Develop and implement a county sustainable purchasing policy on par with other leading public entities and provide sustainable purchasing best practices.
- Encourage purchases that prioritize reuse, durable goods, and avoiding disposables.

Buying sports equipment second-hand.

Strategy: Advocate for state leadership on zero-waste policies and producer responsibility

- Support product stewardship and extended producer responsibility (EPR), especially for plastic packaging and single-use plastics.
- Support standards for product design that minimize environmental impacts, improve product durability and longevity, ensure the right to repair, and establish producer responsibility for end-of-life management of goods they produce.
- Advocate for state funding and market development initiatives that align with climate and zero-waste goals.
- Advocate for additional authority and tools that would allow local government to implement climate action and zero-waste strategies.
- Join the U.S. Plastics Pact, which brings together plastic packaging producers, brands, retailers, recyclers, and waste management companies to take coordinated action to tackle plastic waste and pollution.

Target metrics

- Implement a consumer food waste prevention campaign by 2022.
- Recycle 75% of waste and send zero waste to landfills by 2030.
- Divert at least 75% of construction and demolition waste for reuse or recycling.

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Carbon sequestration

Carbon sequestration is the process of capturing and storing carbon dioxide from the atmosphere. This is a critical part of achieving net zero carbon emissions since it involves "balancing" a certain measured amount of carbon released with an amount of carbon offsets.

Protecting, restoring, and managing natural ecosystems, planting trees and plants, and leveraging the ability of soil to store carbon are among the most effective ways to remove carbon dioxide from the atmosphere. Trees and plants remove carbon dioxide from the atmosphere through photosynthesis. Trees store carbon in their wood, while plants, such as cover crops on fallow agricultural lands, return the carbon to the soil when they decompose. Other examples of carbon sequestration include adding materials that improve soil health, like compost and biochar. Biochar is wood that is heated to create a specialized charcoal that acts like a sponge to hold nutrients in the soil for a long time and help plants grow better.

Each decision that Hennepin County makes around the use and management of properties it owns and manages presents an opportunity to sequester carbon. Hennepin County manages hundreds of miles of road and trail rights-of-way and many building sites, buys and sells property to meet operational needs, and stewards hundreds of properties as they move through the tax-forfeiture process and back into private ownership.

In addition, through the county's role as the Soil and Water Conservation District, there is tremendous opportunity to sequester carbon on private property. This includes in agricultural soils, backyards, pastures, boulevard pollinator gardens, trees, urban farms, forests, woodlands, prairies, and wetlands throughout the county. Given the immense scale of the climate crisis, all opportunities to sequester carbon must be considered, and Hennepin County plays a crucial role in empowering residents, businesses, and communities to play their part.

Researchers are also working to improve technologies that capture the carbon dioxide generated by burning fossil fuels before it is released to the atmosphere. For example, CenterPoint Energy is piloting the use of onsite carbon capture technology locally, including at the Radisson Blu Mall of America. Carbon capture technology is relatively expensive compared to carbon sequestration through biological processes, but this is a field of research to monitor for developments.

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Goal: Reduce emissions in ways that align with core county functions and priorities

Objective: The county sequesters carbon on county-owned property, including along county road rights-of-way and tax-forfeit properties.

Strategy: Reassess policies and practices to increase carbon sequestration on county-owned properties

- Develop goals, accounting strategies, and guidelines to help staff advance carbon sequestration on county projects.
- Prioritize trees and native plants over turfgrass in landscape designs on new projects.
- Convert from turfgrass to other landscape types where appropriate to improve carbon sequestration.
- Use compost and biochar as a soil amendment on county projects.

Biochar being used on Hiawatha Avenue in Minneapolis.

Objective: Landowners sequester carbon by protecting and restoring habitat, building soil health, and preserving and planting trees.

Strategy: Assist residents to sequester carbon on private property

- Develop goals, prioritization frameworks, and outreach and marketing strategies to promote carbon sequestration projects in the most impactful places around the county.
- Provide assistance to landowners wishing to adjust land management practices to increase the carbon storage of soils and sequester carbon in trees and plants. Examples of the types of project the county will provide assistance for include:
  - Agricultural soil health practices
  - Improved grazing and pasture management
  - Diversification of agricultural landscapes and crop types
  - Habitat restoration and protection
  - Expanded shoreline and buffer plantings
- Incorporate carbon sequestration potential into evaluation and planning of other natural resource and water resource projects and partnerships.
- Track carbon sequestration and other benefits accrued from soil health efforts, land management improvements, habitat restoration and protection projects, and other related work on private lands.

Target metrics

- Develop and track a parcel-specific carbon sequestration metric for county properties by 2023.
- Set carbon sequestration goals by 2023 to identify areas with the best sequestration potential and greatest needs.
- Start tracking carbon sequestration and other benefits, such as improved air quality and the water-holding capacity of soils, associated with county initiatives and programs by 2023.

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Goal: Partner in ways that can be most impactful

Climate change is one of the most pressing challenges the county faces because of its significant environmental, societal, and economic impacts on both a global and local level. We know that no one entity can achieve the complex and evolving goal of climate adaptation on its own.

Developing the Climate Action Plan is foundational to the county's response to climate change. However, a plan is only as good as the execution of the strategy. The county has clear authority in some areas of this plan, for example operating the county's roadway network or managing waste responsibly. Other strategies in this plan will require influencing and supporting other organizations that have responsibilities in those areas, like land use and energy.

The plan's success relies on engaging a broad range of stakeholders, including public partners, businesses, community organizations, employees, and residents. The county's Racial Equity Impact Tool guides how we engage with community, particularly those most impacted by a policy, program, or budget decision, and ensures that we consider how the community may benefit or be burdened by those decisions. This process is key to understanding impacts and developing solutions.

Building a more equitable and resilient community will be most effective if the county can align priorities, leverage resources, and foster partnerships.

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Goal: Partner in ways that can be most impactful

Public entity partners

Staff conducted several meetings and surveys with managers, administrators and senior leaders at Hennepin County's cities, watershed organizations, park districts, and other regional and state units of government to learn about their priorities for climate work and opportunities for collaboration and later to gather feedback on proposed strategies that will require external partnership and greater coordination to achieve. More than 80 public entity partners shared feedback through these efforts.

Objective: Partnership models driven by mutual climate goals are explored and pursued

Strategy: Pursue strategies with the widest agreement and clearest direction forward

- Foster long-term, integrated planning that includes jointly collecting and analyzing data and modeling with a lens on health and racial equity.
- Reduce localized flooding and coordinate regional stormwater resiliency efforts.
- Decarbonize transportation and buildings.
- Educate and engage the public in taking collective action.
- Raise a collective voice for climate policy at the local and state level.

Hennepin County's climate action team meets in January 2019

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Goal: Partner in ways that can be most impactful

Community organizations

Staff conducted feedback sessions with representatives from community-based organizations as well as high-school-aged youth involved in environmental and climate change groups. The community organizations and youth represented a diverse set of audiences throughout Hennepin County. Staff also presented to the county's Race Equity Advisory Council, a group of appointed members that advise county leadership on reducing racial disparities and advancing racial equity throughout Hennepin County.

Partners provided feedback on the county's priorities, foundational strategies, and approach to the climate action plan. They also shared the impacts their organizations and community have experienced from climate change and described how the county's priorities align with what they think we need to do to create a climate-friendly future. The participants expressed strong interest in collaboration and commitment to working with us to ensure our plan is effective and impactful.

Objective: Communities are engaged and empowered through partnership and shared leadership

Strategy: Establish long-term partnerships to increase engagement and support community-driven solutions

- Foster long-term community engagement that takes a social and environmental justice lens and gives community partners and youth a voice in plan development and implementation.
- Support community initiatives and empower local leadership to ensure solutions are relevant and effective.
- Improve climate education throughout the county by partnering with community groups and schools to ensure messages and messengers are relevant.
- Take a strong leadership position and collaborate broadly with diverse partners to encourage bold climate action at the local and state level.
- Implement solutions and support community-driven initiatives that provide financing options, offer job training and workforce development, and increase investment in vulnerable communities.
- Increase transparency and facilitate community involvement in measuring progress toward meeting the established goals and ensure accountability.

Community members add design ideas for a sustainable landscaping project at the building complex where they live.

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Foundational strategies

Staff recommend this set of foundational strategies as the best place to start to serve as a strong foundation for the county's long-term response to climate change.

Strengthen individual and community resilience

- Communicate climate risks, develop education efforts, and support collective action.
- Foster relationships with communities to engage, listen, and respond with people-centered solutions.
- Strengthen sustainable access to affordable housing, healthcare, food, and transportation for residents, particularly in areas that have the greatest vulnerabilities.
- Improve preparation for and response to extreme weather.

Transition to renewable energy sources and reduce energy use overall

- Invest in renewable energy through utility sources, community solar gardens, and on-site solar.
- Prioritize conservation, efficiency, and renewable energy in policies and programs.
- Support affordable adoption of renewable energy and conservation for energy consumers, including small businesses and low-income households.

Cut greenhouse gases from transportation

- Reduce vehicle miles traveled in Hennepin County and throughout the region.
  - Advocate for the buildout of planned transit routes.
  - Expand transit-oriented development and bicycle and pedestrian facilities.
  - Reassess flexible work schedules and facilitate remote work for employees.
  - Manage the road system to minimize pollution by leveraging additional technologies.
- Promote electric vehicle infrastructure regionally by working with the private sector to install charging stations.

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Foundational strategies

Prevent food waste and divert organic material from the trash

- Support food rescue efforts to divert more food to people in need.
- Help businesses and organizations that produce a lot of food waste implement best practices for preventing food waste.
- Develop organics recycling infrastructure by advancing anaerobic digestion and making improvements to the Brooklyn Park Transfer Station.
- Increase the use of compost in county projects.

Design infrastructure, buildings, and property to future climate conditions

- Work with local and regional partners to reassess stormwater design standards.
- Build and renovate county buildings following state's sustainable building guidelines (B3) as possible with a goal of net-zero emissions.
- Implement construction and demolition waste procedures.
- Use life cycle analysis for selecting climate-friendly building materials and furnishings.
- Develop and implement a sustainable purchasing policy.

Build and maintain green infrastructure and sequester carbon on all county-owned property

- Install green infrastructure to manage stormwater on county-owned property, including on tax-forfeited properties in flood prone areas to protect surrounding properties and create green spaces.
- Explore a green jobs/pathways program concept for installation, establishment, and maintenance of green infrastructure.
- Convert turfgrass to plants that sequester carbon, where appropriate.

Decrease the heat island effect, especially in areas with highest vulnerability

- Coordinate operations of readily accessible and culturally appropriate cooling centers.
- Preserve mature trees, plant more trees and plants, and address maintenance issues.
- Convert hardscape where possible into pervious pavement or green infrastructure.
- Pursue site development performance standards that include green infrastructure.
- Gather better, real-time data to allow for targeted notification of weather-related warnings.

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Engaging residents to act on climate change

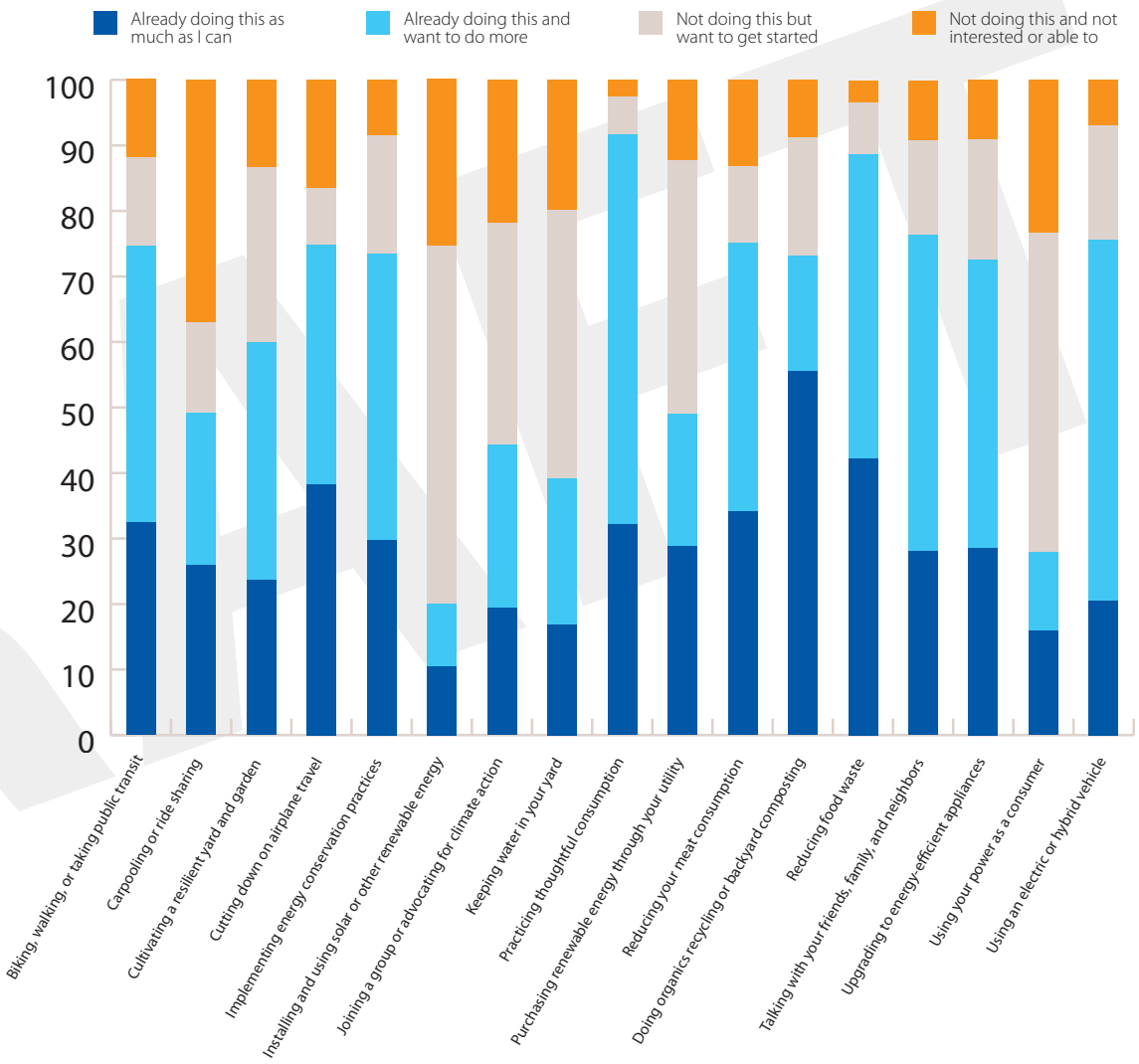
In responding to climate change, the county's top priorities are changing the systems that the county controls and using our influence as a bold leader to collaborate with local and state partners to achieve broader systemic change. The foundational strategies identify the best place for the county to start on those systemic changes.

Engaging our residents to take action on climate change is also important because it helps get people more engaged in the issue, can quickly scale to more impactful collective action, and puts pressure on government agencies, businesses, and institutions to make greater, systemic changes.

People are often presented with a long list of actions that they can take to address climate change, and there is often a disconnect among the actions people think are effective and the actions that actually are. This can leave people feeling overwhelmed and unsure where to focus.

Determining the most impactful actions to focus on for outreach and communications involves factoring in an action's potential to reduce greenhouse gas emissions, people's willingness and readiness to take that action, and the ability of the county and partners to support people in taking that action. Responses in the public survey to a question on climate actions provide useful insights (Figure 13). This information can guide what to promote, what resources and programs to develop, and what partnerships to establish.

Figure 13: Resident interest and engagement in climate actions



Actions residents are already taking

Even among the actions that residents are already doing, there is opportunity for more engagement. The most common actions that residents who responded to the survey are already doing include (% already doing and not able to do more):

- Signing up for organics recycling or composting in your backyard (55%)
- Taking steps to reduce food waste (42%)
- Cutting down on airplane travel (38%)

It's important to note that the survey respondents are likely more engaged in environmental issues and taking more environmental actions than the general public. So with just around half of the respondents already engaged in these actions, there is room to encourage more people to take these actions. Additionally, the responses to cutting down on airplane travel could be skewed by travel restrictions caused by the COVID-19 pandemic, so it will be important to encourage people to continue these actions.

Actions with the best opportunity for increased engagement

Residents identified actions that quickly scale up to having a larger collective impact as actions they want to be doing more – using their power as a consumer, practicing thoughtful consumption, and talking to others about climate change. Residents likely need tools, support, and ideas for getting engaged in these actions. Residents are also interested in renewable energy, energy-efficiency, and electric or hybrid vehicles, as well as lawn care practices that provide habitat and manage water runoff.

The most common actions that survey respondents either said they are already doing and want to do more or are not doing but want to start include (% already doing this and want to do it more plus not doing this but want to start):

- Using your power as a consumer to support businesses that are taking steps to reduce their climate impact (72%)
- Practicing thoughtful consumption by only buying what you need, investing in high-quality, long-lasting items, shopping used, and borrowing items when possible (65%)
- Installing and using solar energy or other renewable energy at your home (64%)
- Cultivating a resilient yard and garden by planting native species that provide habitat for pollinators, considering turf alternatives that require less watering and mowing, or planting a tree (63%)
- Keeping water in your yard by installing rain barrels, designing a rain garden, or redirecting downspouts (63%)
- Talking with your friends, family, and neighbors about why you are concerned about climate change and what you are doing (63%)
- Upgrading to energy-efficient appliances (62%)
- Using an electric or hybrid vehicle (61%)

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Actions with the highest barriers to adoption

The actions that residents said would be the hardest to adopt include carpooling or ride sharing, installing renewable energy at their home, or using an electric or hybrid vehicle. Several of these actions are also on the list of actions to focus on for increased engagement, showing that some residents think the barriers to taking these actions are more insurmountable than others. Although more needs to be learned about the barriers to taking action, some barriers that respondents mentioned include renting versus owning their home and the cost to implement some of these options. Focusing on understanding and reducing barriers and changing systems to make it easier, more convenient, and more accessible for residents will make it more likely that residents will take action.

Actions that survey respondents said they were least interested in or able to do (% not doing this and not interested or able to):

- Carpooling or ride sharing (37%)
- Installing and using solar energy or other renewable energy at your home (25%)
- Using an electric or hybrid vehicle (23%)

Residential solar panels, photo by Jeff Stuhr, courtesy MPCA

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Appendix A: Acknowledgements

Acknowledgements

The Hennepin County Climate Action Plan is the result of collaboration of the 59 staff members representing 20 departments that participated in climate action teams:

- Carol Anderson
- Jay Baldwin
- Felecia Boone
- Kenny Blumenfeld
- Kayla Bromelkamp
- Carolyn Collopy
- Patience Caso
- Kelsey Dawson Walton
- Neil Doyle
- Christi Duffy
- Chad Ellos
- Denise Engen
- Josh Eppen
- Phil Essington
- John Evans
- Mary Finch
- Patricia Fitzgerald
- Karen Galles
- Barbara Garn
- Joe Gladke
- Kris Guentzel
- Tony Hainault
- Emily Harrington
- Nicki Helmberger
- Christina Hill-McNeal
- Leah Hiniker
- Maury Hooper
- Bill Howden
- Melissa Illies
- Bobby Jackson
- Ben Knudson
- Andy Leith
- Toya Lopez
- Robb Luckow
- Abby Malkerson
- Gail Manning
- Ryan Marshall
- Drew McGovern
- Kristy Morter
- Crystal Myslajek
- Dale Paulson
- Juan Piñero
- De'Vonna Pittman
- Lance Robinette
- John Rode
- Lauren Satterlee
- Amy Schrempp
- Veronica Schulz
- Julia Selleys
- Brian Shekleton
- Tom Terwilliger
- Craig Troska
- Ali Turner
- Nariman Vanaki
- Joan Vanhala
- Eric Vogel
- Eric Waage
- Dr. Kristi White
- Lindsey Wollschlager

County leadership that provided guidance and support:

- Lisa Cerney
- Mark Chapin
- Chet Cooper
- Kevin Dockry
- Neil Doyle
- Yvonne Forsythe
- Margo Geffen
- Glen Gilbertson
- Chela Guzman-Wiegert
- David Hough
- Bobby Jackson
- Anne Kanyusik Yoakum
- Rosemary Lavin
- Susan Palchick
- Dan Rogan
- Michael Rossman
- Chris Sagsveen
- Alisa Salewski
- Carla Stueve
- Mark Thompson
- Eric Waage
- Jodi Wentland
- Jamie Zwilling

The plan was prepared by:

- John Evans
- Carol Hoffman
- Rosemary Lavin
- Alisa Reckinger
- Brian Shekleton
- Angie Timmons

Technical consultation was provided by:

- Barr Engineering
- Hennepin County Geographic Information Systems
- LHB, Inc.
- Minnesota Department of Natural Resources Climatology Office

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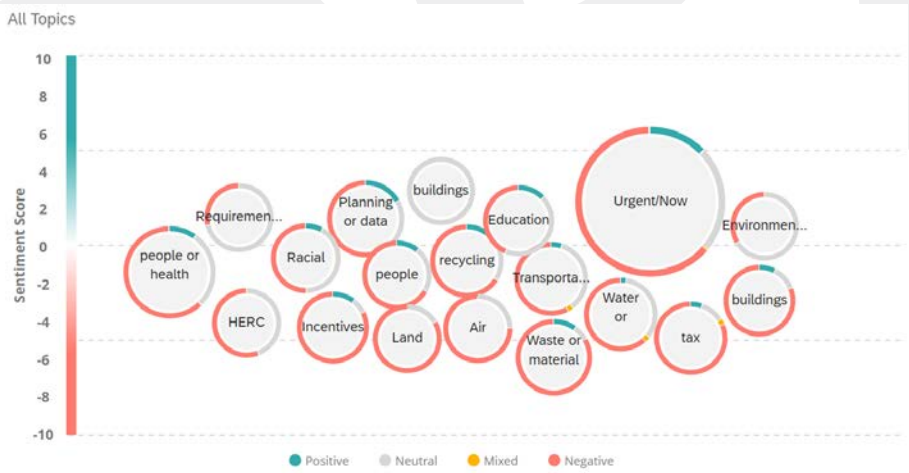
Appendix B: Public engagement findings

The first phase of public engagement

A series of feedback sessions were held in In November 2020 with community groups, youth, and the county's Race Equity Advisory Council. A total of 84 people shared feedback on the climate action plan's foundational strategies, impacts the community has experienced from climate change, and their priorities for a climate-friendly future.

An online survey for residents was also conducted to learn about impacts the community has experienced from climate change and understand residents' priorities to inform the plan. The survey received 2,300 responses.

What else would you like to tell the county about climate change?
Visual of topics identified from open-ended comments



Key findings from the first phase of external engagement efforts

Many insights from the feedback have been incorporated throughout the plan, including the impacts the community has experienced from climate change, the most important values they hold in responding to climate change, and their desire for green jobs. The following key findings reflect commonly expressed ideas that garnered strong support.

Set ambitious goals and provide bold leadership

Most open-ended comments from the online survey stressed the urgency of the issue of climate change and encouraged the county to respond by being ambitious and providing bold leadership. This sentiment was echoed in the listening sessions, with participants noting how Hennepin County's response will be a catalyst for both local and state efforts. Participants wanted to see a more aggressive timeline and stressed that meaningful metrics need to be established so the county and community could measure progress toward meeting our goals.

Climate change is intersectional with racial disparities

Although everyone will be impacted by the climate crisis, it will not be experienced equally. Community partners and survey respondents see the connection of systemic racism and environmental injustices. Many community organizations see the county's development of a climate

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action plan as an opportunity to advocate for changes in the county's transportation network and waste management system, specifically operations of the Hennepin Energy Recovery Center (HERC), as well as for better health outcomes for people of color.

The plan provides a new opportunity to develop and implement a collective vision for:

- Health and well-being outcomes
- Equitable transportation system
- Zero-waste future
- Green economic recovery, workforce development, and job creation

Focus on systems change, not individual choice

A significant number of survey comments focused on the desire for transformational systems change through leadership and the use of policies, procedures, and incentives rather than focusing on educating residents on the actions they can take individually. At the same time, community partners explained that educating the public and empowering their involvement in change would help expand the county's reach and the impact of greenhouse gas emission reduction strategies. Community partners expressed the need for the county to authentically partner with communities to empower local leadership and community-driven initiatives to make solutions relevant and effective.

The second phase of public engagement

Feedback on the draft Climate Action Plan was gathered from February 9 to March 3, 2021, through community meetings, an online comment form, and a survey for public entity partners. Anyone interested in the county's response to climate change was encouraged to attend an online meeting or submit comments. Feedback was received from residents, representatives of community organizations and advocacy groups, and staff from state agencies, cities, and watershed districts.

A total of 79 participants attended the online community meetings where county staff presented goals and core strategies. A recording of the meeting was also made available for those who couldn't attend live. The online comment form received responses from 150 people.

Key findings from the second phase of public engagement

The public engagement process generated more than 1,000 ideas and comments that were categorized based on alignment with the five plan goals and subsections and then analyzed to identify key themes and calls to action. The following key findings reflect the most strongly and commonly expressed ideas.

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What do you like?

Respondents were happy to see the county is working on a climate action plan and making it a priority. They are grateful to live in a place that recognizes the need to take urgent action.

They thought the county developed a comprehensive plan and appreciated the emphasis on collaboration, equitable outcomes, complex and overlapping impacts, and community input. They appreciate the county acknowledging that county policies, systems, and practices need to change.

Respondents appreciated the process of developing the plan and the opportunity to provide feedback, and they expressed support for the plan's implementation and the county's response to climate change.

What is missing or could be improved?

Ensure the plan results in meaningful action that meets the urgency of the climate crisis

Respondents emphasized they want to see the Climate Action Plan be fully implemented to produce meaningful change. They encouraged the county to think bigger and more boldly to meet the reality of the climate crisis. They wanted to see a more ambitious plan with stronger commitments to act on the solutions identified. Respondents also felt the county needed to more clearly communicate the immediacy of climate change and the urgency required to respond.

Set bigger goals and define performance metrics, timelines, and responsibilities

Respondents made it clear that the county's current greenhouse gas emission reduction goals are no longer adequate based on the global scientific consensus and that a more aggressive goal of net zero carbon emissions by 2050 should be adopted. Respondents also noted that the plan seemed more like a framework, and they felt that action plans with specific and measurable goals, targets, and implementation timelines would be needed to provide details on how the work will be accomplished and who is responsible. They also wanted to know how progress on the plan would be shared with the public, expressing interest in reporting requirements and set dates for reviewing and updating the plan.

Put greater emphasis on reducing greenhouse gas emissions

Respondents wanted greater emphasis on greenhouse gas emission reduction efforts and sought more specifics about how to reduce emissions from transportation, buildings and energy use, and zero-waste initiatives. They did not think the plan went far enough in moving the county away from a car-centric transportation system and toward people-centered road design. They called on the county to establish goals to reduce vehicle miles traveled and car lane miles and increase investments in transit, biking, and walking infrastructure and transit-oriented development. Respondents wanted the plan to include more strategies to support the transition from oil and natural gas to clean, renewable energy technologies. They also called for the county to accelerate plans for increasing the energy efficiency of

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county owned and managed buildings and vehicles and incentivizing and supporting low-tech, zero-energy solutions for the community. Respondents wanted to see greater advocacy for waste prevention policies, especially for plastics, increased access to organics recycling, and more focus on shifting behaviors around household goods to focus on avoidance, reuse, repair, and zero waste.

Elevate the role that natural resources play in addressing climate change

Respondents emphasized the critical role healthy, functioning ecosystems play in mitigating climate change impacts and preserving biodiversity, and they felt the plan needed a stronger focus on natural resources, green infrastructure, and carbon sequestration strategies. They were very interested in efforts to protect natural resources, preserve open space, support regenerative agriculture and local food systems, and increase green roofs and green spaces in urban areas.

Respondents liked that safety preparations include flooding and extreme weather. They considered the topic to be timely in regard to recent extreme weather in Texas. They appreciated the amount of data included to determine high risk areas and safety concerns. Many respondents agree that we need to be better prepared. They think that many people believe we are more prepared than we are.

Ensure capacity to respond to natural disasters

Recent natural disasters, such as the energy grid failure in Texas after a winter storm, have increased concern about preparedness for natural disasters. Respondents were concerned about the capacity to respond to natural disasters and other health issues related to climate change. Many respondents stated that the public needs more education about climate change impacts and preparedness, and respondents felt the county should highlight the hidden costs of climate change, including increased costs for health care, emergency responses, agricultural losses, and infrastructure, property, and road repairs.

Define the county's role, scope, and capacity

Respondents felt they needed a better understanding of the scope of the county's responsibilities and the relationships the county has with external partners who will be involved in accomplishing the goals of the plan. They also wanted to understand the capacity of the county departments involved to accomplish the goals laid out in the plan. They wanted to see requirements that all county departments use race equity and climate impact assessment tools when evaluating plans, projects, and investments, and they wanted to see the resources and budget allocated to make implementation possible.

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Increase engagement to build community buy-in and trust
Respondents want the county to do more to collaborate and engage with the community. Some were concerned that the ideas and strategies in the plan were coming from the county and being brought to the community for feedback, rather than being generated by the community. Others felt the timeline for gathering feedback on the plan was too short and the opportunities were too limited. They expressed concern that those providing feedback are likely those who are already engaged in this work, and more approaches are needed to ensure broad participation and create space for more meaningful and diverse engagement. They felt that more community engagement earlier in the process would be critical when developing action and implementation plans to ensure success.

How the feedback informed the plan and will guide the work

The public engagement process provided insights on how the community is experiencing the effects of climate change and helped us understand how our values and priorities align with those of the community.

In many instances, we heard that we are generally on the right track, and the community supports us in taking bold and urgent action. We heard the community wants us to be more bold, more urgent, and more aggressive with our emission reduction strategies, we need to provide more specifics about how the work will be accomplished, and we need to establish metrics and reporting requirements to ensure accountability. We heard the importance of taking an intersectional approach to ensure our climate action plan responds to issues of racial and environmental justice, health, workforce development, and other topics.

Changes to the plan

The following are key changes that were made to the plan based on the feedback from the public and commissioners:

- Set a more ambitious overall goal to reduce greenhouse gas emissions to net zero by 2050.
- Provided more context in the introduction sections to more clearly communicate the urgency of addressing climate change and that humans are responsible for climate change pollution.

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- Added new strategies in the Goal: Enhance public safety to more clearly define the need to support a stronger energy infrastructure and disaster plans that support basic lifesaving resources.
- Renamed the goal "Protect building sites, roads, infrastructure and natural resources" to "Increase resilience of the built environment and protect natural resources" to more accurately describe this section and expanded strategies for protecting natural resources, using green infrastructure, planting and maintaining trees, and increasing carbon sequestration.
- Made the following significant updates to the Goal: Reduce greenhouse gas emissions:
  - Defined stretch goals in a number of key metrics:
    - Carbon-free electricity in county operations by 2035
    - Regional on-site solar goal of 10% by 2030
    - Net zero county fleet by 2050
    - Plant 1 million trees by 2030
    - Acquire 6,000 additional acres of conservation easements by 2040
  - Added strategies to advance fuel-switching (building electrification) and getting to carbon-free electricity.
  - Added strategies to develop a plan to establish a more ambitious vehicle miles traveled goal and strategies to achieve it, along with participating in MnDOT's Statewide Multimodal Plan development in 2021.
  - Added strategies to achieve zero-waste goals faster, including more specifics about organics recycling services, ways to reduce gaps in recycling service at multi-unit housing, and policy advocacy work. Staff also defined the county's position on the Hennepin Energy Recovery Center (HERC) and its role in mitigating climate change.
  - Expanded on carbon sequestration strategies to highlight opportunities both on county properties and in partnership with private landowners.

Implications to guide the work going forward

As the county develops action plans for implementation of the strategies outlined in the plan, the following implications from public engagement process will guide the work:

- Specific action plans for the strategies included in the plan need to be developed to provide details on how the work will be accomplished and who is responsible. The county needs to define the scope of the county's responsibilities and the relationships the county has with external partners who will be involved in accomplishing the goals of the plan.
- The impacts of the climate action plan strategies need to be further analyzed to refine the metrics that the county, community, and public can use to measure progress. Like other environmental justice issues, those who least contribute to the problem of climate change will be most impacted. The county should continue to recognize our obligation to work toward eliminating disparities in our response to climate change.

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- The pathway to transformative climate policies must be created by the county and other leaders, and then supported and moved forward by the public. To advance an impactful climate change response, the county needs to engage residents, listen to how climate change is impacting them, and collectively build support for solutions. Defining and articulating our collective vision for a climate-friendly future is critical to motivating collective action.
- There is a need for more education on the impacts of climate change and increased awareness about the urgency of the issues. Understanding about the connections to racial equity, health, and unequal impacts to vulnerable communities needs to be heightened. Presenting findings from the vulnerability assessment helped groups who were struggling to see the connections more clearly understand the full implications of climate change.
- Community engagement efforts during plan implementation need to be multi-faceted, robust, and consistent to build community buy-in and trust. Participants want the county to do more to collaborate and engage with the community. Both community organizations and public entity partners expressed strong interest in collaborating on climate solutions and working with the county to ensure the plan is effective and impactful. Deeper engagement with more diverse audiences and vulnerable communities will require partnerships with community organizations who can help lead outreach efforts that resonate with their communities.

The full results from the both phases of public engagement are available at **hennepin.us/climate-action**.

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Appendix C: Strategy alignment with disparity reduction

Goals	Objectives	Strategy	Education	Employment	Health	Housing	Income	Justice	Transportation
Goal: Protect and engage people, especially vulnerable communities	Objective: Hennepin County becomes a more resilient community that can withstand and adapt to abrupt and sometimes unforeseen weather, social, and economic changes	Strategy: Strengthen individual and community resilience			x	x			x
	Objective: The county's response to climate change prioritizes the protection of the most vulnerable residents and advances equitable health outcomes	Strategy: Better understand and plan for the health needs of our diverse communities			x	x			x
		Strategy: Mitigate disproportionate impacts associated with climate change			x	x			x
	Objective: Residents, businesses, and organizations pursue individual actions and support collective actions that drive systems change	Strategy: Educate and engage the public in taking collective action	x		x				
	Objective: County climate investments support broader county goals to reduce disparities in employment and grow the economy	Strategy: Maximize green economic recovery and workforce development opportunities	x	x			x		x
Goal: Enhance public safety	Objective: Hennepin County assesses, prepares for, and mitigates risks from hazard events	Strategy: Improve preparation for and respond to extreme weather events, flooding, and other climate disasters			x	x			x
	Objective: Residents, businesses, and organizations understand and are prepared to respond to the impacts of climate change	Strategy: Reduce risks to vulnerable people from extreme heat or cold			x	x			x

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Appendix C: Strategy alignment with disparity reduction

Goals	Objectives	Strategy	Education	Employment	Health	Housing	Income	Justice	Transportation
Goal: Increase the resilience of the built environment and protect natural resources.	Objective: Climate risks and impacts to county buildings and infrastructure are assessed and mitigated	Strategy: Reassess policies, design standards, and maintenance practices for county buildings and infrastructure projects	x	x					x
	Objective: Risks and impacts from increased precipitation, flooding, and landslides are reduced	Strategy: Reassess policies and practices to manage increased stormwater volumes		x	x				x
		Strategy: Coordinate regional stormwater resiliency efforts with public entity partners		x					x
		Strategy: Manage the increased risk of landslides due to increased rainfall			x				x
	Objective: The county employs green and natural infrastructure, including trees, plants, and soil, to increase resiliency of the built environment, especially in areas at higher risks for localized flooding and extreme heat	Strategy: Reassess policies and practices to ensure capacity to design, implement, and maintain green infrastructure	x	x	x				x
		Strategy: Use county investments to increase resilience in the build environment			x	x			x
		Strategy: Plant, diversify, and maintain trees throughout Hennepin County and increase the resiliency of the county's community forest			x				
	Objective: Natural areas and open spaces are functional and diverse	Strategy: Plan for and mitigate anticipated ecosystem and open space impacts		x	x				x

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Appendix C: Strategy alignment with disparity reduction

Goals	Objectives	Strategy	Education	Employment	Health	Housing	Income	Justice	Transportation
Goal: Reduce emissions in ways that align with core county functions and priorities	Objective: Greenhouse gas emissions associated with buildings and energy use are reduced to meet the county's emission goals	Strategy: Reduce climate impacts of buildings through innovative and efficient design, including the use of climate-friendly material choices		x	x				
		Strategy: Transition to renewable energy sources and reduce energy use overall in county operations		x					
		Strategy: Support Hennepin County communities in establishing initiatives to reduce greenhouse gas emissions associated with energy use			x	x			
	Objective: Greenhouse gas emissions associated with transportation are reduced to meet the state's Next Generation Energy Act and county emission goals	Strategy: Reduce vehicle miles traveled in Hennepin County and throughout the region			x				x
		Strategy: Promote electric vehicle infrastructure regionally			x				x
		Strategy: Use transportation investments to support broader county goals including reducing disparities, improving health, enhancing livability, and growing the economy		x	x		x		x
	Objective: Greenhouse gas emissions associated with waste and material use are reduced to meet county goals	Strategy: Prevent food waste and divert organic material from the trash			x				
		Strategy: Reuse and recycle construction and demolition waste			x				

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Appendix C: Strategy alignment with disparity reduction

Goals	Objectives	Strategy	Education	Employment	Health	Housing	Income	Justice	Transportation
		Strategy: Understand the climate impacts of our purchases and mitigate the largest impacts			x		x		
		Strategy: Advocate for state leadership on zero-waste policies and producer responsibility			x				
	Objective: The county sequesters carbon on county-owned property, including along county road rights-of-way and tax-forfeit properties	Strategy: Reassess policies and practices to increase carbon sequestration on county-owned properties		x					x
	Objective: Landowners sequester carbon by protecting and restoring habitat, building soil health and preserving and planting trees	Strategy: Assist residents to sequester carbon on private property			x				
Goal: Partner in ways that can be most impactful	Objective: Partnership models driven by mutual climate goals are explored and pursued	Strategy: Pursue strategies with the widest agreement and clearest direction forward	x	x	x	x	x		x
	Objective: Communities are engaged and empowered through partnership and shared leadership	Strategy: Establish long-term partnerships to increase engagement and support community-driven solutions	x	x	x	x	x		x

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Appendix D: Net zero planning exercise

The following assumptions were used to create the greenhouse gas emissions reduction planning exercise (Figure 10 on page 44) that shows the participation rates required by strategy to achieve net zero emissions by 2050. This work was completed by LHB, Inc.

Commercial/industrial efficiency		2030	2040	2050	Assumptions/context
Energy Code Enforcement	Percentage of new commercial/ industrial building area (in the ten-year time period ending in the specified year) that complies with the Minnesota Energy Code	100%	100%	100%	• Code will continue to be enforced for all new buildings. • This compliance rate is higher than the statewide average of 78% for commercial buildings.
Net-Zero Energy Buildings	Percentage of new commercial/ industrial building area (in the ten-year time period ending in the specified year) that meets advanced energy goals	40%	78%	100%	• This strategy models Minnesota's SB 2030 program of stepped reduction standards for new construction that reach net-zero energy in 2030. • A small number of buildings (5%) will either be required to meet SB 2030 or will voluntarily meet advanced energy goals. Additionally, St. Louis Park's green building policy requires SB 2030 for new municipal buildings and new commercial buildings above a certain size that receive financial assistance from the City. This policy is estimated to impact 15% of new commercial construction. • Multiple local jurisdictions are likely to adopt a stretch energy code option if available, which would apply to all commercial buildings. Bloomington, Brooklyn Center, Eden Prairie, Edina, Golden Valley, Minneapolis, Minnetonka, and St. Louis Park participated in a working group to this end. Based on their forecasted percentage of countywide population and job growth, 63% of new construction in Hennepin County is estimated to occur within these cities. This assumes state legislation enables stretch energy code adoption in 2024. • Based on the proposed Minnesota Energy Code trajectory from a 2019-2020 workgroup convened by MN DLI and Commerce, future versions of Minnesota's energy code are assumed to reach net-zero energy in 2036.

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Commercial/industrial efficiency		2030	2040	2050	Assumptions/context
Existing Building Efficiency	Percentage of energy saved compared to 2018 baseline in existing commercial buildings through energy efficiency retrofits and efficient building operations by the specified year	17%	28%	38%	• Minnesota's Energy Conservation Improvement policy sets annual energy-savings goals of 1.5% for electricity and 1% for natural gas.[14] In Hennepin County between 2015 and 2019, commercial/industrial participants in Xcel's conservation improvement programs achieved annual electricity savings between 1.6 and 2.6% of Xcel's total county-wide commercial/industrial electricity sales, with an average of 2%.[15] • Hennepin County leads the Efficient Buildings Collaborative, which supports the adoption and implementation of local benchmarking ordinances by Minnesota cities. Minneapolis, Edina, and St. Louis Park currently have commercial building benchmarking ordinances in effect and Bloomington is working toward an ordinance. A national study found buildings that benchmark their energy use achieve an average of 2.4% annual savings.[16] • The savings rates shown here for Hennepin County assume that cities with commercial building benchmarking policies (including Bloomington) will achieve 2.4% annual savings for participating buildings and all other buildings/cities will achieve 1.5% annual savings for electricity and 1% annual savings for natural gas. • The following Hennepin County cities have developed Energy Actions Plans for their communities or include existing building efficiency goals in their climate action plans: Bloomington, Edina, Eden Prairie, Golden Valley, Minnetonka, Shorewood, St. Louis Park. The goals for these cities have not been analyzed and may go beyond the rates included here.

[14] M.S. 2016B.241; https://www.revisor.mn.gov/statutes/cite/216B.241

[15] Analysis conducted by LHB using data from Xcel Energy's Community Energy Reports for Hennepin County; https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

[16] U.S. Environmental Protection Agency, 2012, Benchmarking and Energy Savings; https://www.energystar.gov/sites/default/files/buildings/tools/DataTrends_Savings_20121002.pdf

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Appendix D: Net zero planning exercise

Residential efficiency		2030	2040	2050	Assumptions/context
Energy Code Enforcement	Percentage of new residential building area (in the specified year) that complies with the Minnesota Energy Code	100%	100%	100%	• Minnesota's current residential energy code will continue to be enforced for all new buildings. • This compliance rate is higher than the statewide average of 76.8% for residential buildings.
Net-Zero Energy Buildings	Percentage of new residential building area (in the specified year) that produces as much energy on-site as it uses	5%	45%	100%	• A small number of new homes will voluntarily be designed to be net-zero energy by 2030. • Net-zero energy becomes a requirement of Minnesota's Energy Code in 2036.
Existing Building Efficiency	Percentage of energy saved compared to 2018 baseline in existing homes through energy efficiency retrofits and behavioral strategies by the specified year	13%	22%	30%	• Minnesota's Energy Conservation Improvement policy sets annual energy-savings goals of 1.5% for electricity and 1% for natural gas.[17] In Hennepin County between 2015 and 2019, residential participants in Xcel's conservation improvement programs achieved average annual electricity savings of 0.3% and natural gas savings of 0.9% compared to Xcel's total county-wide residential energy sales.[18] • The savings rates shown here for Hennepin County assumes that the 1.5% annual savings goal for electricity and 1% annual savings goal for natural gas will be achieved. • The following Hennepin County cities have developed Energy Actions Plans for their communities or include existing building efficiency goals in their climate action plans: Bloomington, Edina, Eden Prairie, Golden Valley, Minnetonka, Shorewood, St. Louis Park. The goals for these cities have not been analyzed and may go beyond the rates included here.

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[17] M.S. 2016B.241; https://www.revisor.mn.gov/statutes/cite/216B.241

[18] Analysis conducted by LHB using data from Xcel Energy's Community Energy Reports for Hennepin County; https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

Residential efficiency		2030	2040	2050	Assumptions/context
Xcel Energy's Planned Emissions Reduction	Percentage reduction in CO2e emissions per kWh of electricity from baseline year	73%	79%	100%	• Based on the emissions factors derived from Xcel's Preferred Plan for 2020-2034.[19] • For 2035-2050, it follows a linear trajectory to Xcel's stated goal of carbon-free by 2050.
Renewable Energy		**2030**	**2040**	**2050**	**Assumptions/context**
On-Site Renewable Electricity	Percentage of total community electricity use met by on-site renewable electricity generation in the specified year	10%	10%	10%	• The State of Minnesota (M.S. 216B.1691) and the Cities of St. Louis Park and Eden Prairie have goals of generating 10% of electricity use from solar by 2030. Minneapolis aims to generate 10% of its electricity from local, renewable sources by 2025. • Hennepin County's rooftop generation potential equates to about 50% of the annual electricity use.[20]
Green Power Purchase - Business	Percentage of commercial/industrial electricity use met through participation in renewable energy purchasing programs (e.g. Xcel's Windsource or Renewable*Connect) in the specified year	38%	39%	0%	• This strategy uses city-specific goals where available, and historic county-wide trends otherwise. • Minneapolis and St. Louis Park have goals of 100% of renewable electricity by 2030. These cities comprised 38% of the county's commercial/industrial electricity use in 2018.[21] • In 2019 0.7% of Xcel's business customers in Hennepin County participated for a total of 0.3% of total commercial/industrial electricity.[22] A linear growth in this percentage based on 2015-2019 data would result in 0.6% of commercial/industrial electricity in 2030 and 1% in 2040. • When the electricity grid is carbon-free in 2050, green power purchase programs will become obsolete.

[19] Xcel Energy, Upper Midwest Integrated Resource Plan 2020-2034, dated July 1, 2019.

[20] Metropolitan Council, Local Planning Handbook, Solar Resource Calculation for Hennepin County, 2017.

[21] Regional Indicators Initiative.

[22] Analysis conducted by LHB using data from Xcel Energy's Community Energy Reports for Hennepin County; https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

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Residential efficiency		2030	2040	2050	Assumptions/context
Green Power Purchase - Residential	Percentage of residential electricity use met through participation in renewable energy purchasing programs (e.g. Xcel's Windsource or Renewable*Connect) in the specified year	36%	37%	0%	• This strategy uses city-specific goals where available, and historic county-wide trends otherwise. • Minneapolis and St. Louis Park have goals of 100% of renewable electricity by 2030. These cities comprised 33% of the county's residential electricity use in 2018.[23] • In 2019, 6.4% of Xcel's residential customers in Hennepin County participated for a total of 2.2% of community-wide residential electricity.[24] A linear growth in this percentage based on 2015-2019 data would result in 4.1% of residential electricity in 2030 and 5.8% in 2040. • Nationally, the highest participation rate in green power purchase programs is currently 19% (in Portland – assumed to be % of customers, not energy). • When the electricity grid is carbon-free in 2050, green power purchase programs will become obsolete.
Fuel Switching		**2030**	**2040**	**2050**	**Assumptions/context**
Business Electrification	Percentage of commercial buildings served by natural gas for space and water heating that have switched to electricity by the specified year	9%	38%	70%	• Derived from the "Electrification Futures Study Sensitivity" scenario used in the energy modeling analysis for Xcel Energy's Upper Midwest Integrated Resource Plan 2020-2034.
Residential Electrification	Percentage of homes served by natural gas for space and water heating that have switched to electricity by the specified year	17%	55%	97%	• Derived from the "Electrification Futures Study Sensitivity" scenario used in the energy modeling analysis for Xcel Energy's Upper Midwest Integrated Resource Plan 2020-2034.

[23] Regional Indicators Initiative.

[24] Analysis conducted by LHB using data from Xcel Energy's Community Energy Reports for Hennepin County; https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

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Travel		2030	2040	2050	Assumptions/context
VMT Reduction	Percentage reduction from baseline (2017) vehicle miles traveled (VMT) per resident due to increased walking, biking, transit ridership, telecommuting, ride-sharing, and trip efficiency	14%	19%	26%	• An 8.6% reduction is derived from the estimated regional change in daily VMT per resident by 2040 due to all changes made to the regional transit system.[25] • An additional 8% savings are estimated based on a significant and lasting trend toward telecommuting post-coronavirus as well as enhancements to the regional bicycle and pedestrian infrastructure network, advancements in rideshare technology, and autonomous vehicle implementation.[26] • Minneapolis' draft Transportation Action Plan (March 2020) calls for 3 of every 5 trips to be taken by walking, rolling, bicycling, or transit by 2030 and to cut VMT by 1.8% each year from 2018 through 2030 (a 21% total reduction). Minneapolis 2040 notes that "Even with the adoption of electric cars, a 38 percent reduction in passenger miles traveled by automobile is needed to achieve the 80 percent reduction of greenhouse gas emissions by 2050." • Eden Prairie's Climate Action Plan (published pre-coronavirus) calls for a 7% reduction by 2030, 10% by 2040, and 14% by 2050. • St. Louis Park's Climate Action Plan (published pre-coronavirus) calls for a 12% reduction by 2030 and models a 20% reduction in 2040. • The numbers shown here use the city-specific goals for Minneapolis, Eden Prairie, and St. Louis Park's portions of vehicle travel, and 12%/17%/23% reductions for the rest of the county (based on transit plus telecommuting trends).

[25] U.S. Department of Transportation, Federal Transit Administration, and Metropolitan Council, Southwest Light Rail Transit Final Environmental Impact Statement, May 2016; **https://metrocouncil.org/Transportation/Projects/Light-Rail-Projects/Southwest-LRT/Environmental/Final-EIS.aspx**

[26] VMT reduction from telecommuting trends were derived from the Metropolitan Council's COVID-19 (Coronavirus) Outbreak Transportation Survey: May 2020; **https://metrocouncil.org/Council-Meetings/Committees/Transportation-Committee/2020/July-27,-2020/Info-1-COVID.aspx**. The percentage increase from the baseline percentage of days spent teleworking pre-COVID to the preferred future percentage of days spent teleworking (222%) was applied to the 2018 baseline teleworking rate for Hennepin County from the U.S. Census (6.4%); **https://data.census.gov/cedsci/table?q=hennepin%20county%20commuting&tid=ACSST1Y2018.S0801&hidePreview=false**. This survey includes responses from 3,244 metro area adults, with results weighted to reflect the regional population demographics. Respondents who reported never teleworking (even during COVID) and those who reported being unemployed or furloughed during COVID were not asked about future teleworking preferences and are assumed not to telework in the future.

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Appendix D: Net zero planning exercise

Travel		2030	2040	2050	Assumptions/context
Electric Light-Duty Vehicles	Percentage of light-duty vehicles that drive within City boundaries that are electric by the specified year	20%	46%	84%	• BloombergNEF produces global forecasts for electric vehicles, with 64% penetration by 2050.[27] While forecasted passenger vehicle EV adoption rates for the U.S. are similar to global averages, they are likely to be higher in urban areas such as Hennepin County. • Minnesota aims to power 20% of the light-duty vehicles in the state with electricity by 2030.[28] • The Zero Emissions Vehicle (ZEV) standard currently under consideration by the Minnesota Pollution Control Agency as part of the Clean Cars Minnesota rulemaking would require 22% of the light-duty vehicles delivered for sale in Minnesota to have ultra-low or zero tailpipe emissions.[29] • The targets used here represent an acceleration of the global forecast by five years (e.g. the 2030 target equates to the 2035 global forecast) to reflect Minnesota's more aggressive goals.
Emissions Reductions in Medium- and Heavy-Duty Vehicles	Percent reduction in emissions per mile for medium- and heavy-duty vehicles that drive within City boundaries by the specified year	10%	20%	20%	• This strategy reflects the Future Fuels bill currently under consideration by the Minnesota legislature to decrease transportation fuel intensity by at least 20% by 2035.[30]

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[27] BloombergNEF, Electric Vehicle Outlook 2020; **https://about.bnef.com/electric-vehicle-outlook/**

[28] Minnesota Department of Transportation, Minnesota Pollution Control Agency, and Great Plains Institute, Accelerating Electric Vehicle Adoption: A Vision for Minnesota, 2019; **http://www.dot.state.mn.us/sustainability/docs/mn-ev-vision.pdf**

[29] California Code of Regulations, Title 13, Section 1962.2.; **https://govt.westlaw.com/calregs/Document/I505CA51BB0AD454499B57FC8B03D7856?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)**

[30] Minnesota House of Representatives, HF2083; **https://www.house.leg.state.mn.us/bills/Info/HF2083/92/2021/0**

Waste		2030	2040	2050	Assumptions/context
Waste Reduction	Percentage reduction in municipal solid waste per capita by the specified year from 2018 baseline	22%	22%	22%	• There is a regional policy goal to reduce waste generation by 4% from 2015 by 2030.[31] Accounting for anticipated population growth in Hennepin County and its increased waste generation since 2015, this equates to a 22% reduction per capita from 2018.[32] • For context, the county's per capita waste dropped 17% during the economic recession between 2007 and 2009. It dropped an additional 5% by 2015.[33] • Hennepin County generated 5.6 pounds per capita per day in 2018, up from 5.1 lbs in 2015. The median per capita waste in Minnesota counties between 1991-2018 is 4.3 lbs (a 23% reduction from Hennepin 2018). Counties in the lowest quartile reported 1.5-3.4 lbs/person-day (a 39-73% reduction).[34] The 2017 U.S. average is 4.5 lbs and the worldwide average is 1.6 lbs.[35] Since Hennepin County is an economic hub (managing waste generated by people living in other counties), it is expected to have higher per capita rates than the state, national, or worldwide averages. • Minneapolis has a goal of maintaining total waste at 2010 levels.[36] When accounting for population growth, this would be a 17% reduction per capita by 2030.[37]

[31] Minnesota Pollution Control Agency, Metropolitan Solid Waste Management Policy Plan, 2016-2036; **https://www.pca.state.mn.us/sites/default/files/w-sw7-21.pdf**

[32] Analysis conducted by LHB using municipal solid waste data from the Minnesota Pollution Control Agency's SCORE Overview and Data (**https://www.pca.state.mn.us/waste/score-overview-and-data-1991-2018**), historic county population data from the Minnesota State Demographic Center (**https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/pop-finder1.jsp**), and future population estimates from the Metropolitan Council's Thrive MSP 2040 Population Forecasts (January 1, 2020). Hennepin County began including yard waste data in their annual MSW reports in 2016. To provide a consistent baseline, 2015's per capita rate was adjusted using 2018 yard waste data.

[33] Ibid.

[34] Ibid. Yard waste may be undercounted in some Minnesota counties/years.

[35] U.S. average from the U.S. Environmental Protection Agency, National Overview (**https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#R&Ctrends**), accessed August 13, 2020.

[36] Minneapolis Zero Waste Plan, November 2017; **https://lims.minneapolismn.gov/Download/RCA/2885/24-Zero Waste Plan_November 2017_clean.pdf**.

[37] Analysis conducted by LHB using the Metropolitan Council's Thrive MSP 2040 Population Forecasts (January 1, 2020).

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Waste		2030	2040	2050	Assumptions/context
Recycling	Percentage of municipal solid waste that is recycled (including organics recycling) in the specified year	75%	85%	90%	• In 2018, 43% of Hennepin County's MSW was recycled.[38] • Hennepin County has a 75% recycling goal by 2030, including 15% organics recovery and 60% recycling.[39] • Minneapolis has a goal to reach 80% recycling/composting by 2030.[40] • St. Louis Park's Climate Action Plan has a goal of reducing emissions from MSW by 50% by 2030.[41] • Eden Prairie's Climate Action Plan has a goal of net-zero emissions from MSW by 2050.[42] • The Zero Waste International Alliance sets a goal for communities to reduce their waste to landfill, incineration and the environment by 90% or more.[43]
Landfill Diversion	Percentage of municipal solid waste that is diverted from landfills in the specified year	99%	99%	99%	• Hennepin County has a goal to send a maximum of 1% of MSW to landfills by 2030.[44] • In 2018, 78% of Hennepin County's MSW was diverted from landfills.[45] Landfilled waste is expected to increase in the near term due to the closure of the Elk River Resource Recovery Facility in 2019.

[38] Minnesota Pollution Control Agency's SCORE Overview and Data (1991-2018); **https://www.pca.state.mn.us/waste/score-overview-and-data-1991-2018**, accessed August 24, 2020.

[39] Minnesota Statute 115A .551 (**https://www.revisor.mn.gov/statutes/cite/115A.551#:~:text=Subd.,-2a.&text=(b)%20Each%20county%20will%20develop,establishing%20a%20higher%20recycling%20goal**) and Hennepin County Solid Waste Management Master Plan, 2018 (**https://www.hennepin.us/-/media/hennepinus/your-government/projects-initiatives/documents/solid-waste-mgmt-master-plan-18-23.pdf**).

[40] Minneapolis Zero Waste Plan, November 2017; **https://lims.minneapolismn.gov/Download/RCA/2885/24-Zero Waste Plan_November 2017_clean.pdf**

[41] St. Louis Park Climate Action Plan 2040, February 2018; **https://www.stlouispark.org/home/showdocument?id=8214**

[42] Eden Prairie Climate Action Plan, March 2020; **https://www.edenprairie.org/home/showdocument?id=15547**

[43] Zero Waste International Alliance, Zero Waste Community Certification (**http://zwia.org/zero-waste-community-certification/**), accessed August 13, 2020.

[44] Hennepin County Solid Waste Management Master Plan, 2018; **https://www.hennepin.us/-/media/hennepinus/your-government/projects-initiatives/documents/solid-waste-mgmt-master-plan-18-23.pdf**

[45] Minnesota Pollution Control Agency's SCORE Overview and Data (1991-2018); **https://www.pca.state.mn.us/waste/score-overview-and-data-1991-2018**, accessed August 24, 2020.

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Carbon Sequestration		2030	2040	2050	Assumptions/context
Carbon Sequestration	Percentage reduction in business-as-usual county-wide emissions due to carbon sequestration within the County in the specified year	0%	6%	12%	• While advanced strategies to address the remaining emissions from transportation, natural gas, and waste processing may help close the remaining gap to the county's 2050 goal, the majority of this reduction is assumed to be achievable through carbon sequestration within the county through land management practices. Additional research and analysis is needed to quantify how these goals translate directly into implementable actions.

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